Health, Safety, and Environment (HSE) Management Report 2022
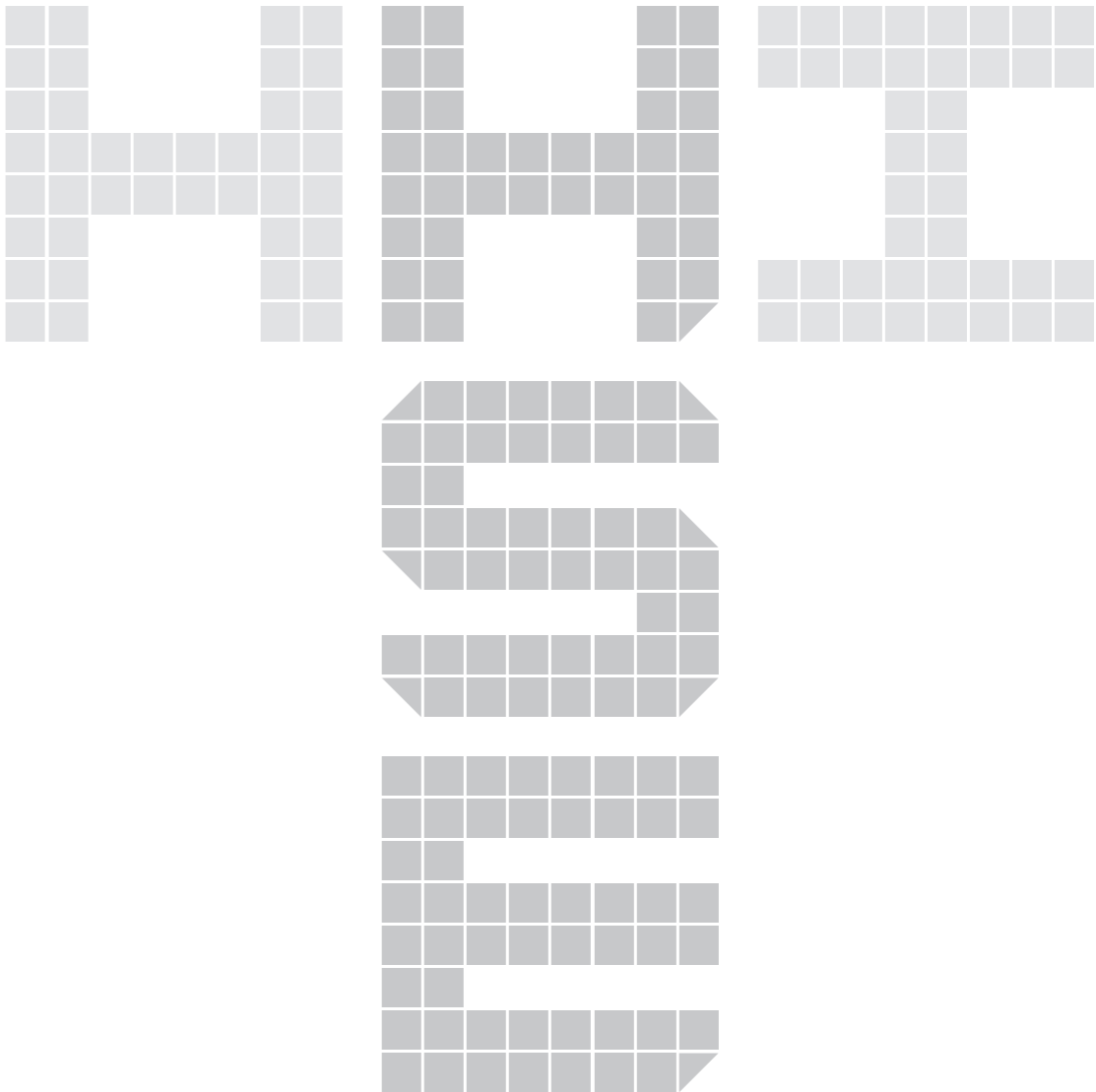
Health, Safety, and Environment (HSE) Management Report 2022

CONTENTS

CREATIVE WISDOM
POSITIVE THINKING
UNWAVERING DRIVE

HHI, with its infinite potential, has been making steps toward becoming a "Global Leader" in the heavy industries sector through its creative wisdom, positive thinking, and unwavering drive.

SAFE AND ECO FRIENDLY MANAGEMENT

HHI has grown into a powerful corporation that brings happiness and prosperity to people through its safe and environment-friendly management.

HHI Business Units

SHIPBUILDING & OFFSHORE BUSINESS UNIT

The HHI Shipbuilding & Offshore Business Unit builds various kinds of ships of the best quality, ranging from ordinary merchant ships to special vessels. In addition, they perform all work processes on a turnkey basis, from designing and purchasing to transporting, installing, and testing operations for various types of plants. This includes fixed or floating plants for developing offshore oil or gas and other onshore plant facilities modules. The Shipbuilding & Offshore Business Unit will continue to serve as the foundation for the Republic of Korea to become the world's leading shipbuilder through its innovative technology and cutting-edge systems.

NAVAL & SPECIAL SHIP BUSINESS UNIT

The Naval & Special Ship Business Unit, equipped with a professional workforce necessary to build naval ships and special vessels, state-of-the-art facilities, and advanced high technologies for the design and construction of ships, has designed and constructed 10,000-ton class state-of-the-art Aegis destroyers and 3,000-ton class multipurpose frigates. They also constructed next-generation destroyers and submarines and have contributed to the defense industry's export by acquiring ship orders from abroad.

ENGINE & MACHINERY BUSINESS UNIT

HHI, the top engine manufacturer holding a market share of approximately 35% in the global large engine market, succeeded in developing the "HiMSEN Engine" with a maximum output of 36,000 horsepower using its own innovation. With the HiMSEN Engine, which is the world's largest midsize engine, the Engine & Machinery Business Unit is helping reestablish HHI as a global engine manufacturer with world-class technologies.

PART 1. HSE Policy

01
Chief Executive Officer (CEO) Message

Lee Sang-kyun,
President and CEO
Hyundai Heavy Industries
Co Ltd.

We at HHI have desperately made more efforts than ever to eliminate accidents by making safety the management's top priority, forming a "New Safety Culture" and establishing an initiative for comprehensive safety improvement to make our workplace safer so that we can leave our work with the same confidence as when we arrived without fear of accidents. However, despite such efforts, I feel a deep sense of responsibility as the CEO for the three unfortunate serious accidents at our worksite last year. Thus, I am committed to implementing extensive countermeasures based on the "S1" management policy of 2022.

Establishing an exemplary safety and health system is essential for comprehensive risk safety management, but it is even more important to operate the system appropriately in the field. Hence, we intend to enhance the capabilities of the safety management organizations by strengthening the on-site safety management system of each business unit, increasing the number of safety management workforces, and preparing a venue where affiliated companies can regularly share best safety management practices to establish a safety management system centered on on-site operability. Moreover, we will preemptively allocate at least 2% of our annual turnover to a safety budget and implement a safety rating system for construction plants and facilities, prioritizing investment on those with a red safety light.

We will make every effort to make our worksites safer by forming a triple management system for high-risk processes with supervisors, safety supervisor in construction departments, and safety workers on-site and conducting various safety improvement activities, such as Hi-SAFE and safety risk identifing contests. We will also make it possible to detect hazards that are likely to arise during work by systematically operating the Hi-STANDARD, a new operation standard/risk assessment system designed specifically for HHI.

We will assist subcontractors in establishing a safety management system and operating the system correctly by focusing on evaluating subcontractors' safety activities, establishing a risk assessment system for subcontractors, and implementing programs to assist them in enhancing safety management capabilities to improve their safety capabilities. We will also closely monitor their overall management systems by improving the method of subsidizing subcontractors for safety and health management expenses and strengthening the system of providing mandatory personal protective equipment (PPE) and safety devices to ensure that the subcontractors' workers are at work with guaranteed basic safety measures.

Furthermore, we should not forget that health management, the importance of which is more emphasized because the COVID-19 pandemic has been prevalent for more than two years, and environmental management, which is directly related to ESG management, including the creation of an environment-friendly and carbon-neutral worksite, are important factors for the corporation's progression. However, safety and the active participation of members, such as their compliance with prevention rules and waste reduction, are the most critical. Today, having a compliance system for a safe and healthy environment cannot be overemphasized. Thus, we ask for your continued participation in the implementation of the HSE plan for 2022 so that it can be executed across all worksites. We also want to remind you that there is no important job that you must do on our worksites if it puts you in danger. Thank you.

02
HSE Policy and Goals 2022

HHI has made company-wide efforts for sustainable safety management by establishing HSE management as the corporation's core value. It also sets the HSE management goals to adhere to the fundamentals and principles and create a robust safety culture.

HSE Policy 2022

In accordance with HHI's philosophy towards human dignity and its value, HHI sets HSE issues as the top priority and promises to fulfill and develop HSE policies in the workplace.

Safety culture based on fundamentals & principles	Comfortable & healthy working environment	Building an environmentally-friendly corporate culture
• Reinforcement of safety activities proactively led by construction section for advanced safety culture • Establishment of self-regulatory safety management system of sub-contractors	• Enforcement of health management system with focus on occupational disease prevention • Deployment of continuous improvement in the workplace	• Establishing a low-carbon implementation system through GHG management • Prevention of environmental pollution and compliance with regulations

President and CEO

Hyundai Heavy
Industries Co., Ltd.

HSE Goals in 2022

"Developing a System for a Safe and Healthy Environment
that is Operability-Based"

Accomplishing the ZERO serious accident and an accident rate less than 0.195	Enhancing employees' health through prevention-focused health management	Setting a foundation for the transition to sustainable, environment-friendly management
• Establishing activities for the intensive management of significant risk factors and developing fundamental safety improvement activities • Strengthening the risk assessment system based on job standards • Expanding experience-/practice-based safety training programs and diversifying training content • Upgrading the accident prevention system by utilizing DT technology	• Improving the quality of health promotion programs and promoting the extended application • Establishing an integrated health management system • Strengthening an on-site chemical management system	• Establishing a management system to address climate change • Improving the quality of the environment management system to enhance the environmental management capabilities

03
HHI's Major Activities for Promoting Safety

Under this year's management policy, HHI set zero serious accidents and an accident rate of 0.195 or less as its safety management goals, making safety their top priority. We intend to make every effort to preemptively manage safety in worksites through the management's safety leadership based on the operability-based, self-regulated safety management system and assist subcontractors in strengthening their self-regulated safety management capabilities to attain these goals.

We will also strive to make HHI safer by collecting workers' opinions on safety and health, identifying risks, and developing a well-organized safety training system.

2022 Management Policy

**New 50 Years
New Challenge**

- Intensively managing significant risk factors
- Developing fundamental safety improvement activities
- Upgrading the accident prevention system by utilizing DT technology
- Expanding experience/practice-based safety training
- Strengthening a risk assessment system based on job standards

- Safety as a top priority
- Expansion of super gaps in technology
- Unity and mutual success
- Establishment of ESG management

PART 2. HSE Organizations and Roles & Responsibilities

01
Duties and Roles of the Organizations for the Safety and Environmental Sector

The HHI Safety Management Group consists of two subordinate organizations: the Corporate Safety Management, which performs staff duties, such as creating corporate policies and systems for HSE, operating the HSE management system, managing accidents and accident statistics, and implementing business affairs related to labor union-management and government; and the Business Unit Safety Management, which conducts line functions, such as developing and implementing safety plans for Business Units, investigating accidents, establishing countermeasures, and managing on-site safety.

In contrast, the HHI Environment Section consist of four teams: the ESG Strategy Team; the Environmental Management Team, which is responsible for establishing the ESG management system, creating corporate environmental policies and systems, operating the environment management system, and implementing government affairs; the Resources Reuse & Recycle Team, which is responsible for managing legal wastes disposal and contracts; and the Incineration Plant Management Team, which is responsible for operating and managing incineration plants.

Safety Management Group

Corporate Safety Management

Main Functions
- Safety policy-making, system planning, and business planning
- Accident Statistics and safety award management
- Company-wide safety and health training
- HSE management system operation
- Operation of safety management programs for subcontractors
- Business affairs implementation related to the Occupational Safety and Health Committee, labor-management, and government
- Firefighting/disaster response and Safety Control Center operation
- Investigation of Serious (near-serious accidents) Accidents and the Process Safety Management (PSM)
- Health examinations, occupational diseases control, infectious diseases prevention, etc.
- Implementation of health promotion programs for workers
- Work environment improvement and hazardous chemical control

Business Unit Safety Management

Main Functions
- Office staff: Safety planning/operation/ training/shipowner relations
  - Safety planning, safety and health training for Business Units
  - Assists subcontractors in safety activities (conference, etc.)
  - Safety breakfast meeting by management, HSE affairs for shipowners, and Pre-qualification assistance
  - Investigation of (near-serious accidents) accidents and establishment of countermeasures

- Yard safety supervisors : On-site safety management
  - On-site safety inspections and improvements
  - Approval of permit to work(PTW) and on-site inspection
  - Discipline for safety rule violations
  - Emergency response
  - Emergency response drills in various areas/situations

Environment Section

Main Functions
- Environmental policy-making, system planning, and business planning
- ESG management strategy establishment
- ESG training and advocacy
- Carbon-neutral strategy and vision formation
- Environment management system operation
- External environmental regulation and environmental information management
- Environmental licensing and permission and environmental facility management
- Greenhouse gas emission trading scheme response
- Assisting shipowners in HSE affairs and performing government affairs
- Collection/transportation/legal disposal of wastes
- Incineration plant operation and management

02
Organization of the Safety Management Group (Corporate Safety Management) and the Environment Section

The Corporate Safety Management plays a vital role in company-wide safety and health management. In contrast, the Environment Section led by the Head of the Management Support Division, serves as a control tower for company-wide environmental management.

Corporate Safety Management (staff duties)
51 persons in 5 teams (excluding executive officers)
• Company-wide HSE system/ policy review and planning
• Accident statistics management and accident investigation
• Government affairs / labor affairs / response to and management of citizen complaints
• Standard/guideline management for company-wide safety environment
• Company-wide health planning

President and CEO
Person in (General) Charge of Safety and Health

Chief Safety Officer (Corporate chief sustainability officer (CSO))
Person in (General) Charge of Safety and Health

Head of the Management Support Division

Head of Safety & Property Management Group

Technical advice

Chief Safety Director

Chief Environment Director

Safety Planning Team (8 persons)
1 HHI Safety Officer

Safety Culture Team (5 persons)

Safety Management Team (23 persons)
2 HHI Safety Officers

Safety Risk Management Team (5 persons)

Health Management Team (10 persons)
3 HHI Health Officers

ESG Strategy Team (4 persons)

Environmental Management Team (8 persons)

Resources Reuse & Recycle Team (12 persons)

Incineration Plant Management Team (38 persons)

Duties
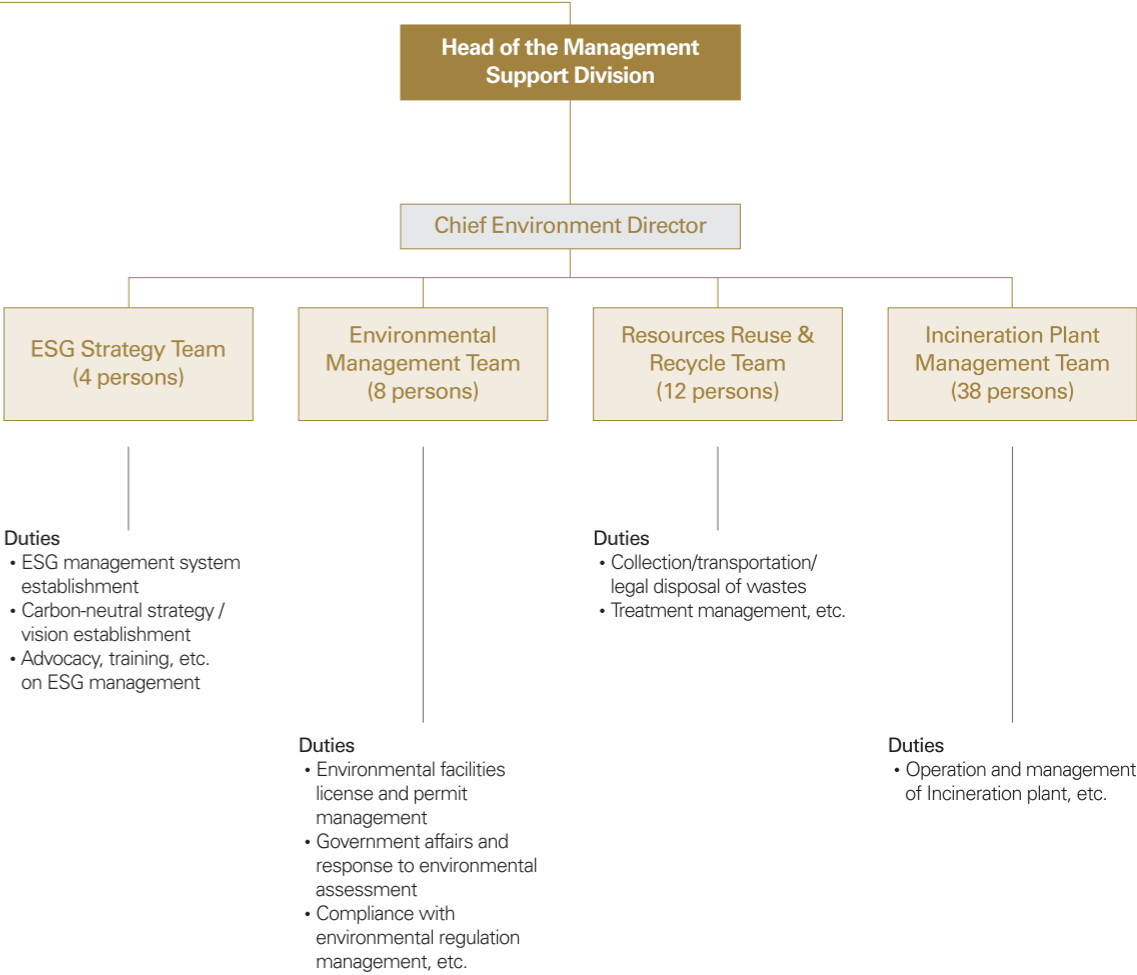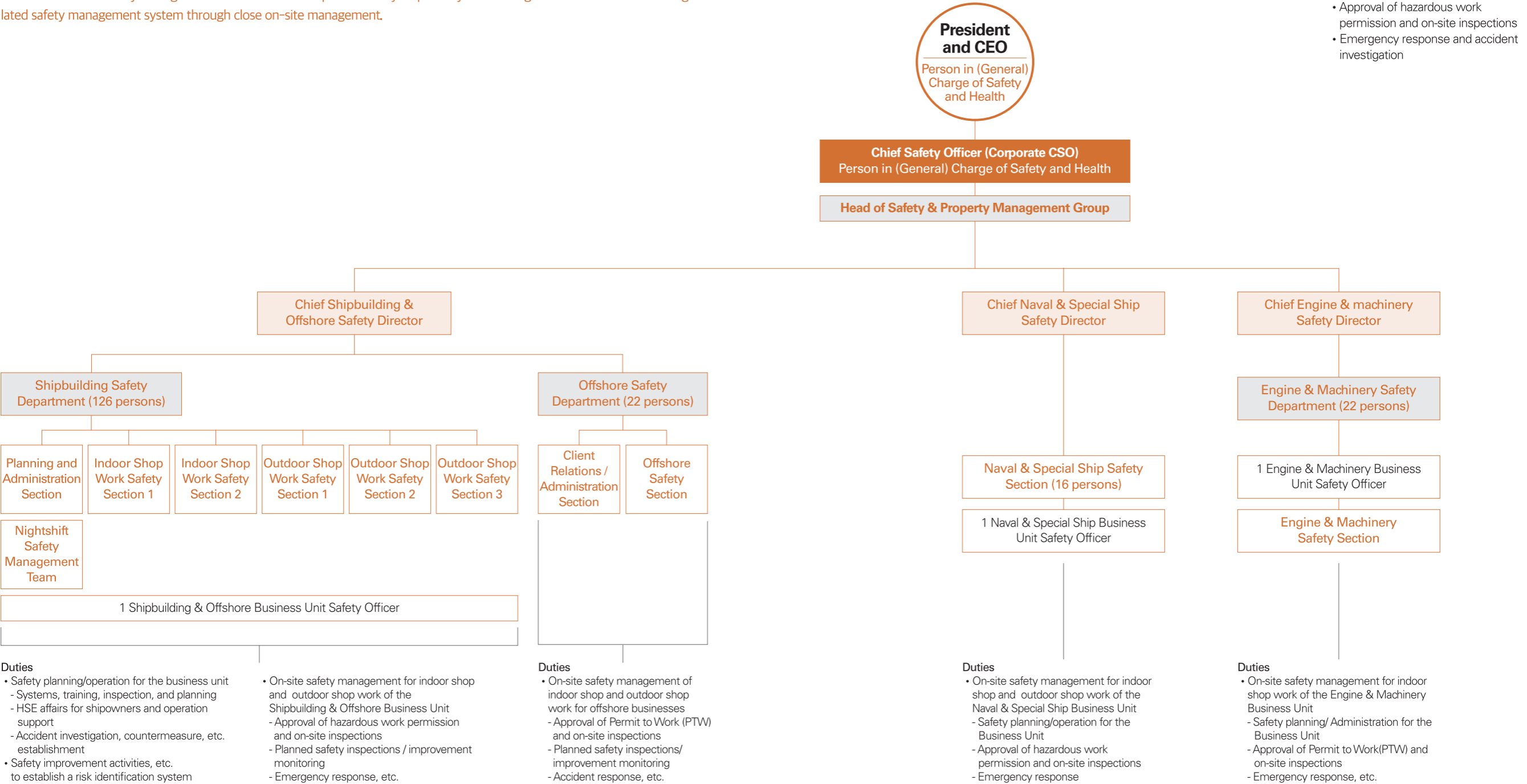• Safety policy-making / system and business planning
• Management of accident/ accident statistics
• HSE system, etc. operation
• NEW job standard / risk assessment system (Hi-STANDARD) operation

Duties
• Planning of company-wide safety and health training
• Integrated Safety Training Center operation
• Examination of the level of company-wide level safety culture
• Safety career path (SCP) system operation

Duties
• Government affairs and labor-management relations
• The Occupational Safety and Health Committee
• Firefighting/PSM/ Hazardous materials
• Integrated control center / disaster & emergency response, etc.

Duties
• Risk identification system operation
• On-site risk improvement activities
• Establishment of digital safety management

Duties
• Company-wide health planning
• Health examinations / occupational disease management
• Work environment monitoring
• Mandatory protective equipment management, etc.

Duties
• ESG management system establishment
• Carbon-neutral strategy / vision establishment
• Advocacy, training, etc. on ESG management

Duties
• Environmental facilities license and permit management
• Government affairs and response to environmental assessment
• Compliance with environmental regulation management, etc.

Duties
• Collection/transportation/ legal disposal of wastes
• Treatment management, etc.

Duties
• Operation and management of Incineration plant, etc.

03
Organization of the Safety Management Group (Business Unit Safety Management)

The Business Unit Safety Management has made the workplace safer by responsibly establishing a field-oriented and self-regulated safety management system through close on-site management.

Business Unit Safety Management Group (line functions) 186 persons (excluding executive officers)
- Planning, administration, etc. of safety systems for Business Units
- On-site safety inspection and monitoring
- Approval of hazardous work permission and on-site inspections
- Emergency response and accident investigation

Organization Chart

President and CEO
Person in (General) Charge of Safety and Health

Chief Safety Officer (Corporate CSO)
Person in (General) Charge of Safety and Health

Head of Safety & Property Management Group

Chief Shipbuilding & Offshore Safety Director

Shipbuilding Safety Department (126 persons)
- Planning and Administration Section
- Indoor Shop Work Safety Section 1
- Indoor Shop Work Safety Section 2
- Outdoor Shop Work Safety Section 1
- Outdoor Shop Work Safety Section 2
- Outdoor Shop Work Safety Section 3
- Nightshift Safety Management Team

1 Shipbuilding & Offshore Business Unit Safety Officer

Offshore Safety Department (22 persons)
- Client Relations / Administration Section
- Offshore Safety Section

Chief Naval & Special Ship Safety Director

Naval & Special Ship Safety Section (16 persons)

1 Naval & Special Ship Business Unit Safety Officer

Chief Engine & machinery Safety Director

Engine & Machinery Safety Department (22 persons)

1 Engine & Machinery Business Unit Safety Officer

Engine & Machinery Safety Section

Duties

Duties
- Safety planning/operation for the business unit
  - Systems, training, inspection, and planning
  - HSE affairs for shipowners and operation support
  - Accident investigation, countermeasure, etc. establishment
- Safety improvement activities, etc. to establish a risk identification system

Duties
- On-site safety management for indoor shop and outdoor shop work of the Shipbuilding & Offshore Business Unit
  - Approval of hazardous work permission and on-site inspections
  - Planned safety inspections / improvement monitoring
  - Emergency response, etc.

Duties
- On-site safety management of indoor shop and outdoor shop work for offshore businesses
  - Approval of Permit to Work (PTW) and on-site inspections
  - Planned safety inspections/ improvement monitoring
  - Accident response, etc.

Duties
- On-site safety management for indoor shop and outdoor shop work of the Naval & Special Ship Business Unit
  - Safety planning/operation for the Business Unit
  - Approval of hazardous work permission and on-site inspections
  - Emergency response

Duties
- On-site safety management for indoor shop work of the Engine & Machinery Business Unit
  - Safety planning/ Administration for the Business Unit
  - Approval of Permit to Work(PTW) and on-site inspections
  - Emergency response, etc.

PART 3. HSE Budgets and Facilities

01
Standards for HSE Budget Composition and Compilation

Items	Definitions	Details
Personnel expenses	Human resource management expenses of the HSE organizations and work allowances of supervisors for safety and health activities	**Human resources for safety and health management** • Safety Management: Safety and health management staff, field safety workers • Construction Sector: Safety supervisor in construction departments • Subcontractors: Allowances of cranes and T/Ps signalmen, safety managers, fire watchers, and confined-space watchers of the subcontractors **Work allowances of supervisors** • Safety responsibility allowances of supervisors
PPE, safety consumables	Costs of purchasing, maintaining, and repairing mandatory PPE and safety consumables for preventing accidents and health hazards	**Mandatory PPE** • Safety helmets (for preventing the hazards of fall and electric shock; ABE) • Safety boots (8 in / 6 in / 4 in / blasting / nonslip / for preventing electrostatic discharge) • Masks (dustproof masks / gas masks / dustproof gas masks / air supply masks / electric respiratory protective equipment) • Safety harness • Protective goggles (ordinary/dustproof/wearable with eyeglasses) • Earplugs (earmuffs) **Other safety-related consumables** • Personal gear: Safety gloves, protective suits, face shields, heated vests, cooling jackets, cooling arm sleeve covers, ice jackets, fine-dust masks, etc. **Installation of safety facilities (subsidiary materials)** • Installation of safety supervisor in construction departmentrails, fall prevention nets, maintenance hole covers, lifelines, ropes, ventilation fans, etc., and the cost of materials
Safety and health training	Expenses for compulsory or voluntary safety and health training programs for workers, supervisors, and individuals relating to safety and health (including subcontractors)	**Compulsory safety and health training** • For new employees / supervisors (regular)/ workers (regular) / transferred employees • For general Safety and Health Manager / Safety Manager / Health Manager • Specialty safety and health training / hazardous chemicals training / MSDS (Material Satety Data Sheet) training **Voluntary safety and health training** • For newly appointed supervisors / employees returning from occupational safety incidents / foreign workers / traffic safety / violators of the golden safety rules • For union members / HSE promoters / site safety supervisors (including subcontractors' ones) • Qualification training (for scaffolds, cranes, gondolas, forklifts, working at height platforms, etc.) • Special lectures on safety **Planning of company-wide safety and health training** • (Outsourced) operation of the Integrated Safety Training Center • Development of training programs, safety guidelines (manual), integrated HSE safety reports, books on safety statutes and regulations, fees for internal safety instructors, etc. • Promotional materials: Safety signs/placards, printed materials, etc.

Items	Definitions	Details
Safety awards/ events	Expenses for organizations'/ individuals' awards for outstanding safety performance and events	**Organization awards for outstanding performance** • Outstanding departments/teams/subcontractors **Individual awards** • Outstanding supervisors / outstanding safety managers of the subcontractors / outstanding safety workers / instant awards / event awards **Safety events** • Safety events (safety risk identifing contests, golden bell contests, etc.), safety forums, etc.
Safety checkup/ consultation	Expenses for checkups, tests, reviews, and advisory services on safety and health under relevant acts and regulations or voluntarily through external institutions (experts)	**Safety and health checkups, tests, and consultation** • Safety and health checkups (by an external or internal institution) • Certification/inspection of dangerous machines and instruments • HSE Management System (ISO 45001, ISO 14001) • Safety and health consultation (PSM, firefighting, safety management of subcontractors, etc.) • Safety Innovation Advisory Committee
Health promotion	Expenses for worker health protection and promotion activities	**Health examinations** • General examinations / special examinations / comprehensive examinations / others (temporary, occasional, etc.) **Health promotion** • Total Health Promotion (THP) program, rehabilitation program, smoking-cessation/ obesity clinic operation • Infectious disease prevention and control, influenza prevention and vaccination, etc. • (Outsourced) medical clinic/dispensary operation; Korean medicine hospital operation; ambulance operation **Work environment management** • Work environment monitoring; local ventilation system inspection (prevents hazards and dangers), etc. **Medical benefit, etc. payment** • Medical benefit payment for injuries on duty; musculoskeletal disorders and incurable diseases medical treatment; disinfection and sterilization expenses; hygiene and health convenience facilities, etc.
Maintenance and repair for safety	Expenses for maintaining and repairing major safety devices and safety protection equipment	**Maintenance and repair of major safety devices and safety protection equipment (in nature of consumables)**

Items	Definitions	Details
Safety facility investment	Accident prevention; work environment improvement; safety facility, system, computer system, and technology investment for promoting workers' health	**Safety facility and systems investment for health protection** • Safety facility and systems installation to prevent accidents • Safety equipment and jigs production and purchase • Safety improvement by replacing and repairing worn-out machines and equipment based on the safety and internal inspection results of hazardous machines and equipment (cranes and working vehicles) • Safety training content creation and training environment improvement • Ventilation systems (local ventilators, dust collectors, air conditioners, etc.) and lighting fixtures • Medical facility expansion for health promotion; medical instrument and equipment purchase; worn-out instrument and equipment replacement • Establishment of safety management systems (gas detectors, fire detectors, ventilation systems) for high-risk areas (confined spaces) • Firefighting and disaster prevention equipment purchase and supplementation and worn-out equipment replacement • Control equipment and systems for workplace safety, traffic control, etc. (closed-circuit televisions (CCTVs) and image analysis systems) • Investment in emergency safety improvement (activities including the elimination of high-risk factors in fieldwork and safety management) • Facility construction for natural disasters (typhoons and earthquakes) • Exclusive use of equipment, vehicles, etc. for emergency response safety management activities **Computer system development for accident prevention and technology investment** • Safety design programs (simulators), models for predicting risks with DT, etc. • Risk assessment systems development • Technology development for accident prevention, such as collision prevention of cranes/forklifts • Computer system establishment, operation, and improvement for safety management, such as the integrated safety management system. (Hi-SEs)
Investment, maintenance, and repair of environmental facilities	Environmental facilities investment, maintenance, and repair to minimize the environmental impact of pollutants emitted through business activities and comply with relevant statutes and regulations; development of computer systems and technology investment for such purpose	**Investment, maintenance, and repair of environmental facilities** • Installation of New environmental-related facilities (emitting and prevention facilities) and replacement of decrepit facilities • Regular replacement of consumables (filters and motors, etc.) in pollutant treatment facilities **Computer system development for systematic environmental management and technology investment** • Systems development for reducing environmental pollutants • Raw materials development for reducing pollutants, such as eco-friendly paints • Computer systems establishment, operation, and improvement for environmental management, such as the integrated HSE management system (Hi-SEs) and the company-wide greenhouse gas management system

03
Current Status of HSE Facilities

HHI is fully equipped with training facilities, such as the Integrated Safety Training Center, and firefighting facilities, health facilities, and environmental facilities, to improve and strengthen safety management quality in various ways. It also has thoroughly-maintained hazardous machines, instruments, and equipment in the workplace.

HSE facilities

Training facilities

Category	Size	Capacity	Number
Integrated Safety Training Center	Area: 3,591㎡	-	1
Safety Experience Center	Area: 1,386㎡	120 trainees	1
Virtual reality (VR) Safety Training Facilities	-	16~20 trainees	3
Lecture Room	-	36~120 trainees	8
Total			13

Firefighting facilities

Items	Quantity	Items	Quantity
Fire extinguishers	20,700	Special stretchers	22
Fire hydrants	2,340	Xenon searchlights	11
Automatic fire detection systems	155	Smoke-penetrating lanterns	10
Sprinklers	25	Megaphones (portable)	6
Gas-type fire extinguishers	21	Electric winches	10
Air-purifying respirators	77	Portable searchlights	2
Fireproof suits (coats and pants)	63	Automated external defibrillators (AEDs)	15
Firefighting helmets	52	Oxygen concentrators	3
Multipurpose stretchers	15		

Health facilities

Category	Number of personnel	Number of facilities
Health Promotion Center	Three doctors and six nurses	1
	Four physical therapists and one exercise therapist	1
District infirmaries	Eight nurses	8
Korean medicine clinic	Two Korean medicine doctors and two nurses	1
Psychological counseling office	Two psychological counselors and one clerk	1

Environmental facilities (based on the main plant)

Category	Type	Places or Number
Air pollution prevention facilities	Regenerative Thermal Oxidizer (RTO)	4
	Catalytic Oxidation (CO)	28
	Adsorption facilities	45
	Filter dust collector	180
	Electric dust collector	1
	Wet scrubber	6
	Inertial dust collector	4
	Centrifugal dust collector	9
	Facilities with combustion controls (low NOx burners)	178
Water pollution prevention facilities	Wastewater treatment facilities (physicochemical treatment facilities)	1
Wastes-related facilities	Wastes sorting facilities	1
	Wastes incineration facilities[1]	1
Hazardous chemical substances handing facilities	Use facilities	7
	Preservation /storage facilities	5

1) Operated in incineration plants

Current status of hazardous machinery
●

Category			Total
Cranes (rated load)	Overhead/ gantry cranes	Less than 10 t	379
		Less than 50 t	361
		Less than 100 t	80
		200 t or less	71
		500 t or less	22
		More than 500 t but not more than 1,000 t	2
		More than 1,000 t but not more than 1,500 t	2
		More than 1,500 t but not more than 2,000 t	2
		Subtotal	**919**
	Hoist	Less than 5 t	250
		5 t or more	124
		Subtotal	**374**
	Tower cranes	20 t or less	58
		More than 20 t	2
		200 t	0
		Subtotal	**60**
	Jib cranes/ others	Less than 10 t	89
		Less than 50 t	37
		100 t or less	13
		More than 100 t but not more than 200 t	6
		More than 300 t but not more than 400 t	1
		Less than 2 t	0
		Subtotal	**146**
	Mobile cranes		31
	Total		**1,530**
Pressure vessels (internal volume)		Less than 2㎥	629
		Less than 5㎥	138
		Less than 30㎥	24
		Less than 40㎥	0
	Total		**791**
Shearing machines		Less than 50 t	8
		Not less than 50 t but less than 200 t	7
		Not less than 200 t but less than 300 t	0
		Not less than 300 t but less than 1,000 t	1
	Total		**16**
Gondolas			1,287
Lifts			43
Conveyors			108
Industrial robots			3
Grand total			**3,778**

Current status of equipment subject to PSM (Process Safety Management)
●

Division	Department	Relevant Process or Equipment	Substance	Date of Submission
Shipbuilding & Offshore Business Unit	Pre-Painting Department	Painting shops (Shops 1–8)	Paint / LNG	March 2002
		Yard 2 painting shops (Shops 1-6)	Paint / LNG	March 2002
		Offshore painting shops (Shops 1-2)	Paint / LNG	March 2002
Engine & Machinery Business Unit	Large Engine Assembly Department 3	LNG supply systems	LNG	December 2015
		LNG supply systems	LNG	January 2020
	Large Engine Assembly Department 1	Methanol engine systems	Methanol	March 2019
		LNG supply systems	LNG	In progress
		LPG supply systems	LPG	In progress
	HiMSEN Engine Assembly Department	Gas compressors	LNG	November 2019
Management Support Division	Utility Planning Team	Ethylene storage facilities	Ethylene	October 1996
	HyukJin Co., Ltd.	Oil tanks	Gasoline, kerosene, etc.	March 2002

Training facility (Integrated Safety Training Center)

The Integrated Safety Training Center is a comprehensive safety training facility designed to teach personnel safety work procedures for each position through lecture, practice, and experience in a simulated work environment.

Operation
Korea New Job Development Institute
Composition of training facilities
11 training facilities (Area: 3,591㎡)
Other facilities: Three VR experience systems

Category	Current Status	Photos
Research (5)	One large lecture room, one medium lecture room, and three small lecture rooms	
Practice/ experience (5)	#1 Welding, piping/ outfitting	
	#2 Fitting/grinding, painting (blasting, spraying)	
	#3 Electrical and mechanical work	
	#4 Cranes, slings	
	#5 Scaffold, gondolas, longis	
Others (1)	VR experience systems	

Instructors
52 internal instructors (field supervisors, safety sector personnel, etc.)
* Internal instructors currently employed in the field and have at least 10-year work experience in relevant positions.

Current status of training courses (as of 2021)

Category	Curriculum	Number of Courses	Number of Completed Courses	Number of Trainees (persons)
Mandatory	Training of the subcontractors' new employees	1	272	6,755
Qualifications	Lifting, rigging & hoisting, Scaffolding Erecting & Dismantling Lv.1~4, Gondola, pendant remote control, etc.	12	112	1,743
Voluntary	Training for safety leadership improvement Lv. 1 / Lv. 2	1	-	-
Jobs	Practical safety training	4	101	1,514
Others	Integrated training of lifting, rigging & hoisting, training for scaffold modification	17	23	385
Total	-	35	508	10,397

Certification as a training institution: Certified as a designated training scaffolding work institution
In April 2019, the Integrated Safety Training Center was "certified as a designated institution for training scaffolding work" for the first time in the shipbuilding industry. As a result of the certification evaluation, its operation of training courses, including training facilities, instructors, curricula, and syllabus, was considered appropriate by an external institution specializing in scaffolding work training (Korea Scaffolding Institution). The center has maintained the stability of its training courses by undergoing an external audit quarterly since it obtained the certification.

Training facility (safety experience training facility)

The safety experience training facility in the Technical Education Institute has contributed to accident prevention by offering experience-based training courses for various situations. This includes the use of safety facilities for new employees, transferred employees, and others. Trainees can recognize the importance of following safety rules in the worksite by exploring the inside of a confined space, experiencing suspended in a safety harness, handling heavy materials, and using hand tools. Since its establishment in 2005, the center has provided training opportunities to over 340,000 individuals.

Location HHI Technical Education Institute
Establishment 2005
Development 2021
Size 1,388㎡
Seating capacity Maximum of 90 persons
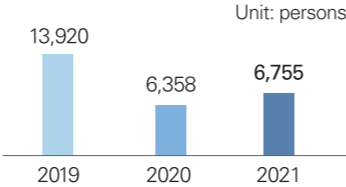
Achievements in the training during the past three years

Unit: persons

- 2019: 13,920
- 2020: 6,358
- 2021: 6,755
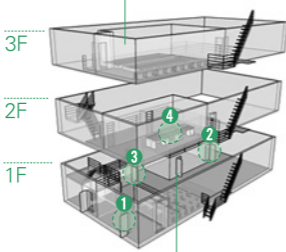
Total 345,638 persons

Course 3 3F
- Cardiopulmonary resuscitation (CPR)
- Noise
- Electricity

3F
2F
1F
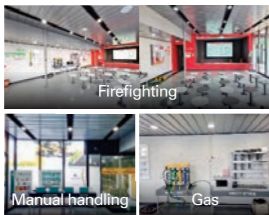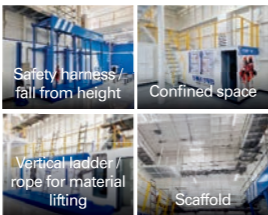
❶ Door
❷ Understanding hazards of poor lighting in the workplace
❸ Exploring a confined space
❹ Instructors' room

Course 2 Outdoor
- Firefighting
- Manual handling
- Gas

Course 1 1F
- Safety harness / fall from height
- Confined space
- Vertical ladder / rope for material lifting
- Scaffold

Research lecture room

Training facilities (VR safety training facilities)

Since the center introduced a VR experience system to safety training for the first time in the industry in 2017, it has developed and upgraded the system twice. Now, it offers 11 kinds of VR content in 3 training facilities and 1 PR center. The content has been developed in five different languages (Korean, English, Chinese, Vietnamese, and Uzbek) to meet the trainees' language requirements and facilitate the employment of the increasing number of foreign workers.

Shipbuilding VR training facilities

Location 1 facility in Yard 1 and 1 facility in Yard 2
Seating capacity 16 persons in each facility

Two facilities

Offshore VR training facilities

Location 1 facility on the 1st flr. of the Offshore Construction Technology Center
Seating capacity Maximum of 20 persons

One place

Composition of VR content

Experiencing accidents	On-the-job training
• Being hit (by a broken lever puller) • Struck (by a material that fell while being hoisted by a crane) • Struck (by a moving forklift) • Electrocuted (by a live part in a distribution panel) • Falling from height (while dismantling scaffolds)	• Working in a confined space (within a block) • Hot work (cutting a lug with a gas torch) • Painting (touch-up painting inside a tank) • Working with hand tools (grinder / lever puller / jack ram) • Operating a crane / a signaller (loading a block) • Fire (evacuating from a fire from an LPG ship)

Annual training achievements

Category	Year	Shipbuilding	Offshore	Total
VR training	2017	10,086	2,993	13,079
	2018	8,293	1,258	9,551
	2019	9,577	277	9,854
	2020	VR training has been suspended since 2020 because of the spread of the COVID-19.		
	2021			
Total		27,956	4,528	32,484

Training facilities (lecture rooms)

The Safety Management Group provides seven lecture facilities for general training: Two in the Safety Management Group; three in the Shipbuilding Business Unit; one in the Offshore Business Unit; and one in the Engine & Machinery Business Unit.

Large lecture room in the Safety Management Group

Location 4th flr. of the Health Promotion Center

Seating capacity Maximum of 120 persons

Small lecture room in the Safety Management Group

Location 4th flr. of the Health Promotion Center

Seating capacity Maximum of 60 persons

Training Facility in the Shipbuilding Business Unit

Location 2nd flr. of the Construction Technology Center 2

Seating capacity Maximum of 50 persons

Large lecture room 1 in the Shipbuilding Business Unit

Location 7th flr. of the outdoor shop Work Center 1

Seating capacity Maximum of 100 persons

Large lecture room 2 in the Shipbuilding Business Unit

Location 7th flr. of the outdoor shop Work Center 1

Seating capacity Maximum of 100 persons

Lecture room in the Offshore Business Unit

Location 1st flr. of the Offshore Technology Center

Seating capacity Maximum of 120 persons

Lecture room in the Engine & Machinery Business Unit

Location 2nd flr. of the Engine & Machinery Business Unit at the entrance of the main building (the building connected to the Mechanical Processing Plant 1-1)

Seating capacity Maximum of 40 persons

Safety facilities (firefighting/rescue)

The Integrated Control Center broadcasts the situation in real time to respond quickly to an emergency and performs rescue operations and activities. It monitors hazardous work through the 368 CCTVs equipped with an intelligent video analysis solution to prevent quarry accidents.

Location
1st flr. of the future Building (Area: 57.33㎡)
Operation
The special rescue team (6 persons) in the Safety Management Team of the Safety Management Group
Current Status of Equipment
368 CCTVs, 6 control servers,
5 55" monitors, 5 neckbands, etc.

Current status of emergency vehicles

Three fire engines

- Location: Fire station garages
- Number of vehicles: Two in the main plant; one in the Offshore Business Unit

Three ambulances

- Location: Fire station garages
- Number of vehicles: Two in the main plant; one in the Offshore Business Unit

Current status of firefighting systems

Fire extinguishers	Fire hydrants	Automatic fire detection systems	Sprinklers	Gas-type fire extinguishers	Total
20,700	2,340	155	25	21	23,241

Current status of firefighting equipment

Air-purifying respirators		Auxiliary masks	Firefighting suits (coats and pants)	Firefighting helmets	Multipurpose stretchers	Special stretchers
For 50 min						
Set	Spare containers					
77	76	14	63	52	15	22

Xenon searchlights	Smoke-penetrating lanterns	Megaphones (portable)	Electric winches	Portable searchlights	AEDs	Oxygen concentrators
11	10	6	10	2	15	3

Integrated management system for automatic fire detection
- Established 24-hr fire detection and monitoring systems (the main plant and the Offshore plant; 155 locations in total)
- 24-hr full-time outsourced management
  - Emergency mobilization and measures upon a fire signal from firefighting facilities
  - Planning and conducting 24-hr inspections on sites with fire alarm control stations
  - Shift pattern at work (one team leader, four team members): Main plant (two in the daytime; one during the weekend/nighttime) / Offshore (one in the daytime)

The Health Promotion Center and medical facilities
●

Current status of medical facilities and personnel
A clinic connected to the company, district infirmaries, a Korean medicine clinic, and a psychological counseling office providing health management services to employees, including health counseling and medical treatment

Category		Number of Personnel	Notes
Health Promotion Center	The connected clinic	Three doctors and six nurses	
	Physical/rehabilitation therapy room	Four physical therapists and one exercise therapist	
District infirmaries	District infirmaries (eight locations)	Eight nurses	
Korean medicine clinic	3rd flr. of the Culture Building	Two Korean medical doctors and two nurses	
Psychological counseling office	3rd flr. of the Culture Building	Two psychological counselors and one clerk	Mind Garden

The affiliated clinic
- Location: 2nd flr. of the Health Promotion Center
- Treatment / health counseling / emergency mobilization, etc.

District infirmaries: 8 locations in total
- First-aid and health counseling

Physical/rehabilitation therapy room
- Location: 3rd flr. of the Health Promotion Center
- Physical therapy and rehabilitation therapy

Korean medicine clinic
- Location: 3rd flr. of the Culture Building
- Medical treatment with acupuncture, moxibustion, cupping, etc.

Psychological counseling office
- Location: 3rd flr. of the Culture Building
- Psychological treatment programs

Equipped with AEDs
- Located in main buildings with a large number of people and external visitors

Installed kiosks in medical facilities
- Prevent infectious diseases by measuring the visitors' body temperature without direct contact

Environmental facilities (air pollution prevention facilities)

An air pollution prevention facility uses combustion control methods, catalytic oxidation methods, etc., to reduce air pollutants emitted from air pollutant emission facilities and hazardous air pollutants (HAPs) fugitive emission facilities in compliance with the permissible emission levels.
HHI has established and operated the optimum preventive facilities for each type of air pollutant released by air pollutant emission facilities.

Major air pollution prevention facilities

Filter dust collector   Adsorption facilities   RTO (Regenerative Thermal Oxidizer)   CO (Catalytic Oxidation)

Prevention Facility	Major Installation Process	Major Treated Substance	Treatment Efficiency
RTO (Regenerative Thermal Oxidizer)	Pre-treatment painting facilities in the Shipbuilding & Offshore Business Unit	Gaseous matter, such as total hydrocarbon (THC)	An average of 95%
CO (Catalytic Oxidation)	Large painting facilities in the Shipbuilding & Offshore Business Unit		90% or more
Adsorption facilities	Painting facilities in the Engine & Machinery Business Unit		90%
Filter dust collector	Descaling facilities in the Shipbuilding & Offshore Business Unit	Dust and other particulates	90%
Inertial dust collector	Foundry sand disposal facilities in the Engine & Machinery Business Unit		70%
Centrifugal dust collector	Foundry sand disposal facilities in the Engine & Machinery Business Unit		70%
Electric dust collector	Smelting furnaces in the Engine & Machinery Business Unit		over 95%
Wet scrubber	Pre-treatment painting facilities in the Shipbuilding & Offshore Business Unit	Dust and other particulates Gaseous matter, such as THC	80% over 20%
Facilities with combustion controls (low NOx burners)	Boilers and absorption chiller-heaters in the Management Support Division	Nitrogen oxide	69.8%

Environmental facilities (water pollution prevention facility)

HHI operates one water pollution prevention facility, which eliminates or reduces water pollutants released from the worksite. It is equipped with physical treatment facilities, such as flow rate control facilities, oil–water separator, and chemical treatment facilities, which treat wastewater with chemicals, such as coagulants and neutralizing agent. This wastewater is then discharged to the Bangeojin Water Quality Improvement Plant in Ulsan after undergoing physical and chemical treatment methods to meet the legally permissible discharge limit. In addition, sediments in the water pollution prevention facility are disposed of as sludge after being processed in concentration and dehydration facilities.

Work flow of water pollution prevention facilities

Facility for regulating the volume of water (collection facility)
⌄
Oil skimmer
⌄
Oil–water separator
⌄
Coagulation/ flocculation facility
⌄
Sedimentation facility
⌄
Flow rate control facility
⌄
Filtration facility
⌄
Discharge tanks
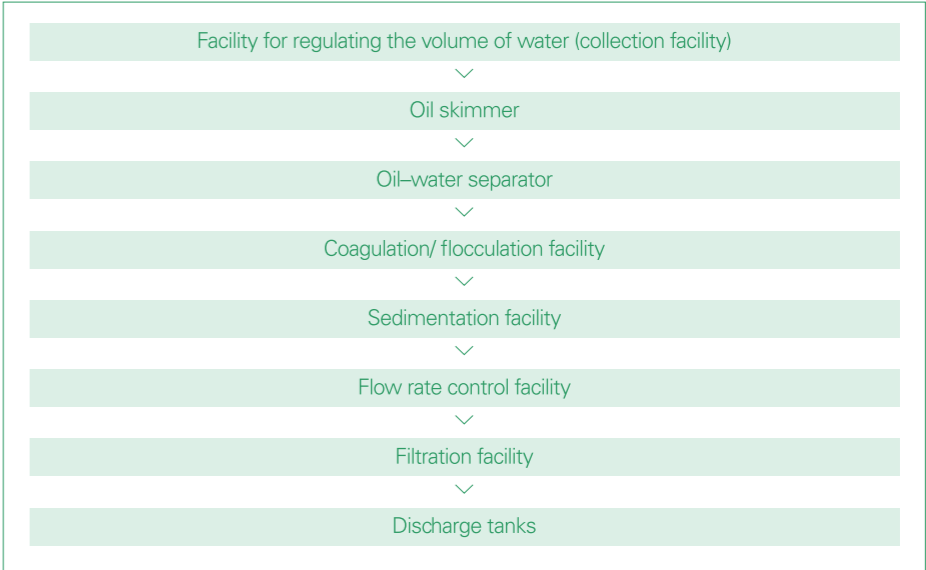
Average concentration of each pollutant in the effluent after the treatment at water pollution prevention facilities

Category	Total Organic Carbon (TOC)	Biochemical Oxygen Demand (BOD)	Suspended Solids (SS)	Total Nitrogen (T-N)	Total Phosphorus (T-P)
Concentration of permissible discharge limit (mg/L)	75	120	120	60	8
Average concentration in 2021 (mg/L)	8.63	3.21	2.54	1.42	0.02

* The relevant data are subject to verification by the Ministry of Environment, and some figures may be modified.

Environmental facilities (wastes sorting facility and wastes storage facility)

The wastes generated from HHI are collected from ordinary/designated wastes storage facilities and recycling bins (those for recycling and landfill) in rotation and transported to the Resources Reuse & Recycle Plant, which is operated and managed by the Resources Reuse & Recycle Team of the Environment Section. The Resources Reuse & Recycle Plant sorts wastes for recycling, incineration, and landfill in compliance with the standards of wastes treatment to minimize the waste disposal charges. The sorted waste is then sent to the Hyundai Incineration Plant (an incineration plant owned by HHI and treated the wastes for Hyundai-affiliated companies) or entrused specialized companies for treatment.

Environmental facilities (wastes incineration facility - Hyundai Incineration Plant)

The Hyundai Incineration Plant, which is located at 140, Bangeojinsunhwando-ro, Dong-gu, Ulsan, is operated by the Incineration Plant Management Team of the Environment Section for treating wastes of Hyundai-affiliated companies.

With permission for discharging facilities in business establishments subject to integrated contol issued in August 2020, the Hyundai Incineration Plant regulates pollutants generated during the incineration process to meet the permissible emission leves that are more restrictive than the existing environmental laws. It maintains the efficiency of the prevention facilities' performance and the transparency of the facilities' operation by monitoring the real-time status of pollutant emissions with the tele-monitoring system (TMS) installed in the outlet of each air pollution prevention facility. It also transmits data to the relevant government office. Furthermore, it is operated as a high-efficiency prevention facility with regular equipment inspection and repair.

Overview of facilities

- Incineration facility: Stoker-type
- Air pollution prevention facility: (First step) electric dust collection facility → (second step) wet scrubber → (third step) selective catalytic reduction (SCR) → outlet
- Water pollution prevention facility: Physicochemical treatment

Major investment details of facilities in 2021

| Category	Improvement	Effect of Improvement	Notes
Replacement of worn-out parts at the incineration facility	• Replacement of boiler water pipes • Replacement of refractory materials, chutes, and ducts	Optimum operation of the incineration facility	Efficiency improvement of operation
Repair of the air pollution prevention facility	• Replacement of catalyst in the SCR systems • Replacement of GAS / GAS heat exchangers • Installation of an malodor-preventing facility	Efficient removal of pollutants	Efficiency improvement of the prevention facility
Improvement of other equipment	Installation of traveling/traversing inverters in the wastes crane	Stable operation	Efficiency improvement of operation

Environmental facilities (Hazardous chemical substances handling facilities)

Hazardous chemical substances handling facilities are safely operated under relevant laws, such as the Chemical Substances Control Act, to ensure safe handling (use, preservation, storage, etc.).

These facilities are installed with collection facilities (proper dike and curbing), leakage detectors and warning systems, CCTVs, etc., to prevent pollutant leakage, given the nature of hazardous chemical substances . They are also equipped with PPE for safe handling, emergency services equipment and disaster prevention chemicals for response chemical accident.

Category	Use	Preservation / Storage Facilities
Shipbuilding & Offshore Business Unit	1	1
Naval & Special Ship Business Unit	1	1
Engine & Machinery Business Unit	5	3
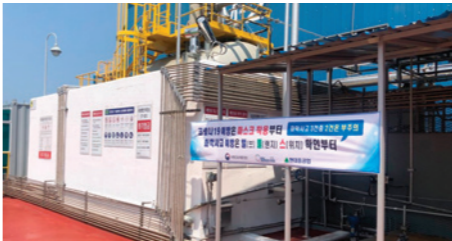
Harzardous chemical substances handing facilities

CCTV

Leak detector

PPE storage

Disaster prevention chemicals

Disaster Response:
Repeated Drills are the Answer

Disasters Occur Without Warning

In today's uncertain times, there are limits to preventing disasters and accidents in advance. Once a disaster or an accident occurs, prompt evacuation and control are more important than anything else to minimize damage.

However, people are not aware of the significance of disaster evacuation in our society. Even when an emergency bell rings in the workplace, people tend to assume that it is a mistake or a drill and observe others' reactions rather than deciding to evacuate immediately. If a disaster happens, such a careless response can lead to serious tragedy.

Fortunately, we can often see our society's gradual movement toward positive change. Since the recent earthquake, elementary, middle, and high school students across the country have been repeatedly taught how to evacuate after an earthquake. Hence, most students already know the evacuation procedure. These improvements show that our society's concern for and participation in safety is gradually increasing.

Each of us must view disaster response exercises as essential for our safety and the safety of those around us rather than viewing them as annoying and inconvenient. This is for us to become more cautious: Because disasters occur without warning. It is vital to conduct disaster response drills every year because it may be difficult for people to respond quickly and effectively in real crises if they are not trained in normal times.

PART 4. HSE Activities and Plans

Health   Safety

Environment

4-1
Safety Management Achievements

HHI established the value of S1 as the first management policy and has made every effort to prevent serious accidents to ensure that all workers safely leave the workplace with the same confidence as when they arrived. In 2022, HHI will continue to do its best to create a safer workplace for all workers with its enhanced on-site operability and safety and health management system.

01
Safety Management Achievements Over the Past 5 Years (2017~2021)

HHI reorganized the previous "Comprehensive Safety Management Improvement Countermeasures" and established and implemented the "Comprehensive Safety Countermeasures to Prevent Serious Accidents" in good faith to make our workplace free of serious accidents. Moreover, HHI removes risk factors from the site by conducting various risk-reduction activities and reflecting the workers' opinions.

HHI's Footprints Over the Past Five Years
●

Accident Trends and Major Activities

HHI has made continuous efforts to prevent serious accidents each year under its commitment in 2016 to establish the value of S1 as the first management policy. After the accident in January 2018, HHI achieved over a year without serious accidents occurring until the first half of 2019. In 2021, 3 serious accidents occurred, including one in February in which a worker became caught-between a steel plate and a jig. Thus, HHI reorganized the previous "Comprehensive Safety Management Improvement Countermeasures" and established and implemented the "Comprehensive Safety Countermeasures to Prevent Serious Accidents" in good faith to make our workplace free of serious accidents. It also removes risk factors from the site by conducting various risk-reduction activities and acknowledging the workers' opinions. Furthermore, HHI developed the Hi-STANDARD, which is a new job standard, to provide detailed job standards and conduct risk assessments.

■ Number of serious accidents
─●─ Number of work related accidents

2017
January: Assisted subcontractors in appointing safety managers
February: Opened the Integrated Control Center
March: Prepared safety guidelines
April: Introduced the safety leading indicator (SLI)
April: Developed VR experience training programs
July: Published HSE Newsletter
November: Established standards for illumination in confined spaces
December: Adopted the evaluation system for safety supervisors' job competency

2018
February: Performed precise safety checkup for overhead cranes
March: Held a ceremony declaring the "fair" safety practice
May: Established a nightshift safety management organization
July: Published revised safety guidelines
August: Installed a speed warning system on main roads
September: Conducted a company-wide safety moment
October: Developed a tool for assessing the safety culture level
December: Established the Integrated Safety Training Center

2019
January: Conducted a workshop for the Shipbuilding & Offshore Business's safety sector
February: Assessed HHI's safety culture level (until March)
May: Held an agreement signing ceremony for safety management collaboration between prime contractors and subcontractors
June: Specialized PSM consultation
July: Improved the company-wide safety award system
August: Established and operated the Marine Traffic Management Center
October: Held a company-wide safety forum
December: Conducted a program for training safety culture's internal examiners of affiliated companies

2020
April: Conducted company-wide safety improvement activities, such as Hi-SAFE
June: Established comprehensive countermeasures for safety management improvement
- Held a ceremony announcing the new safety culture
- Reorganized into a safety-oriented business unit system (established the Safety Construction Division / Responsible Safety Management System)
- Established the Safety Risk Management Team and Standards Innovation Task Force
- Granted "Securing Safety Authority (SSA)"
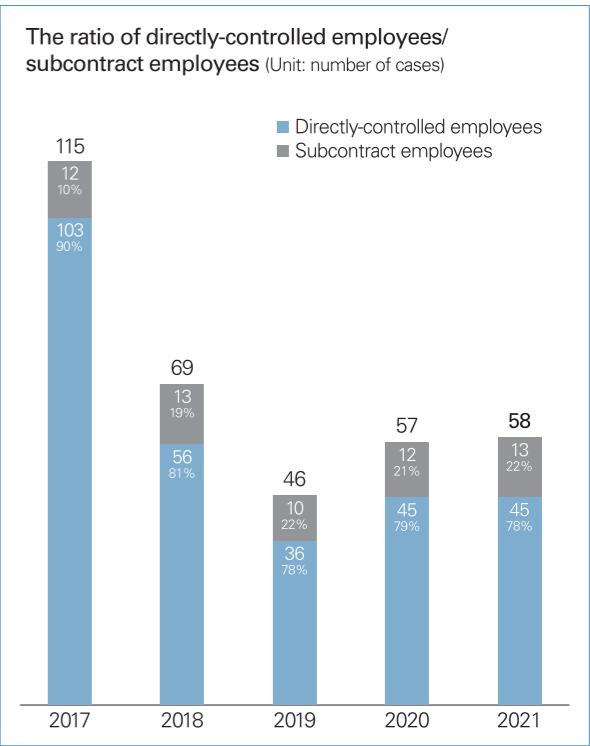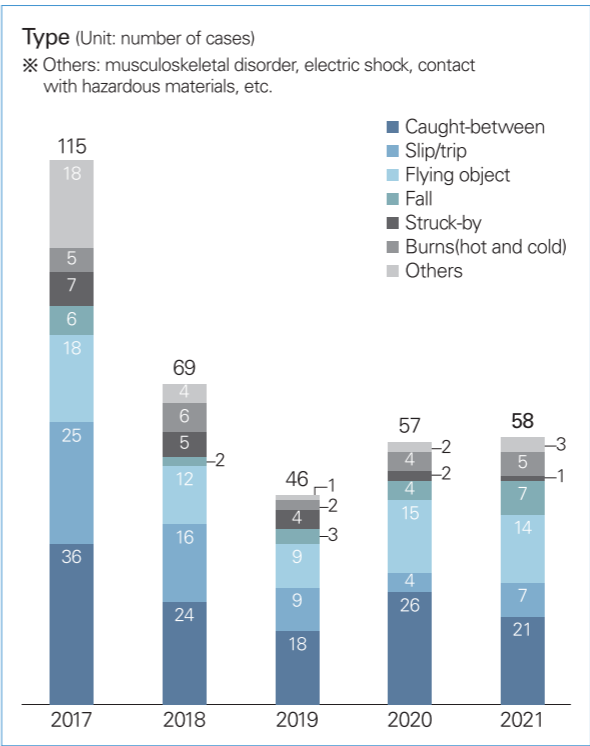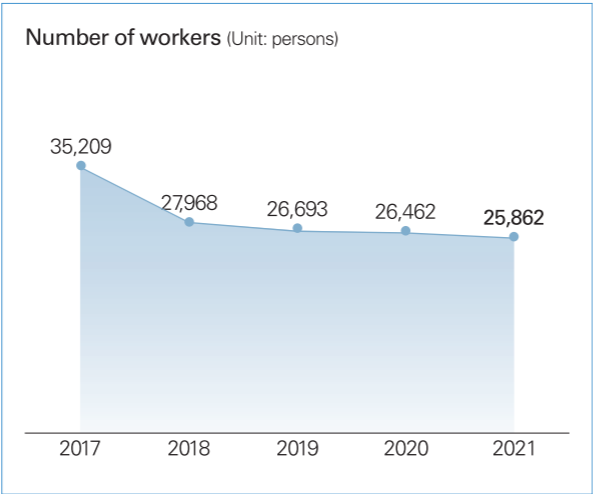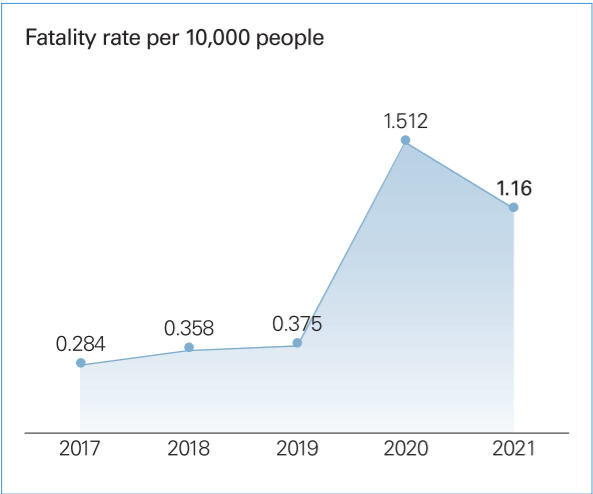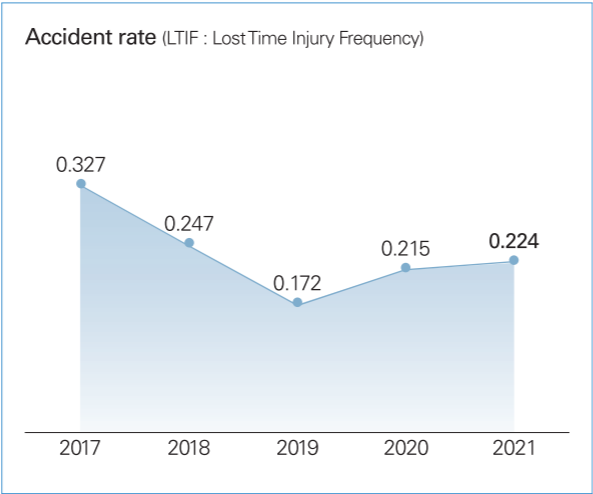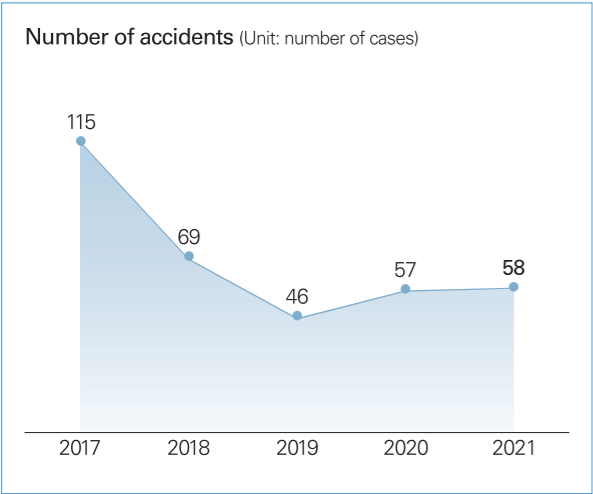August: Conducted a safety risk identifying contest

2021
April: Established a triple risk management system for high risks (supervisors - safety supervisor in construction departments - safety workers)
May: Conducted experience/practicum-based training programs for high-risk jobs
June: Established comprehensive safety countermeasures for serious accident prevention
July: Conducted a company-wide simulation drill for typhoon preparedness
September: Conducted a safety culture level checkup
October: Established a risk assessment system (Hi-STANDARD)
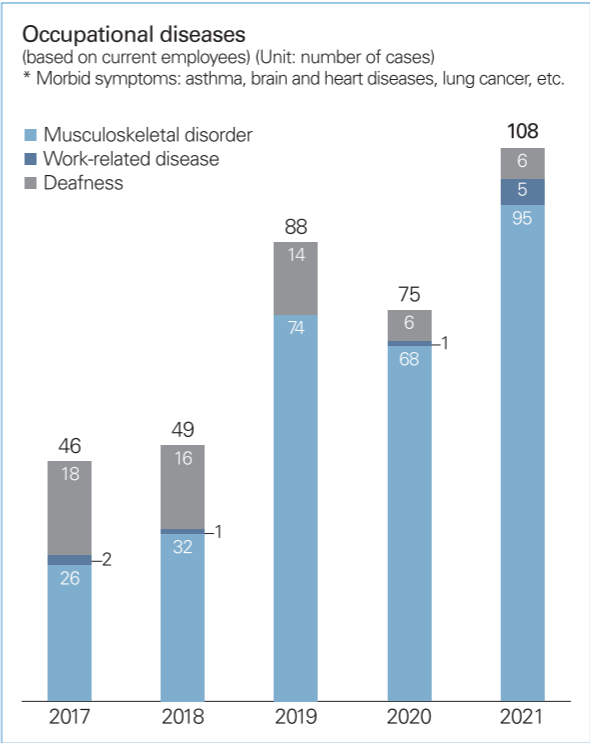December: Launched a platform for safety improvement ideas and proposal

02
Lost Time Injury Cases Over the Past 5 Years (2017~2021)

HHI promotes a practice-based safety culture by strengthening on-site management activities to prevent serious accidents. Through company-wide efforts, it will continue to do its best in 2022 to establish a workplace where all workers can work comfortably.
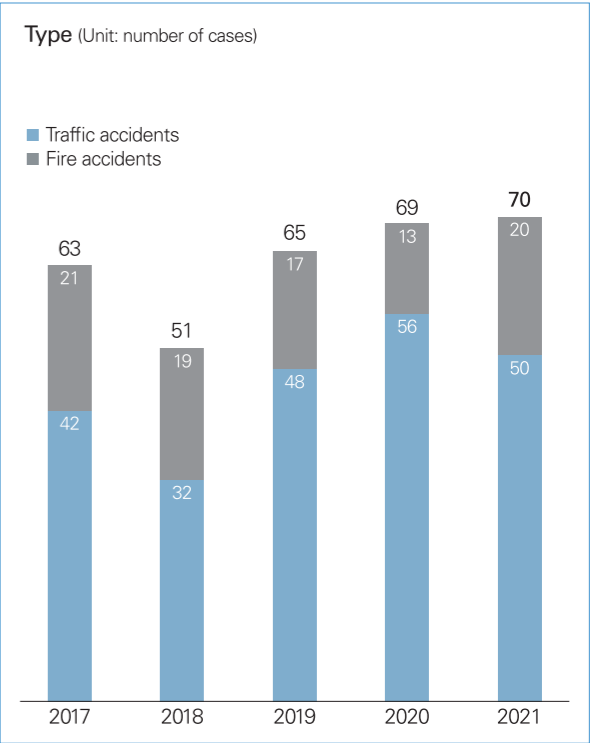
Occupational accidents over the past five years (work-related accidents)

Number of accidents (Unit: number of cases)

115 (2017), 69 (2018), 46 (2019), 57 (2020), 58 (2021)

Accident rate (LTIF : Lost Time Injury Frequency)

0.327 (2017), 0.247 (2018), 0.172 (2019), 0.215 (2020), 0.224 (2021)

Fatality rate per 10,000 people

0.284 (2017), 0.358 (2018), 0.375 (2019), 1.512 (2020), 1.16 (2021)

Number of workers (Unit: persons)

35,209 (2017), 27,968 (2018), 26,693 (2019), 26,462 (2020), 25,862 (2021)

Type (Unit: number of cases)
※ Others: musculoskeletal disorder, electric shock, contact with hazardous materials, etc.

Legend: Caught-between, Slip/trip, Flying object, Fall, Struck-by, Burns(hot and cold), Others

2017 (115): 18, 5, 7, 6, 18, 25, 36
2018 (69): 4, 6, 5, 2, 12, 16, 24
2019 (46): 1, 2, 3, 4, 9, 9, 18
2020 (57): 2, 2, 4, 4, 15, 4, 26
2021 (58): 3, 1, 5, 7, 14, 7, 21

The ratio of directly-controlled employees/subcontract employees (Unit: number of cases)

Legend: Directly-controlled employees, Subcontract employees

2017 (115): 12 (10%), 103 (90%)
2018 (69): 13 (19%), 56 (81%)
2019 (46): 10 (22%), 36 (78%)
2020 (57): 12 (21%), 45 (79%)
2021 (58): 13 (22%), 45 (78%)

Occupational accidents over the past five years (non-work related accidents)

Occupational diseases
(based on current employees) (Unit: number of cases)
* Morbid symptoms: asthma, brain and heart diseases, lung cancer, etc.

Legend: Musculoskeletal disorder, Work-related disease, Deafness

2017 (46): 18, 2, 26
2018 (49): 16, 1, 32
2019 (88): 14, 74
2020 (75): 6, 1, 68
2021 (108): 6, 5, 95

Reports filed over the past five years (non-work related accidents)

Type (Unit: number of cases)

Legend: Traffic accidents, Fire accidents

2017 (63): 21, 42
2018 (51): 19, 32
2019 (65): 17, 48
2020 (69): 13, 56
2021 (70): 20, 50

03
Safety Management Achievements in 2021

HHI, which pursues the S1 management, has established safety discipline through high-risk–focused on-site inspections and has been striving to reduce the accident rate and significant accidents by implementing a new safety culture through practical/experiential safety training.

Accident rate control & performance

The group's three shipbuilding companies (HHI, Hyundai Mipo Dockyard, and Hyundai Samho Heavy Industries) have standardized and implemented the accident rate targets. In 2021, the companies determined the accident rate targets for HHI (0.179) and Hyundai Samho Heavy Industries (0.184) using the linear regression model. The three shipbuilding companies planned to formulate the accident rate targets using the linear regression model in 2022.

HHI established an accident rate target of 0.179 in 2021, while the 2021 accident rate was 0.224, which fell short of the target. Based on the estimated 2021 accident rate (0.235), the target accident rate for 2022 was set at 0.195. Hence, we will create a safety culture where employees collaborate to achieve the target accident rate for 2022.
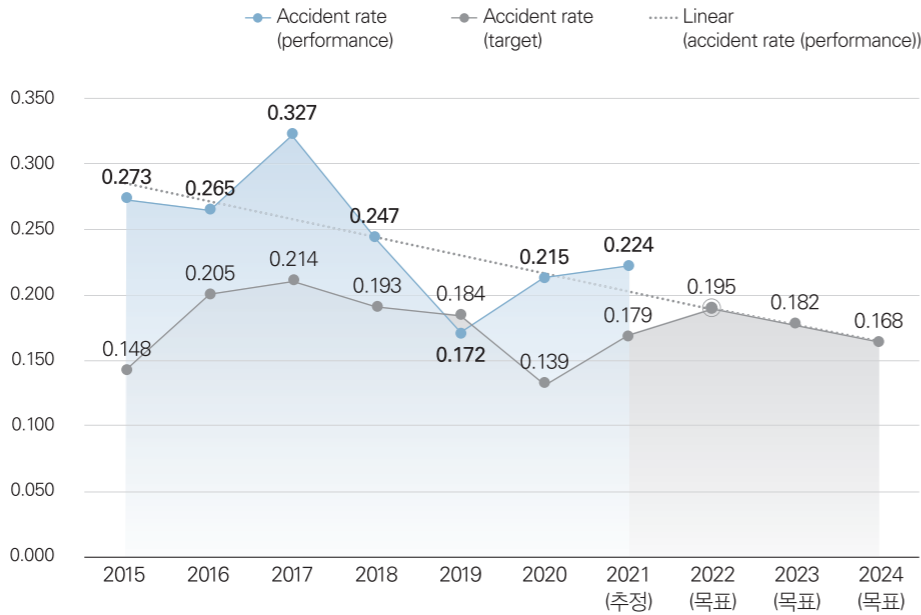
Accident and fatality rate per 10,000 people

Category	2018	2019	2020	2021
Accidents (persons)	1	1	4	3
Fatality rate per 10,000 people*	0.358	0.375	1.512	1.16

* Fatality rate per 10,000 people: occupationalities per 10,000 workers

Occupational accidents in 2021 (work related accidents)

Number of accidents by month
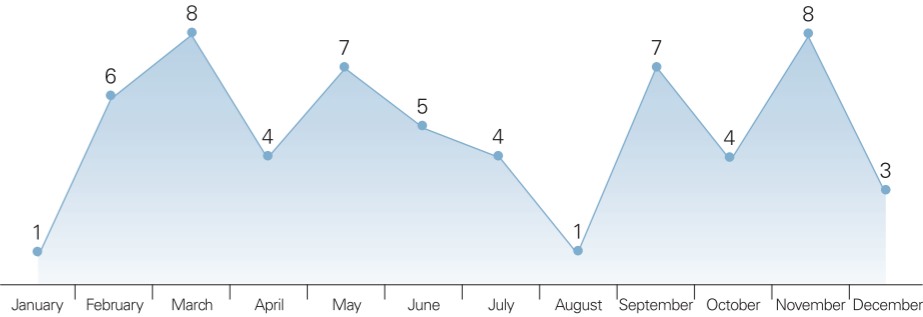
Occupational accidents by business unit
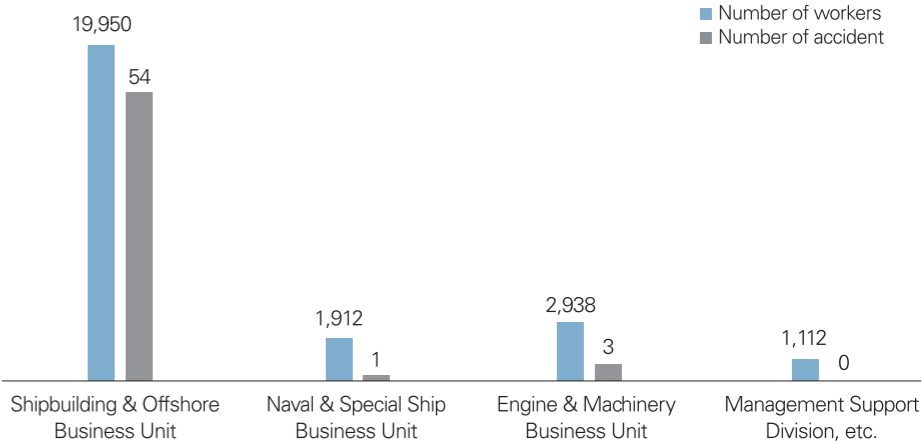
Business Unit	Number of Accidents	Accident Rate	Fatality Rate Per 10,000 People	Number of engaged workers
Shipbuilding & Offshore Business Unit	54(3)	0.271	1.504	19,950
Naval & Special Ship Business Unit	1	0.052	0	1,912
Engine & Machinery Business Unit	3	0.102	0	2,938
Management Support Division, etc.	0	0	0	1,112
Total	58(3)	0.224	1.16	25,912

* The figures in ( ) represent the number of significant accidents.

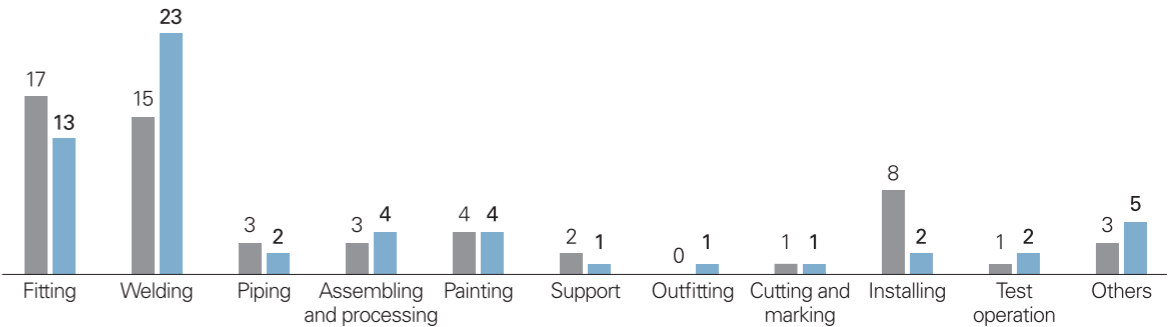## Industrial accidents from 2020~2021 (work related accidents)
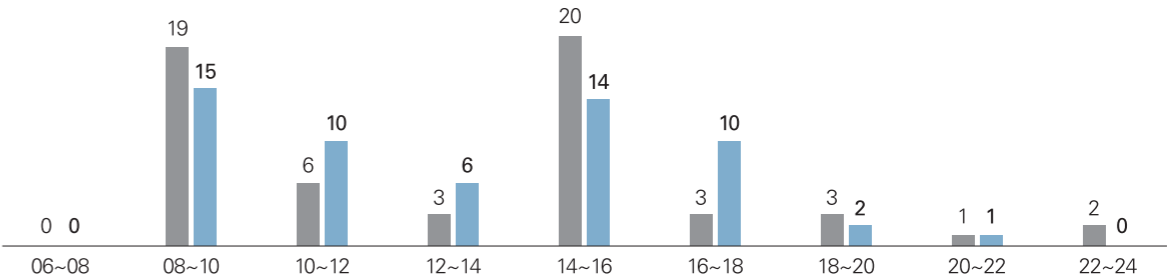
57 cases in ■ 2020
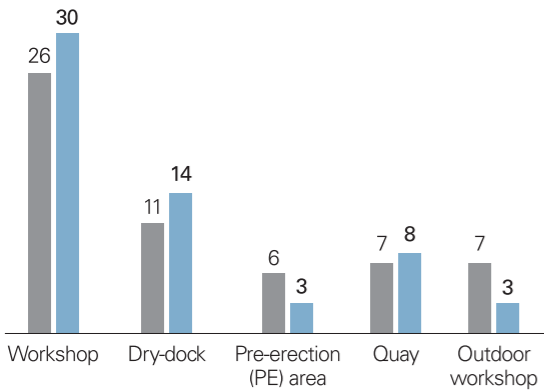58 cases in ■ 2021

By injured part (Unit: number of cases)

Part	2020	2021
Face	4	8
Chest	1	6
Shoulder	0	0
Arm	3	2
Hand/wrist	2	6
Finger	25	20
Waist/pelvis	2	2
Hip	2	0
Thigh	0	1
Knee	1	4
Calf	2	0
Foot/ankle	5	5
Toe	3	1
Others	7	3

By job (Unit: number of cases)

Job	2020	2021
Fitting	17	13
Welding	15	23
Piping	3	2
Assembling and processing	3	4
Painting	4	4
Support	2	1
Outfitting	0	1
Cutting and marking	1	1
Installing	8	2
Test operation	1	2
Others	3	5
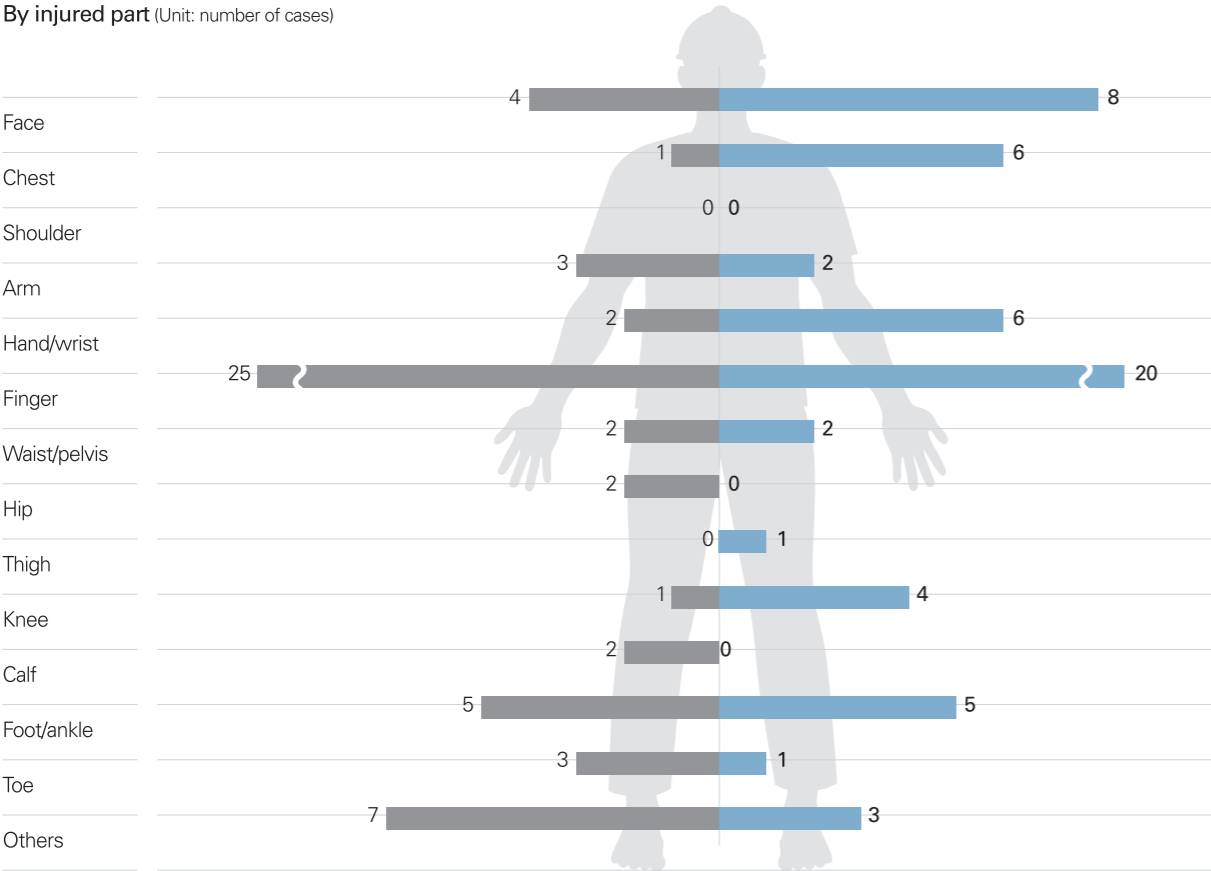
By time slot (Unit: number of cases)

Time slot	2020	2021
06~08	0	0
08~10	19	15
10~12	6	10
12~14	3	6
14~16	20	14
16~18	3	10
18~20	3	2
20~22	1	1
22~24	2	0

By place (Unit: number of cases)

Place	2020	2021
Workshop	26	30
Dry-dock	11	14
Pre-erection (PE) area	6	3
Quay	7	8
Outdoor workshop	7	3

By age (Unit: number of cases)

Age	2020	2021
Below 20 years old	0	0
20~29 years old	1	6
30~39 years old	18	10
40~49 years old	19	30
50~59 years old	14	9
60 years old or older	5	3
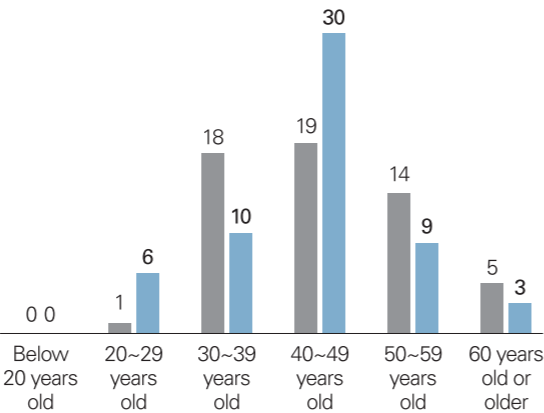
By continuous years of service (Unit: number of cases)

Years of service	2020	2021
Less than 5 years	11	13
5~10 years	16	15
10~15 years	9	11
15~20 years	5	10
20~25 years	5	1
25~30 years	2	7
30 years or longer	9	1
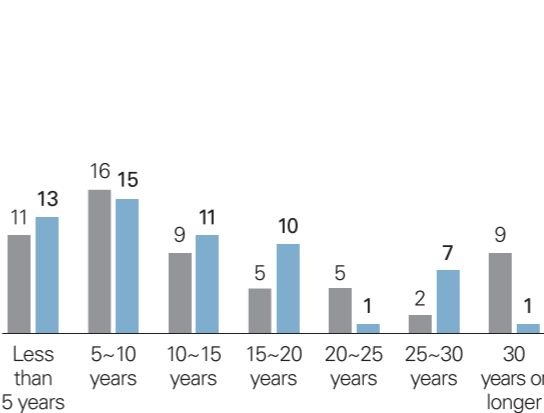
By type of injury (Unit: number of cases)

Type	2020	2021
Fracture	38	38
Ligament rupture	2	4
Burn	4	4
Sprain	2	0
Dislocation	0	1
Tooth fracture	0	0
Laceration	5	5
Others	6	6
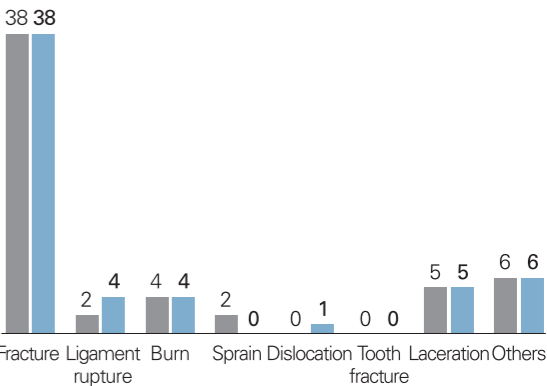
Health   Safety

Environment

4-2
Management Performance of
the Safety Planning Team

The Safety Planning Team of the HHI Safety Management Group strives to make the company safer by developing company-wide safety policies and planning systems. Furthermore, it promotes the efficiency and effectiveness of the safety management system by operating the HSE management system. This enables the safety management system to be established on the construction site.

01
Safety Planning Team Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Non-achievable reason	Future Plan
Establishing a construction-led and self-regulated safety management system	**Establishing a self-regulated management system to create a new safety culture** • Balanced implementation of the zero-tolerance principle (safety golden rules, priority control items against significant accidents) and caring culture based on the responsible safety management led by the site • Clarifying the Role and Responsibilities (R&R) to the Safety Management Group and Business Unit Safety Organization	**Establishing a self-regulated management system to create a new safety culture** • The zero-tolerance principle (safety golden rules: 360 violations; critical control points : 39 violations) and safety intervention activities for caring culture (1·3·5 and 4S campaign) • Adjusting the R&R of each relevant person by applying the role division between the Safety Management and Business Unit Safety Organization based on job standards	Continually Continually	Whether implemented Whether implemented	100 100		
	Continuously improving the Safety Leading Indicators(SLI) • Reviewing the reflection of various leading indicator factors, such as the Tool Box Meeting (TBM) campaign activity results, standards revision rate, and risk assessment implementation rate, etc. • Developing a registration program for safety intervention/ and securing safety authority results by connecting Hi-SNS and Hi-SEs • Creating a long-term promotion plan for the SLI upgrade	**Continuously improving the Safety Leading Indicators(SLI)** • Reviewing the reflection of various leading indicator factors, such as the Tool Box Meeting (TBM) campaign activity results, standards revision rate, and risk assessment implementation rate, etc. • Developing a registration program for safety intervention/ and securing safety authority results by connecting Hi-SNS and Hi-SEs • Creating a long-term promotion plan for the SLI upgrade	Continually Continually Continually	Whether examined Program development progress Whether the long-term promotion plan was established	100 100 50	Planning to proceed concurrently with the improvement of Hi-SEs for 2022	Planning to proceed concurrently with the improvement of Hi-SEs for 2022
	Operating the company-wide safety award and continuously improving it effectively • Motivating individuals/organizations by operating the safety award and establishing a safety management culture • Monitoring the on-site immediate award presented by safety supervisors and analyzing the effects of the award by listening the workers' opinions (by job classification) ※ Zero-accident awards, year-end awards for outstanding performance, outstanding team safety performance awards, instant awards, accident prevention, etc. awards	**Operating the company-wide safety award and continuously improving it effectively** • Awarded the company-wide safety award (individuals/organizations) • Surveyed relevant persons to clarify the effects of zero-accident awards and outstanding subcontractor awards	Continually One time/quarter	Number of times conducted / Number of times planned Number of times conducted / Number of times planned	100 50	- Conducted only in 1st and 2nd quarters	To be conducted continuously Improving awards based on the survey results
	Developing and implementing the safety key performance indicators (KPIs) • Improving the on-site operability of safety activities and enhancing the effectiveness of KPIs by persuing proactive indicators instead of reactive indicators • Creating an evaluation tool following KPIs' diversification and conducting an evaluation (evaluation, etc. of safety leadership and improvement activities)	**Developing and implementing the safety KPIs** • Developed a new indicator • Evaluated by the new indicator	Quarterly One time semiannually	Whether an indicator was developed Number of times conducted / Number of times planned	100 100		
	Establishing a caring safety culture through activation of safety intervention and observation programs • Inducing workers to work safely through a safety intervention program that is based on the 1·3·5 and 4S activities • Promoting the SSA to improve unstable conditions	**Establishing a caring safety culture through activation of safety intervention and observation programs** • Encouraged workers to work safely through a safety intervention program based on the 1·3·5 and 4S activities (Number of safety intervention cases: 184,919 cases) • Utilized various publicity to promote the SSA (in-house newspaper, visual safety training programs, etc.)	Continually Continually	Whether programs were utilized Performance management through a system	100 100		
	Improving the operational efficiency of the "Safety Innovation Advisory Committee" • Holding meetings through workshops by selecting detailed subjects for each specialized field concerning the increase in safety innovation advisors ※ Specialized fields: Safety training / Safety and health systems / Statutes and regulations / Health management, etc.	**Improving the operational efficiency of the "Safety Innovation Advisory Committee"** • Completed a Safety Innovation Advisory Committee meeting (1st Quarter)	One time/quarter	Number of times conducted / Number of times planned	25	Reduced meetings and training courses because of the spread of the COVID-19	To be reflected in the 2022 plan
	Issuing an HSE management report • Preparing an integrated HSE management report with which activities can be verified in detail (posting on the website and producing and issuing in the form of a book) • Reviewing the plan for the integrated HSE management report and the progress quarterly • Producing and issuing an HSE report	**Planning to issue the HSE Management Report 2022 (by the end of January)** • Compared the actual performance with the item-by-item plan to enable a detailed review of activities • Completed the quarterly verification of the actual progress against the integrated HSE management report preparation • The production and issuance of the HSE Management Report 2022 are in progress.	4th Quarter 4 One time/quarter 4th Quarter 4	Whether prepared Whether verified Whether issued	100 100 90	The production of the HSE Management Report 2022 is in progress	

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Non-achievable reason	Future Plan
Establishing a construction-led and self-regulated safety management system	**Reporting the safety and health plan to the board of directors under the new provisions of Article 14 of the Occupational Safety and Health Act** • Reporting a company-wide safety and health plan (expenses, facilities, and personnel) to the board of directors (early February) • Presenting the 2021 agenda items to the board of directors and preparing report materials (an HSE management report)	**Reporting the safety and health plan to the board of directors under the new provisions of Article 14 of the Occupational Safety and Health Act** • Completed the reporting and approval of the company-wide safety and health plan (expenses, facilities, and personnel) to the board of directors (early February) • Finished presenting the 2021 agenda items to the board of directors and preparing report materials (an HSE management report)	Early February In January	Whether implemented Whether implemented	100 100		
	Continuously implementing the comprehensive safety improvement countermeasures and reflecting the comprehensive safety checkup results in safety policies • Planning to improve and implement functions at the "Check(C)- Action(A)" stages of the HSE management system • Enhancing the on-site operability by connecting the activity results of the job standard task force and HSE management system • Considering the connection of process-safety computer systems (establishing a construction-based safety system)	**Continuously implementing the comprehensive safety improvement countermeasures and reflecting the comprehensive safety checkup results in safety policies** • Operating comprehensive safety improvement countermeasures and comprehensive safety checkup result monitoring team with Ministry of Employment and Labor and the Korea Occupational Safety and Health Agency • Completed reviewing the Hi-STANDARD contents during the internal/external inspections for the HSE management system • Established various construction-based safety systems (systems for safety intervention/improvement, etc.)	Continually Continually Continually	Whether implemented Whether reviewed Whether the system was established	100 100 100		
Enhancing the on-site operability of the HSE system	**Maintaining the (ISO) certification of the HSE management system and strengthening the management system** • Computerized management of the Safety Management Group's (Business Unit Safety Management) management plan (quantitative measurement of the achievement level and the management of the performance data) • Optimizing the management of risk/opportunity assessment (Safety Management Group) • Conducting company-wide training programs for HSE management system inspectors (adding new job standards and risk assessment system) • Implementing an internal inspection of the company-wide HSE management system of construction departments ※ January: Focused on the management of HSE goals and main performance; December: Focused on new job standards and risk assessment • Monitoring the HSE management systems of all construction departments quarterly and providing feedback (Hi-SEs) • Evaluating compliance with a safety relevant law • Preparing a management review report and submitting it to the management	**Maintaining the (ISO) certification of the HSE management system and strengthening the management system** • Modified the forms to enable the quantitative measurement of the achievement level when compared with the Safety Management Group's management plan • Completed the management risk and opportunity assessment (Safety Management Group) • Canceled training programs at the beginning of the year because of COVID-19 (replaced them with training materials) • Completed a one-time internal inspection (completed measures for 82 non-conformity items) • Inspected ISO specifications and taken actions for the non-conformity items (action was taken 100% about 27 non-conformity items) • Conducted one-time monitoring activities • Reviewed the Serious Accidents Punishment Act and prepared response plans • Substituted the HSE Management Report with 2021	Continually One time/quarter One time/year One time/year One time/year One time/quarter One time/year One time/year	Form change: 50 / Computerization: 50 Whether conducted Whether conducted Number of times conducted / Number of times planned Whether measures were taken Number of times conducted / Number of times planned Whether conducted Whether conducted	50 100 100 100 100 25 50 100	Documentary management by changing forms Not conducted because of the serious accident and the implementation of the Serious Accidents Punishment Act Planning to review the Occupational Safety and Health Act and other statutes and regulations	 To be reflected in the 2022 plan Planning to conduct in January 2022
	Overall review of the safety guidelines and publication of the second revision • Conducting an overall review of the safety guidelines and form change • Preparing management guidelines by theme (e.g., the earthing methods of machines and instruments, management guidelines of site facilities by wind velocity, etc.) • Producing and distributing the revised safety guidelines • Upgrading mobile safety guidelines	**Overall review of the safety guidelines and publication of the second revision** • Canceled the overall review plan but completed the form change • Established and amended the necessary guidelines (five cases) • Produced and publicated the safety guidelines at the beginning of the year • Scheduled to proceed when the Hi-SEs system is improved in 2022	The first half of the year The first half of the year 3rd Quarter Continually	Form change: 50 / Whether changed: 50 Whether prepared Whether measures were taken Whether the long-term promotion plan was established	50 100 100 50	Postponed the overall review to the following year Scheduled to proceed when the Hi-SEs system is improved in 2022	To be reflected in the 2022 plan To be reflected in the 2022 plan
Forming subcontractors' self-regulated safety systems	**Continuously operating programs to improve the subcontractors' safety management capability** • Improving the standards for assessing the subcontractors' safety management level (increasing reflection rate of the on-site safety management factors and adding the items under evaluation by the site safety section of each business unit) • Conducting a training program (8 hr) to increase the safety awareness of the subcontractors' representatives • Implementing a training program (8 hr) to improve the job competency of the subcontractors' safety officers • Awarding the subcontractors for their outstanding safety performance • Awarding the subcontractors' safety officers for their outstanding performance • Assisting the subcontractors in obtaining accreditation for outstanding risk assessment performance (from the Korea Occupational Safety and Health Agency)	**Continuously operating programs to improve the subcontractors' safety management capability** • Completed the level evaluation sheet improvement (two times) • Canceled the training program to increase the safety awareness of the subcontractors' representatives • Canceled the training program to improve the job competency of the subcontractors' safety officers • Awarded the subcontractors for their outstanding safety performance • Awarded the subcontractors' safety officers for their outstanding performance • Assisted the subcontractors in obtaining accreditation for outstanding risk assessment performance	1st Quarter One time/year One time/year One time/quarter One time semiannually Continually	Whether improved Whether conducted Whether conducted Number of times conducted / Number of times planned Number of times conducted / Number of times planned Whether assisted	100 0 0 100 100 100	 Minimized meetings and training courses because of the spread of COVID-19 Minimized meetings and training courses because of the spread of COVID-19	 To be reflected in the 2022 plan To be reflected in the 2022 plan

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Non-achievable reason	Future Plan
Forming subcontractors' self-regulated safety systems	**Establishing the safety management plan for short-term variable workforce** • Operating a program to enhance the safety management capabilities of the project subcontractors (applying the same standards as existing in-house subcontractors) • Preparing a system to assist the project subcontractors with safety management ※ Assisting in the appointment of safety managers / fire watchers / cherry picker signalman, providing personal protection, council meetings and joint inspections and ensuring time for mandatory safety and health training • Developing a plan to regulate ghost workforce for hazardous work (face-to-face authorization)	**Establishing the safety management of short-term variable workforce** • Adopted and implemented the program for enhancing project subcontractors' safety management capabilities • Assisted the project subcontractors in appointing safety managers; held council meetings and conducted joint inspections; and assisted project subcontractors in obtaining accreditation for outstanding risk assessment performance • Completed changes to the work subject to authorization for hazardous work (shipbuilding)	Continually Continually One time/year	Whether applied Whether assisted Whether improved	100 100 100		
Proactive response to act/decree/ regulation changes	**Continuous monitoring of and preemptive response to statute/regulation changes on HSE** • Operating an information-sharing system through continuous exchange with the Korea Enterprises Federation • Minimizing damage to the company operation by the proactive response to excessive regulations and changes • Contributing to the growth of the company's HSE by continuously attempting to improve regulations	**Continuous monitoring of and proactive response to act/decree/regulation changes on HSE** • Conducted continuous exchange with the Korea Enterprises Federation and its members • Prepared a plan to respond to the Serious Accidents Punishment Act • Adopted the plan to the company's system and to respond to the Serious Accidents Punishment Act	Continually Continually Continually	Whether information is exchanged Preparation of a response scheme Whether adopted to the system	100 100 100		
Increasing the statistical data usability	**Establishing the annual target accident rate** • Forming the target accident rate for the following year based on the accident rate trend over the past 10 years (linear regression model) • Promoting the standardization of the targer accident rate among affiliated companies	**Establishing the annual target accident rate** • Formed the target accident rate for the following year based on the accident rate trend over the past 10 years (linear regression model) • Standardized the target accident rate among affiliated companies	4th Quarter 1st Quarter	Number of times conducted / Number of times planned Number of times conducted / Number of times planned	100 100		
	Providing the quarterly data contributing to the establishment of accident prevention countermeasures • Conducting a periodic statistic and trend analysis on major safety indicators, such as accidents and rule violations, and reflecting the analysis results into the policies	**Providing the quarterly data contributing to the establishment of accident prevention countermeasures** • Canceled the periodic statistic and trend analysis on major safety indicators, such as accidents and rule violations	One time/quarter	Number of times conducted / Number of times planned	0	Not conducted because of the serious accident and the implementation of the Serious Accidents Punishment Act	Planned to prepare statistical and trend analysis data in 2022
Establishing job standards and a risk assessment system	**Reestablishing and systematizing job standards** • Adding details regarding work behaviors and information to be assessed and classifying keywords • Enhancing the quality of the obtained job standards by upgrading the photos, texts, and charts • Considering the establishment or amendment of the job standards of the Shipbuilding & Offshore, Plant, Engine & Machinery Business Units and MOS	**Reestablishing and systematizing job standards** • Reorganized the standard work system of each department and developed new job standards (reclassified the separated values of large/medium/small categories and job standards) • Enhanced the quality of job standards by attaching on-site work photos and various reference data through the amendment of job standards • Completed the establishment/amendment of the job standards: 3,188 cases in the Shipbuilding & Offshore Business Unit; 249 cases in the Engine & Machinery Business Unit; and 978 cases in MOS	Continually Continually Continually	The ratio of the amended job standards over the past three months The ratio of on-site photos attached to job standards The number of amended job standards	90 70 90	An adjustment period to the new system is necessary Attaching some on-site photos is necessary The amendment ratio of some departments is insufficient	Allocating separate hours for risk assessment (regular safety training) Continuous promotion of the work for quality improvement Continuous monitoring and feedback
	Developing a risk factor database • Extracting risk factors by process/function based on the risk factor classification system and making a list of risk factors • Preparing backup data for risk assessment by connecting risk factors, safety guidelines, and the types of disasters	**Preparing a list of risk factors and reflecting the Hi-STANDARD** • Extracted 134 keywords of major risk factors and completed the connection of 1,225 standard risk factors in the Shipbuilding & Offshore Business Unit • It is possible to provide and utilize the list of standard risk factors during the risk assessment through the Hi-STANDARD system	Continually Continually	Preparing a list of standard risk factors Whether Hi-STANDARD was reflected	100 100		Discovering additional standard risk factors Adopting a system for standard risk factors / improvement countermeasures
	Forming a system-based risk assessment system • Amending the detailed guidelines on the risk assessment management and preparing a service user manual • Conducting a training program and risk assessments for field staff (construction team leaders and responsible section managers) • Monitoring the risk assessment results, determining whether or not improvement countermeasures have been established and whether or not the countermeasures have been implemented, and providing feedback	**Forming a system-based risk assessment system and risk assessment** • Amended the detailed guidelines on the risk assessment management and prepared and distributed the service user manual • Conducted a training program on risk assessment concurrently with the supervisor training program and the regular safety and health training program • Monitored the implementation results by forming a special organization for risk assessment and providing feedback (indoor shop/ outdoor shop work support department in the Shipbuilding & Offshore and Engine & Machinery Safety Department)	Continually Continually Continually	Whether the manual was prepared and distributed Whether a risk assessment training program was conducted Whether a special organization was formed and monitored	100 100 90	The formation of a special organization is completed, and the monitoring continues	Utilizing a grading system and reinforcing the monitoring function

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Non-achievable reason	Future Plan
Establishing job standards and a risk assessment system	**Establishing job standards and computer system risk assessment** • A system for inquiring, establishing, and amending job standards and for the record management (Web, mobile) • A system for risk assessment and the management of special countermeasures to reduce major risks • A system to monitor and provide feedback on job standards and risk assessment • The development of an additional system for computerizing daily work instructions is considered.	**Establishing job standards and computer system risk assessment (Hi-STANDARD)** • Established/amended job standards and developed a system to determine and monitor the current status of the company-wide risk assessment and record management (Web) • Conducted a risk assessment and developed a system to manage the special countermeasures to reduce major risks (Web) • Developed a system for automatically sending daily safety-related text messages to mobile devices • Considered the development of an additional system for computerizing daily work instructions	Continually Continually Continually Continually	Whether systems are developed (Web) The execution ratio of risk assessment Whether systems are developed (Mobile) Completed the examination	100 100 100 100		
	Connecting the new job standards and risk assessment system with the Integrated Safety and Health Management System (Hi-SEs) • Determining standard adverse risk factors and developing a computer system risk assessment • Conducting a training program on new job standards and a risk assessment for construction team leaders, HSE promoters, and subcontractors • Monitoring the risk assessment results of construction departments and providing feedback (the safety department of each business unit) • Reviewing and improving the standard adverse risk factors • Analyzing and enhancing job standards • Analyzing the performance of company-wide job standards and risk assessments and reflecting the analysis results into the following year's plan	**Connecting the new job standards and risk assessment system with the Integrated Safety and Health Management System (Hi-SEs)** • Developed the Hi-STANDARD computer system and standard risk factors • Completed a practical computer training program on Hi-STANDARDs for supervisors and the subcontractors' relevant persons • Monitored the risk assessment results and provided feedback (monitored by the indoor shop/ outdoor shop work support department of the Safety Management) • Reviewed the standard adverse risk factors, and improvements are in progress • Analyzed the job standard results, and improvements are in progress • Assessed the current status of the company-wide job standards and risk assessment	April The first half of each year Continually The second half of each year The second half of each year The second half of each year	Development rate of the computer system Execution rate of the practical computer training program Monitoring rate Review and improvement rate Review and improvement rate Whether analyzed	100 100 80 80 80 90	 A special monitoring organization will be designated after the system is stabilized Improvements are postponed to 2022 Improvements are postponed to 2022 Improvements are postponed to 2022	 To be reflected in the 2022 plan To be reflected in the 2022 plan To be reflected in the 2022 plan Planning to develop an analysis tool
Increasing the Integrated Safety and Health Management System (Hi-SEs) usability	**Increasing the storage of the NAS server of Hi-SEs to create an HSE database** • Creating a huge safety database by preparing the server capacity necessary for the future analysis of big data • Expanding the storage to 13 TB (current server capacity: 600 GB; remaining capacity: 10.5 GB)	**Increasing the storage of the NAS server of Hi-SEs to create an HSE database** • Expanded the storage of the NAS server to secure the server capacity necessary for the future analysis of big data • Increased the storage to 13 TB	One time Quarterly	Whether increased Whether increased	100 100		
	Enhancing the accessibility of Hi-SEs • Rearranging the menus of Hi-SEs and the database layout • Preparing a user manual of Hi-SEs by item	**Enhancing the accessibility of Hi-SEs** • Rearranging the menus and the overall layout by creating a new Web version of Hi-SEs • Preparing a user manual of Hi-SEs by item	1st Quarter 2nd Quarter	Whether implemented Whether implemented	100 0	 Scheduled to proceed when the Hi-SEs system is improved in 2022	 Scheduled to proceed when the Hi-SEs system is improved in 2022
Administrating the Safety Management organization	**Administrating /managing the Safety Management Group** • Administrating and managing the budget of the Safety Management Group • Managing the organization chart of the Safety Management Group; the current status of personnel; the weekday/weekend extended work; and the night shift in the Integrated Control Center • Standardizing and monitoring of the safety workers' uniform (construction technician: two suits/year; administrative technician: two suits/two years) • Application for printed materials from outside and the management of distribution	**Administrating /managing the Safety Management Group** • Administrated the budget of the Safety Management Group and monitored the actual expenditure • Managed the organization chart of the Safety Management Group; the current status of personnel; the weekday/weekend extended work; and the night shift in the Integrated Control Center • Standardized and monitored the safety workers' uniform (construction technician: two suits/year; administrative technician: two suits/two years) • Applied the outside printed materials and managed the distribution	Continually Continually Two times/year Continually	Whether implemented Whether implemented Whether managed Whether managed	100 100 100 100		

02
Establishing Self-Regulated Safety Management System by Construction Division

HHI has been firmly implementing the self-regulated safety management system by enhancing the SLI and balancing the execution of the zero-tolerance principle and caring culture to establish a new safety culture. It also provides awards, develops and adopts safety KPIs, promotes safety intervention and monitoring programs, implements comprehensive safety countermeasures, and conducts checkups.

Establishing a self-regulated management system to create a new safety culture

Balancing the execution of the zero-tolerance principle and caring culture
The safety golden rules are safety regulations that all executive officers and employees must observe without exception. They consist of seven company-wide common rules and three to five special rules for each business unit. At the end of 2021, about 5,046 violations have been observed because of the enforcement of the zero-tolerance principle for everyone, regardless of the violators' status. Over the past 5 years, the observation trend shows that the number of violators has decreased despite implementing the zero-tolerance principle, which can be attributed to safety interventions, such as the 1·3·5 Campaign and the 4S activities. Thus, the company will strive to avert tragedies by implementing the zero-tolerance principle and caring culture.

No use of mobile phone or wearing earphones while walking/working/driving	No smoking while walking/working/driving	Speed limits for vehicles under 30km/hr (Forklift under 8km/hr)	Secure full body harness while working at height
No entry under suspended loads	No overriding safety devices without authorization	Verify isolation and use lock out/tag out (LOTO)	No simultaneous hot and painting work in same area
No unauthorized erection/modification of scaffolding (fall protection)	Ensure full welding to temporary lifting lugs	No modification of gas hoses and their couplings	No parking on crane tracks

Violation trend of safety golden rules over the past five years

2017	2018	2019	2020	2021
1351	623	665	464	343
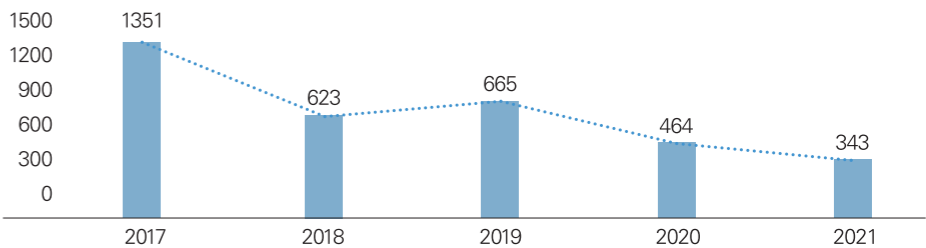
Continuously improving leading indicators to upgrade the SLI

Reflecting and examining various leading indicators
The Safety Management Group plans to transition the SLI from a result-based indicator, such as an accident rate, to a leading indicator, such as proactive safety activities. It also intends to improve the SLI based on the leading activities at the site, such as firefighting drills and safety management system, when the Hi-SEs, which are the integrated HSE management systems, are fully improved in 2022.

Classifying the SLIs > Examining the possibility of reflection > Selecting the SLI items to be reflected > Reflecting the SLI
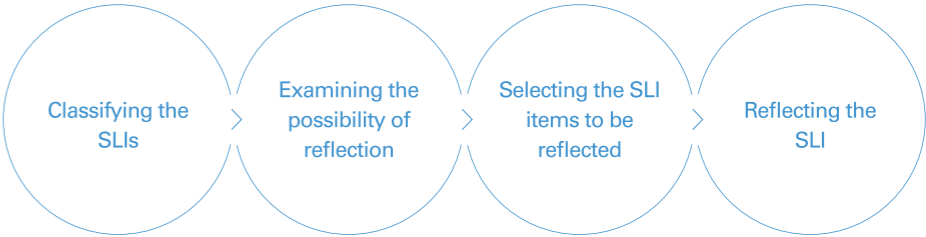
Developing an input program to enter the safety intervention performance using the intracompany messaging application
A program for entering the safety intervention performance has been developed through the intracompany messaging application. With it, a supervisor can immediately enter the safety intervention performance after improving the risk factor at the site or initiating a safety intervention for a worker who has engaged in a hazardous activity. This tool has been well received because supervisors can now easily enter and manage their safety activity performance.

1. Run the Hi-SNS App
2. Touch a photo/image for more than 1 second
3. Select the safety intervention or the securing safety authority on the screen
4. Enter and save the relevant information on the pop-up display that resembles the input screen of the Hi-SEs
5. The information will be saved in the Hi-SEs database
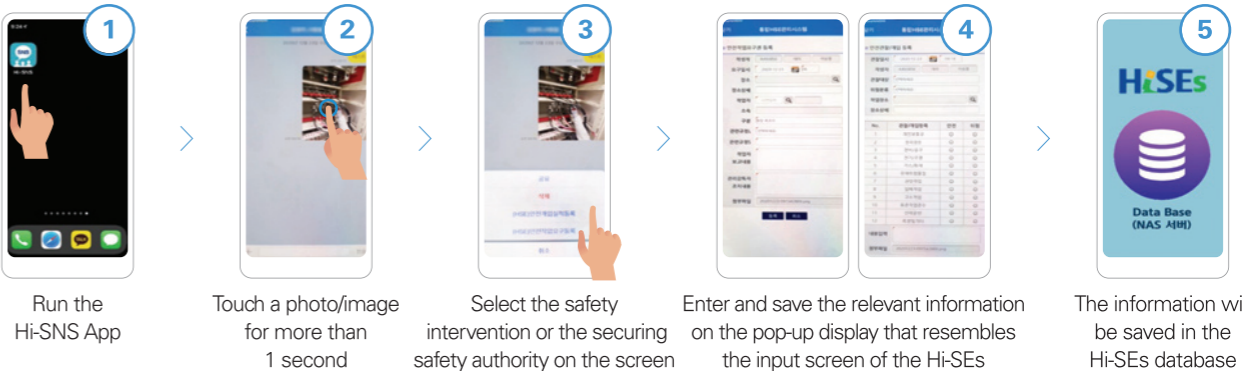
Improving the system by analyzing the company-wide safety award system
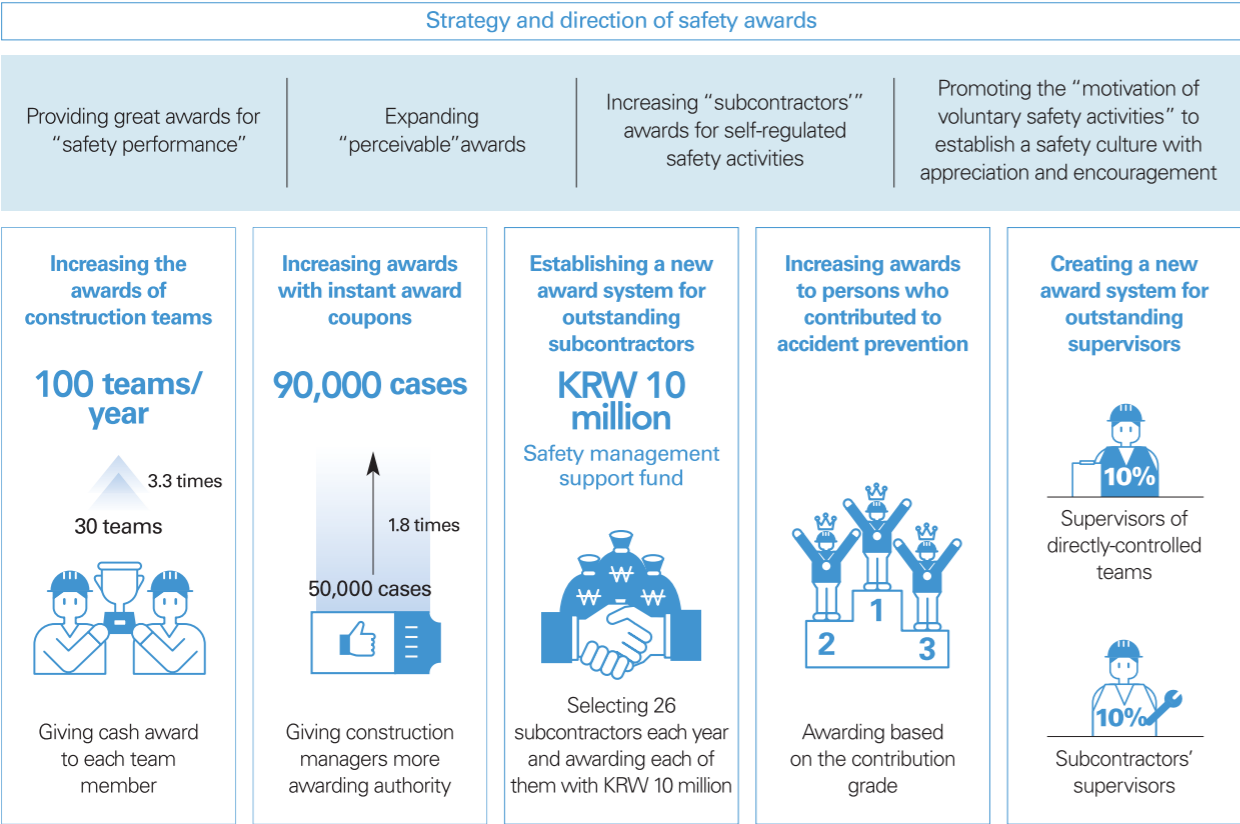
Performing the company-wide safety award system and the current status of improvement

HHI is motivating its employees with various award systems to create a safe workplace and a culture where safety comes first. We promote safety activities through individual awards and establish a system to recognize organizations with outstanding safety performance through awards.

Current status of safety awards

HHI implements a company-wide safety award system to create "a safety culture with all members' participation." We provide great awards to organizations that have shown their outstanding safety performance so that each worker can instantly recognize them. In addition, we offer incentives and motivate our subcontractors to establish an outstanding safety management system. Through the increased award system, we foster practice-oriented safety activities and spread a culture of self-regulated safety management. We are also raising the influence of awards by optimizing the award system, building the foundation for the safety culture, and raising the satisfaction level.

Strategy and direction of safety awards

| Providing great awards for "safety performance" | Expanding "perceivable" awards | Increasing "subcontractors'" awards for self-regulated safety activities | Promoting the "motivation of voluntary safety activities" to establish a safety culture with appreciation and encouragement |

Increasing the awards of construction teams
100 teams/year
3.3 times
30 teams
Giving cash award to each team member

Increasing awards with instant award coupons
90,000 cases
1.8 times
50,000 cases
Giving construction managers more awarding authority

Establishing a new award system for outstanding subcontractors
KRW 10 million
Safety management support fund
Selecting 26 subcontractors each year and awarding each of them with KRW 10 million

Increasing awards to persons who contributed to accident prevention
Awarding based on the contribution grade

Creating a new award system for outstanding supervisors
10%
Supervisors of directly-controlled teams
10%
Subcontractors' supervisors

Current status of the improvement of safety awards

| Improved the award payment method and the evaluation criteria for the subcontractors' outstanding safety performance | The improvement of the instant award payment system is in progress (paper coupons → benefit points) | Expanding award promotion channels (Hi-SEs, corporate magazines, etc.) |

Awarding organizations

Name of Award System	Main Activity	Time of Awarding	Cash award
Outstanding safety performance teams	Outstanding directly-controlled teams in safety management by quarter	Quarterly	KRW 100,000/person
Outstanding safety performance subcontractors	Improving the self-regulated safety management system by awarding outstanding safety management subcontractors	Quarterly	KRW 10 million/subcontractor
Zero-accident awards	Promoting the attainment of the target number of accident-free days	Monthly	KRW 5,000~7,000/person
Awards in the contest for outstanding Hi-SAFE assignments	Departments with outstanding performance in safety improvement assignments	Annually	KRW 1~10 million

Individual awards

Name of Award System	Main Activity	Time of Awarding	Prize money
Instant awards (complimentary coupons)	Encouraging outstanding workers to participate in on-site safety activities	Occasionally	KRW 5,000/coupon
Awarding workers for their contribution to accident prevention	Encouraging workers to contribute to the prevention of a serious accident	Occasionally	Class 1: Hotel vouchers/2 vouchers Class 2: KRW 200,000 Class 3: KRW 100,000

Manager awards

Name of Award System	Main Activity	Time of Awarding	Cash award
Awarding outstanding supervisors	Encouraging responsible section managers and construction team leaders to participate in safety activities and increase their responsibilities	Semiannually	KRW 1 million/person
Subcontractors' safety officers	Encouraging the outstanding subcontractors' managers to participate in safety management semiannually	Semiannually	KRW 500,000/person
Outstanding safety workers of directly-controlled teams	Encouraging outstanding safety supervisors of directly-controlled teams semiannually	Semiannually	KRW 500,000/person

Annually paid safety awards

in 2019	in 2020	in 2021
KRW 1,127 million	KRW 1,036 million	KRW 1,061 million

Awards to teams for their outstanding safety performance

Each construction team's performance is evaluated quarterly based on each business unit's standards for safety performance evaluation, such as rule violations, safety activity performance, and instant awards. Outstanding teams are given CEO-level awards based on the evaluation results, and each team member receives KRW 100,000 as a cash award and a certificate of commendation.

Current status of outstanding team awards by business unit

Category		Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit
1st Quarter	Team	18 teams	3 teams	4 teams
	Cash award	KRW 29.2 million	KRW 4.4 million	KRW 3.2 million
2nd Quarter	Team	18 teams	3 teams	4 teams
	Cash award	KRW 28.3 million	KRW 3.2 million	KRW 3.2 million
3rd Quarter	Team	17 teams	3 teams	4 teams
	Cash award	KRW 27.7 million	KRW 4.2 million	KRW 3.5 million
4th Quarter	Team	19 teams	3 teams	4 teams
	Cash award	KRW 28.2 million	KRW 4.1 million	KRW 4.5 million
Total	Team	72 teams	12 teams	16 teams
	Cash award	KRW 113.4 million	KRW 15.9 million	KRW 14.4 million

Subcontractors' awards for their outstanding safety performance

Outstanding subcontractors who will be awarded are chosen quarterly by evaluating their disaster indicators, safety systems, and on-site safety management levels. Each subcontractor selected for outstanding safety management will receive KRW 10 million.

Current status of outstanding team awards by business unit

Category		Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit
1st Quarter	Subcontractors	5	-	1
	Cash award	KRW 50 million	-	KRW 10 million
2nd Quarter	Subcontractors	5	1	1
	Cash award	KRW 50 million	KRW 10 million	KRW 10 million
3rd Quarter	Subcontractors	5	-	1
	Cash award	KRW 50 million	-	KRW 10 million
4th Quarter	Subcontractors	5	1	1
	Cash award	KRW 50 million	KRW 10 million	KRW 10 million
Total		26 subcontractors in total (total award: KRW 260 million)		

This year, we added conditions for the appointment of safety managers and revised the evaluation criteria to ensure distinction and fairness. Moreover, an award of KRW 10 million will be granted in installments as existing safety and health management progress payments beginning in 2022 (it will be paid as existing progress payments).

Zero-accident awards

CEO-level awards are given to organizations that have achieved the target number of accident-free days among construction departments and construction support departments.

Target number of accident-free days

Number of personnel (persons)	Less than 100	100~199	200~299	300~399	400 or more
Target number of accident-free days	100 days	90 days	80 days	70 days	60 days

Zero-accident awards paid in 2021 (from January to November)

Business Unit	Number of Departments	Amount of Award
Shipbuilding & Offshore Business Unit	95	KRW 122,563,000
Naval & Special Ship Business Unit	14	KRW 16,711,000
Engine & Machinery Business Unit	30	KRW 21,840,000
Management support	27	KRW 2,484,000
Grand total	166	KRW 163,598,000

Hi-SAFE awards

Company-wide safety improvement activities (Hi-SAFE) are conducted for all departments responsible for design or construction support (including HHI MOS). Furthermore, awards are shown through presentations to select the outstanding assignments.

Methods of selecting awardees

Presentation and evaluation of subjects	Interim announcement and KPI evaluation for the first half of the year	Result announcement and KPI evaluation for the second half of the year	Company-wide examination and awards following the business unit evaluation
January~February	March~May	June~September	October
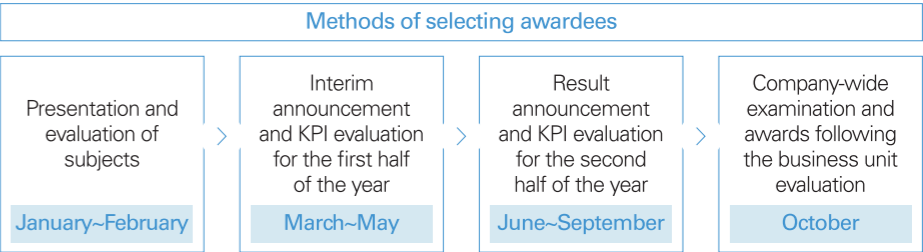
2021 awardees

Award	Business Unit	Department	Task	Award Amount
Grand Prize	Shipbuilding & Offshore Business Unit	System Design Department	Improvement to prevent falling while assembling /disassembling TRUSS for CCS work	KRW 10 million
Best Prize	Shipbuilding & Offshore Business Unit	LNG Construction Department	Development of a carriage to prevent caught-between while fastening small-module TRUSS columns	KRW 7 million
Excellence Award	Shipbuilding & Offshore Business Unit	Hull Construction Department 2	Improvement to prevent falling while closing hold openings in LNS hulls	KRW 5 million
	Engine & Machinery Business Unit	Propeller Construction Department	Improvement to prevent falling while conducting the molding sand filling process	
	Naval & Special Ship Business Unit	Special & Naval Ship Hull Design Department, Special & Naval Ship Hull Construction Department	Development of a system to provide information that is specific to each work process for the prevention of safety accidents by utilizing a smart assembly chart (3D)	
Participation Award	Shipbuilding & Offshore Business Unit	Hull Design Department	Removal of risk factors by modifying the interior structure of ships	KRW 3 million
	Shipbuilding & Offshore Business Unit	ITER Construction Department	Improvement to prevent suffocation while performing argon purging	
	Shipbuilding & Offshore Business Unit	Outfitting Department 1	Improvement to prevent suffocation by establishing standards for the ventilation of E/R zones	
	Shipbuilding & Offshore Business Unit	Piping and Electrical Device Design Department	Improvement of design standards for the safe installation of heavy piping materials	
Safety Improvement Award	Naval & Special Ship Business Unit	Special & Naval Ship Outfitting Department 2	Improvement to prevent falling while installing/arraying SPY-1D FDN	KRW 1 million
	Engine & Machinery Business Unit	Large Engine Technology Department	Improvement to prevent falling while performing piping work for WinGD X92-2's fuel leakage	
	Engine & Machinery Business Unit	2-Stroke Engine Engineering Department 1	Improvement to avoid being caught-between while working in an engine chamber	
	HHI MOS	Heavy Equipment Support Department	Improved block overturn prevention during block unloading operation at quay	

Instant awards

This is a system wherein safety workers and construction supervisors instantly award workers for their outstanding safety activities at the site. It plays a significant role in establishing a culture of self-regulated safety activities within the organization and strengthening the field safety control through safety intervention. On average, 7,349 coupons (KRW 36.75 million) are given each month as awards, and 6,780 coupons (KRW 33.9 million) are awarded by executive officers and employees each month (4,412 coupons are issued monthly by safety managers and 2,937 coupons by construction managers). Recently, the types of goods that may be exchanged for coupons have been changed, considering employees' preferences. Furthermore, the payment method is being changed from paper coupons to welfare points, which is expected to raise the satisfaction level of awards.

Self-encouraging participation in safety activities	Adapting safety activities through on-site instant awards whenever outstanding safety activities by workers are observed

Issuing complimentary coupons
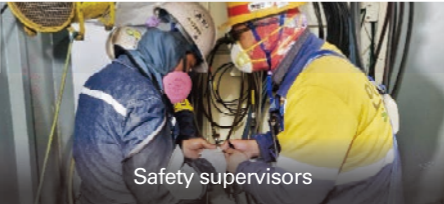
Safety supervisors

construction managers

Using complimentary coupons

Usable like cash	Exchangeable with goods
Usable like cash at canteens and nearby shops	Exchangeable with 24 different kinds of goods at department stores

Using welfare points (planned)

Usable at HHI Welfare Mall and other affiliated facilities

Instant awards by year

2017	2018	2019	2020	2021
71,499 cases	47,860 cases	59,815 cases	91,236 cases	88,141 cases
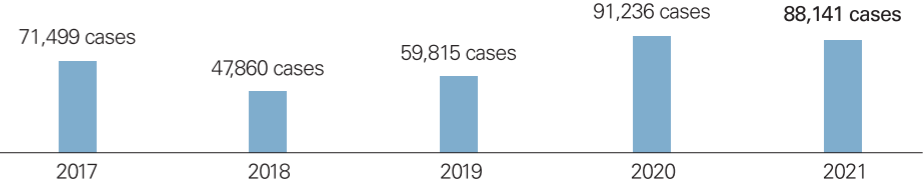
Awards for accident prevention contributor

An award is given based on the contribution grade after the internal deliberation of the Safety Management Group, along with a certificate of commendation issued by the Chief Safety Officer. It is granted to an employee who has contributed to minimizing damage from an accident by taking outstanding initial measures upon fire or a personal injury accident or preventing an accident by identifying a risk factor in the worksite and taking appropriate measures.

Awarding procedure

Construction Department	Business Unit Safety Management	Safety Management Group	Safety Management Group
Preparing a contribution report	Verifying/ examining facts	Final deliberation/ awarding	Managing the current status
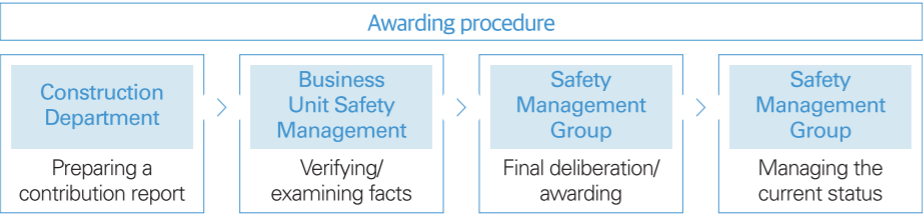
2021 major awards details

The Shipbuilding & Offshore Business Unit, 1 person (2000~2021)
→ For voluntary traffic signaling service by hand every morning for the past 21 years since 2000
The Shipbuilding & Offshore Business Unit, 2 persons (May 12, 2021)
→ For preventing further damage by immediately performing CPR on a coworker who had stopped breathing after falling down
The Shipbuilding & Offshore Business Unit, 1 person (September 27, 2021)
→ For averting further damage by promptly taking initial measures against a coworker whose behavior was unusual

Awards for outstanding supervisors

We have been promoting active safety intervention activities and fostering a self-regulated safety culture by selecting and recognizing supervisors for their outstanding safety performance.

Methods of selecting awardees

Calculation of points	Selection of candidates (three-times number of T/O)	Evaluation by each business unit (one-time number of T/O)	Final examination and notification to the Human Resources Team
Safety Planning Team	Safety Planning Team	Business Unit Safety Management	Safety Planning Team
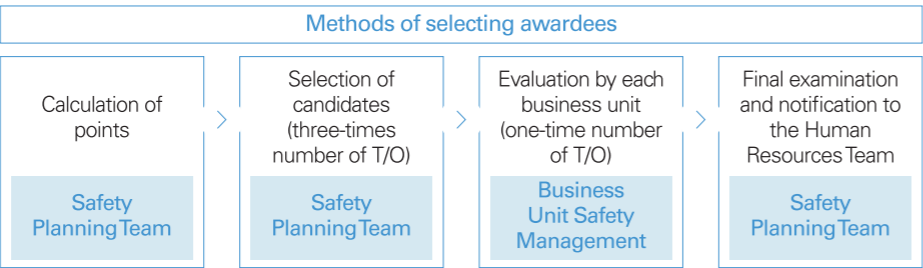
※ Calculation of points: Rule violations + Safety accidents + Safety activities + SLI

Scale of awards: Selected 36 persons in the first half of the year and 37 persons in the second half, and each received KRW 1 million

	Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Total
The first half of each year	Responsible section managers	10 persons	2 persons	2 persons	14 persons
	Construction team leaders	16 persons	2 persons	4 persons	22 persons
The second half of each year	Responsible section managers	11 persons	2 persons	2 persons	15 persons
	Construction team leaders	16 persons	2 persons	4 persons	22 persons
Total	Number of persons	53 persons	8 persons	12 persons	73 persons
	Amount	KRW 53 million	KRW 8 million	KRW 12 million	KRW 73 million

Awards for the subcontractors' safety officers for their outstanding safety performance

We increase the subcontractors' safety capability level and establish a self-regulated safety culture by selecting and recognizing the subcontractors' safety officers for their remarkable safety competency and outstanding safety management activities.

Scale of awards: Selected 14 persons in the first and second halves of the year, and each received KRW 500,000

Category	First Half	Second Half	Total
Awardees	7 persons	7 persons	14 persons
Cash award	KRW 3.5 million	KRW 3.5 million	KRW 7.0 million

Methods of selecting awardees

Quantitative evaluation (60)	Qualitative evaluation (40)
Accident indicators (20)	Evaluation by each business unit safety (20)
Safety inspection activities (20)	On-site safety management (10)
Subcontractors' evaluation results (20)	Safety communication (10)
Acquisition of safety-related qualification certificates (additional points)	Safety improvement activities (additional points)

Awards for the subcontractors' outstanding safety managers in 2021

	Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Total
The first half of each year	Number of persons	6 persons	–	1 person	7 persons
	Amount	KRW 3 million		KRW 0.5 million	KRW 3.5 million
The second half of each year	Number of persons	5 persons	1 person	1 person	7 persons
	Amount	KRW 2.5 million	KRW 0.5 million	KRW 0.5 million	KRW 3.5 million
Total	Number of persons	11 persons	1 person	2 persons	14 persons
	Amount	KRW 5.5 million	KRW 0.5 million	KRW 1 million	KRW 7 million

Awards for the outstanding safety supervisors of directly-controlled teams

We improve the safety sector expertise and communication capabilities of directly-controlled safety supervisors by evaluating their job competence and awarding them for their outstanding performance.

Scale of awards	Selected 16 persons in the first and second halves of the year, and each received KRW 500,000

Method of selecting awardees

Category	Safety Performance	Performance Evaluation	Qualifications/ Work Experience	Duty Training	Total
Distribution of Points	40 points	30 points	20 points	10 points	100 points
Criteria	Safety accidents in the assigned area, awards/ disciplinary actions, etc.	Evaluation results of responsible superiors	Safety-related qualification certificates, work experience	Evaluation results of the safety workers' job training	-

Evaluation results (First half of 2021)

Grade S	Grade A	Grade B	Grade C	Grade D	Total
8 persons (6%)	60 persons (43%)	66 persons (47%)	5 persons (4%)	0 person (0%)	139 persons (100%)

Safety performance (40%, 8 points)	**Evaluation items** - The achievement rate of the target accident rate (20%) - Results of subcontractors' safety activities (20%) **Evaluation details** - Similar to the current calculation formula of the accident rate evaluation - Quarterly applies the average value of the evaluation results of the subcontractors' safety activities ※ Serious accident - 2 points
Safety improvement (30%, 6 points)	**Evaluation items** - Results of the selection and implementation of safety improvement (Hi-SAFE) tasks (30%) - (Additional points) open innovation and improvement (maximum of 1.8 points) **Evaluation details** - Classifying improvement tasks based on their performance difficulty level and assessing the improvement progress rate - Giving additional points based on the number of improvement cases

Evaluation system diagram

Executive officers	Safety leadership: 30% (individual)	⊕	Safety Performance: 40% (organization)	⊕	Safety leadership: 30% (organization)
Head of Department managers	Leadership ⊕ Performance ⊕ Improvement "Head of Department Manager A"		Leadership ⊕ Performance ⊕ Improvement "Head of Department Manager B"		

Development and application of safety KPIs

Development of the new process-focused safety KPIs

HHI has improved its existing result-focused safety KPIs, such as the current accident rate, to indicators focused on preemptive safety activities, such as safety improvement and safety leadership. This encourages executive officers and department heads to engage in proactive and continuous field safety management activities and promotes a culture of proactive safety activities. In the first half of 2022, a safety leadership evaluation tool will be developed and implemented, and its reliability will be enhanced by engaging specialized external institutions to conduct a fair and objective evaluation. The company will do its best to become safer by implementing new safety KPIs for executive officers and head of department managers.

Improvement of KPIs for executive officers/head of department managers (proposal)

Safety leadership (30%, 6 points)	**Evaluation items** - Comprehensive evaluation of safety compliance, safety leadership within the organization, safety management plan, the power of execution, etc. **Evaluation details** - Questionnaires (multidimensional) + interviews (in person) - Ensuring fairness/objectivity through third-party evaluation (specialized external institution) ※ The development of an evaluation tool is in progress (expected to be completed in the first half of 2022)

Establishment of caring safety culture by promoting programs for safety intervention and monitoring

Adoption of safe work/behavior among workers through safety intervention programs

We have been conducting safety intervention activities based on the 1·3·5 campaign and 4S activities to prevent workplace accidents and disasters caused by hazardous work and unstable conditions. Each supervisor meets with at least five workers three times a day to discuss safety to practice the 1·3·5 campaign and perform more effective safety intervention activities by repeating Stop-Stay-See-Say activities (stopping, staying, watching, and discussing safety while inspecting hazardous work at the worksite).

1. Checking the permit to work (PTW) (work plan)
2. Reviewing whether any work is similar to any previous serious or significant accident
3. Reviewing works within the safety golden rules or the priority control items against significant accidents
4. Establishing and implementing a plan for the 1·3·5 campaign based on the review
5. Conducting 4S activities which should be monitored flows while conducting the 1·3·5 campaign
6. Examining the matters that must be included in the job standard among the 4S activity results (Feed-100%)

Establishment of activating the SSA to improve unsafe conditions

Workers are granted the SSA to request safety improvements from their supervisors if the working conditions are unsafe or if they are instructed to perform risky work. All workers on the worksite may activate their rights without negative consequences. Hence, the company continuously promotes the right to request safety work by using official letters, safety training materials, in-house newsletters, etc., to establish the exercise of the SSA. Upon a request to improve safety measures, the supervisor must submit their performance in the "Hi-SEs," an integrated HSE management system, after taking improvement measures to verify the improvement results.

Efficiency improvement of the Safety Innovation Advisory Committee

Holding meetings in the form of workshops by sector

HHI organizes and operates an advisory committee composed of professors, government officials, safety experts from innovative companies, etc. (8 persons). Since 2017, the Safety Innovation Advisory Committee has held quarterly meetings since the first term of advisors was commissioned. They have also contributed to HHI's distinct safety culture by listening to external experts' diagnoses and proposals for safety innovation plans and reflecting them into the safety policies. In 2021, the committee held short workshops for each subject to examine the Serious Accidents Punishment Act and the direction of its response but was unable to hold additional meetings because of the spread of COVID-19. The Safety Innovation Advisory Committee is expected to significantly strengthen internal safety and health in 2022 by providing fair working-level employees with opportunities. This is for them to learn and apply external information and knowledge in their work through its active activities.

Current status of advisors

Advisors	Profession	Specialized Area	Career
Jeong Jin-woo	Professor, Safety Engineering Department, Seoul National University of Science and Technology	Safety engineering and occupational safety and health law	Former Regional Director of the Ministry of Employment and Labor
Yoon Seok-jun	Professor, Korea University, Health Science Research Institute	Preventive medicine and corporate safety culture evaluation and improvement	Engineering Doctorate, University of Alaska Fairbanks
Lee Hun-Hee	The divisional head of DNV GL Business Assurance (BA) Korea	Safety and health management system and risk management	OHSAS 18001 certification of 3 shipbuilders
Shin Kwan-seop	Professor, Design and Human Engineering Department, Ulsan National Institute of Science and Technology (UNIST)	Human engineering and prevention of musculoskeletal disorders	Engineering Doctorate, North Carolina State University
Kahng Seong-kyu	Professor, Gachon University, College of Medical Science	Medicine of safety, health, and occupational environment	Former President of the Occupational Safety and Health Research Institute
Kim Jeong-ran	Korea Industrial Education Institute	Education	Education planning in the National Human Resources Development Institute of the Busan Metropolitan Government
Yim Wu-Taek	The Head of Safety and Health Division of the Korea Enterprises Federation	Law and policies of government agencies and enterprises	Policy expert for the Ministry of Employment and Labor
Yang Sang-cheol	Technical advisor to HHI	Safety in chemical engineering and safety and health systems	Former branch manager of the Korea Occupational Safety and Health Agency

Main activities of safety innovation advisors

Discussed subjects	details
Serious Accidents Punishment Act	Implications of the Serious Accidents Punishment Act and response strategy - Double application (this Act / the Occupational Safety and Health Act) is possible if this Act is enacted - It is difficult to develop a response strategy before establishing the subordinate regulations after the legislation - It is necessary to clarify the role and responsibility of business owners, managers, etc., and manage the performance of major activities related to safety and health

Reporting an HSE management plan to the board of directors

Reporting results to the board of directors

On February 3, 2021, the HHI held a board of directors meeting for the approval of the HSE Management Plan for 2021. The principal agenda included the HSE management policy, the organizations' composition and roles for the HSE management, the budget and the current status of facilities, and the results of and the plan for activities. All board of directors voted unanimously and approved the plan. In 2022, the Safety Management Group intends to obtain the board of directors' approval on the performance and plan for the HSE management under Article 14 of the Occupational Safety and Health Act.

Continuous implementation of the comprehensive safety initiative and comprehensive safety examination results

●

Current status of the comprehensive safety initiative to prevent serious accidents

HHI developed and implemented a comprehensive safety initiative to prevent serious accidents and improve operability, resulting in establishing a safety management system that succeeded in preventing three serious accidents this year. The initiative aims to establish an operability-based safety management system, operate an integrated risk management process, and strengthen subcontractors' safety management by utilizing smart safety management technologies. It also shares the value of "S1 management" with executive officers and employees. Thus, HHI continues to monitor the safety initiative to ensure that it functions effectively in the field.
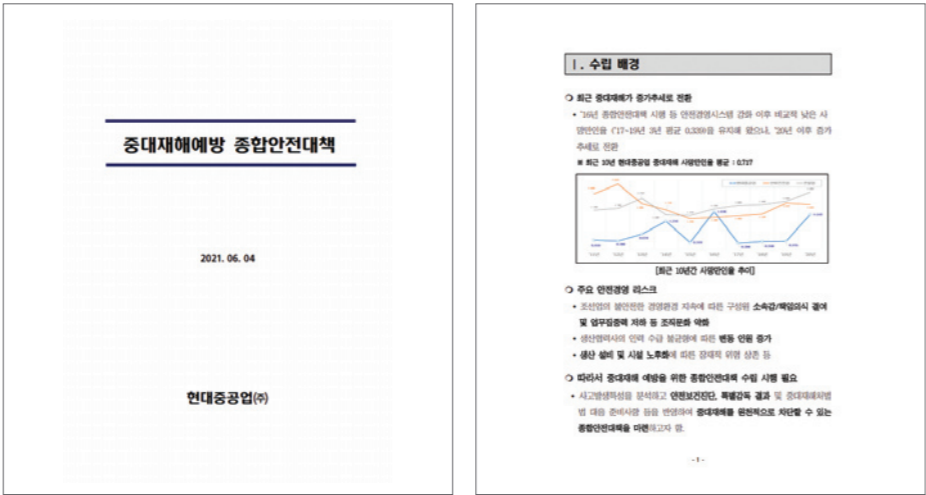
Main content and progress of the comprehensive safety initiative for preventing serious accidents

Establishment of an operability-based safety management system

Category	Performance Ratio	Details
Safety compliance system establishment	50%	• Developed a safety and health system and a compliance system following the implementation of the Serious Accidents Punishment Act
Safety personnel increase	50%	• Appointed new safety technical advisors on September 6, 2021 • Planned to increase the number of safety personnel by 20% until 2022
Safety investment budget increase	100%	• Raised the budget for safety and health investments (securing 2% of the turnover in advance) - Investment plan for 2021: KRW 226.3 billion • Operating a budget for investment in emergency safety facilities
Safety culture level examination	75%	• Upgraded the tool for internal examination of the safety culture level • Conducted a company-wide examination of the safety culture level (September~October 2021)
Sharing technologies among affiliated shipbuilders	100%	• Formed the Safety Management Council of 3 shipbuilders and held a meeting in October (October 8)

Construction, design, and safety integrated risk management process operation

Category	Performance Ratio	Details
Triple risk defense system development	100%	• Established a triple safety management system comprising supervisors, safety supervisors, and safety supervisor in construction departments - Supervisors: Developed a safety intervention system; compensated for their work - Safe clover: Conducted basic training programs and provided instant award coupons for safety intervention
Mobile-based safety work management	100%	• Developed a daily mobile safety information system - Utilizing job standards and risk assessment results provided by mobile for TBM
Standard work innovation by work unit	100%	• Completed data-based job standards and risk assessment system (Hi-STANDARD) • Standardized fieldwork by work unit and provided computer services
Risk assessment customization	75%	• Reviewing and enhancing the visualized risk assessment while considering the job standards • The system upgrade is in progress
Risk identification system innovation	100%	• Completed safety improvement activities (Hi-SAFE) • Conducted a "risk identifying contest" • The development of an open innovation system is in progress

Application of Smart Safety Management Technologies, such as DT

Category	Performance Ratio	Details
Upgrading the risk control system	50%	• Expanding the scope of integrated control to hazardous work areas, etc. - Attaching body cameras and promoting a risk work control system equipped with artificial intelligence (AI) CCTVs, etc.
Big data–based accident forecast system	100%	• Completed the joint development of a big data platform by 3 affiliates (October 2021) • Provided services through the system (November 2021)
Simulator-based inspection of work safety	100%	• Created five inspection system items (simulator) for each high-risk sector
Securing construction safety support facilities	50%	• Formulating standards for rating the safety of engine-powered equipment, such as cranes and forklifts • Considering the budget for safety and health management expenses and the safety rating system
Strengthening the chemical management system	75%	• Reinforcing the examination standards by adding skin-hazardous substances to the database of chemical substances subject to examination • Establishing an information and alert system for when new chemical substances are brought into the workplace

Development of a compliance culture

Category	Performance Ratio	Details
Operation of experience /practicum- based safety training programs	75%	• Renovated the entire safety training facility to conduct experience-based training programs and train new employees • Conducted training courses for eight high-risk jobs, including crane, scaffold, welding, special welding, piping/outfitting - The development of training curricula for the remaining three processes is in progress
Training programs tailored to the life cycle	50%	• Introduced the SCP program to provide safety training programs based on the life cycle systematically - Offering custom training programs by level and separating trainees into regular employees, supervisors, managers (executive officers), and the Safety Management
TBM promotion	100%	• Completed the standard TBM procedure, focusing on individual hazard awareness and the pointing and calling - Connected the daily mobile safety information system
Safety training program expansion for subcontractors	100%	• Developed essential safety training guidelines and standard teaching materials • Distributed a large volume of teaching materials for each type of accident

Improving subcontractors' safety management

Category	Performance Ratio	Details
Establishment of standards for selecting qualified contractors	50%	• Added safety management competency items subject to examination and evaluation for selecting contractors (applied on June 2021) - Examined the weight increase of safety management competency items • Improving the selection standards based on the guidelines of the Ministry of Employment and Labor for selecting contractors
Increase of assistance for safety management competency promotion	100%	• Expanded the programs for strengthening safety management competency to project subcontractors - Provided support for the expenses of appointing safety managers, assisted in obtaining the risk assessment certification, and featured in the entities subject to technical guidance/evaluation
Improvement of the safety activity evaluation	100%	• Improved the assessment of the subcontractors' safety and health level • Assessing the level of the subcontractors' safety officers
Expansion of safety communication	100%	• Holding meetings with the subcontractors' representatives, council, and subcontractors' safety officers

Current status of performance following the result of the comprehensive safety and health checkup

A comprehensive safety and health checkup was conducted to improve the fundamental system in HHI's safety management system because of the 4 serious accidents in 2020. Derived from the report are the examination results on various subjects, such as the organizational and safety culture, the safety and health management system, the assistance to subcontractors in safety and health, and the workplace environment. These results were categorized into 53 items, and the company has been monitoring the improvement results.
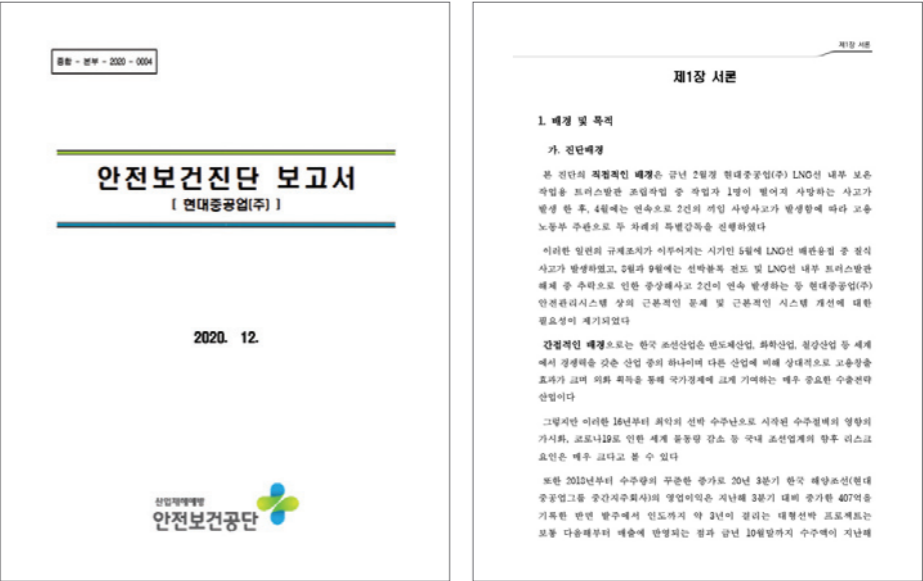
Highlights and Progress of the Comprehensive Safety and Health Examination

Serial No.	Category	Item	Matters Requiring Improvement	Improvement Measures Taken (Planned)	Whether Completed
1	Leadership and safety indicators	Organizational and safety culture / Safety and health management system	Developed/implemented a plan through which executive officers of all departments can contribute to safety and established an evaluation plan (KPI) - Provided feedback through periodic evaluations - Created and delivered custom safety leadership programs	• Improvement of executive officers/department managers' safety KPIs - Improved reactive indicators to proactive indicators - Increased the ratio of safety KPIs - Planned to connect the system with the SCP leadership training programs for executive officers (in the 3rd quarter of 2021)	Completed
2	Leadership and safety indicators	Organizational and safety culture	Established and implemented key behavior index (KBIs) by class (management / executive officers/ managers) for worksite employees to understand safety leadership	• Strengthened supervisors' safety activities by upgrading the SLI - Reflected safety intervention result and SSA action performance by supervisors	Completed
3	Leadership and safety indicators	Organization and safety culture / Safety and health management system	Upgrading SLIs (the connection with BBS, the establishment of a big data system of safety, etc.) - Included macroscopic indicators affecting the accident rate	• Improved the SLI - Reflected the points of safety intervention activities and SSA action performances, etc. - Analyzed correlations by separating leading and lagging indicators and established and reviewed the plan for establishing a big data system - Converted the results of safety activities, the improvement rate of risk assessment, etc., into a leading indicator and considered reflecting them in the SLI	Completed
4	Leadership and safety indicators	Safety and health management system	Utilization of safety management indicators - Directly-controlled employee: Determined the KPI based on individual and organization performance (prepared a system for reflecting performance assessment, promotion, etc.) - Subcontractor employee: Included the indicator of the management's safety-related activities in contracting regulations and linked it to incentives	• Improvement of safety KPIs of executive officers / head of department managers - Components of KPI: Safety leadership, safety performance, preventive measure performance	Completed
5	Leadership and safety indicators	Safety and health management system	Developed the quantitative indicator of subordinate organization activities to achieve the overall safety and health target (accident rate, the number of serious accidents) and linked it to performance indicators systematically	• Prepared standards for the establishment of detailed targets to attain the overall safety and health target	Completed
6	Safety communication	Organizational and safety culture	Streamed documentation related to on-site workers' safety suggestions and requests and established a compensation plan	• Conducting safety risk identifying contests regularly - Identified/improved the hazards hidden in the worksite - Received executive officers' and employees' suggestions and requests via mobile phone, mail, etc., and paid compensation	Completed
7	Safety communication	Organizational and safety culture	A plan to promote organizational trust and expand positive safety management - Established consistency in the control of safety rule violations - Improved safety-related terms for positive cognition	• Prepared a plan to promote organizational trust and expand positive safety management - Established guidelines for ensuring consistency in the control of safety rules violations - Selected company-wide safety slogans through executive officer and employee contests	Completed
8	Safety communicatio	Assistance to subcontractors in safety and health	Preparation and provision of separate guidelines for the workers' PPE information	• Improved the procedure for the subcontractors' PPE management - Improved supply process of safety shoes for subcontractors - Established guidelines for significant PPE	Completed
9	Safety organizations and personnel	Organization and safety culture	Establishment of a career path for promoting the expertise and support of safety department employees, safety supervisors, etc.	• Established a new occupational training program for safety in the SCP program - Manpower training, regular training, in-depth training	Completed
10	Safety organizations and personnel	Safety and health management system	Strengthening the authority of the safety planning department (Safety Management Group) - Standardizing the R&R for the planning/ management/implementation of safety targets and activities - Operating the system by raising the authority of safety organizations	• Retaining the Safety Management Group as an organization under the president's direct control • Creating the "S1" corporate culture • Improving the safety and health management system (strengthening the PLAN DO CHECK ACTION (PDCA) of safety and health activities by safety organizations)	Completed
11	Safety organizations and personnel	Safety and health management system / Safety job competency (resilience)	Defining the roles of the corporate organization and business unit organizations - Identifying the roles of the Safety Management Group and business units' safety departments - Modifying the R&R of each relevant person by implementing job standards in response to the excessive duplication of duties related to company-wide safety	• Reorganizing safety and health organizations by integrating construction and safety departments - Reorganizing safety and health organizations to assure the on-site operability of the high-risk management and ensure the operation of the integrated management support function - (Short-term) Transforming the Safety Management Group into a safety strategy department and strengthening the on-site risk management organization - (Long-term) The safety organization under the president's control was reorganized to monitor and audit. In contrast, the organization under the control of each business unit's head was restructured to have responsibility and authority for prevention/supervision	Completed
12	Safety organizations and personnel	Safety duty competency (resilience)	Includes the demand for superior decision-making by analyzing the underlying causes of accidents and near misses - Necessary to train specialized analysts	• Established a big data–based accident prediction system - Utilized data with high correlations by categorizing and computerizing accident-related data and developed an accident prediction model	Completed
13	Safety organizations and personnel	Safety duty competency (resilience)	Strengthening functions by increasing human resources for training, providing opportunities to improve expertise, developing high-quality teaching materials, and improving the training feedback system	• Established a new system for a company-wide safety training (SCP) • Continued improvements by establishing a system for collecting training feedback • Developed high-quality teaching materials and improved the experience-based training content	Completed
14	Safety organizations and personnel	Safety duty competency (resilience)	Because safety managers are responsible for the vast area and risks at the worksite, they frequently avoid their managers' monitoring and supervision. Thus, adding technologies or human resources is necessary to strengthen the monitoring function	• Long-term examination	Completed
15	Safety system	Workplace environment	Strengthening safety activities to establish the right to request safety improvement	• Conducted training programs and public activities through video safety training programs • Reflected the results of the measures taken for the SSA and SLI	Completed
16	Safety system	Workplace environment	Systematized workplaces and strengthened restrictions on access to areas other than the designated working area - In training programs for visiting workers on short-term projects of less than 15 days, the restrictions on access to areas other than the designated working area should be approached and enforced from the standpoint of "safety" rather than "security"	• As part of the safety training, the department applying for a short-term project provides a training course on the restrictions on access to areas other than the designated working area and for emergency response (2H) • The supervisors of the responsible department/ safety dupervisors conduct inspections regularly to check if someone is absent from the working area • Changed the content of the cyber training program for short-term visiting workers to safety-focused content	Completed

Serial No.	Category	Item	Matters Requiring Improvement	Improvement Measures Taken (Planned)	Whether Completed
17	Safety system	Safety and health management system	Improvement of the on-site operability based on risk assessment - Reflected the safety countermeasures of pre-work risk assessment in work permission - Safety departments: Determining if measures have been implemented at the worksite - Construction department: Verifying if measures have been followed before the work at the worksite and communicating through TBM - Interconnected and integrated activities to report a danger and suspend operations when an unexpected hazardous factor is detected	• Risk assessment tailored to the shipbuilding industry - Reconducted a risk assessment by developing an assessment technique that considers the shipbuilding industry design work, variability, and job standards	Completed
18	Safety system	Safety and health management system	Identification and preventive management of risk and potential factors related to serious accidents - The development of a system for classifying and analyzing accidents, a methodology for investigating accidents, and tools for risk assessment, and the evaluation of performance level, etc. (a tool for assessing the serious risk management level) - Periodic examinations of fieldwork using the assessment tool	• Innovation of the risk identification system - Conducting safety risk contests regularly - Operation of an open system for improving significant accident risks - Promotion of safety improvement (Hi-SAFE) by each organization • Established big data–based accident prediction system	Completed
19	Safety system	Safety and health management system	Composition of the serious risk management committee - Management of safety issues, including the establishment and assessment of relevant procedures, accident investigations, remedial measures, and safety proposals - Development of custom training programs by simulating the competency required to perform the roles of the chairperson and members - Evaluation and verification of the eligibility of personnel conducting the core procedure of high-risk work through an internal qualification system, etc.	• Operation of the safety management improvement committee - Operation of the safety management improvement committee as a permanent task force in preparation for significant accidents, safety issues, etc. - Taking improvement measures by each business unit after analyzing the improvement results (monitoring and providing feedback)	Completed
20	Safety system	Safety and health management system / Safety job competency (resilience)	Establishment of a PDCA implementation plan for all safety and health activities - Establishing a PDCA implementation plan in a cyclical structure - Creating an implementation plan, reflecting the circulation structure that links the inspection and implementation to the plan in all inspections, management, etc.	• Improving the integrated HSE management system (Hi-SEs) to measure and provide performance feedback about HSE result to construction departments' key areas • Applying the principle of PDCA to the safety and health activities of the Corporate Safety Management	Completed
21	Safety system	In-depth analysis of safety and health management system / Cause of accident	Developing an integrated information system on management, construction, personnel management, and safety - Developing an information support system interconnecting management objectives, work management, schedule management, organization management, etc. - Creating a construction-based safety system (checking the current status of major organizations' job standards, construction schedule, workforce placement, etc., and assisting in the design of a preventive safety plan) - Forming a sharing system for safety reports (assisting in voluntary reporting and detection of near misses and collecting, analyzing, and sharing near-miss reports in the entire company)	• A sharing system for safety reports is in progress - Created a computerized entry program for safety intervention and SSA • Developing integrated management system by planning, construction, human resource, and safety department (long-term review)	Completed
22	Safety system	Safety and health management system	Combined implementation of the performance evaluation system based on the priority activities for ISO certification and the result evaluation system for annual management plans - Conducting quantitative and qualitative evaluations of safety and health activities for each business unit under the Hi-SEs	• Improving the integrated HSE management system (Hi-SEs) to measure and provide performance feedback about HSE result to construction departments' key areas • Applying the principle of PDCA to the safety and health activities of the Corporate Safety Management	Completed
23	Safety system	Safety and health management system	Developing quantitative safety and health activity indicators - Preparing for new activities, setting objectives, and establishing a system for the evaluation of activity and feedback performance - Incorporating the new activities not reflected in the evaluation plan's annual plan and conducting a performance evaluation	• Improving the integrated HSE management system (Hi-SEs) to measure and provide performance feedback about HSE result to construction departments' key areas • Applying the principle of PDCA to the safety and health activities of the Corporate Safety Management	Completed
24	Job standard	Safety and health management system / Assistance to subcontractors in safety and health management / Safety duty competency (resilience)	Management of the system of job standards and the establishment and amendment procedure - Increasing the participants' authority in the construction of job standards and raising compensation - Establishing procedures for the construction and amendment of job standards (streamlining and systematizing existing standard work instructions in various forms after the construction job standards) - Developing standards to prevent variation regardless of who performs the work by complying with the fundamentals of construction - Integrating standard works with on-site implementation - Forming a rule-based work performance system and strengthening work procedure monitoring	• Improving job standards and risk assessment - Creating a database of all construction site work processes - Decreasing risks through each process' risk assessment - Monitoring the standard work compliance, etc.	Completed
25	Hazardous work management	Safety and health management system / Assistance to subcontractors in safety and health management / In-depth analysis of the cause of accidents	Improvement of the work permission system - Identifying the work requiring permission via computer/face-to-face (minimizing unnecessary face-to-face permission) - Streamlining the work permit procedure for PSM - Establishing regulations on permission for each work type and managing changes (creating a system for documenting and reporting work changes in ordinary/irregular/nonroutine work) - Strengthening the work permit system for short-term visiting workers (to be placed after assessing construction/safety risks) - Increasing the level of authority for issuing a face-to-face permit (to the safety section manager) - Conducting regular evaluation meetings on work permission	• Improving the work permission system - Clarifying the work requiring permission via computer/face-to-face/on-site - Reflected high-risk work (19 jobs) in jobs requiring "permission on-site" - Reflected the work requiring permission (at the PE area) - Strengthening the work permit system for short-term work, etc. - Enhancing the impact of work permits, etc.	Completed
26	Hazardous work management	Safety and health management system	Practical safety management of chemicals - Determining and utilizing methods for comprehensive hazard assessment of mixtures - A plan to increase the level of usage of on-site workers' Material Safety Data Sheet (MSDS)	• Strengthening the standards for chemical hazard examination - Examining the hazards of new chemical products through the chemical management system and allowing only appropriate products to be transported into the workplace (prohibiting the transport of highly hazardous chemicals) - Providing information on the hazard assessment of chemicals and broadening the information system for the notification of items subject to the MSDS education, etc.	Completed
27	Hazardous work management	Safety and health management system	Comprehensively identifying potentially unsafe activities, such as accidents involving being caught between big doors, and establishing improvement countermeasures	• Countermeasures must be continuously implemented	Completed
28	Health management	Organizational and safety culture	A plan to address employees' mental health and stress (expanding the role of relaxation gardens, facilities, etc.)	• Improving and operating programs for psychological recovery - Reducing the mental trauma of accident victims and facilitating their psychological recovery - Providing psychological treatment and counseling services in relaxation gardens (if necessary, additional counseling by medical specialists is also offered)	Completed

Serial No.	Category	Item	Matters Requiring Improvement	Improvement Measures Taken (Planned)	Whether Completed
29	Health management	Assistance to subcontractors in safety and health	Increasing health service workforce - Insufficient workforce to perform the duties of health managers - Appointing health managers for each production department to improve on-site health management or increasing the workforce of the Health Management Team to at least 20 persons (improving health management and postaccident health management with exclusively responsible personnel based on the production scale in each site)	• Improving subcontractors' health management - Conducting meetings with health management service providers and improving associated works - Strengthening the monitoring of small-scale subcontractors (with less than 50 employees)	Completed
30	Health management	Assistance to subcontractors in safety and health	Assisting subcontractors in health management and strengthening the supervision - Monitoring and supervising subcontractors' health management (situation surveys, including regular meetings with service providers) - Reviewing the reports on subcontractors' health management status and assisting them - Intensive management of vulnerable subcontractors in health management, such as examining their work environment and their medical checkup results - Inspecting subcontractors with less than 50 employees and no authorized service provider and raising their level of supervision		Completed
31	Production	Organizational and safety culture	Checking the current status of cooperation with MOS (crane, maintenance) to ensure smooth workflow and resolve problems	• Countermeasures must be continuously implemented	Completed
32	Production	Workplace environment	It is necessary to comprehensively review the causes of unreasonable overwork and address such issues by consulting with the safety department	• Workload management to prevent unreasonable rush work (allocation of work volume based on work hours of no more than nine hours) • Indicator management to prevent unnecessary rush work (management of the SEQENCE compliance rate)	Completed
33	Production	Assistance to subcontractors in safety and health	Flexible distribution of work volume among subcontractors without criteria for allocating work volume across directly-controlled teams and subcontractors in the construction sector	• Long-term review	Completed
34	Production	Workplace environment / Assistance to subcontractors in safety and health	Formulating an advanced construction plan by identifying and researching reasonable work hours - Creating a predictable workplace through an advanced construction plan (minimizing structural problems, such as additional work caused by inadequate construction plans) - Calculating and determining reasonable work hours by managing subcontractor progress payments - Appropriate work volume and work hour design (calculating work volume)	• Increasing the standard internal quantity per unit, considering adequate efficiency and work - Increasing the quantity per unit by reviewing periodically (one time/year) and occasionally - Adjusting the quantity per unit by reflecting safety-related improvements, etc. - Raising the quantity per unit by approximately 160,000 work hours compared with 2021	Completed
35	Design	Workplace environment	A plan to address the fluctuating number of skilled workers in design departments after voluntary resignation	• Producing/utilizing video products for training new/transferred workers • Strengthening the operation of the 1:1 mentor/mentee program • Improving skills through participation in design-related meetings	Completed
36	Design	Safety duty competency (resilience)	Improvement of change management - Design changes, etc., pose a high safety risk, requiring prior consultation or communication on work objects and details through change management - Redesigning the consultation process between the changing entity and the construction and safety departments	• Reflected safety-related matters while revising design drawings • Promoted design-construction joint review meetings • Upgraded simulator-based construction safety work	Completed
37	Subcontractors	Workplace environment	Increasing and adjusting the specified progress payment amount to enable subcontractors to participate in self-regulated safety and health management and improve the work environment	• Continuing the regular adjustment of unit prices by reflecting the annual inflation rates and changes in the government's policies	Completed
38	Subcontractors	Workplace environment	Adopting the safety and health management expenses of the construction industry as a model for distributing and paying safety and health management expenses	• Long-term examination	Completed
39	Subcontractors	Workplace environment	Considering the implementation of a monitoring system or a (tentatively called) personnel expense payment account system to ensure the subcontractors' payment of wages to workers	• Monitoring the subcontractors' payment for personnel expenses because of high legal risks, such as illegal dispatch	Completed
40	Subcontractors	Workplace environment	It is necessary to develop a plan for the stable operation of the workforce following the limitation of 52 work hours	• Continuously encouraging subcontractors to observe the legal work hours - Implementing various plans for subcontractors' stable operation of the workforce, such as the assistance in employing foreign workers and the negotiation of agreements on a network for the supply of technical workforce	Completed
41	Subcontractors	Workplace environment	Ensuring adequate wages for the subcontractors' workers - Stabilizing the subcontractors' employment. However, if stable wages are not guaranteed, there will be a demand for freelance teams (if the 52-hour workweek policy is implemented, workforce operation will become unstable, and the accident risk (volatility) will increase because of wage reduction)	• Monitoring the subcontractors' payment for personnel expenses because of high legal risks, such as illegal staffing practices	Completed
42	Subcontractors	Workplace environment	Considering short-term projects with internal subcontractors	• Long-term examination	Completed
43	Subcontractors	Assistance to subcontractors in safety and health	Appointing safety managers for project subcontractors, providing subsidies, and supplying various PPE, safety-related personal consumables, etc. at the same level as internal subcontractors	• Enhanced support for the promotion of safety management competency of project subcontractors	Completed
44	Subcontractors	Assistance to subcontractors in safety and health	Control of access to subcontractors' short-term workforce - Conducting comprehensive situational surveys on each subcontractor regularly (minimizing the ratio of freelance teams) - Considering the long-term installation of a speed gate	• Conducting situational surveys on each subcontractor's passes regularly • Considering the long-term installation of a speed gate - Consulting, etc. with the labor union	Completed
45	Subcontractors' safety management	Organizational and safety culture	A plan to promote safety competency among subcontractors whose safe management is inadequate (there is a considerable variation in subcontractors' safety management)	• Improved the safety assessment standards for promoting the subcontractors' safety competency - Appointed safety managers and improved and reflected evaluation items, such as supervisors' safety activities	Completed

Serial No.	Category	Item	Matters Requiring Improvement	Improvement Measures Taken (Planned)	Whether Completed
46	Subcontractors' safety management	Workplace environment	Appointing the leader of each team, composed of 10 workers, as a legal supervisor or granting such team leaders the authority to fulfill the duties of a nonlegal supervisor (granting the authority for requesting safety improvement and strengthening safety work responsibility)	• Granting the head of each team leader or foreperson the role and authority of a nonlegal supervisor (the SSA, safety intervention, etc.) • Evaluating the activities of team leaders or forepersons serving as supervisors while assessing subcontractors' safety management level	Completed
47	Subcontractors' safety management	Workplace environment	Introducing the buddy system to monitor the mutual safety of workers	• Implementing the buddy system in hazardous work areas - Work on the scaffold, work in confined spaces, work with heavy equipment, work with strict deadlines, etc.	Completed
48	Subcontractors' safety management	Workplace environment	Compliance with the measures adopted by the project owner to prevent industrial accidents for full-time subcontractors performing non-construction or support services	• Compliance with the measures adopted by the project owner to prevent industrial accidents, such as the composition and operation of a council of full-time subcontractors performing non-construction or support services and joint inspections	Completed
49	Subcontractors' safety management	Assistance to subcontractors in safety and health	Improvement in the selection of qualified contractors - Determining the subcontractors' qualifications based on the level of risk in each type of work	• Establishing standards for selecting qualified contractors - Adding safety assessment items to contractor selection standards and strengthening assessments - Conducting a thorough inspection of each subcontractor's safety management plan and countermeasures for risk management and accident prevention	Completed
50	Subcontractors' safety management	Assistance to subcontractors in safety and health	Improvement of the subcontractors' safety officers' performance - Eliminating the misconception that they are nonprofessionals - Providing promotion opportunities, expertise improvement, etc. (a plan to minimize the turnover rate) - Raising wages for safety managers	• Enhancing the safety assessment standards to promote subcontractors' safety competency - Appointing safety managers and improving and reflecting evaluation criteria, such as work experience	Completed
51	Subcontractors' safety management	Assistance to subcontractors in safety and health	Specialized management to ensure the timely and accurate distribution of protective equipment to subcontractors (legal protective equipment)	• Improved the procedure for the subcontractors' PPE management - Improved supply process of safety shoes for subcontractors - Established guidelines for major protective equipment	Completed
52	Subcontractors' safety management	Assistance to subcontractors in safety and health	Taking safety and health precautions in contracted projects under the Occupational Safety and Health Act, such as the council of internal subcontractors and joint safety inspections	• Taking safety and health precautions in contracted projects, such as the council of project subcontractors and joint safety inspections - Reflecting the standards for assessing the subcontractors' level of safety	Completed
53	Subcontractors' safety management	Assistance to subcontractors in safety and health	A risk assessment shall be conducted by prime contractors annually. However, the participation of subcontractors' safety officers for communication and cooperation shall be managed by organizing a safety council of prime contractors and subcontractors (quarterly)	• Verifying whether safety managers and safety/health management service providers participate in risk assessment and whether standards were established or amended during the quarterly evaluations of subcontractors	Completed

03
Enhancing the On-Site Operability of the HSE System

HHI has improved the HSE management system to meet international standards. It has also thoroughly reviewed and enhanced its safety guidelines to prevent safety accidents and voluntary HSE activities at the worksite and effectively applied them to on-site safety management.

Maintenance of the certification of the HSE Management System (ISO 45001)
●

Current status of the certification of the HSE Management System

We continue to hold the international certification of the HSE Management System (safety and health: ISO 45001; environment: ISO 14001). We upgraded the integrated HSE management system (Hi-SEs) to improve the operation of the HSE Management System and record and manage the main requirements for specifications using the computer system. We have also enhanced the monitoring and feedback functions through the system.

Furthermore, we have complied with the requirements of the ISO specifications and improved the system and on-site operability. We determined the current level of each department by conducting internal inspections with the inspection team composed of professionals who have completed the ISO training course for internal inspectors and providing guidance.
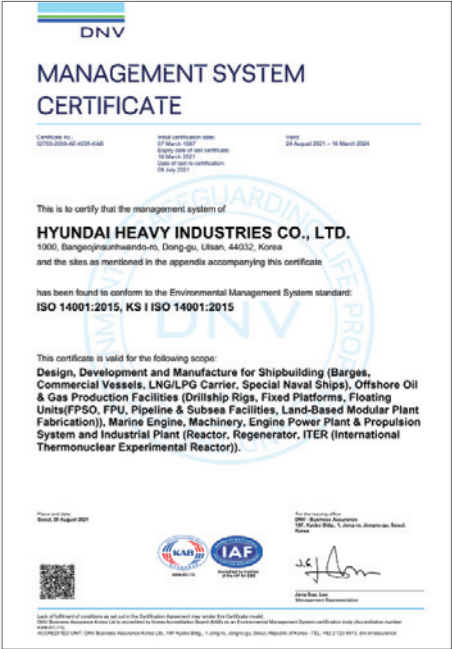
Highlights of internal inspection
●

Results of the 2021 internal inspection on the certification of the HSE Management System

Category	External
Period of Inspection	From June 9, 2021, to June 16, 2021 (6 days)
Inspectors	Safety Management Group personnel (5 persons)
Departments subject to an inspection	46 departments: Construction and support departments
Inspection results (number of cases)	86 nonconformity cases

Main deficiencies identified

Category	External
Emergency drills	Failed to prepare an organization chart for internal firefighting drills or conduct drills
Safety Training	Failed to prepare an annual training program and provide training programs to those with a record of absences and tardiness
Risk Management/Assessment	Failed to establish a plan for risk/opportunity assessment and improvement

※ Completed measures to rectify 86 nonconformity cases

Highlights of external inspection
●

Results of the 2021 external inspection on the certification of the HSE Management System

Category	External
Period of examination	From July 5, 2021, to July 9, 2021 (5 days)
Examiners	Examiners specialized in DNV (6 persons)
Departments subject to an examination	49 departments/teams - Construction and support departments: 46 departments - Safety Management Group: 3 teams
Inspection results (number of cases)	Noncompliance: 0 case / Monitoring: 1 case / Improvement recommendation: 27 cases

Main deficiencies identified

ISO 45001	ISO 14001
Risk assessment Inadequate details and omitted assessment **Work environment monitoring** Failed to establish adequate noise and dust prevention measures	**Environmental goals** Failed to consider Environmental aspects and company-wide environmental goals When setting environmental goals for each department

Results of remedial measures

Category	Nonconformity	Monitoring	Improvement recommendation	Total
Number of observed cases	0	1 case	26 case	**27 case**
Number of completed actions	0	1 case	26 case	**27 case**
Completed (%)	-	100%	100%	**100%**

Establishment and amendment of safety guidelines
●

Current status of the establishment and amendment of safety guidelines

The safety guidelines, which can be referred to as a white paper for on-site safety management, have been utilized for on-site safety management since its establishment in 2016. The guidelines contain detailed safety, health, and environmental guidelines that site supervisors and safety supervisors must know. The guidelines are amended or revised to reflect changes in the worksite, work process, or new equipment storage. This year, 12 new guidelines were established, including those covering the work with serious accidents, and 8 existing guidelines were amended.

Type of Work	Applicable Business Unit	Date of Establishment or Amendment	Times	Title	New or Amended
Equipment	Common	'21.11.24		Safety Guidelines for Excavator Work	New
Equipment	Shipbuilding	'21.09.17		Guidelines for Safety Management of Base Plate Tower Crane Work	New
Hoisting	Common	'21.04.04	2	Guidelines for Lugs and Support for Release	Amended
Miscellany	Shipbuilding & Offshore Business Unit	'21.01.14		Guidelines for the Installation and Management of Lighting Equipment (Offshore)	New
Equipmen	Common	'21.11.18		Safety Guidelines for Magnet Crane Work	New
Welding/ Cutting	Common	'21.07.27	5	Safety Guidelines for Gas Cutting Machines and Heating Torches	Amended
Painting	Shipbuilding	'21.06.18	2	Guidelines for the Installation of Ventilators for Painting (Grinding, Spraying) Work in a Confined Space	Amended
Welding/ Cutting	Shipbuilding	'21.06.18		Indoor Shop Work BLT / Guidelines for the Management of Longi PE and Module Unit Fitting (Shipbuilding)	New
Welding/ Cutting	Shipbuilding	'21.04.08		Indoor Shop Work PE / Guidelines for Safety Management in Shelter E Block Work (Shipbuilding)	New
Hoisting	Common	'21.03.06		Guidelines for the Usage of Lifting Lugs by Type and Application of Shackles	New
Hoisting	Common	'21.03.06		Specifications of Lifting Lugs by Type and Extent of Welding	New
Hoisting	Offshore	'21.03.05	1	Guidelines for Safety Work in Deck Plate Traction (Offshore)	Amended
Jig	Common	'21.02.14		Guidelines for the Registration and Management of Jigs	New
Jig	Common	'21.02.14		Guidelines for the Safety Marking and Regular Inspection of High-Risk Jigs	New
Equipment	Common	'21.02.12	1	Guidelines for Safety Work in Skid Loaders	Amended
Miscellany	Shipbuilding	'21.02.07		Guidelines for the Installation and Management of Lighting Fixtures in Hulls under Construction (Shipbuilding)	New
Welding/ Cutting	Common	'21.02.05	1	Guidelines for the Prevention of Electric Shocks in Plugging Welding Carriages, Semiautomatic Cutting Machines, and Heaters	New
Hoisting	Common	'21.01.16		Guidelines for Color (Pattern) Marking of Sling Belts by Tonnage	New
Equipment	Common	'21.01.09	2	Guidelines for Safety Work of Forklifts	Amended
Working at height	Common	'21.01.07	2	Guidelines for the Inspection of Scaffolds	Amended

04
Subcontractors' Self-Regulated Safety Systems

HHI has reestablished the safety management process of internal subcontractors, improved the evaluation standards for the safety management level, and continuously conducted empowerment programs to support safety and management activities fully.

Continuous operation of programs for improving subcontractors' safety management

HHI selects, supports, evaluates, and monitors subcontractors to promote specialized and qualified subcontractors who meet the productivity and safety requirements and assist them in safety activities. HHI has recently expanded the scope of such subcontractors to project subcontractors to accomplish their responsibility and duty as project owners. Thus, HHI will continue to consider all subcontractors as important business partners and will do its best to provide maximum support for safety and health activities.

Reestablishment of the safety management process of subcontractors

1. Selection of subcontractors	• Strengthening the evaluation of subcontractors for selection and dismissal - Increased the points allotted to the evaluation of the safety management level from 16 points to 20 points

2. Assistance in promoting safety management competency	• Expanded project subcontractor subsidies to cover the cost of appointing safety managers - Paying a maximum subsidy of KRW 3 million per month • Increasing subsidies by awarding outstanding safety management subcontractors - Awarding KRW 10 million quarterly • Improving the subsidization of safety and health management expenses - Separating subsidy and management separate from progress payments

3. Monitoring and evaluation of performance	• Expanded the scope of subcontractors under current status monitoring to project subcontractors • Evaluation of subcontractors' safety and health activities • Reflected the KPI for executive officers / department managers (20%) based on the evaluation results of the subcontractors' safety and health activities

Improvement of the standards for evaluating subcontractors' safety management level

In June this year, HHI amended and implemented the standards for selecting internal and project subcontractors to select specialized and qualified subcontractors who meet the productivity and safety requirements. New items receive 16 points, equivalent to 20% of 80 points, for examining safety management competency. In contrast, supplier selection evaluations are conducted from various viewpoints, such as safety, shared growth, and construction.

The selection standards will be improved based on the Ministry of Employment and Labor's guidelines for the contractor selection from January 2022. The standards for evaluating safety management competency will be further expanded to increase the points from 16 to 20. In internal construction projects, an evaluation statement on the safety and health management level of new subcontractors and the safety health management level upon the completion of a construction project was newly established. This ensures that subcontractors who have implemented a safety and health management system can award and perform contracted projects.

We expect to significantly contribute to subcontractor accident prevention by applying the new standards for selecting outstanding subcontractors capable of conducting risk assessment, such as establishing a safety and health management system and appointing safety managers.

Establishment of new items subject to the examination of safety management competency (completed improvement in June 2021)

Before change	After change
Examination factors	**Examination factors**
Management strategy (15) Stability in transactions (20) Business plan (30) Contractor's qualifications (15) Ability to perform the project (20)	Management strategy (12) Business plan (20) Ability to perform the project (16) Stability in transactions (8) Safety management competency (16) Contractor's qualifications (8) *Planning to adjust to 20 points
Total points: 100 points	Total points: 80 points (20 points are deducted for document examination)

Increasing and improving the weight of the evaluation of safety management competency (planning to be applied by January 2022 onward)

Evaluation sheet for safety management competency of internal and project subcontractors

Examination Item	Detailed Examination Item	Allotted Points				Evaluated Points
		Very Positive	Positive	Average	Negative	
Safety management system	1) Establishment of policies/goals for safety and health -Whether the policy conforms to our HSE policies and is practical and sustainable -Whether the goals are measurable 2) Action plan for accident prevention - Specificity of the action plan 3) Current status of the organization -The ratio of supervisor/safety managers to workers, etc	6	5	4	3	
Safety managers	1) Whether there are appointed safety managers -The precedence of qualifications in the appointment process	3	2	1	0	
Risk assessment	1) Ability to prepare job standards / risk assessments - Evaluation of samples of representative processes -The level of understanding of relevant processes/jobs	4	3	2	1	
Safety training	1) Safety and health training plan - Adequacy of the training plan for workers 2) Current status of the instructor pool for safety and health training - Instructors' qualities and work experience	4	3	2	1	
Emergency measures	1) Development of a safety and health organization chart (communication network) - Establishment of specific communication systems, responsibilities and powers, etc.	3	2	1	0	
Current status of occupational accidents	1) Number of cases identified as occupational accidents (confirmed by the Korea Workers' Compensation & Welfare Service) - Confirmed the number of accidents over the past two years	Deducted points				
Total points						20

Safety and health level evaluation report in a construction project

Safety and health level evaluation report of a new subcontractor

Construction completion safety and health level evaluation report

Strengthening safety management of short-term variable workforce
●

Operation of an empowerment plan for the project subcontractors' safety management

The empowerment plan for internal subcontractors' safety management has been extended to project subcontractors. HHI granted a maximum subsidy of KRW 3 million per subcontractor for the costs of appointing safety managers to support subcontractors in promoting their safety management expertise and lessen their burden. Quarterly awards of up to KRW 10 million are offered to outstanding subcontractors in safety management. In addition to progress payments, a subsidy for safety and health management expenses is paid to share the financial burden of safety and health management.

Current program
• Differentiated payment based on appointment qualification requirements

	Class 1	Class 2~3
	KRW 2 million	KRW 1.8 million

• Eligible persons: Maximum of 2 persons (50 persons or more)

Expanded program (proposed)
• Differentiated payment based on appointment qualification requirements (maintaining the current program) • Increase (addition) in subsidies based on the employment duration

Employment Period	Class 1	Class 2	Class 3
Less than 1 year	KRW 2 million	KRW 1.8 million	KRW 1.8 million
1~3 years	KRW 2.5 million	KRW 2.3 million	KRW 2 million
3 years or more	KRW 3 million	KRW 2.5 million	KRW 2 million

• Eligible persons: Maximum of 2 persons (100 persons or more)

Strengthening the management of hazardous work in short-term construction projects

HHI offers all external subcontractors who enter its premises for short-term work a one-hour cyber training program, a two-hour safety training program at the relevant business unit, and a two-hour training program at the relevant department. Through these programs, the company supports short-term project workers in understanding HHI's worksite and identifying risk factors, allowing them to work safely. In addition, short-term project workers must get a permit for hazardous work when applying for access to the short-term project so that relevant supervisors and safety workers can manage the relevant work.

Hazardous work management process for short-term projects

Application for a short-term project → Completion of the one-hour cyber training program for visiting workers → Request for a hazardous work permit → Entry of workers → Completion of a two-hour training program in the Safety Management of the relevant business unit → Completion of a two-hour training program at the relevant department → Face-to-face meeting with safety workers (work coordination, etc.) → Deployment of workers to the project site

Implementation of the obligation and support to obtain the "recognition of an outstanding workplace in risk assessment" from the Korea Occupational Safety and Health Agency

HHI requires internal subcontractors to compulsorily obtain the "recognition of an outstanding workplace in risk assessment" under the system that the Korea Occupational Safety and Health Agency implements for small workplaces with less than 100 workers to establish a risk assessment system and provide support.

Category	Number of Subcontractors	Notes
Workplace with less than 50 workers	8	Recognition rate: 62% (increased by 10% compared with 2019) * 78 subcontractors who have less than 100 workers (as of October 2020)
Workplace with less than 100 workers	39	
Total	47	

05
Increasing the Statistical Data Usability

HHI established standards for accident rate management by utilizing reliable data, such as accident statistics, and contributes to safety management activities scientifically.

Establishing annual target accident rate
●

Establishment of standards for the management of the targeted accident rate for the following year, based on the accident rate trend over the past 10 years

The group's three shipbuilding companies (HHI, Hyundai Mipo Dockyard, and Hyundai Samho Heavy Industries) have standardized and implemented the method for establishing target accident rate. In 2021, the companies determined the target accident rate for HHI (0.179) and Hyundai Samho Heavy Industries (0.184) using the linear regression model. The three shipbuilders plan to formulate the target accident rate using the linear regression model beginning in 2022.

Legend: Accident rate (result); Accident rate (target); Linear (accident rate (result))

Data points — Accident rate (result): 2015: 0.148, 2016: 0.205, 2017: 0.214, 2018: 0.193, 2019: 0.172, 2020: 0.139, 2021 estimate: 0.179, 2022 target: 0.195, 2023 target: 0.182, 2024 target: 0.168

Accident rate (target): 2015: 0.273, 2016: 0.265, 2017: 0.327, 2018: 0.247, 2019: 0.184, 2020: 0.251, 2021 estimate: 0.224
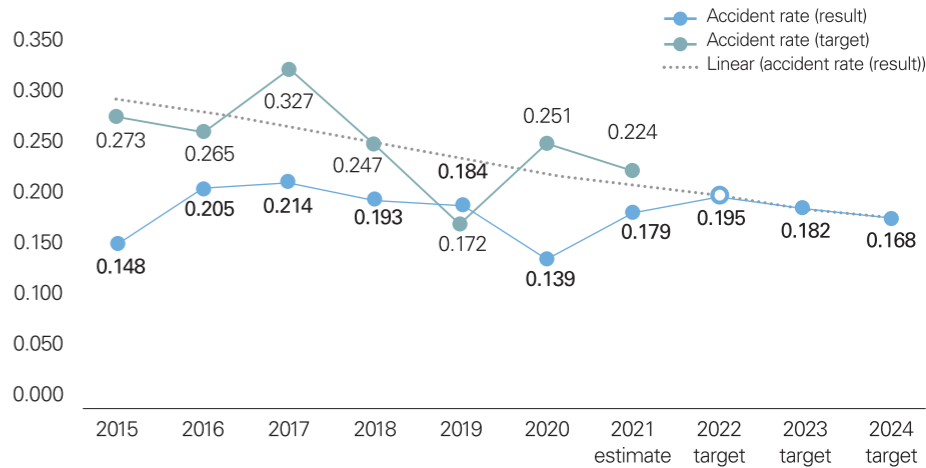
HHI established the 2021 target accident rate of 0.179, while the 2021 estimated accident rate was 0.224, which fell short of the target. Based on the estimated 2021 accident rate, the target accident rate for 2022 was set at 0.195. Hence, we will create a safety culture where employees collaborate to achieve the target accident rate for 2022.

06
Establishing Job standards and a Risk Assessment System

HHI has been fully committed to safety management to maximize the safety of work activities and the efficiency of work processes on the worksite. Thus, it reestablishes and systematizes job standards, develops a system for risk assessment, and strengthens the worksite system.

Reestablishment and systematization of job standards
●

We reestablished job standards to create and maintain job standards for all processes in the construction site without exception. We reclassified the entire construction process, from stockpiling steel materials to processing, cutting, assembling, drying, mounting, painting, and trial operation, and established job standards based on the classified process flow (process job standards). Moreover, separate job standards were formed for the commonly performed tasks (welding machine operation, crane movement, forklift operation, etc.) across various processes, and detailed work methods and precautions were arranged in order (functional job standards). As such, we aim to formulate and systematically maintain standards for all work based on the process flow by reestablishing job standards.

Rearrangement of separator values resulting from process reclassification (classified into large/medium/small categories)

대구분	중구분	소구분
가공	공통	Truss 설치
대조립	관철	UT검사
의장생산	기동	갑판피복
선행의장	냉동	검사
선행도장	도장	계류시운전 지원
건조	도장검사	계류작업
기계의장	목의장/설비/보온	고소차
후행도장	반목	곡성형
LNG공사	보기	곡중조
시운전	비파괴	공조
공사지원	선PE	구명정
기능	선각	그라인딩
발판지원	선거	기계가공
선실생산	선실	기계의장검사

Development of a database for standard risk factors
●

Risk assessment contains a series of processes for estimating risks by identifying risk factors through fieldwork inspection, including reviewing job standards, and forming improvement measures. Among them, identifying risk factors is the most important. If risk assessment is not performed accurately, accidents caused by hidden risks are always possible. Thus, we have analyzed accidents in our workplace and risk assessment results to identify all risk factors in the workplace and find the most common risk factors (standard risk factors).

Standard risk factors are applied to risk assessment through the Hi-STANDARD system, main keywords are extracted using text analysis included in each work activities. Then, risk factors related to those keywords are shown as options, preventing the evaluator from overlooking any hidden risk factor. Through the management of standard risk factors, we expect that the risk assessment level of our workplace will be increased.

Improvement of risk factor classification system

Category	Details	Type of Related Accident
Mechanical Factors	Cought between	Cought between
	Amputation, cut, or scratch (hazardous surface)	Amputation, cutting
	Slip/trip	Slip/trip
	Falling (risk of fall)	Falling
	Collision	Collision
	Risk of falling materials (machines)	Falling object
	Risk of flying materials (machines)	Flying object
	Risk of overturning materials (machines)	Overturning materials
	Contact with an abnormal temperature, burn, or frostbite	Contact with an abnormal temperature
	Risk of fire/explosion	Risk of fire/explosion
Causes of work behavior	Unstable working position, working (operating) tools	ALL
	Workers' mistake (human error)	ALL
	Handling of a heavy object, repetitive work	Musculoskeletal disorder
Chemical factors	Gas, steam, fume	Fire/explosion
	Solid (dust), liquid, mist	Fire/explosion, disease
	Risk of fire/explosion	Fire/explosion
Electrical Factors	Electric shock	Electric shock
	Risk of fire/explosion	Fire/explosion
Working condition factor	Risk of suffocation, an area lacking oxygen	Suffocation
	Lighting, space, passage	ALL
	Noise, ultrasonic wave, infrasound, vibration	Musculoskeletal disorders

Establishment of a system-based risk assessment system

Revision of detailed management rules on risk assessment and distribution of manuals

The detailed risk assessment management rules were revised along with the development of job standards and the risk assessment management system, and related manuals were distributed throughout the company. The newly revised risk assessment management rules improved the risk assessment criteria from the existing 3 x 3 method to 5 x 5, enabling a more extensive and subdivided risk assessment. Based on the risk assessment score, a risk of no more than 9 points is classified as an acceptable risk, whereas a risk of no less than 10 points requires immediate improvement measures. It is because improvement measures can be taken based on the severity (priority) of risk factors.

Detailed management rules on risk assessment

Hi-STANDARD manual

Establishment of job standards and a risk assessment computer system

Development of the Hi-STANDARD system

The job standards, which had been managed as a "standard work guide / hazard risk assessment report" in the existing Excel file format, were reorganized based on the working methods of construction plants and worksites. In April, they were subdivided into unit work, work activities, and information verification to develop the Hi-STANDARD system as a practical job standard system that can be used for various purposes, and the system is now operated. The reorganized job standards and the risk assessment results were converted into data and linked with standard risk factors and the integrated safety and health system (Hi-SEs) to establish a system that systematically enables us to conduct a risk assessment and monitor the implementation status at any time.

Current program		Improvement	
Management	Managed in an Excel format	Management	System-based data management
Characteristic	It is difficult to share revised data and manage the history of its revision	Characteristic	The entire company can share data and manage the history of its revision
Composition	Mainly contains text	Composition	A large volume of site photos, diagrams, and graphs are attached

Regular risk assessment

We conducted a regular risk assessment upon launching the Hi-STANDARD system in April 2021. In July, the second regular risk assessment was executed for all job standards, resulting in completing risk assessments of 7,868 cases. Hence, we established special risk control measures, and managed the results based on the PDCA procedure to lessen the significant risks discovered from the assessments.

Exemplary case of job standards (Accomodation Construction Department)

Exemplary case of risk assessment (Seungri Engineering Co., Ltd.)

Category	Details
Assessment period	April (first assessment), July (second assessment), and other occasional assessments
Assessed organizations	Construction support departments and internal subcontractors
Assessment results	Established the job standards for 4,510 cases and the risk assessment for 7,868 cases in directly-controlled teams / Established the job standards for 4,205 cases and the risk assessment for 4,239 cases in subcontractors

Current status of the Hi-STANDARD system

Job standards and risk assessments have been developed in collaboration with construction/support departments since the launch of the Hi-STANDARD system in April 2021. Consequently, the job standards for 4,510 cases and the risk assessment for 7,868 cases have been developed and are now in operation at the worksite. By enhancing job standards and risk assessment, the company intends to establish job standards that even new employees can easily comply with and a risk assessment that uncovers all work-related risk factors.

Category	Job standards	Risk Assessment	Category	Job standards	Risk Assessment
Shipbuilding & Offshore Business Unit — Indoor Shop Works 1	519	575	Engine & Machinery Business Unit — Material/Propeller	39	78
Indoor Shop Works 2	594	995	Crank/Processing	32	52
Indoor Shop Works 3	218	366	Large Engine Assembling	73	129
Outdoor Shop Work 1	119	610	Test Operation/Performance	66	176
Outdoor Shop Work 2	235	786	Construction, Others	39	39
Outdoor Shop Work 3	116	164	Subtotal	249	474
Cabin	96	175	Management — Management Support	95	97
Painting	273	299	U/T	242	242
H Dock	267	283	MOS — Indoor shop Work Equipment	34	41
Offshore Outdoor Shop Work	276	602	Preservation	600	600
Test Operation	396	1156	Outdoor Shop Work Equipment	50	85
Quality/Others	79	206	Heavy Equipment	52	112
Subtotal	3,188	6,217	Subtotal	978	1,080

Health   Safety

Environment

Management Performance of the Safety Culture Team

The Safety Culture Team continues to develop safety training programs to inspire and raise executive officers' and employees' safety awareness, operate the safety training infrastructure composed of the latest technologies and experts, provide realistic experience/practicum-based curricula, and create the groundwork for zero accidents. In addition, it assesses the safety culture level and strengthens our safety competency to enhance safety awareness.

01
Safety Culture Team Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Improvement of the field-oriented safety training quality	**Improving the effect of the workers' mandatory regular safety and health training programs** • Increasing the effect of safety training by offering experience/practicum-based training programs to workers engaged in a high-risk job (4 hr/year) ※ High-risk jobs (8 jobs): Welding, special welding, fitting, grinding, pipe outfitting, spraying, blasting, crane work, scaffold • Enhancing the effect of training programs by improving the composing methods and implementing monthly safety and health training programs	**Improving the effect of the workers' mandatory regular safety and health training programs** • Establishing the infrastructure for practicum/experience-based safety training programs and providing such training programs • Promoting the utilization of training hours by increasing the duration of each training course and the composing methods and implementing educational courses	Continually Continually	Whether an infrastructure was established and training programs were provided Whether training programs were improved	100% 100%		Continuous improvements by reviewing/reflecting feedback Examining whether additional improvements are necessary
	Developing and implementing the SCP(Safety Career Path) • Planning and implementing detailed curricula for each step of the SCP system established in 2020 • SCP 1 (Step 1~3): Regular employees (training programs for new employees, regular safety and health training programs, training programs for potential supervisors) • SCP 2 (Step 1~3): Supervisors (training programs for newly appointed supervisors, regular training programs for supervisors) • SCP 3 (Step 1~2): Executive officers (training programs for newly appointed executive officers, refresher training programs for executive officers) • SCP S (Step 1~3): Safety Management (training programs for being site safety supervisors, competency improvement training for HSE professionals	**Developing and implementing the SCP** • Established and launched the SCP system: 15 courses, 23 modules, and 78 curricula • SCP 1 (Step 1~3): Regular employees (training programs for new employees, regular safety and health training programs, training programs for potential supervisors) • SCP 2 (Step 1~3): Developing training programs for supervisors (training programs for new supervisors, regular training programs for supervisors) • SCP 3 (Step 1~2): Implementing training programs for executive officers (training programs for new executive officers, supplementary training programs for executive officers) • SCP S (Step 1~3): Establishing training programs for the Safety Management (training programs for being site safety supervisors, competency improvement training for HSE professionals)	When it occurs	Number of Curricula under Development / Number of Developed Curricula	75%		Developed in January 2022
	Promoting the operation of the Integrated Safety Training Center and safety experience training facility • Ensuring operation expertise by reorganizing entrusted operating institutions and managing personnel efficiently • Establishing the infrastructure for experience/practicum-based training programs through the partial improvement of the Integrated Safety Training Center • Enhancing the quality of safety training programs for new employees through the overall improvement of the safety experience training facility	**Promoting the Integrated Safety Training Center and safety experience training facility** • Evaluating the entrusted operating institutions and selecting new operating institutions • Establishing the infrastructure for Integrated Safety Training Center's experience/practicum-based training programs and offering training aids • Renovating the safety experience training facility's infrastructure and improving the curricula	Continually Continually Continually	Improving personnel management efficiency Whether an educational infrastructure was established Whether the training facility was renovated	100% 100% 100%		Changing entrusted operating institutions Examining additionally required training aids Promoting the utilization of the training facility
	Developing content for safety training through the information and communication technology (ICT) convergence and establishing a database • Opening a new space for the storage/management of the safety training's content database (in Hi-SEs) • Producing and distributing custom content for safety training by job category and period (videos, photos/image files, etc.) • Enhancing the effect of training by expanding experience-based training programs through new technologies, such as augmented reality / extended reality (AR/XR) (experiencing significant accidents, etc.)	**Developing content for safety training through ICT convergence and establishing a database** • Introducing a new QR code attendance management system and reflecting the database system for all safety training programs in the budget for the following year • Producing and utilizing micro-learning content for safety training • Producing additional VR content for safety training: 13 products in total	When necessary Two products/month When necessary	QR code: 20% / System: 80% Number of products per month Number of Products Made / Number of Products Planned	20% 0% 10%	The QR code is currently in use / the system's development will begin next year The plan was established, and the construction will begin next year The plan was established, and the construction of two products began	To be reflected in the 2022 plan To be reflected in the 2022 plan To be reflected in the 2022 plan
	Strengthening and supporting safety and health training programs by class/course • Developing/implementing new training content • Improving and strengthening the operation of safety and health training programs for foreigners (providing separate programs for each country/job and applying experience/practice-based training methods) • Enhancing the quality of internal qualification training programs through a comprehensive review (searching for and improving training content through surveys on the level of satisfaction with training programs and demand for programs)	**Strengthening and supporting safety and health training programs by class/course** • Developing/implementing new training content • Improving and strengthening the operation of safety and health training programs for foreigners (providing separate programs for each country/job and applying experience/practice-based training methods) • Enhancing the quality of internal qualification training programs through a comprehensive review (searching for and improving training content through surveys on the level of satisfaction with training programs and demand for the programs)	Annually Annually Annually	Whether the content was produced for each new/regular course Conducting training programs once a year Conducting or improving training programs once a year	25% 0% 50%	Developed an exclusive regular course for supervisors Minimized collective training programs because of the spread of the COVID-19 Completed training programs this year / the improvement plan will be implemented next year	To be reflected in the 2022 plan To be reflected in the 2022 plan Reflected in the improved plan for 2022

| Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Improvement of the field-oriented safety training quality	**Improving safety training programs for external visitors** • Providing information on safety regulations to ordinary visitors (other than short-term project workforce) (via mobile messenger services, etc.) • Improving the monitoring method of the results of the training programs provided to short-term project visitors (online training programs, etc.) ※ Strengthening the monitoring of training programs by reflecting the training program results of short-term projects in the SLI for the training program evaluation	**Improving safety training programs for external visitors** • The development of a mobile messenger service is in progress • All training programs for short-term project workforce are conducted in the Integrated Safety Training Center	Continually Continually	Whether mobile messenger services are applied Whether the monitoring method was improved	0% 25%	Included in the 2022 plan for the development of internal systems Continuously improving the programs	To be reflected in the 2022 plan To be reflected in the 2022 plan
Safety inspection	**Strengthening the management of hazardous machines, instruments, and equipment** • Conducting mandatory regular safety inspections (approximately 2,400 EA): The first half of each year (March) and the second half of each year (September) • Improving the integrated management system for safety inspection: Managing the registration by linking the QR codes of equipment	**Conducting mandatory regular safety inspections on hazardous machines and instruments: 2,321 units of hazardous machines and instruments** • The first half of the year (March): Inspected 732 units (504 cranes, 199 pressure vessels, 6 lifts, 23 mobile car cranes) • The 1st safety inspection for the second half of the year (September): Inspected 454 units (192 cranes, 250 pressure vessels, 12 lifts) • The 2nd inspection for the second half of the year (November): Inspected 1,135 units (3 cranes, 15 shearing machines, 1,117 gondolas) **Improving the Hi-SEs integrated management system for safety inspection** • Changing the management items in the current management status of dangerous machines and instruments • Managing the registration by linking the QR codes of equipment	One time/ Semiannually When it occurs	Number of units planned / Number of units inspected Development progress rate - Under planning (25%) - Partially changed (30%) - Completed the development (100%)	100% 25%		
Establishing a construction-led and self-regulated safety management system	**Utilizing an ICT-converged smart safety management system** • Developing a plan to improve safety management by introducing and utilizing a heavy equipment qualification management system (installing a qualification certification system, etc.) ※ Implemented a qualification certification system for cherry pickers in 2020 and analyzed and monitored the effect of the system	**Utilizing an ICT-converged smart safety management system** • Monitoring and managing the effect of the tagging system for cherry pickers	Continually	Maintenance and repair when an issue occurs	100%		

02
Improving the Quality of Field-Oriented Safety Training

HHI operates the Integrated Safety Training Center, the largest safety training facility designed to teach workers safety work procedures for each job in research, practice, and experience concurrently in the simulated workplace. This institution features 11 training facilities (5 for research, 5 for practice, and 1 for experience) and 52 in-house expert instructors. The in-house expert instructors have at least 10 years of relevant work experience and comprise worksite supervisors and Safety Management personnel. Furthermore, the Technical Skill Assessment Center (a welding assessment, a mechanical/electrical training, and a painting/blasting training facility) was introduced in the second half of 2019 as an additional training infrastructure.

Safety Training Center

Lifting job
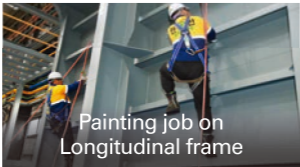
Painting job on Longitudinal frame

Working on gondola
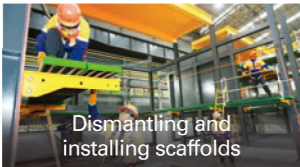
Dismantling and installing scaffolds

Knot method

Operating gargo crane

Accident experience

Improving the effect of mandatory safety and health training programs for workers

Providing experience/practicum-based training programs to workers engaged in a high-risk job

New training courses were provided to enable workers in high-risk jobs to directly or indirectly experience and practice the job and avoid significant accidents in the company. The new training courses consist of eight courses, including welding, special welding, piping/outfitting, spraying, blasting, crane work, and scaffolding work. Furthermore, they are offered to all workers who perform jobs related to such courses. Each education course consists of safety standards, accident cases, practice/experience, related videos, etc., and is expected to substantially contribute to the prevention of safety accidents.

Improving the effect of monthly regular safety and health training courses

Introducing the QR-code attendance management system to safety training programs

The replacement of the traditional attendance management system, wherein attendance is checked by a signed attendance register, with a computerized QR-code attendance management system eliminated unnecessary work and significantly improved the management of training program results.

Automated entry of the dates of confirmed participation or attendance after adopting the QR attendance system

Implementing online regular safety and health training programs for office workers

In 2020, the traditional regular safety and health training programs for office workers, which had also been conducted for construction workers, were changed to online self-regulated learning programs to provide custom safety training programs to office workers. An online assessment is performed during each training course to remind trainees of the training course's content. In addition, cyber training programs for office workers have been shown to increase the completion ratio of training programs and office workers' awareness and concern about safety and health.

Trainees

Office workers and researchers in non-construction departments of HHI / Korea Shipbuilding & Offshore Engineering (approximately 4,300 persons)

Training method

Voluntary and quarterly participation in the self-regulated learning of the training content (3 hr/quarter)

Training content

- Understanding in the Occupational Safety and Health Act
- Understanding the Industrial Accident Compensation Insurance System
- Prevention and control of the visual display terminal (VDT) syndrome
- Consists of 12 subjects, including the prevention and control of cardiovascular diseases

Main safety and health training programs in 2021

Classifications	Training target		Number of trainee	Training hours	Number of training sessions
Mandatory training	Safety and health training programs for the job change of supervisors (HHI)		789	16	31
	supervisors (subcontractors)		1,089	16	
	new employees (subcontractors)		6,755	8	272
	transferred employees				
Duties	Visiting workers	Less than 15 days	17,233	1	Online
		15 days or more	193	2	Occasional
	Safety Academy(golden safety rules violators)		194	8	8
Qualifications	Internal qualification	Crane signaller Lv1	771	8	41
		Crane signaller Lv2	157	16	9
		Crane signaller Lv3	-	16	-
		Pendant remote-controlled crane	546	4	41
		Cherry picker	294	16	21
		Gondola	239	4	18
Collective agreement	Safety training for labor union members in construction or technical work		6,057	8	28 +Online

Development and operation of the SCP system

The SCP system is a phased safety training program in which regular safety training courses are offered based on its curriculum system to enhance the safety competency and the level of awareness required for each class of trainees' responsibility and role. The SCP system was introduced to establish a training system using the existing training courses. In addition, it enhances the safety competency of executive officers and employees, allowing safety training programs to be provided to each job class/category systematically (construction / office work / executive officer / safety).

Enhancing executive officers' safety management competency
Implementing a competency-based training
system required by each job class and each department to recognize the value of safety

Securing continuity and sustainability through phased safety training	Designing training content based on competency and job	Securing the power of execution and operability at the worksite	Confirming the need for and effects of training
• Sustainable training through a constant operating system and training content • Maximizing the effect of training by providing regular safety training programs	• Addressing the substance of competencies and jobs • Focusing on on-site safety activities for various training activities	• Systematizing the composition and operating and modularizing the training • Operating standardized training courses to secure the training quality	• Reflecting the need for safety training • Enhancing the effects of training by providing feedback on the training results

Role and responsibility for safety required from each job class/category

Competency for minimizing risks arising from the job performance

Training phases	Classification of trainees	Phase 1 : Basic Concepts	Phase 2 : Enhancement of application ability	Phase 3 : Practice competency
SCP-1 Ordinary Employee Level	Construction worker / Office worker	Training of new employees (office/construction jobs) Understanding basic safety regulations and learning relevant guidelines	Safety and health training (construction workers) Learning the basics of safety and health to prevent worksite accidents Experience-based training for high-risk jobs (construction workers) Experiencing and learning how to avoid worksite accidents in a high-risk job Online lectures (office workers) Strengthening safety competency by studying the amended relevant regulations and cases	Training of potential supervisors (construction jobs) Understanding the roles and responsibilities required for potential supervisors (construction jobs) Training of potential supervisors (office jobs) Understanding the roles and responsibilities required for potential supervisors (construction jobs)
SCP-2 Supervisor Level	Manager (Department / Section Manager) / Supervisor (Team Leader / Foreperson)	Training for the appointment of new managers (responsible section/department managers) Raising the awareness of the role/responsibility as a new supervisor and learning basic information to perform the role Training for the appointment of new supervisors (team leaders/forepersons) Raising the awareness of the role/responsibility as a new supervisor and learning basic information to perform the role	Training course I for supervisors Learning how to develop and implement a plan to resolve safety issues based on risk factors and safety-related statutes and regulations Training course II for supervisors Learning worksite safety and management activities through coaching so that workers may work safely Training course III for supervisors Learning how to recommend solutions and countermeasures after accurately evaluating the safety conditions and circumstances and identifying the cause of the problem	Safety management strategy (managers) Creating a safety culture, establishing a safety management system, and sharing the decision-making method in an emergency
SCP-3 Executive Officer Level	Executive officers	Training for the appointment of new executive officers Learning how to recognize matters necessary for developing a corporate safety and health management system and applying the system in the organization	Special lectures / breakfast meetings for executive officers Learning how to reinforce safety values and share and disseminate the organization's primary issues	Safety management strategy (executive managers) Creating a safety culture, establishing a safety management system, and sharing the decision-making method in an emergency
SCP-S Safety Management Level	Safety	Training course for safety workers Learning basic information on the performance of the role as a safety worker to increase the understanding of the role and responsibility	Training course for improving safety workers' job competency Gaining knowledge and techniques for each safety area to identify worksite risk factors and strengthen safety management competency	Training of safety management professionals In-depth learning to train safety management professionals for each area

Strengthening and supporting safety and health training programs by class/course

Developing and utilizing new training content for enhancing the safety competency of supervisors

The SCP system has enhanced the safety competency by reestablishing the overall structure of the existing training method and making it possible to complete training courses necessary for each class on time.

Securing the operability of on-site safety management through the development and implementation of effective safety and health training courses based on the supervisors' R&R for safety to comply with the government's safety and health policies and manage high-risk jobs

Task objectives	Securing the operability of on-site safety activities through safety and health training based on the government's policies and the supervisors' R&R for safety
	• Responding to the government's safety and health policies, important instructions and issues from the Ministry of Employment and Labor, formulating a practice plan based on the supervisors' R&R for safety, and increasing safety awareness • Developing and implementing training courses to identify risk factors in high-risk jobs that are directly related to serious accidents and establishing appropriate accident prevention countermeasures • Securing on-site operability by providing effective training programs
Major tasks	• Developing bespoke safety and health training programs - Analyzing the HHI SCP system - Analyzing the government's policies and the supervisors' R&R - Seeking a plan to enhance the identification of risk factors and development of preventive countermeasures • Ordering instructors to secure the quality of their lectures - Giving assignment preferences to instructors who have designed a training course - Establishing a plan to manage the instructors based on the length of the service period - Providing lectures to instructors to ensure the quality of their lectures
Expected effects	Establishing a corporate culture of safety-oriented management and creating a happy workplace safeguarding the life and health of all HHI workers
	• Responding proactively to safety accidents by conducting the supervisors' R&R for safety • Improving the on-site operability by enhancing supervisors' competency for safety management activities, identifying risk factors, and establishing preventive countermeasures
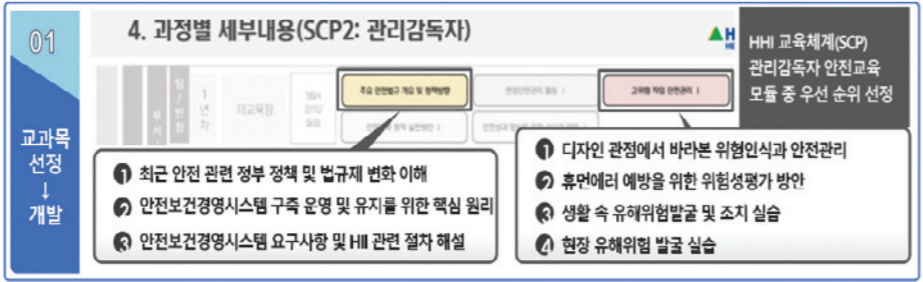
Full rearrangement of theory classes in mandatory safety and health training programs for new employees

The SCP system was established to create a self-regulated safety culture within the organization, allowing members of all classes and positions to receive safety training opportunities. New employees are provided with safety training programs that systematically organize the basics and essentials. Before working in our company, they must be trained and provide accurate information to improve their basic safety level and encourage a proper safety mindset.

Curriculum	Main content
Class 1 What is Safety?	- The concept of safety - Changes in the paradigm of safety - The Occupational Safety and Health Act - Enhancement of the safety mindset
Class 2 Safety Culture and Systems	- HHI's safety culture - Safety rules - Safety rewards - Safety systems
Class 3 Accident Prevention and Risk Recognition	- What is a risk? - Causes of accidents and preventive countermeasures
Class 4 What is Health?	- The concept of health - Substance safety and health data - Prevention of occupational diseases - Introduction of internal health activities - Health hazards caused by workplace bullying - Prevention and management of job stress

Improving safety training programs for external visitors

Providing safety training programs to short-term project workers by the Integrated Safety Training Center

The Integrated Safety Training Center now operates safety training programs previously offered to external visitors (for short-term projects) through online training and self-regulated training by field departments. This integrated program increases the safety awareness of those who visit our company by providing systematic and effective safety training by expert instructors.

Current Program	• Online training: 1 hr • Training by field departments: 2 hr • Instructor: Field supervisors
Changes	• Same as above • Integrated Safety Training Center: 2 hr • Instructor: Expert instructors

Trainees
External visitors (for short-term projects)
Training Method
Collective lecture: 2 hr
Training Content
- The Occupational Safety and Health Act
- Essential safety rules (absolute rules / items subject to priority control in the event of a significant accident / traffic rules / general rules)
- Occupational safety and accident prevention
- Occupational health, occupational disease prevention, etc.

Considering the utilization of an ICT-converged smart safety management system

Introduction of the Heavy Equipment Qualification Management System

HHI implemented a qualification management system for 525 working at height vehicles to prevent workplace accidents and is now systematically blocking unauthorized operations by unauthorized individuals.

The cherry picker qualification management system enables real-time monitoring, making it possible to immediately determine whether any cherry picker operating on the worksite is malfunctioning and verify the qualification before operating the equipment. If there is an issue, such as the theft, transfer, or duplication of a qualification, detected while verifying the qualification, the system stops the equipment and produces a warning sound while stating directional phrases. It is proposed to consider the system's applicability to equipment other than cherry pickers through constant monitoring of its effect.
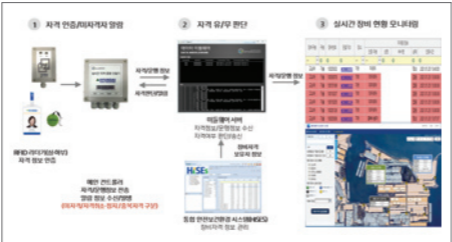
Full upgrade of the safety experience training facility

Since its establishment in 2005, the safety experience training facility, which all our executive officers and employees have visited before undergoing safety training programs, has provided safety training to many individuals.

Hence, we have fully improved its structure and environment so that all training courses may be conducted in this facility through practice and experience rather than concept. Through this improvement, we can prevent accidents and improve the concentration of trainees visiting the safety experience training facility, the level of safety, and the expected effect of training.

Curriculum	Main content
Research Class	- Explaining the entire layout of the shipbuilding yard and main facilities - Safety rules (golden safety rules, significant accident rules, general rules, traffic rules) - Main risk factors, accident cases, etc. in each process
Experience Training Class 1	- Learning how to wear safety harness and experiencing hanging with a safety harness - Research and practice on the safety standards for confined spaces - Learning how to safely move with a vertical ladder and how to use material handling ropes - Learning how to safely move on a scaffold - What is a risk? 2
Experience Training Class 2	- Research and practice on electrical safety - Research and practice on noise control/hearing protection - Research and practice on CPR
Experience Training Class 3	- Research and practice on firefighting safety - Research and practice on gas safety - Research and practice on workforce transportation

Current status of the safety experience training facility
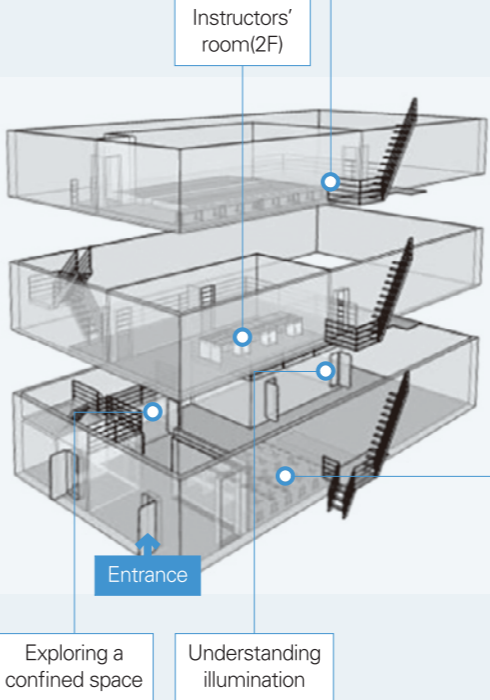
Course 3 (3F): Noise, electricity, CPR

CPR

Noise

Electricity

Course 2 (Outdoor): Firefighting safety, gas safety, workforce transportation

Fire

Manual carriage

Gas

Course 1 (1F): Safety harness, ladder, scaffold, confinement, illumination

Safety harness / Falling

Confined space

Vertical ladder / Material handling rope

Scaffold

Research lecture room

Instructors' room(2F)

Entrance

Exploring a confined space

Understanding illumination
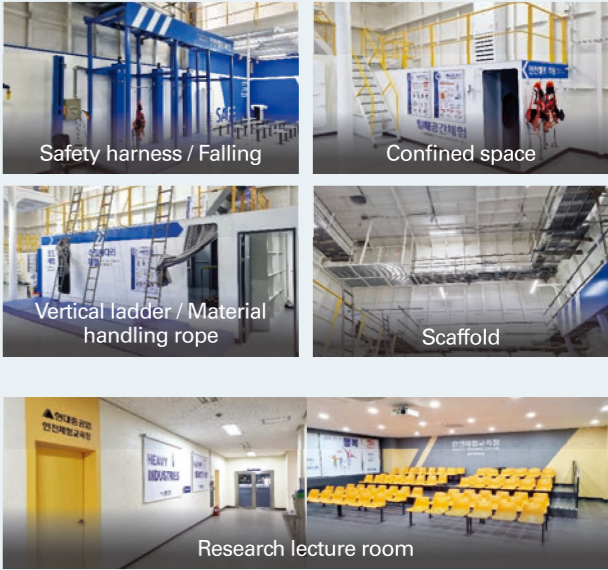
Mandatory safety and health training program for supervisors in 2021

We strive to increase the level of expertise on safety and health by providing training programs on statutes and internal regulations on safety and health to approximately 1,800 supervisors of prime contractors and subcontractors working at the forefront. We also seek to promote the growth of the internal safety level and the safety culture by sharing exemplary supervision cases. In addition, we invite expert instructors to help supervisors understand the significance of communication and the attitude necessary for safety management and conduct training programs that can improve leadership, which is important in safety management. We conduct various activities, such as presenting the company's goals and visions for safety and health, informing supervisors of their R&R, and conducting cyber training programs for areas where enhancing expertise is necessary.

Curriculum of the mandatory safety and health training program for supervisors in 2021

Category	First Half	Second Half
Concurrently conducting collective and cyber training courses	[Eight-hour course] • Main issues on internal safety and health • The Occupational Safety and Health Act • How to minimize worksite hazard • How to lead safety training • Exemplary cases of on-site management	[Eight-hour course] • Understanding of the Serious Accidents Punishment Act and its response • Supervisors' role and data management • Emotional safety leading method • Safety leadership

Safety academy in 2021

We operate a safety academy for those who violated the golden safety rules to create a safety culture based on the fundamentals and principles. The violators of the rules must attend the safety academy, undergo individual behavior evaluations, and participate in training activities to foster safety behavior to increase safety awareness. This training is helpful to reduces safety accidents by preventing the repetition of safety rule violations.

Safety academy curriculum
(Currently conducting a one-day training course because of the spread of the COVID-19)

Day 1	Day 2

• Orientation on the safety academy
• Methods to ensure daily life safety
  - Safety in daily life
  - Identifying unsafe habits
  - Methods to ensure in daily life
• Coaching voluntary safety actions
  - Occupational accidents and individual character
  - Examining and analyzing individual character and the phases of safe/unsafe behaviors
  - Practicing activities for adapting appropriate behaviors
	• Training to increase safety awareness
	  - Narratives about the absolute rule compliance
	  - Safety awareness and safety confidence
	  - Training for instilling absolute rules
	  - Individual/team training and evaluation
	• Safety mindfulness meditation
	  - Stress control
	  - Body and mind relaxation and safety behavior
	  - Yoga exercise for preventing musculoskeletal disorders
	• Reassessment of safety habits
	  - Writing letters to family members
	  - Recommitment to a new beginning for a happy life

Trainees and status of completion

	2016	2017	2018	2019	2020	2021
	649	818	329	425	252	218
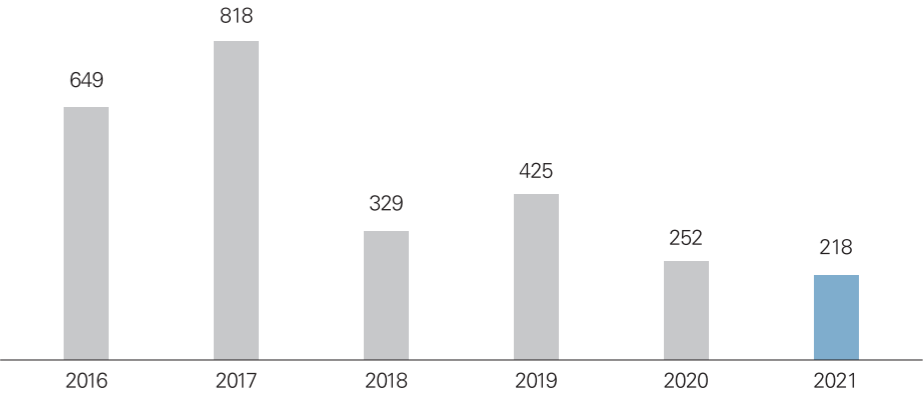
Category	Total Number of Violations	Persons Subject to Training		Individuals Excluded From Training					
		Completed	To be Enrolled	Others/ Visitors	Short-Term Project	Relieved	Two violations	Three violations	Gunsan Yard / Resigned / Foreigner
Persons		2,680	296	505	513	37	96	4	335
%	4,466	90.1%	9.9%	33.9%	34.4%	2.5%	6.4%	0.3%	22.5%
Total		2,976							1,490

Health   Safety

Environment

4-4
Management Performance of the Safety Administration Team

The Safety Management Team actively supports safety activities for the safer operation of HHI's workplace to operate a prompt and systematic emergency response system through preemptive safety management. It also complies with legal requirements through cooperation in internal and external safety management and prevents accidents through practice-oriented safety management.

01
Safety Management Team Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Strengthening activities for internal and external safety management	**Management of government affairs** • Criminal complaints, accusations, petitions (such as hiding an occupational accident): Gathering factual evidence and responding to such complaints, etc. • Supervision of safety and health: Responding case-by-case and taking remedial measures • Upon a serious (significant) accident: Preserving the scene, accompanying officials from the Ministry of Employment and Labor and other relevant agencies, and responding to minimize the operation suspension period	**Management of government affairs** • Gathering evidence on the labor union's criminal accusations regarding the Occupational Safety and Health Act and responding to such accusations: 11 cases • Underwent 3 Ministry of Employment and Labor inspections (regular, special, permanent): Completed remedial measures for the 684 cases submitted to judicial proceedings • Responded to the actions of related government agencies regarding the occurrence of three serious accidents	Continually Continually Continually	Number of investigations / Number of accusations Number of remedial measures / Number of remedial orders Number of actions / Number of occurrences	100 100 100		Maintaining the current status (reflected in the plan for 2022)
	Management of labor union affairs • Operating the occupational safety and health committee: Managing the performance status of the agreement results • Holding frequent meetings between departments responsible for labor-management affairs: Discussing safety and health improvements once or twice a month • Minimizing the frequency and duration of labor union's right to suspend operations • Conducting labor-management joint inspections for 16 days each month and honorary occupational safety supervisor inspections 5 days each month	**Management of labor union affairs** • Held five occupational safety and health committee meetings (regular and special) • Held meetings between departments responsible for labor-management affairs: One time/month • Labor union's exercise of its right to suspend operations: Approximately 140 cases • Conducted labor-management joint inspections for 16 days each month and honorary occupational safety supervisor inspections 5 days each month	One time/quarter One time/month Continually Continually	Number of actions / Number of occurrences Number of actions / Number of occurrences Number of investigations / Number of accusations Number of actions / Number of target actions	100 100 100 100		Maintaining the current status (reflected in the plan for 2022)
Preventing major industrial accident through PSM	**Elevating the grade (M+ → S) through the improvement of PSM and enhancing 12 PSM guidelines** • Evaluating the performance of PSM under the supervision of the Ministry of Employment and Labor once each year (by the Major Industrial Accident Prevention Center) • Conducting an internal audit on the operation status of PSM in the workplace (One time/year) • Conducting internal inspections on the status of operation of PSM in the workplace (1 time/quarter) • Conducting a special inspection of high-risk workplace facilities by the management • Holding meetings about PSM: If necessary, after the Ministry of Employment and Labor's performance evaluation or special supervisory inspection • Conducting a training program for PSM practices: For PSM personnel and supervisors (One time/year) • Consulting on PSM: Solving persistent problems through consulting with specialized external institutions • Preparing to grade PSM: Assessing the performance to improve the grade for the PSM consultation	**Elevating the grade (M+ → S) through the improvement of PSM and enhancing 12 PSM guidelines** • Assessing the Ministry of Employment and Labor's performance grade of PSM: Conducted for 4 days [May 17 (Mon) ~ May 21 (Fri)]; Completed the result submission of measures taken for 22 remedial orders • Conducting an internal audit on the operation status of PSM in the workplace: November 15 (Mon) ~ December 31 (Fri) • Conducting internal inspections on the operation status of PSM in the workplace: Replaced with the Ministry of Employment and Labor's status of performance inspection • Conducting a special inspection on high-risk facilities by the management in the workplace: Completed on April 30 (Fri) (4 facilities, including the ethylene storage) • Holding meetings about PSM: Completed on July 7 (Wed), 15:00~17:00) • Conducting a training program for practices of PSM: April 6 (Tue) ~ April 7 (Wed) / 2 days (30 persons) • Consulting on PSM: Completed on September 14 (Mon) (revised the process safety report and conducted process risk assessment training courses 4 times) • Assessing the PSM grade: Conducted on May 24 (Mon) ~ May 26 (Wed) / Results: Grade M+ (71.87 points → 78.27 points / 6.4 points ↑)	1 time/2 years 1 time/year 1 time/quarter 1 time/year 1 time/year Continually 1 time/4 years 1 time/4 years	Number of actions / Number of target actions Number of actions / Number of target actions Number of actions / Number of target actions Number of actions / Number of target actions Number of actions / Number of target actions Persons to be trained / Persons who completed Whether the consulting was completed Whether the grade was attained	100 100 100 100 100 100 100 98	Acquired points: 78.27 / Target points: 80	Maintaining the current status (reflected in the plan for 2022) Planning to conduct in 2024 Planning to conduct in 2025
Improvement of managing emergency through preventive safety management	**Improvement of managing emergency** • Enhancing emergency response by obtaining the business accident certification (Business Continuity Management System / ISO 22301) • Reviewing and improving the emergent responding manual and standards for an emergency response once a year • Operating the emergency text messaging system for emergency response and improving the system • Establishing a company-wide typhoon alert and monitoring system: Linking with the response manual • Improving firefighting and fire suppression capabilities: Supporting training in facilities subject to PSM, Business Unit Safety Management firefighting exercises, etc. • Continuous management of equipment for firefighting and rescue (air-purifying respirators, thermographic cameras, Xenon searchlights, megaphones, waterproof cloth, etc.)	**Improving emergency response capabilities** • Planning to acquire the business accident certification (ISO 22301) (in the second half of 2022) • Reviewed and enhanced the accident response manual and standards (January 2021) • Operated the emergency text messaging system for emergency response and improved the system (dispatched 308,733 messages, including those regarding COVID-19) • Established a company-wide typhoon alert and monitoring system and completed a simulation exercise (linking with the response manual in July 2021) • Conducted firefighting and fire suppression exercises: 11 cases • Inspected equipment for firefighting and rescue (air-purifying respirators, thermographic cameras, Xenon searchlights, megaphones, waterproof cloth, etc.) (One time/month)	Continually One time/year When it occurs When it occurs Continually One time/month	Whether the accident certification was obtained Number of actions / Number of target actions Number of actions / Number of occurrences Whether the system was established Number of actions / Number of target actions Number of actions / Number of target actions	100 100 100 100 100 100		

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Improvement of managing emergency through preventive safety management	**Enhancing the accident response through the stable operation of the Integrated Control Center** • Acting as a safety control tower in an emergency caused by a disaster (typhoon, earthquake, massive fire, etc.) (operating an all source situation room, ASSR)	**Enhancing the accident response through the stable operation of the Integrated Control Center** • Two times for the safety control tower operation in typhoon cases	When it occurs	Number of actions / Number of occurrences	100		
	• Monitoring the safety of all yard (extracting videos of rule violations and hazardous work → Notifying the Business Unit Safety Management for remedial measures)	• Notified the real-time monitoring videos about the hazardous work and performed remedial measures: 60 cases	Continually	Number of actions / Number of occurrences	100		Maintaining the current status (reflected the plan for 2022)
	• Conducting a training program for mastering the work of the Integrated Control Center (real-time monitoring, emergency alert, etc.) (for persons on a weekend or holiday duty)	• Completed a training program for mastering the work of the Integrated Control Center (for persons on a weekend or holiday duty) (One time/week)	One time/week	Number of actions / Number of target actions	100		Conducting the program in training session of the internal fire brigade (2022)
	• Conducting training programs for the Safety Management Group's internal fire brigade (fire suppression skills, rescue/relief, emergency alert, etc.)	• Completed a training program for the fire brigade of the Safety Management Group (November 2021)	One time/month	Number of actions / Number of target actions	100		
	• Strengthening nighttime safety management (performing safety management, supervising at the Integrated Control Center and the worksite)	• Performed nighttime safety management at the Integrated Control Center: Six rescue/relief cases	Continually	Number of actions / Number of occurrences	100		Maintaining the current status (reflected the plan for 2022)
	• Managing offshore safety by assisting the Offshore Control Center in controlling ships' entry and nighttime departure (the current status of the quay, etc.)	• Number of cases in which the Offshore Control Center was assisted in controlling ships' entry and nighttime departure: 186 cases	Continually	Number of actions / Number of occurrences	100		
Strengthening practice-oriented on-site safety management	**Improving the firefighting and safety management of hazardous substances** • Improving practical skills by completing the required practical training program for firefighting personnel / safety managers in charge of hazardous substances (142 persons)	**Improving the firefighting and safety management of hazardous substances** • Completed the mandatory practical training program for firefighting personnel / safety managers in charge of hazardous substances (142 persons) (April 2021)	One time/year	Persons to be trained / Persons who completed	100		
	• Minimizing the risk of violation by thoroughly preparing for the relevant fire department's special inspections (such as statutory authorization and permission)	• Conducted a special inspection on firefighting/hazardous substances under the supervision of special judicial fire police officers from the Ulsan Fire Department: On October 20, 2021 (3 cases subjected to administrative fines)	Continually	Number of remedial measures / Number of remedial orders	100		
	• Maintaining firefighting facilities in a normal operating condition by conducting mandatory inspections (comprehensive close inspections and operating function inspections)	• Performed the mandatory inspections of firefighting facilities: Comprehensive close inspection (38 locations) / inspections of operating functions (137 places)	Continually	Number of actions / Number of target actions	100		
	• Stabilizing the operation of firefighting facilities, including automated fire detecting systems (154 locations), by outsourcing 24-hour maintenance and repair services for such firefighting facilities	• Conducted (24-hour) maintenance and repair services for automated fire detecting systems: Completed the measures 892 times	Continually	Number of actions / Number of target actions	100		Maintaining the current status (reflected in the plan for 2022)
	• Stabilizing the operation of all internal/external fire hydrants and firefighting pumps by inspecting them to ensure that they are in their normal condition (81 locations: the Safety Management Team)	• Performed company-wide inspections on internal/external fire hydrants and firefighting pumps to ensure that they are in their normal condition (81 locations)	One time/year	Number of actions / Number of target actions	100		
	• Stable operation by increasing internal inspections of facilities for storing/handling hazardous substances (79 locations) and improving firefighting equipment	• Conducted the mandatory inspection on 19 locations subject to the regular inspection on hazardous substances and prepared regulations to prevent hazardous substance risks (December 23 ~ December 27, 2021)	One time/year	Number of actions / Number of target actions	100		
	• Minimizing fire insurance expenses by determining the fire insurance premium rate (one time/year)	• Conducted the fire insurance inspection to determine the fire insurance premium rate: Completed on September 14 ~ September 16, 2021	One time/year	Number of actions / Number of target actions	100		
	Preventing traffic accidents by increasing internal road traffic facilities and by guidance or regulation (number of traffic accidents: not more than 30 cases) • Preventing speeding violations on internal main roads through the maintenance and management of speed limit warning systems and the guidance and regulation on speeding violations	**Preventing traffic accidents by increasing internal road traffic facilities and by guidance or regulation** • Number of traffic accidents: 50 cases / Number of speeding violations: Gave warnings in 185 cases	Continually	Number of Accidents / Target Number	100		Intensifying guidance to/regulation of traffic violators (2022)
	• Strengthening the safety management of vehicles entering the premises for delivery and other purposes (turning on headlamps, observing the speed limit within the premises, fastening tightly, etc.)	• Performed the safety management of vehicles entering the premises for delivery and other purposes: Regulated or provided training/guidance for 185 cases	Continually	Number of actions / Number of target actions	100		
	• Improving traffic facilities along internal main roads (continuous management of road surface and lanes, various signs, electric signboards, etc.)	• Repaired slippery internal pedestrian passages and installed additional speed limit warning systems	Continually	Whether the plan was implemented	100		Maintaining the current status (reflected in the plan for 2022)
	• Guidance or regulation on motorcycles and bicycles operated without safety devices during winter	• Guidance or regulation on motorcycles and bicycles operated without safety devices during winter: November 2021 ~ March 2022	Continually	Whether the plan was implemented	100		

02
Promoting Safety
Labor-Management Joint Activities

The HHI and the labor union have solved various worksite issues by consulting with the Occupational Safety and Health Committee and taking measures for findings identified during their joint inspection.

Management of labor union affairs

Operation of the Occupational Safety and Health Committee

Through the Occupational Safety and Health Committee, the company and the labor union have discussed safety and health matters to be improved so that employees can work in a safer environment. This year, they held special meetings on serious accidents and quarterly meetings. They have also worked to improve safety facilities, conduct accident prevention activities, and comply with their agreement.

Measures taken in response to the labor union's requests through the Occupational Safety and Health Committee

Operation of the Occupational Safety and Health Committee in 2021	
Quarterly 1	Discussed 20 issues, including the replacement of worn-out equipment
Quarterly 2	Discussed nine issues, including the provision of mini gas masks
Quarterly 3	Discussed nine issues, including the reduction of the cherry pickers' travel distance
Quarterly 4	Discussed six issues, including the improvement of electric grinders
Special meetings (two times)	Discussed 27 issues, including the prevention of serious accident recurrence

Measures taken by the labor union suspension of work

The company guarantees the safety and health activities of the labor union to create a safer and healthier worksite. The labor union has the right to suspend of work as agreed by and between the labor and the management, such as the noncompliance with a request to improve safety facilities under the relevant law or immediate danger. The right to suspend of work can be considered a process for addressing a potentially unsafe state of safety and health at the worksite. This year, improvement measures have been taken in 139 cases where the works were suspended (59 cases for an accident and 80 cases for an unsafe state).

Labor-management joint inspection and inspection by honorary occupational safety supervisors

The company and the labor union conduct a labor-management joint inspection for 16 days every month. In contrast, an inspection by an honorary occupational safety supervisor takes five days each month to improve and prevent unsafe worksite factors and behaviors. Through these inspections, the company and the labor union collaborate as partners to achieve cooperation.

Findings identified by safety and health supervisors

Main Findings Identified	Number of Cases Inspected and Actions
Prevention of fall / falling objects	127
Hazardous materials	3
Machines/equipment/facilities	31
Electrical safety	87
Safe passages/illumination	43
Prevention of fire/explosion	3
Confined space/ventilation	7
PPE	1
Others	164
Total	466

03
Preventing Major Occupational Accidents Through the Process Safety Management (PSM)

HHI conducted the PSM(Process Safety Management) grading under the supervision of the Ministry of Employment and Labor and has monitored and addressed workplace issues by conducting internal audits and special inspections regarding the operation status of PSM, operating a task force team, holding meetings, and consulting with experts.

PSM (PROCESS SAFETY MANAGEMENT)

Evaluating (Grading) the Performance of PSM in 2021

HHI conducted the PSM grading under Article 46 (4) of the Occupational Safety and Health Act last May. Presently, we operate 11 facilities subject to PSM that are highly likely to cause serious industrial accidents, including VOC processing facilities in the painting plant, LNG supply facilities, ethylene storage, and oil storage (gas stations), which have grade M+.

The evaluation group consisting of 5 members, including labor inspectors from the Ministry of Employment and Labor and experts from the technical support team of the Korea Occupational Safety and Health Agency, evaluated the performance status based on the process safety report, including interviews with the CEO and other relevant persons, document review for 12 PSM elements, and on-site verification. Regarding the 22 violations identified during the evaluation (solution instructions), a report on the continuous security and the results of remedial measures was submitted to the Ministry of Employment and Labor.

Current status of companies' PSM grades in the same industry (2021)

Category	HHI	HSHI	HMD	SHI	DSME
Grade	M+	M+	M+	S	M+

PSM grade and management

Category	Meaning	Benefits and Matters Subject to Guidance and Inspections
Grade P (90 points or more)	A workplace where the safety level is gradually increased by systematically establishing and operating the PSM system	• The status of performance is evaluated once every four years
Grade S (80 points, less than 90 points)	A workplace where the safety level does not increase and remains stagnant at a certain level although the PSM system is operated	• The status of performance is evaluated once every two years • The inspection is exempted if an internal audit was conducted by private experts (This term or next term) (The inspection is not exempted for two consecutive terms)
Grade M+ (70 points, less than 80 points)	A workplace where the PSM system is not operated under normal conditions	• The status of performance is evaluated once every two years • Technical coaching is conducted every two years (technical support team)
Grade M+ (less than 70 points)		• The status of performance is evaluated once a year • Technical coaching is conducted once every two years (technical support team)

Criteria for allocating points to each evaluation item

Item	Maximum Points	Conversion Factor	Maximum Converted Points
Safety management and workers' participation	370	0.057	21.0
Process safety materials	70	0.071	5.0
Process risk assessment	130	0.041	5.5
Safe operation guidelines and procedures	80	0.050	4.0
The plan for checking, inspecting, and repairing facilities, and the maintenance plan and guidelines	120	0.046	5.5
The permission and procedure for safety work	80	0.106	8.5
Contractors' safety management	100	0.080	8.0
Training on process operation	70	0.071	5.0
Preoperational inspection guidelines	60	0.050	3.0
The plan for the management of variables	70	0.100	7.0
Internal audit	90	0.044	4.0
Guidelines for the investigation of process accidents	90	0.033	3.0
Emergency plans	80	0.044	3.5
Field inspection	210	0.081	17.0
Total	1,620		100

Internal audits and inspections on the operation status of PSM in the workplace

HHI conducts an internal audit each year to examine and ensure whether the process safety management is performed based on workplace regulations.

An internal audit team comprises internal experts in PSM. Moreover, firefighting, hazardous substances, and maintenance and repair of facilities continue to be inspected to determine whether each department in charge of facilities subject to PSM appropriately implements the PSM system, whether the system meets the standards, and whether there is no problem in the system or procedure.

Special inspections of PSM high-risk facilities

Last April, HHI's executives operating high-risk facilities subject to PSM, such as ethylene storage and a painting plant, conducted a special inspection on such high-risk facilities to promote PSM.

The Safety Management Group and the executives and department managers in charge of the PSM facilities participated in the special inspection to prevent serious industrial accidents (fire, explosion, and leakage). Since then, remedial measures have been continuously taken to address issues using nonexplosive–proof electrical machines and appliances within places with explosion risk, as found in the inspection.

Operating PSM task force and holding meetings

The Safety Management Group operates a task force team for PSM grade improvement (M+ → S) and business improvement.

The task force team, which consists of persons in charge of firefighting, hazardous substances, or PSM and those in charge of the maintenance and repair of facilities, conducts special inspections on high-risk (fire/explosion) facilities, matches the status of worksite facilities with the drawings of such facilities and conducts training programs specialized in risk assessment. Last July, the team discussed operational facility issues during a business improvement meeting and implemented and monitored remedial measures. They also conduct internal and specialized external training programs for PSM experts and continuously take additional measures for business improvement and operational issues.

Consulting on PSM

HHI operates the PSM system to prevent major industrial accident caused by a fire, explosion, or the leakage of hazardous or dangerous substances. We are currently operating 11 facilities subject to PSM, including VOC processing facilities in the painting plant, LNG supply facilities, ethylene storage, and oil storage. Major issues, such as updating the process safety report and conducting practical training

programs (four times) to increase the capabilities of PSM personnel, are regularly solved by consulting with experts for PSM grade and business improvement.
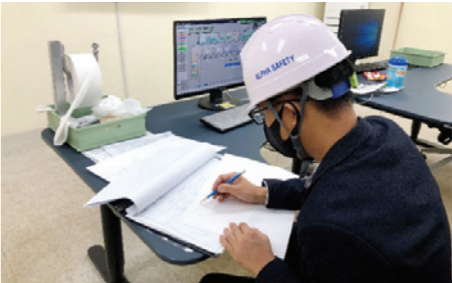
04
Improving Emergency Response Through Preventive Safety Management

The systematic management of dangerous situations caused by various accidents, disasters, and incidents is a prerequisite for implementing safety management. Hence, HHI is doing its best to respond promptly and properly to an emergency by publishing a manual for serious accident preparation and establishing a response process.

Improving emergency response capabilities

Issuing company-wide emergency crisis management manual

HHI has published and implemented a company-wide emergency crisis management manual to protect corporate assets and limit the damage to executive officers and employees during a company-wide emergency situation, such as a serious accident, natural disaster, or environmental accident. If an emergency occurs, we will respond systematically, quickly, and effectively based on the manual. In addition, we are preparing to acquire the ISO 22301 certification to obtain international recognition of the effectiveness of the disaster management system in preparedness for accidents and disasters and the stability of our shipbuilding capabilities. ISO 22301 is an international standard that establishes the work priorities in the event of various disasters. Recently, the ISO 22301 certification has become one of the basic transaction conditions for international business, and shipbuilders are expected to develop their international business capabilities by obtaining the certification.
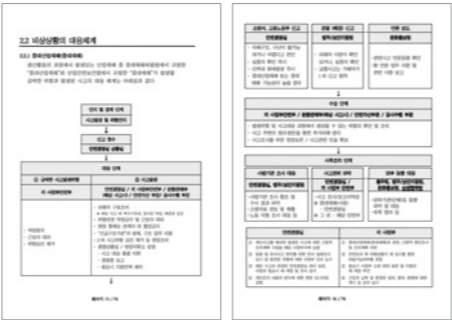
Response to serious accidents or immediate danger of serious accidents

In preparation for a serious accident or its immediate danger, HHI has issued and implemented a company-wide emergency crisis management manual and an emergency plan for each business unit/department. The emergency plan provides countermeasures, such as the suspension of work, the evacuation of workers, and the removal of risk factors, relief measures for injured individuals, and information to prevent further damage.
By establishing an emergency action plan in preparation for an emergency, such as a serious accident, we can systematically respond to an imminently dangerous situation and limit the damage.
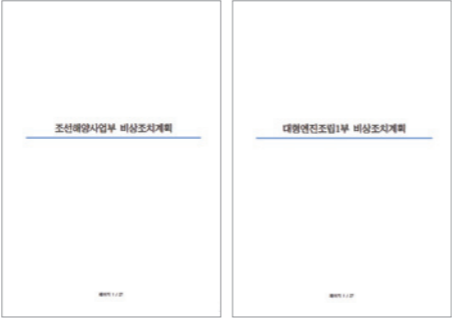
Serious accidents or immediate danger of serious accidents

HHI specifies at least 15 events as "imminently dangerous situations" based on the "risk estimation criteria" after conducting a risk assessment (intensity and frequency) on all work in the company, which is based on the internal standards, "Job standards and Detailed Rules on Risk Assessment Management (HHIS-AE-1001)."
If there is a possibility of a serious accident caused by insufficient safety measures while working in an "imminently dangerous situation," the work must be stopped immediately. It may be resumed after the supervisor has taken safety measures.

		severity			
		1 Negligible injuries	2 Minor injuries	3 Major injuries	4 Fatality
Probability	1 Rare	1	2	3	4
	2 Unlikely	2	4	6	8
	3 Possible	3	6	9	12
	4 Likely	4	8	12	16
	5 Almost certain	5	10	15	20

Risk Criteria	Measures	Assessment Points
Maintaining reasonably achievable reduction measures	Any additional measures or the management of the relevant grounds' records is unnecessary, but self-regulated improvement activities may be conducted if deemed necessary	1~3 points
The current measures are insufficient for safety	Improvements are necessary during the regular repair period based on the annual improvement plan, considering solutions or improvement schemes. Moreover, continuous on-site monitoring and inspection are necessary until improvements are made	4~6 points
	The measures mentioned above and preventive measures, such as temporary safety measures, are necessary, considering that the case is in between danger and safety	7~8 points
The risk of occurrence of an accident exists	An improvement plan to reduce the risk should be established, and it is necessary to take preventive measures as quickly as possible. If there is a possibility of a serious accident, the level of preventive measures must be raised, and immediate actions are necessary	9~12 points
The risk of failure to meet legal standards or the risk of a serious accident is very high	Work must be stopped immediately to take remedial measures. If it is possible to resume work after reevaluating safety, subsequent safety measures, such as the establishment and implementation of an improvement plan, should be taken after making a list of the types of work that pose a similar risk of occurrence	15~20 points

Response Process by Class in Imminently Dangerous Situations

Category	Worker	Supervisor	Safety Worker
Risk	Imminently dangerous situation	Imminently dangerous situation	Imminently dangerous situation
	Suspension of work	Suspension of work	Suspension of work
	Exercise of SSA		
Measures	Safety measures ○	Safety measure (removal of risk factors)	
		Registration on Hi-SEs (the record of measures)	
Action	Resumption of work		

Exercise of SSA

HHI operates the SSA system to prevent accidents resulting from a work environment that violates absolute rules or priority control items to avoid significant accidents before the start of work. Hence, we have established the "Securing S1" culture and continue implementing activities to prevent safety accidents.
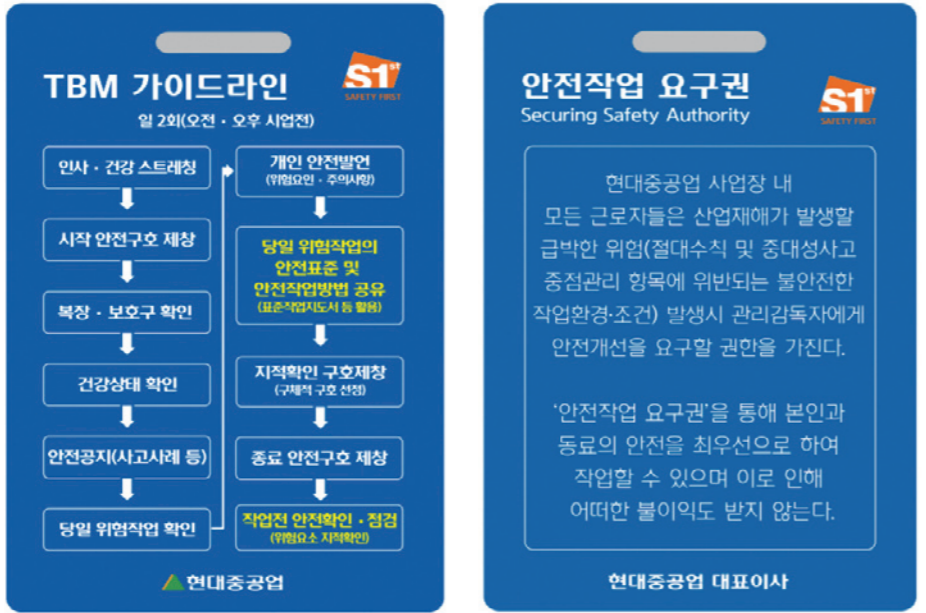
Procedure for accident response

HHI enforces a manual to systematically respond to an emergency and take relevant measures by developing a system for responding to an emergency or a conventional accident, such as caught-between or falling, or a fire or an imminent danger of such an accident.

Adoption of rescue/relief manual by type of accident

HHI enforces a response and action manual to respond to all types of accidents quickly and accurately. We provide prompt rescue and relief following the response guide for the 7 types of accidents, such as maintenance hole and confined area accidents, and the response and action guide for 21 types of emergencies, such as clinging to a gondola or an cherry picker and falling.

Division of the restricted area of a significant accident or a fire/explosion accident

HHI enforces a "map of a restricted area" when a significant accident or a fire/explosion accident occurs. By classifying who is permitted to enter each type of hazardous area, additional accidents are prevented by preserving and controlling the accident scene for an efficient investigation.
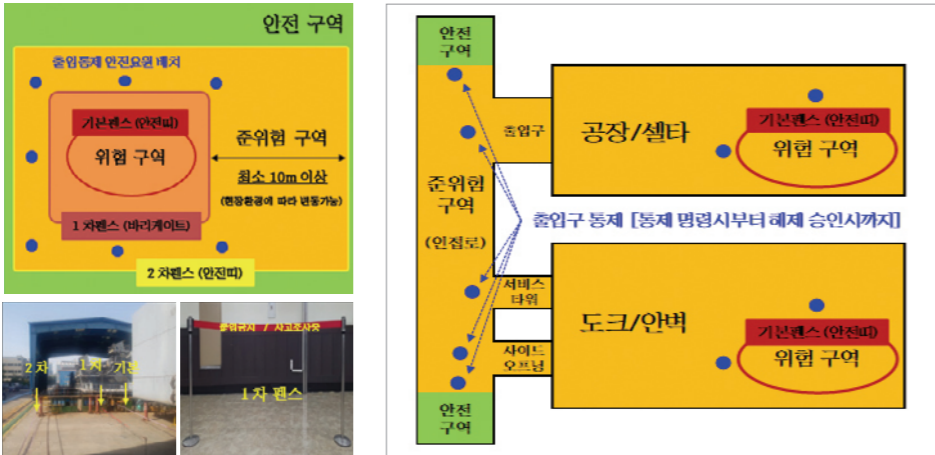
Division map of the restricted area of an ordinary (significant) accident

Division map of the restricted area of a fire/explosion accident

Persons permitted to enter a dangerous area (applicable in common to ordinary accidents and fire/explosion accidents)

Category	Details
Dangerous area	• Rescuers/investigators • Persons approved by the head of the safety department are permitted to enter a quasi-dangerous area
Quasi-dangerous area	• Personnel of the relevant safety section (road guards) • Executives of the company • Government officials • Supervisors of the department affected by the accident • Executive officers of the labor union • Personnel of the Labor Safety and Health Office
Safe area	• Personnel of the safety department, excluding those of the relevant safety section (prohibiting those not involved in the accident and photography)

※ Once the fire officers arrive at the scene, firefighting and rescue are led by the commander of fire officers

Inspection of the status of compliance with the manual for responding to "imminently dangerous situations"

In preparation for a serious accident or an imminent risk, HHI inspects the performance status at least once semiannually to determine whether "imminently dangerous situations" are classified based on the risk criteria after assessing risks of all work within the company, whether safety measures have been taken to an unsafe condition and work, and whether response exercises have been conducted following the emergency plan.

Cycle of emergency response exercise/criteria

Statutes	Scope of Exercise	Title of Exercise	Training cycle	Notes
The Serious Accidents Punishment Act	Imminently dangerous situation	Exercise in preparation for imminently dangerous situations	One time / Semiannually	-
The Occupational Safety and Health Act	Confined area	Emergency rescue exercise	One time / Semiannually	-
The Occupational Safety and Health Act	Facilities subject to PSM	Emergency action exercise	One time / Annually	Department with facilities
The Firefighting Facilities Act	Specific Firefighting Objects	Fire evacuation exercise	One time / Annually	Replaceable with the Framework Act on the Management of Disasters and Safety

Measures to prevent additional damage

HHI implements measures to prevent additional damage within the workplace, such as similar accidents, by identifying appropriate causes and establishing countermeasures through risk re-assessment based on the disaster cause analysis using the root cause analysis (RCA) technique, etc. to a serious (significant) accident that occurred.
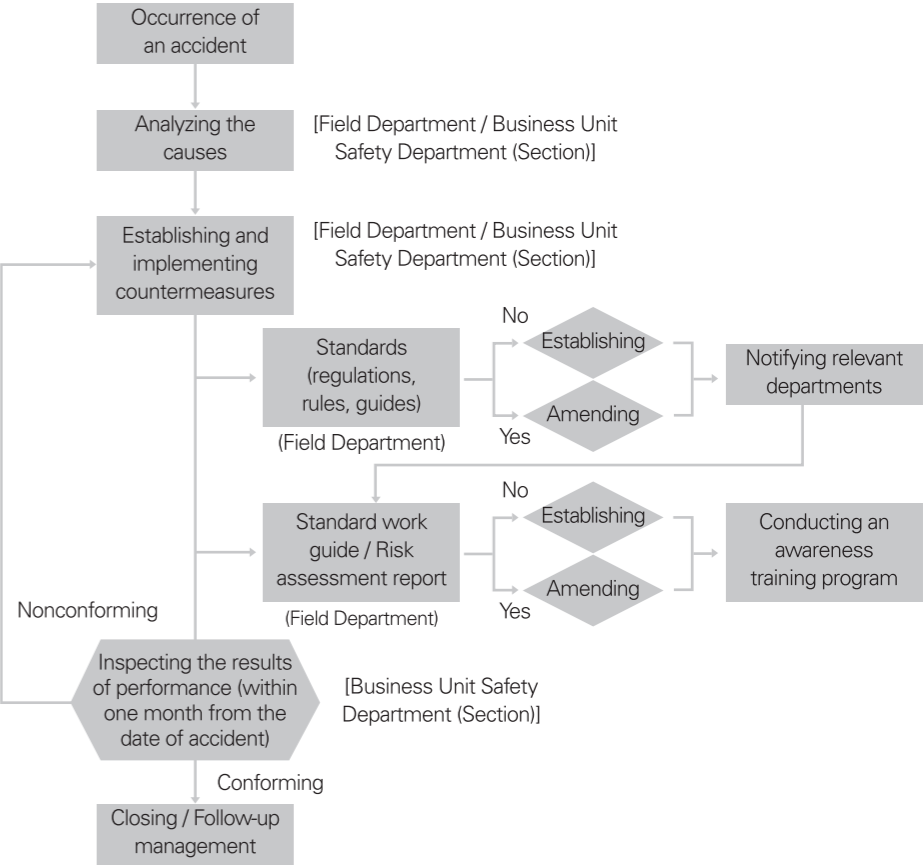
Establishing a company-wide typhoon status management system and conducting simulation exercises

The Safety Management Group implemented a company-wide typhoon status management and monitoring system in July 2021 to reduce the yearly damage caused by typhoons.

The system established based on the company-wide typhoon response manual enabled us to promptly respond to typhoons (No. 12 Omais and No. 14 Chantu) through the systematic management of information about typhoons and prevention, the sharing of information on the real-time status of typhoons, the damage caused by typhoons, and the management of the record of the restoration.

Establishing a system based on the company-wide typhoon response manual

1) Standards for grading and assessing the risk level of typhoons (classifying typhoons into four stages and considering wind velocity, rainfall, and wave height)

Risk Levels	Assessed Points
Stage 1 (Concern)	15~24 points
Stage 2 (Caution)	25~34 points
Stage 3 (Alert)	35~39 points
Stage 4 (Serious)	40~53 points

Wind velocity (m/s)		Rainfall (mm)		Wave height (m)	
7~25m/s	15 points	[Heavy rain watch] 70 mm/6 hr or 110 mm/12 hr	1 point	2m	1 point
25~33m/s	25 points	[Heavy rain warning] 110 mm/6 hr or 180 mm/12 hr	3 points	3m	3 points
33~44m/s	35 points	[Local torrential rainfall] 100 mm/hr or more	6 points	5m	5 points
44 m/s or more	40 points	-	-	6m	7 points

2) Calculation of the risk level of a typhoon (Risk level = Wind velocity + Rainfall + Wave height)

Category	Wind velocity	Rainfal Heavy rain watch (1 point)	Heavy rain warning (3 points)	Local torrential rainfall (6 points)	Wave height				Risk level
Stage 1 (Concern)	15	16	18	21	2m 1point	3m 3points	5m 5points	6m 7points	15~24points
Stage 2 (Caution)	25	26	28	31					25~34points
Stage 3 (Alert)	35	36	38	41					35~39points
Stage 4 (Serious)	40	41	43	46					40~53points

3) Preparations for responding to typhoons

Risk level	Led by the Emergency Response Committee	Details
Stage 1 (Concern)	[Shipbuilding & Offshore BusinessUnit] The head of the Safety Construction Division and the chairperson of the Typhoon Response Committee (the director responsible for operation control) [Naval & Special Ship Business Unit] The head of the Construction Planning Group [Engine & Machinery Business Unit] The head of the Safety Construction Group	• Operating a typhoon emergency response committee for each business unit • Prohibiting boarding/working on a hull at the quay • Taking safety measures in preparation for a strong wind
Stage 2 (Caution)		• Operating a typhoon emergency response committee for each business unit • Prohibiting outdoor work • Taking safety measures in preparation for a strong wind
Stage 3 (Alert)	The Head of the Emergency Situation Room (Chief Safety Officer)	• Operating the Corporate Typhoon Emergency Response Committee • Adjusting the arrival or the departure time or considering a temporary closure order • Prohibiting work in the entire company
Stage 4 (Serious)		• Taking safety measures in preparation for flooding and strong wind • Prioritizing the prevention of casualties / property damage

Overview of the company-wide typhoon status management system

Category	Functions	Notes
Common	• Management of basic typhoon information • Typhoon risk assessment • Typhoon countermeasures checklist • Typhoon alert text messaging system	-
Typhoon pre-inspection management	• Registration of standard pre-inspection sheet of each department • Registration of the pre-inspection results of each department (section/team) • Registration of typhoon preparedness record	Before a typhoon
Real-time typhoon status management	• Registration of daily typhoon records • Registration of the real-time status of damage • Monitoring the current status of damage to facilities and damaged area	During a typhoon
Follow-up measures for a typhoon	• Registration of facility damage and a restoration plan • Registration of the record of restoration of damage by a typhoon • Compilation of the results of typhoon preparedness and recovery	After a typhoon

4) Typhoon response measures

| Before a typhoon (D-7~1) | During a typhoon day (D-day) | After a typhoon (D+1~3) |

[D-7~6] Real-time monitoring

- Typhoon response measures
- Company-wide notification
- Identifying similar typhoons through typhoon forecasting

[D-5] Operation of the emergency response committee

- Operating a typhoon situation room
- Considering evacuating and moving ships

[D-4~1] Final determination of the risk level of a typhoon

- Preparation for evacuating ships and departure
- Conducting inspections in preparation for a typhoon
- Establishing an emergency system in preparation for a typhoon
- Removing ladders for boarding ships
- Adjusting the attendance time or the quitting time or considering an order of temporary closure

[D-day] Real-time typhoon control

- Operating an emergency room
- Intensive management of vulnerable areas
- Real-time registering and broadcasting the status of damage
- Monitoring the status of the typhoon
- Establishing a plan for the entry of evacuated ships

[D+1] Analysis/aggregation of damage

- Registering the details of damage
- Registering activities for damage restoration
- Aggregating damage to facilities and establishing a restoration plan

[D+3] Examining the restoration budget

- Calculating the budget required for typhoon preparedness and restoration
- Analyzing the requested budget and determining the budget

Composition of the system by stage of typhoon

Stage of Typhoon	System Item	Scope of System		User
Common	Typhoon information management	• Management of basic information on a typhoon • Typhoon risk assessment • Checklist of countermeasures against typhoons • The Typhoon Alert Text Messenger System	Operating a response system depending on the risk level, declaring an emergency, confirming response measures to a typhoon, etc.	Safety Management Office
Before a typhoon	Typhoon forecasting	• Typhoon Forecasting System	Identifying similar typhoons based on big data	All departments (teams)
	Pre-inspection	• Management of the standard inspection sheet of each department (team) • Management of the results of the pre-inspection of each department (team) • Registration of the record of preparation for a typhoon	Conducting typhoon prevention activities through pre-inspection in preparation for a typhoon	
During a typhoon	Real-time status of typhoon	• Real-time monitoring of a typhoon • The current status of typhoon damage based on GIS • Registration of the real-time status of damage • Plan to move hulls	Real-time monitoring of the status of the typhoon and responding to the typhoon by broadcasting damage cases	All departments (teams)
		• Registration of daily typhoon records	Real-time broadcasting of the status of a typhoon	Operation Control Department
After a typhoon	Follow-up measures for a typhoon	• Registering the results of restoration from the typhoon damage • Registration of facility damage and a restoration plan • Compilation of the results of typhoon preparedness and recovery	Calculating restoration expenses by entering the results of restoration from typhoon damage and conducting restoration work	All departments (teams)

Typhoon forecasting system

HHI adopted a typhoon forecasting system based on the typhoon and weather data. By utilizing the GIS-based current map of typhoon damage, we continue to improve the system to reduce typhoon damage while taking extra measures to damaged areas in advance by referring to records of the damage status.

Simulation exercises in preparation for typhoons

Last July, HHI conducted a simulation exercise by integrating the corporate typhoon status management and monitoring system with the typhoon response system to limit the damage.

Relevant personnel from 33 departments, including departments representing each Business Unit Safety Management and the Corporate Safety Management, participated in a debate-based simulation exercise scenario based on the status of typhoon No. 9 Maisak, which caused extensive damage to the company in 2020.

Using this exercise, participants will become familiar with the typhoon response system through the typhoon response manual (system). We will continue to conduct exercises to address the deficiencies.

Enhancing the capability of responding to accidents through the stable operation of the integrated control center

Operation of the Integrated Control Center with special rescue team

The Integrated Control Center is operated 24 hours a day as the corporation's emergency room when an emergency occurs, broadcasting emergencies in real time and conducting rescue operations to enable rapid response. In addition, 367 CCTVs are monitoring hazardous work in real time, including internal road traffic accidents, quayside, offshore and air pollution, and safety accidents. Preventing activities are also performed through intelligent video analysis solutions.

Status of dangerous work control

Category	January	February	March	April	May	June	July	August	September	October	November	December	Total
No. of cases	12	5	2	-	14	1	3	1	6	4	2	9	59

Status of firefighting mobilization in 2021

First Half						Second Half					
January	February	March	April	May	June	July	August	September	October	November	December
1case	-	-	-	2cases	1case	1case	1case	-	1case	2cases	1case
4 cases						6 cases					

※ The total firefighting mobilization cases in 2021: 10 cases

Status of mobilization for rescue and relief (Number of cases)

Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Management/Others	Monthly Total
January	21	4	1	6	32
February	12	2	3	3	20
March	12	2	2	-	16
April	16	3	-	6	25
May	9	1	2	-	12
June	19	9	1	3	32
July	23	4	3	5	35
August	17	2	-	6	25
September	26	2	1	4	33
October	16	6	-	2	24
November	16	2	-	4	22
December	22	3	3	4	32
Grand Total	209	40	16	43	308

Installing emergency electricity generators in the areas requiring CCTVs for the Integrated Control Center

The Integrated Control Center, which the Safety Management Group operates, installed emergency electricity generators for power supply at nine locations (six in the main yard and three in the Offshore Business Unit) to handle the shutdown of power supplies, such as distribution panels, before a typhoon damage it impossible to monitor controlled areas, such as quayside and seawalls. The generators are expected to enable us to respond promptly in an emergency, such as the approach of a typhoon or a safety accident, through real-time video monitoring.

Organization, operation, management of the internal fire brigade

HHI formed and operated a nonmandatory internal fire brigade (with three fire engines and three ambulances) to respond to massive fires or explosions more quickly. The members of the internal fire brigade, composed of executive officers and employees of the Safety Management Group, take the initiative in fire suppression and life-saving in preparation for a ship accident or a fire in any facility through monthly exercises to learn how to handle various situation.

Nighttime safety management by the integrated control center

The HHI Safety Management Group operates a nighttime safety team to manage nighttime safety and quickly respond to accidents or emergencies. The nighttime safety team, comprised of four persons, performs activities for safety management such as patrol, control in the entire company area, receiving accident reports, conducting rescue/relief activities if a safety accident occurs, broadcasting an emergency.
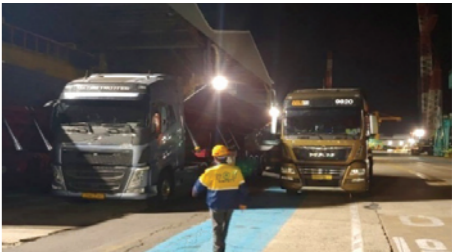
Status of nighttime violators of safety rules

Category	January	February	March	April	May	June	July	August	September	October	November	December	Total
No. of cases	-	-	-	-	-	-	-	1	-	1	-	-	2

Operation of the Ship Navigation Management Center

HHI operates an Ship Navigation Management Center that prevents various accidents, such as collisions by monitoring and controlling the real-time sea route of all ships in the yard to ensure the safe operation of ships entering and leaving the port and protect ships at anchor.

The center serves as a main weather information office with a cutting-edge electronic chart–based ship control system, very high frequency (VHF) communication equipment for passing ships, and the automatic ship identification system (AIS). It also established and functioned radar sites in Jeonha Bay and Mipo Bay to locate the positions of small ships and floating obstacles. Furthermore, it prepares for judges whether to evacuate hulls based on evaluation of accumulated date such as intensity of similar typhoons and weather information system.

Status of entry and departure of ships (No. of cases)

Category	January	February	March	April	May	June	July	August	September	October	November	December	Total
Daytime	132	133	133	115	125	133	102	71	83	102	91	124	1344
Nighttime	24	26	16	24	9	18	12	4	12	2	11	28	186

05
Enhancing Practice-Based Yard Safety Management

HHI is developing a safe workplace where anyone can work with confidence through comprehensive self-inspection, training, education and accident prevention infrastructure. These are being performed to strengthen safety management against unexpected fires and traffic accidents occurring in the company.

Improving firefighting and safety management of hazardous substances

●

Preventive Management by examining firefighting facilities and hazardous substances

Through the first and second half of the year, the company conducts regular examination of firefighting facilities for 176 buildings, including the main building. There are 954 deficiencies that require remedial measures, including replacing fire extinguishers over the 10 years, malfunctioning visual alarms, and nonfunctioning exit lights. Immediate measures are taken and invested based on priorities. In addition, a 24-hour firefighting equipment emergency repair team conducts walk-around examination to ensure that all firefighting equipment in the company operates properly and maintained through emergency mobilization and repair about malfunctions.

Category	Main Plant (No. of cases)			Offshore Plant (No. of cases)		
	Malfunctioning Measures	walk-around inspection	Complementary inspection	Actions for malfunction	walk-around inspection	Complementary inspection
January	59	53	152	12	44	1
February	26	64	26	4	44	9
March	57	109	38	4	44	9
April	56	111	37	10	45	22
May	48	110	37	13	45	11
June	58	109	107	17	44	14
July	114	109	40	24	44	9
August	99	110	33	20	44	7
September	60	47	24	10	44	24
October	71	111	37	8	44	51
November	42	111	65	16	44	-
December	42	110	154	22	44	14
Grand Total	732	1154	750	160	530	171

Status of firefighting facilities subject to mandatory examination

Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Management	External Facilities	Total
Objects	92	6	21	31	25	175

Status of facilities for handling hazardous substances

Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Management	External Facilities	Total
Objects	27	3	36	7	1	73

Fire safety information investigation in 2021

The fire safety investigation survey team from the Dongbu Fire Station stayed in the company for two month to intensively conduct a fire safety information survey to prevent massive fires and actively implement the State's policies for life of a citizen.

The investigation was conducted in 112 locations (93 plants / 19 locations for hazardous substances), including the HHI main building and external plants. Moreover, measures to address 330 deficiencies (including 5 cases subjected to judicial actions) identified in the investigation are in progress.

Preventing fires through regular inspections of facilities for storing or handling hazardous substances

Under Article 18 of the Act on the Safety Control of Hazardous Substances, gas stations and similar facilities (19 facilities in the company) must undergo a regular inspection at least once a year and keep the inspection results for 3 years. The relevant provision, which was amended last October, requires inspection results to be submitted to the relevant government office within 30 days of completion. Hence, we had an external company with a special license to conduct the inspection and ensure that a close inspection could be done to limit the risks.

Status of hazardous substances subject to regular inspections

Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Management	External Facilities	Total
Objects	8	1	5	5	-	19

Conducting a fire insurance inspection to determine the fire insurance premium rate

HHI is a defense contractor designated under Article 35 of the Defense Business Act. It makes a comprehensive property insurance contract with the Korea Fire Protection Association, which is a public institution, annually. On September 14, the insurance company conducted a regular survey, a field inspection, an inspection based on the firefighting plan, and an evaluation of fire prevention activities, including exercises.

Private-government joint firefighting exercise in 2021

On November 2, HHI and the Dongbu Fire Station conducted the "2021 Private-Government Joint Firefighting Exercise" at the quay wall. According to Article 15 of the Enforcement Rule of the Firefighting Facility Act, assuming a fire occurred in an LNG ship (No. 3145) under construction, activities from receiving a report to emergency mobilization, emergency rescue, and firefighting must be conducted. Thus, about 50 workers on the ship promptly moved to a safe location and conducted an evacuation exercise, just like in an actual situation.

Results of exercises for firefighting and fire suppression

Category	January	February	March	April	May	June
Times	4	4	4	4	4	4

July	August	September	October	November	December	Total
4	4	4	5	6	4	51

Practice training for safety managers in charge of firefighting / hazardous substances

HHI completed a practice training course provided by the Korea Fire Safety Institute to 142 Safety Managers in charge of workplace firefighting/hazardous substances last April. The practice training program is conducted every two years. It focuses on maintaining and managing firefighting facilities to ensure that they can function properly when a fire or an explosion occurs. In addition, it emphasizes the preservation of evacuation facilities, etc., to facilitate evacuation. It is expected that the training program will enable rapid response in emergencies.

Category	Shipbuilding & Offshore Business Unit	Naval & Special Ship Business Unit	Engine & Machinery Business Unit	Management	Total
Firefighting safety manager	4	-	-	6	10
Firefighting safety management assistant	74	3	25	8	110
Firefighting engineer	–	-	-	4	4
Safety manager in charge of hazardous substances	11	1	6	2	20

Preventing traffic accidents by improving internal road traffic facilities and by guidance and regulation

●

Status of internal road traffic safety management

The Safety Management Group operates a Traffic Safety Team to prevent internal road traffic accidents and maintain a smooth logistics flow on main roads. The Traffic Safety Team consists of 6 persons. It conducts activities for preventing internal road traffic accidents, such as providing traffic guidance on crossings during rush hours, limiting traffic rule violators, identifying areas with a damaged main road, requesting repairs, maintaining and managing traffic safety facilities, and guiding people (visiting very important persons (VIPs)) to christening ceremonies.

Number of traffic accidents (past 5 years)

Category	2017	2018	2019	2020	2021	Total
No. of Cases	42	32	48	56	50	228

Status of violators of traffic rules

Category	January	February	March	April	May	June	July	August	September	October	November	December	Total
No. of Cases	35	30	49	53	30	51	37	45	48	52	35	34	499

Status of issuance of motorcycle pass

Category	January	February	March	April	May	June	July	August	September	October	November	December	Total
No. of Cases	84	54	113	109	61	99	119	53	136	128	272	123	1351

Status of traffic safety facilities

Category	Speed measuring system	light-emitting diode (LED) electric signboard (30 km/hr)	Psychedelic warning light	Breath analyzer	Motorcycle	Camcorder	Speed meter	Total
Quantity	10	8	18	3	6	6	3	54

Enhancing work to prevent slipping on internal pedestrian passages

In October, HHI improved work to prevent slip accidents (of pedestrians and motorcyclists) on the slippery or frozen surface of internal pedestrian passages on rainy days or in winter.

Such improvement was done in the main area of each entrance (about 3.2 km) with frequent traffic and is expected to reduce the number of slip accidents on pedestrian passages significantly.

Installing additional speed warning systems on internal main roads

The Safety Management Group operated speed warning systems on five main roads where speeding within the premises occurs frequently and installed the systems on five more locations last June. The speed warning systems detect the driving speed of vehicles and motorcycles, create a face-shaped image based on the current speed, and produce a warning sound when it detects a vehicle traveling faster than 35 km/hr. The speed warning systems are expected to considerably reduce traffic accidents caused by speeding violations.
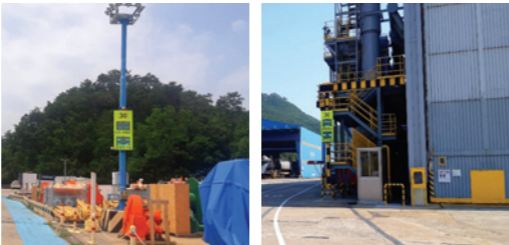
06
Safety and Health Supervision by the Ministry of Employment and Labor

HHI has complied with the Ministry of Employment and Labor's supervision for safety and health. It strives to comply with statutes and regulations by submitting reports on action results for the findings identified in supervisory inspections.

Management of government affairs
●

Supervisory inspections by the Ministry of Employment and Labor over safety and health

When serious accidents occurred at HHI, the Ministry of Employment and Labor conducted three supervisory inspections. The safety and health supervisory inspections allowed the company to identify deficiencies in the safety and health management system, worksite, etc. Thus, we reported to the Ministry of Employment and Labor on the remedial actions taken for 684 findings identified during the inspections.

Findings identified by safety and health supervisors

Main Findings	Number of Findings
Prevention of fall / falling objects	308
Machines/equipment/facilities	129
Electrical safety	74
Safe passages/illumination	70
Prevention of fire/explosion	48
Confined spaces/ventilation	17
Hazardous matreials	9
PPE	3
Others	26
Total	684

Health   Safety

Environment

4-5
Management Performance of the Health Management Team

The Health Management Team creates a healthier workplace and focuses on prevention by conducting safety and health activities, such as executive officer and employee health promotion. They also reinforced disinfection guidelines for preventing infectious diseases, such as COVID-19, and upgraded the hazardous substance management system in the workplace by operating a chemical management system.

01
Health Management Team Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Systematizing health management data and focusing on prevention	**Strengthening the health data (indicators) management system** • Establishing and reviewing KPI items for health • Analyzing the results of medical checkups, follow-up management, and measurements of the working environment and creating a database of statistical data and improving the operating system	**Strengthening the health data (indicators) management system** • Establishing and reviewing KPI items for health • Analyzing the results of medical checkups, follow-up management, and measurements of the working environment and creating a database of statistical data and improving the operating system	One time/year One time/year	Whether established Whether the system is improved	100 50	Schedule change	Developing a computer system (expected to be completed in the first half of 2022)
	Preparing a road map of the integrated health management system • Designing → Purchasing → Managing chemicals → Measuring the working environment → Establishing a procedure/system for connecting with the medical checkup management system	**Preparing a road map of the integrated health management system** • Designing → Purchasing → Managing chemicals → Measuring the working environment → Establishing a procedure/system for connecting with the medical checkup management system	One time/year	Location of the procedure	50	Schedule change	To be reflected in the 2022 plan
	Upgrading the health examination follow-up system and improving the quality of health promotion activities • Expanding, improving, and operating the THP program (custom health management for executive officers and employees) (Evaluation of the risk level of cardio-cerebrovascular disease + Programs for quitting smoking/obesity + Job stress + Follow-up examinations on liver diseases • Establishing a plan to utilize the results of the job stress assessment	**Upgrading the health examination follow-up system and improving the quality of health promotion activities** • Expanding, improving, and operating the THP program (custom health management for executive officers and employees) (Evaluation of the risk level of cardio-cerebrovascular disease + Programs for quitting smoking/obesity + Job stress + Follow-up examinations on liver diseases • Failed to establish a scheme to utilize the results of the job stress assessment	Occasionally One time/year	Implementor/beneficiaries Whether the utilization scheme was established	100 0	The plan was changed because of COVID-19	Improving/supplementing the system To be reflected in the 2022 plan
	Conducting health examinations more efficiently • Appropriate health examinations: General (one time/year), special (one or two times/year). Examinations before assignment, etc. • Improving the procedure for the individual cycle management of health examinations, including special examinations	**Conducting health examinations more efficiently** • Appropriate health examinations: General (one time/year), special (one or two times/year). Examinations before assignment, etc. • Established a plan to improve the procedure for the individual cycle management of health examinations, including special examinations	Continually One time/year	(Monthly) examination implementor/examinees Whether the procedure is improved	100 50		Reflecting the Integrated Health Management System in 2022
	Improving the system for responding to work-related diseases and strengthening prevention activities • Established the internal work ability assessment standards for work-related diseases (musculoskeletal disorders, etc.) • Strengthening training programs for preventing work-related diseases and improving health management instructional materials • Improving internal and external rehabilitation programs • Strengthening the follow-up management of persons with a diagnosed occupational disease, persons who need monitoring, and persons with a rare disease	**Improving the system for responding to work-related diseases and strengthening prevention activities** • Established the internal work ability assessment standards for work-related diseases (musculoskeletal disorders, etc.) • Strengthened training programs for preventing work-related diseases and improved health management instructional materials (One case) • Failed to improve internal and external rehabilitation programs • Strengthening the follow-up management of persons with a diagnosed occupational disease, persons who need monitoring, and persons with a rare disease	One time/year One time/year One time/year Continually	Whether assessment standards are established Whether teaching materials are prepared Whether the improvement scheme was established Implementor/beneficiaries	100 100 0 100	The plan was changed because of COVID-19	To be reflected in the 2022 plan
Securing response capabilities against new health risks	**Strengthening the system for infectious disease response** • Operating an emergency room for COVID-19 response • Establishing a system for prompt response to infectious diseases and upgrading the procedure for such purpose (improving the infectious disease response manual, reviewing the procedure for response in each type of situation, etc.)	**Strengthening the system for infectious disease response** • Operating an emergency room for COVID-19 response • Established a system for prompt response to infectious diseases and improved the procedure for such purpose (upgraded the content about COVID-19 in the infectious disease response manual) • Conducted COVID-19 vaccinations at the workplace (vaccinated 18,746 persons)	Continually One time/year Occasionally	Whether the manual was improved Whether the vaccination was conducted	100 50 100	Additional supplementation is necessary because of the changes in policies	To be operated continuously To be updated continuously
	Improving subcontractors' health management • Monitoring subcontractors' health indicators, such as work-related diseases, the current status of persons with a diagnosed disease, etc. • Strengthening the connection with health management service providers (operating a council, monitoring the operation of service providers, inspecting major subcontractors) • Reinforcing monitoring and guiding of small subcontractors with no service provider	**Improving subcontractors' health management** • Failed to monitor subcontractors' health indicators, such as work-related diseases and the current status of persons with a diagnosed disease • Held meetings to strengthen the connection with health management service providers [June 15 (Tue), September 9 (Thu)] (Ulsan University Hospital and the Korea Industrial Health Association) • Reinforcing monitoring and guiding of small subcontractors with no service provider	Occasionally Occasionally Occasionally	Whether conducted Whether conducted Whether conducted	0 100 100		To be operated continuously To be operated continuously

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Securing response capabilities against new health risks	**Improving the quality of the chemical management system (strengthening the system for conveying information on chemicals)** • Strengthening the procedure for the hazard assessment of newly purchased chemicals [Considering the application of additional assessment factors in addition to the current assessment standards (examination of regulated substances/CMR)] • Establishing a hazard/risk preexamination procedure for newly developed products and processes	**Improving the quality of the chemical management system (strengthening the system for conveying information on chemicals)** • Strengthened the hazard assessment procedure for newly purchased chemicals (considering the addition of items hazardous to the skin): Reflecting 865 substances Corrosive/irritant/hypersensitive to the skin in the regulation information database • Failed to establish a hazard/risk preexamination procedure for newly developed products and processes	Continually One time/year	Whether the assessment standards were amended Whether the relevant procedure was established	100 0		To be reflected in the 2022 plan
	Improving the quality of the MSDS education system for departments handling chemicals • Reviewing the process for the management of information on materials subject to the MSDS education in connection with the chemical management system and the outcomes of education (revised information on the MSDS of each material in the system, the function of reviewing the amendment cycle, etc.) • Preparing teaching materials for practical MSDS education and distributing practice guides	**Improving the quality of the MSDS education system for departments handling chemicals** • Developing a notice system for materials subject to MSDS education in connection with the chemical management system • Preparing teaching materials for practical MSDS education and distributing practice guides	One time/year One time/year	Whether the relevant procedure was established Whether the guides were prepared and distributed	50 100	Schedule change	Developing a computer system (expected to be completed in the first half of 2022)
	Improving the chemical risk assessment system • Reestablishing the chemical risk assessment system (considering a change in risk estimation standards and preparing occasional assessment standards) • Computerizing the chemical risk assessment process (streamlining the procedure for calculating the risk level)	**Improving the chemical risk assessment system** • Reestablishing the chemical risk assessment system (revising the risk estimation standards) • Developing the chemical risk assessment system	One time/year One time/year	Whether the system was improved Whether the computer system was established	100 50	Schedule change	Developing a computer system (expected to be completed in the first half of 2022)
Improving the quality of activities of improving the working environment	**Measuring the working environment and establishing a systematic management system for improvement activities** • Regular measurement: One time/semiannually, periodically Shortened measurement: One time/three months • Reinforcing site management activities in measuring the working environment (occasional inspection of the status of sample collector wearing, working position, etc.) • Monitoring hazardous factors that exceeded the exposure standards in measuring the working environment and managing the improvements of the work environment (sharing exemplary improvement measures and cases, intensive management of major departments exceeding the exposure standards) • Promoting the operation of the hearing acuity preservation system and the respiratory system protection program and improving the level of management	**Measuring the working environment and establishing a systematic management system for improvement activities** • Regular measurement: One time/semiannually, periodically Shortened measurement: One time/three months • Reinforcing site management activities in measuring the working environment (occasional inspection of the status of sample collector wearing, working position, etc.) • Monitoring hazardous factors that exceeded the exposure standards in measuring the working environment and managing the improvements of the work environment (sharing exemplary improvement measures and cases, intensive management of major departments exceeding the exposure standards) • Promoting the operation of the hearing acuity preservation system and the respiratory system protection program and improving the level of management	Continually Occasionally Occasionally Occasionally	Whether the working environment was measured Whether site inspections were conducted occasionally Whether site inspections were conducted occasionally Prepared and distributed teaching materials on hearing acuity and the respiratory system	100 100 100 100		To be operated continuously To be operated continuously To be operated continuously
	Strengthening health and hygiene management activities • Performing work based on the plan for preventing hazards and dangers in ventilating systems • Conducting internal and external safety inspections on local ventilating systems and managing such systems (Objects: All local ventilating systems; Cycle: One time/year) • Anti-epidemic disinfection: Regular disinfection (all year round), special disinfection (May~August), additional disinfection (occasionally), hygiene inspections for mass feeding facilities	**Strengthening health and hygiene management activities** • Performing work based on the plan for preventing hazards and dangers in ventilating systems(Completed 8 cases) • Conducting internal and external safety inspections on local ventilating systems and managing such systems (Objects: All local ventilating systems; Cycle: One time/year)(Completed 127 cases) • Anti-epidemic disinfection: Regular disinfection (all year round), special disinfection (May~August), additional disinfection (occasionally), hygiene inspections for mass feeding facilities	Occasionally Two times/year Continually	Whether the prevention plan passed the examination Whether safety inspections were conducted on such systems Whether anti-epidemic measures and hygiene inspections were conducted	100 100 100		To be operated continuously To be operated continuously To be operated continuously
	Improving the system for the management of PPE and personal consumables • Considering a plan for company-wide integrated management of PPE • Establishing and supplementing the guidelines for wearing PPE and personal consumables and standardizing specifications of products • Improving the performance and quality of PPE and personal consumables regularly (one case/month) • Inspecting the state of use of PPE and personal consumables occasionally (confirming appropriate selection and safety, etc.)	**Improving the system for PPE and personal consumable management** • Improving the system for managing PPE/subsidiary materials • Preparing the standards for wearing PPE and personal consumables (three cases) • Improving PPE and examining products when new materials are registered (38 cases) • Inspected the quality of PPE and consumables provided to individuals (three products)	One time/year Occasionally Occasionally Occasionally	Location of the management plan Number of cases per item of protective equipment and personal consumable Number of cases per item of protective equipment Number of cases per item of protective equipment and personal consumable	100 100 100 100		Reflecting on the plan for 2022 Reflecting on the plan for 2022
	Improving the guidelines for the supply and management of subcontractors' safety shoes • Preparing a plan to improve the guidelines for supplying safety shoes to the subcontractors' new employees	**Improving the guidelines for the supply and management of subcontractors' safety shoes** • Completed the improvement of the guidelines for supplying subcontractors' safety shoes	One time/year	Whether the improvement plan was prepared	100		

02
Systematizing Preventive Health Management Data

HHI conducts regular medical checkups for employees, checkups and psychological treatment for high-risk groups, work ability evaluation to prevent work-related diseases, such as musculoskeletal disorders. It also provides education to prevent skin and occupational diseases and does its best for follow-up management.

Upgrading the health examination follow-up system and improving the quality of health promotion activities

Risk level assessment of cardio-cerebrovascular disease and job stress assessment

The company administers annual blood lipid tests to employees to promote their health, although the tests are supposed to be provided once every four years. It also assesses the risk of cardio-cerebrovascular disease using assessment items based on the KOSHA Guide and has implemented job stress assessment to prevent health problems caused by job stress.

The company's connected clinic and district infirmaries provide counseling services to high-risk groups for cardio-cerebrovascular disease and specialized programs for psychological recovery to high-risk groups for job stress.

- Period of service: March 24 (Wed), 2021~December 31, 2021 (Fri)
- Location: Ulsan University Hospital Occupational Environment Health Center
- Eligible persons: All employees
- Assessment institution: Ulsan University Hospital
- Assessment method: Preparing medical questionnaires for medical checkups and providing counseling services
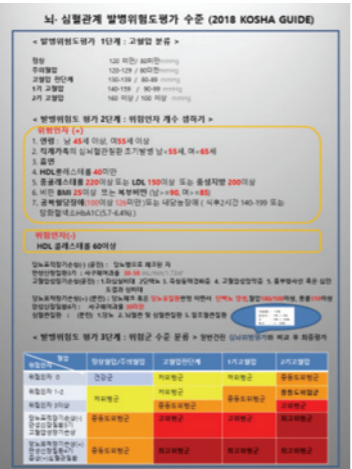
Basis on the KOSHA GUIDE

Programs for helping psychological recovery

- Eligible persons: High-risk groups for job stress
- Provider: Relaxation garden
- Services: Psychological therapy and counseling service
- Place: 3rd flr., of the Culture Building

Conducting health examinations more efficiently

Regular medical checkup

General checkups are performed on executive officers and employees to monitor their health status. In addition, special checkups are conducted for those who work with noise, hazardous rays, metals, or organic compounds. Furthermore, long-serving executive officers and employees are provided with comprehensive checkups, and each job category is also offered custom preventive care.

Operation of health checkups in 2021

Category	General	Special Checkup		Comprehensive Checkup	Others
		First Half	Second Half		
Period	March 24 (Wed) ~ December 31, 2021 (Fri)				
Eligible persons	Office worker	Construction worker	Person excessively exposed to measurement factors	Person aged 40 years above, person employed for more than 5 years ※ Additional: optional examinations (one time every six years)	Checkup prior to assignment/ overseas checkup/ employment checkup/ second close checkup
Checkup cycle	One time/year	one time/year	-	one time/two years	
Number of persons who received a checkup	3,966 persons	8,600 persons 864 persons (nighttime)	3,294 persons	4,957 persons 1,345 persons (additional: optional examinations)	

Optional examinations	① Colonoscopy
	② Low-dose lung computerized tomography (CT) scan /
	    Measurement of biological age
		③ Ultrasound for prostate/thyroid
		④ Ultrasound for breast/bone
		    density test

Follow-up management of medical checkups

The specialized medical personnel of the company provides special counseling services, medications, and health education to high-risk groups with relatively higher chances of developing cardio-cerebrovascular diseases, such as hypertension, dyslipidemia, and diabetes, and individuals with other diagnosed diseases based on the health checkup results in each year.

- Period: 1st group (March 24) ~ 13th group (December 31)
- Method: Providing information to each field department group and counseling services by experts
- Expert counseling: The company's connected clinic and local infirmaries
  * Taking measures, such as limiting work hours, if necessary, by occupational physicians after the examination

Improving the system for responding to work-related diseases and strengthening prevention activities

Establishing internal work ability assessment standards for musculoskeletal disorders

As the number of applications for industrial accidents with musculoskeletal disorders increases, we have established internal work ability assessment standards to improve work processing procedures for work-related diseases. It also shortens the processing time of the relevant departments and secures objective data on whether or not industrial accidents are recognized.

근골격계질환 자체 작업력 평가 결과서(예시)

■ 인적사항

사업부	조선해양	부서	의장2부	사번	8306359	성명	윤XX
생년월일	1959-10-17	입사일	1983-08-29	퇴사일	2020-12-31	근속연수	37년4개월

■ 평가항목
- 작업력 평가 기준표에 의거, 신청인의 상병명과 해당직종의 인과관계 유무 파악

해당 상병명	회전근개파열	외상과염	반월상연골 파열	요추 추간판탈출증	경추	수근관 증후군	기타
	☑	☐	☐	☑	☐	☐	☐
해당 직종	용접 ☑	용접 ☐	용접 ☐	용접 ☑	용접 ☐	용접 ☐	
	취부 ☐	취부 ☐	-	-	취부 ☐	-	-
	배관 ☐	배관 ☐	-	배관 ☐	배관 ☐	-	
	도장 ☐	도장 ☐	-	-	-	도장 ☑	
근속연수 (기준 :10년이상)	37년4개월						-
유효기간1)	개별 상병명 당 유효기간 기준						-
	12개월 이내	2개월 이내	12개월 이내	12개월 이내	12개월 이내	6개월 이내	
	11			11			
업무관련성	해당			해당			

1) 유효기간 : 신청인이 신체부담업무를 중단한 다음날부터 최초 상병진단일까지의 기간

-종 합 의 견-

위 신청인은 현대중공업 자체 '근골격계질환 작업력 평가 기준표'에 의거 신청상병과 해당업무 사이에 인과관계가 있다고 판단되어, 보험가입자의견서 및 사업주조사서 내용을 첨부와 같이 제출 예정이오니 이견이 있을 경우, 의견 제시 바랍니다.

보 건 관 리 팀

Number of cases approved as industrial accidents with musculoskeletal disorders (based on current employees)

Category	2018	2019	2020	2021
Number of Approved Persons	32	74	68	95

Conducted occasional cause investigations on jobs affecting the musculoskeletal system in 2021

- Number of investigations: 228 cases
- Investigated entities: Departments in which musculoskeletal disorders occurred with evident industrial accidents during the relevant period
- Measures taken: Improvement of the work environment for the jobs affecting the musculoskeletal system and other measures

Strengthening training programs for preventing work-related diseases and improving teaching materials for health management

We have improved health care teaching materials on managing and using substances that can cause skin diseases to prevent work-related diseases.

Hygiene management rules to prevent skin diseases

- Washing hands and maintaining personal hygiene
- Using skin protection cream

Procedure for operating medical care programs for skin diseases

Step	Examination Items	Examination Details
1	Monitoring persons with symptoms	Examining whether there is a skin trouble after the TBM and work
2	District infirmaries	Issuing a prescription for general skin medication
3	The company's connected clinic	Getting a consultation and medical treatment by a physician and issuing a prescription for special skin medication
4	Requesting medical examination	Requesting medical examination based on the physician's prescription, if necessary (to Ulsan University Hospital)

Follow-up management of persons with a diagnosed occupational disease and persons who need monitoring

Based on the examining institution's health management classification from the relevant year's health checkup, follow-up management, such as job changeover, is provided for those with a diagnosed occupational disease (D1) under Article 43 (5) of the Occupational Safety and Health Act. In additional, we strive to prevent the contracting of a disease by those with a diagnosed occupational disease (D1) by offering those in need of occupational disease (C1) monitoring with disease prevention and management training.

Category	Persons with a Diagnosed Occupational Disease (D1)			Notes
	In total	Hearing Loss	Others	
2019	21	19	2	The number of people suffering from occupational diseases is decreasing year over year because of preventative measures, such as conducting earplug suitability tests, offering information on wearing protective equipment, and conducting individual interviews.
2020	22	18	4	
2021	4	4	0	

03
Securing Response Capabilities Against New Type of Health Risks

HHI has strengthened and upgraded its response system for infectious diseases such as COVID-19, Intra-company vaccination, and influenza vaccination, and is also strengthening health management for subcontractors. In addition, it improved the quality of the chemical management system and continued activities of measuring and improving the working environment and health and hygiene management.

Strengthening the system for responding to infectious diseases

Response to COVID-19

The company effectively responds to the persistent COVID-19 by operating the COVID-19 emergency room. We are preventing the entry and spread of the COVID-19 within the company through close cooperation between relevant departments in receiving reports on unusual signs of COVID-19, establishing and disseminating disinfection guidelines, taking special disinfection measures, managing cafeterias/convenience facilities, managing business trips/dispatched workers, managing working systems, such as telecommuting, promoting disinfection regulations, and responding to the final diagnosis of the disease at an early stage.

Operating thermographic cameras at main entrances and monitoring individuals' health
We installed and operate thermographic cameras at the company's main entrances. Each department always checks whether there is any executive officer or employee who has a health concern, such as fever, before starting to work.

Special disinfection and hygiene management
Special disinfection is performed in buildings and cafeterias periodically. Hand sanitizers, information on hygiene management, such as how to wear a mask, how to wash hands, and personal hygiene rules are regularly provided.

Measures for strengthening disinfection of cafeterias
Individual partitions were installed on all tables in cafeterias, and disposable plastic gloves were provided. We are making various efforts, such as spreading out the crowd at the cafeteria by expanding the operation of the convenient food service.

Using self-test kits for early detection of persons infected by COVID-19
Any person with a respiratory disease or symptom suspected of COVID-19 who received medical treatment in the company's connected clinic is advised to use a self-test kit based on the medical personnel's assessment. This is to ascertain the suspected disease in advance.

Additional control of persons from abroad and provision of self-isolation facilities
We are enforcing stricter guidelines on top of government measures (additional isolation when entering the country aside from self-quarantine, etc.) to prevent the spread of infectious diseases within the workplace from foreign workers. In addition, we provide executive officers and employees with self-isolation facilities when returning from overseas business trips/dispatches.

COVID-19 vaccination by the company

The company vaccinated its employees against COVID-19 to establish early herd immunity within the workplace. As a result, 18,000 individuals, including employees, subcontractors, and group companies, were vaccinated, contributing to the early achievement of workplace herd immunity and the prevention of infectious disease in the local community.

Category	Description	Notes
Location	The company's connected clinic	
Vaccine	Pfizer	
Period of Vaccination	1st: July 27 (Tue) ~ August 20 (Fri) 2nd: August 24 (Tue) ~ September 16 (Thu)	
Vaccinated persons	Workers ages 18 and 59 in the Ulsan worksite	* Persons who wanted vaccination
Number of vaccinated persons	18,746 persons	

* The company achieved early herd immunity within the workplace with an inoculation rate of higher than 70%
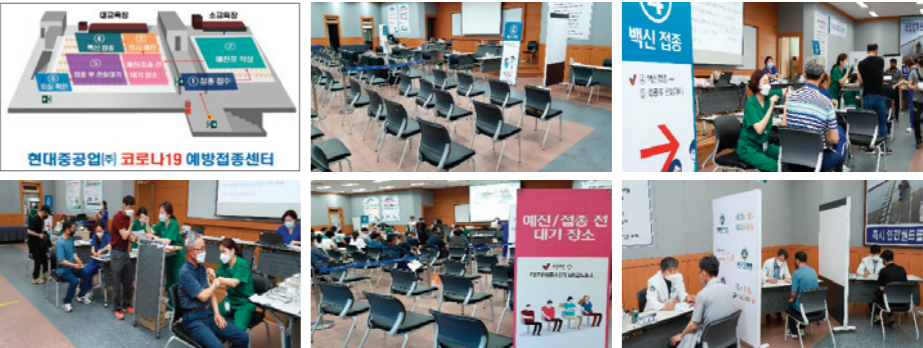
Establishing a system for prompt response to infectious diseases and upgrading the procedure for such purpose

The company has established and implemented the "Infectious Disease Response and Prevention Management Manual" to prevent the spread of infectious diseases within the company. The content of the manual on new infectious diseases, such as COVID-19, is continuously updated following the government disinfection guidelines.

감염병 대응 및
예방관리 매뉴얼

2021.10.01.

현대중공업 안전경영실
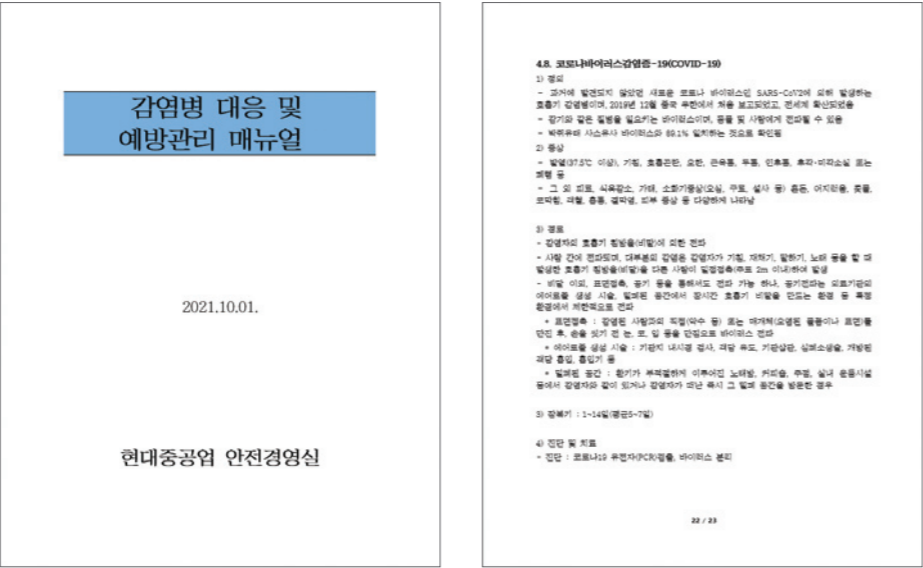
System for reporting and transporting persons diagnosed with COVID-19
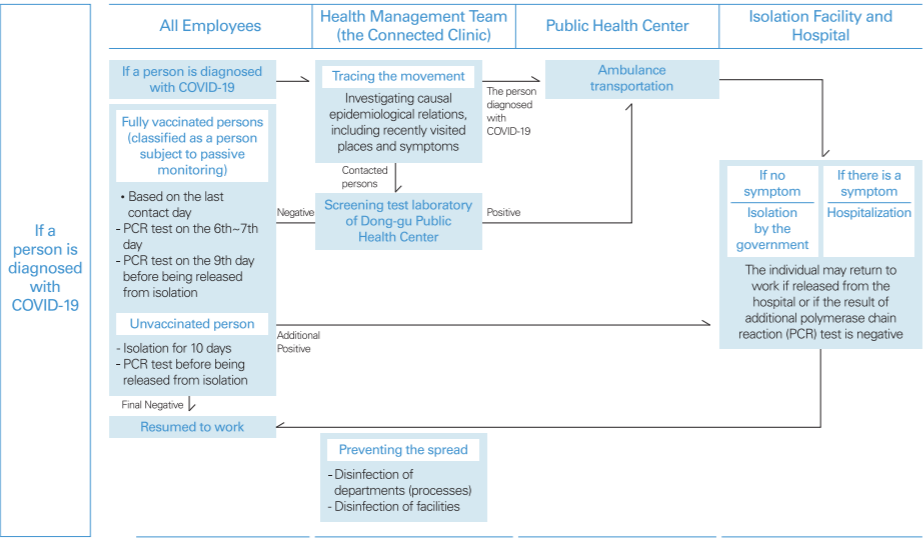
Inquiry

Emergency room	T.202-5670
Ulsan Public Health Center	Dong-gu T.209-4080 Buk-gu T.241-8124 Jung-gu T.290-4334
	Nam-gu T.226-2426 Ulju-gun T.229-8056

Current Status of COVID-19 in HHI

- Preemptive response measures to prevent the spread of COVID-19 in the workplace
  - Conducting internal epidemiological investigations when a person in the company is diagnosed with a disease (checking contact suspects and disinfection-needed site)
  - Conducting additional epidemiological investigations with the disinfection authority, taking measures to prevent the spread, and utilizing data of internal investigations if a person is diagnosed with a disease Introducing self-test kits for early diagnosis of persons with COVID-19
- Disclosing information about COVID-19 concerns transparently
  - Operating a COVID-19 situation board in the workplace and providing information (movement, measures taken) regarding diagnosed individuals via short message service (SMS)
- Operating an internal vaccination center to achieve early herd immunity of executive officers and employees in the workplace
  - Achieved early herd immunity of executive officers and employees by operating the vaccination center from July until September 2021 (increased to 75% in September) * Immunization Vaccination rate in December 2021 (increased to 93%)

Local confirmed cases (Ulsan) vs. HHI confirmed cases

■ HHI confirmed cases   — Local confirmed cases (Ulsan)

	January	February	March	April	May	June	July	August	September	October	November	December
Local confirmed cases (Ulsan)	222	77	144	772	649	246	400	1,020	943	199	224	1,265
HHI confirmed cases	4	1	2	21	11	2	13	35	13	3	16	21
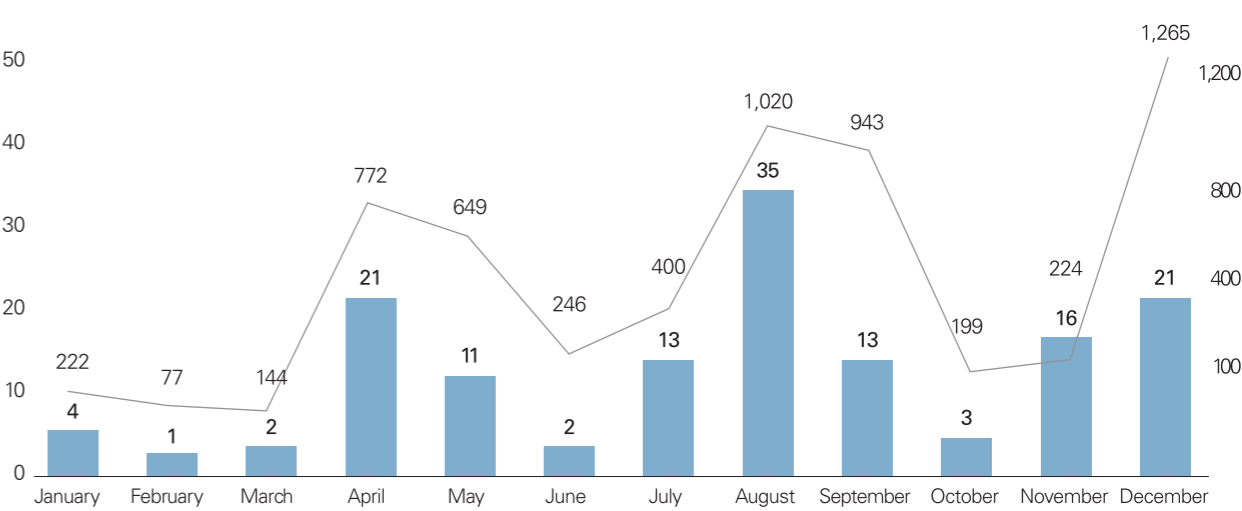
Flu vaccination in 2021

Since 2007, the company has been providing flu vaccinations every year to promote the health of executive officers and employees during the winter season. In 2021, 4,882 persons were vaccinated (Immunization rate: 38%), and internal subcontractors' vaccination expenses were fully paid through the Common Welfare Fund.

Category	No. of Persons to be Vaccinated	No. of Vaccinated Persons	Immunization rate
2021	12,833 persons	4,882 persons	38%
2020	13,599 persons	9,562 persons	70%
2019	14,269 persons	5,940 persons	42%
2018	14,715 persons	6,248 persons	42%

Reinforcing subcontractors' health management

Holding Meetings with Health Management Service Providers

The company holds regular meetings with the health management service providers, the Occupational Environment Health Center of the Ulsan University Hospital, the Korea Industrial Health Association, and the Ulsan Industrial Health Center every year to promote subcontractors' health management.

Meeting Dates
- June 15 (Tue) / September 19 (Thu)

Topics
- The current status of work-related diseases and diagnosed workers of subcontractors
- A health management plan for new employees
- Issues related to solvent-free paints
- Management, etc. of PPE and personal consumables

Technical assistance to subcontractors with less than 50 workers in the health area

We are promoting the health management of small-scale subcontractors with no service provider by visiting them to offer technical assistance in health management, conducting preliminary inspections, and offering guidance on areas where health-related vulnerabilities may occur.

Improving the quality of the chemical management system

Operation of the chemical management system

We use the hazard assessment process to ensure the safety of chemicals delivered to the workplace before being transported. The hazard assessment process is conducted through the chemical management system, and the potential risk of each product is examined with the MSDS provided by the supplier during the purchase of chemical for the information on chemical hazards. Through this process, we verify the adequacy of the content of the MSDS, the hazards of the product, and whether it contains legally regulated substances. Thus, only approved products after the examination is purchased. Persons handling chemicals can easily access the MSDSs in the MODS database of the Integrated HSE Management System.

Results of operation of the chemical management system (data as of Quarter 4, 2021)

Category	Chemical Hazard Assessment				Submission of Imported Chemical's MSDS*
	Approval (Purchasing)	Conditional Approval		Disapproval (Non-Purchasing)	
		Replacemen	Receiving Evidence		
2019	932	6	0	3	-
2020	3,337	7	5	13	-
2021	1,924	0	1	14	21

Note 1) If it is determined during the hazard assessment stage that a product contains a highly hazardous substance or a legally regulated substance, the product or the substance in question must be replaced after discussion with the department requesting the product. Moreover, the supplier or product must only be purchased if it meets the assessment standards by providing evidence of the actual content of the regulated substance. A product that fails to meet the standards must not be purchased to prevent the entry of products containing highly hazardous chemicals or legally regulated substances into the workplace.

Note 2) Based on the fully amended Occupational Safety and Health Act in 2021, a person who intends to directly import a chemical product shall prepare a Korean MSDS and submit it to the national MSDS system before transporting the product.

Work flow of the chemical management system

Material management system
Determining if there is a chemical in the material list

Purchase system
Obtaining MSDS and assessing hazards

Integrated HSE management system
Inquiring/obtaining data from the MSDS database
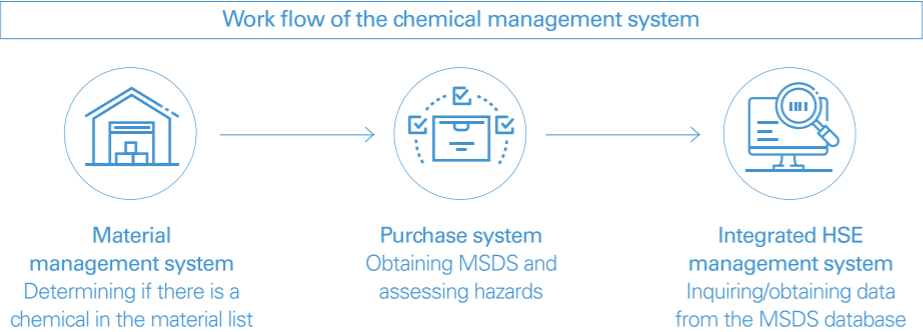
Strengthening chemical hazard assessment items

When conducting a hazard assessment of chemical products, we use our own database of regulated substances to easily check whether a chemical is a legally regulated substance or a highly hazardous chemical (carcinogenicity, reproductive toxicity, germ cell mutagenicity, etc.). Information on 865 types of hazardous substances to the skin in the relevant DB was added to enable a preliminary examination of the types and content of substances during the hazard assessment stage and strengthen the hazard examination items.

Items subject to hazard assessment and types of substances hazardous to skin reflected in DB

Hazard assessment
- Adequacy of MSDS
- High-risk hazards (CMR)
- Substances regulated by the Industrial Safety Act
- Substances regulated by the Chemical Management Act
- Skin hazards

Classification	Skin-irritant	Skin-corrosion	Skin-hypersensitive	Skin-irritant/ hypersensitive	Skin-corrosion/ hypersensitive
Number of substances	130 substances	323 substances	261 substances	89 substances	62 substances
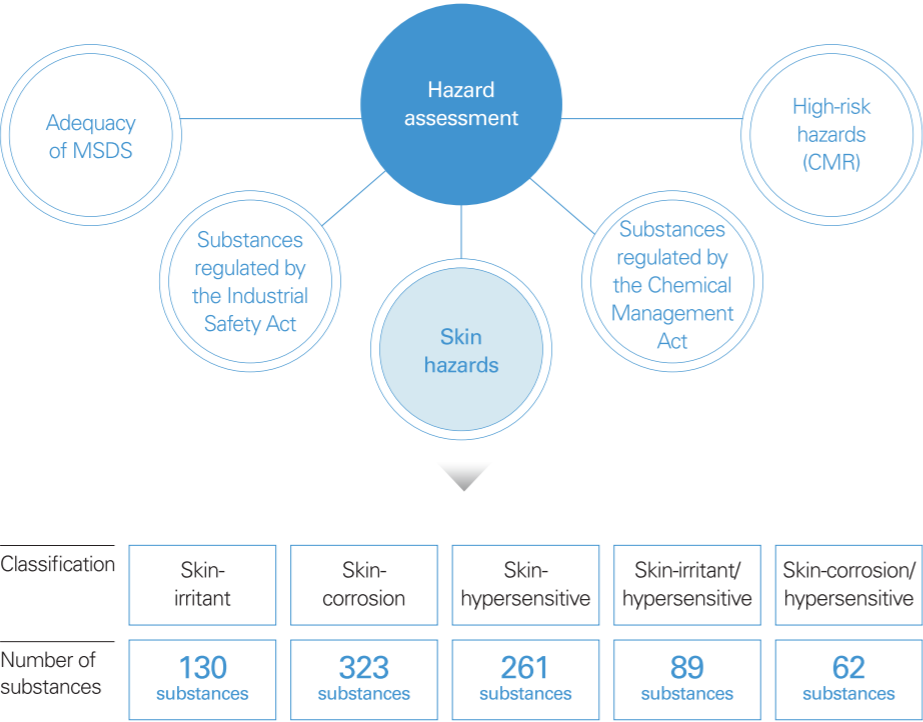
Improving the quality of the MSDS education system for departments handling chemicals

Distributing MSDS education guide

The MSDS training is an education program that must be conducted for safely handling chemical products and must be undertaken before handling chemical products. A guide for education personnel has been produced and distributed for the department handling chemicals to effectively conduct MSDS education. The guide contains instructional content and provides five educational templates for each type of chemical product, allowing you to create an MSDS education syllabus easily.

Composition and main content of MSDS education guide
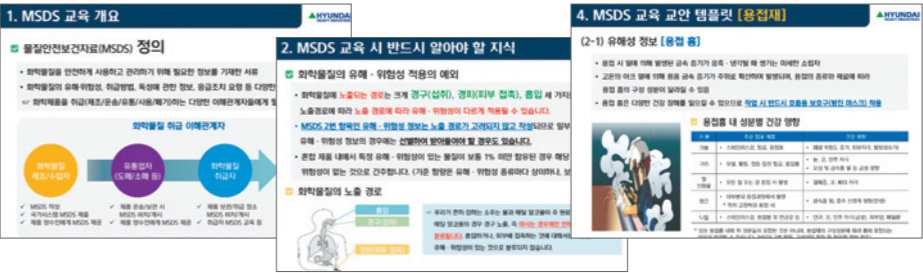
Improving the chemical risk assessment system

A chemical risk assessment is conducted regularly to quantitatively identify the risk of chemicals and lower the risk level. Risks are calculated quantitatively by classifying the exposure level of hazardous factors and hazards (intensity) by stage. A plan to improve the working environment is established for hazardous factors with a risk not lower than a certain level to reduce the risk. From this year onward, the risk calculation standards, which were divided into three stages of frequency and intensity, are now divided into five stages of frequency and four stages of intensity through system improvement to determine the risk of hazardous factors by a process in detail. In addition, the scope of risks that require a plan to improve the working environment is now expanded.

Frequency
Five stages of exposure level

×

Intensity
Four stages of hazards

=

Calculation of Risks of a Chemical (maximum 20 points)

Establishing a plan to improve the work environment → Eight points or more

Monitoring and daily inspection /improvement → Less than eight points
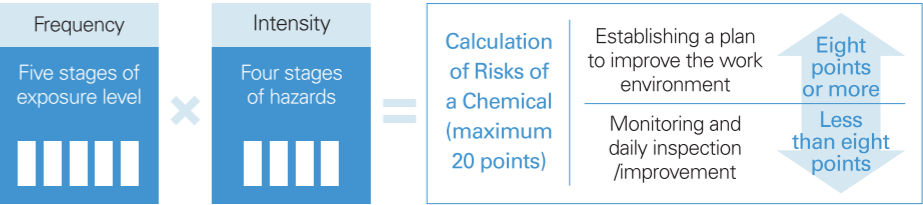
04
Enhancing Activities' Quality for an Improved Working Environment

HHI protects field workers from potential accidents by continuously enhancing the PPE used in the workplace.

Measuring the working environment and establishing a systematic management system for improvement activities

Under Article 125 of the Occupational Safety and Health Act, HHI conducts work environment measurement (collecting, analyzing, and evaluating samples after the employer establishes a measurement plan for the relevant workers or workplace to determine the condition of the work environment) twice a year.
• Measurement period: 2020 (2nd half), 2021 (1st half)
• Measuring institution: The working environment measurement team of the Ulsan University Hospital

Category	2020 (2nd half)	2021 (1st half)
Period required for measurement	July 13 ~ December 23, 2020 (86 days)	January 18 ~ June 30, 2021 (90 days)
Measured departments (including subcontractors)	59 departments	58 departments
No. of measured persons (including subcontractors)	2,442 persons	2,558 persons
No. of measured cases (including subcontractors)	16,188 cases	18,171 cases
1) Dust, fume, etc. 2) Noise/fever 3) Organic compound 4) Other factors	8,599 cases 2,387 cases 3,138 cases 2,064 cases	10,547cases 2,584cases 2,781cases 2,259cases

Strengthening site management activities in measuring the working environment
Reducing the excess rate by strengthening site management activities in measuring the working environment
• The number of excess cases decreased: 711 cases in 2020 (2nd half) → 618 cases in 2021 (1st half)
• The excess rate (%) decreased: 4.39 in 2020 (2nd half) → 3.40 in 2021 (1st half)
(22.6% decreased, compared with the preceding year)

Inspecting the operation of the ventilation system, the status of wearing protective equipment, and the status of wearing measurement samples

Promoting the operation of the hearing acuity preservation system and the respiratory system protection program and improving the level of management
• Distributing training materials for the hearing acuity preservation system and the respiratory system protection program
  - Distributing training materials for departments conducting the hearing acuity preservation system and respiratory system protection program (departments working with excessive noise and dust)
  - Uploading training materials to the Hi-SEs training database
• Sharing outstanding performance of site improvements with construction departments
  - Distributing exemplary cases of excessive process improvement

Hearing acuity / respiratory system	Distributing the record of exemplary improvement
Distributing additions to existing training materials	Increasing investment in ventilation systems
Sharing Hi-SEs training materials	Utilizing low-noise tools and introducing new equipment

Strengthening activities for health and hygiene management

Safety Inspection of Local Ventilation Systems
• Number of inspected units: 127 Units
• Inspection period: June~October 2021

Plan to prevent hazards and dangers (equipment related to controlled hazardous substances and dust work)
• Number of plans submitted in 2021: 8 cases

Equipment for safety inspection of local ventilation systems	examination of plans to prevent hazards and dangers

Inspection of hygiene of feeding facilities
• Facilities to be inspected: 37 facilities (34 cafeterias, 3 external lunchbox caterers)
• Inspection period: May 25, 2021 ~ June 29, 2021 (8 days)
• Scope of inspection: Examining the bacterial growth rate of samples collected from tablewares, cutting boards, knives, and dishcloths

Internal disinfection

(regular disinfection + special disinfection + special COVID-19 disinfection)
- Disinfection area: 69 buildings, 27 cafeterias, and other drains
- Service period: Regular disinfection (Buildings: 1 time/2 months; cafeterias: 1 time/month) and special disinfection (1 time/month for buildings with a cafeteria and drains from May until October)

Regular disinfection and special COVID-19 disinfection

Improving the system for the management of personal protective equipment and personal consumables ●

Improving the management system for personal protective equipment/subsidiary materials

The management system for subsidiary materials was improved to meet the requirement of the management system for safety/health expenses and efficient management of PPEs/consumables.

Improvements
- Designated a new material code (510) for safety consumables: 1,050 items
- New subsidiary materials for safety consumables are required to be registered after being examined by the Safety Management Group
  - The registration of a subsidiary material is subject to prior examination of the safety/suitability of the product
- Computerized the management of internal subcontractors' safety subsidiary materials by each department
  - Executing Hi-SEs → Health → It can be verified in the "Expenses of Personal Protective Equipment and Safety Consumables"
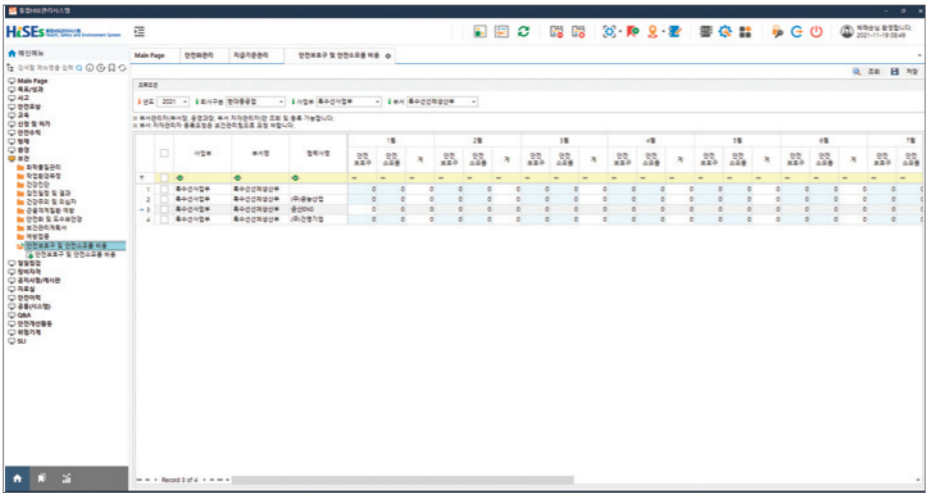
* Internal subcontractors can manage PPEs/safety consumables in the Hi-SE system.

Establishing the standards for wearing personal protective equipment and personal consumables

We are developing standards for supplying custom PPEs and personal consumables to each person and providing adequate protective equipment based on the job/place/environment, etc. Currently, we have established the standards for three items: safety helmets, safety boots, and safety harnesses. By the first half of 2022, we will improve and establish the standards for providing 6 items, including masks, earplugs, earmuffs, chemical resistant gloves, safety glasses, and face shields, to prevent the use of protective equipment beyond its lifespan or the use of damaged protective equipment at the worksite.

Standards for providing PPE (safety helmet, safety shoes, safety harness)

Item	Eligible Job	Standard	Time of Provision	Directly-controlled employee	Subcontractor	Notes
1) Safety helmets	All construction jobs (including registered subcontractors)	18 months	Relevant month			
	Others (design sector, etc.)	When necessary	-			Applying for each department's budget for subsidiary materials
	※ Standards for providing safety helmets by type - Safety helmets for welding: Persons engaged in welding, fitting, flammable work, etc. - Safety helmets with a clear window: Signallers ※ Standards for replacing safety helmets - Shock-damaged products - Severely contaminated products	-	-			Immediately replaceable when damaged
2) Safety shoes	All construction jobs (direct construction workers)	Six months (two times / year)	May November			Two pairs a year for workers engaged in test operation or QM among support construction jobs
	Indirect construction workers [materials, driving, materials management (warehouse), operating jobs (equipment), etc.]	12 months (1 time / year)	May			
	Leather safety shoes — Others (design sector, etc.)	-	-			Permitted to occasionally request if necessary for work (subject to the head of the department's approval)
	※ Standards for providing safety shoes by type - 4 in, 6 in: Materials, driving, quality - Blasting shoes: Workers engaged in blasting work - Nonslip: Workers in a highly slippery workplace because of oil, etc., such as inside an engine chamber - 8 in: Other construction jobs	-	-			Permitted to occasionally apply for the replacement of damaged or defective shoes
	Rubber safety shoes — All construction jobs					Applying for each department's budget for subsidiary materials
	※ Standard for providing rubber safety shoes - Outdoor workers may exchange 1:1	When necessary				
3) Safety harnesses	All construction jobs (including registered subcontractors)	36 months	relevant month			
	※ Standards for providing swing safety harnesses - Working at a high place					

Examining products to be registered as major protective equipment improved in 2021

The Health Management Team of the Safety Management Group prevents health hazards and accidents by continuously improving the PPE used in the workplace. In 2021, we conducted product improvement and review on 38 items, including seat belt shock absorbers, loafer-type safety shoes, and earplugs with an enhanced fit. We will continue to improve to offer more user-friendly protective equipment for field workers.

Safety harness

• Integral type of lanyard and shock absorber (built-in internal type minimizing interference when working in a narrow space)
• Only the lanyard can be replaced partly if the shock absorber (lanyard) is damaged.
• Excellent fit with spandex material for leg webbing

Safety shoes (Loafers)

• Trekking shoe type (dial type)
• Seamless processing
• The weight is 22% lighter than traditional shoes

Earplugs

• Soft material that provides a comfortable fit (sound insulation rate: 33 dB)

Welding apron

• A product with added knee protectors and instep protectors in trousers

Vibration proof & cut resistance gloves

• Excellent anti-vibration effect and cut prevention with an anti-vibration pad on the palms

Air hood

• A flame retardant product with improved safety performance for protecting the body of field workers in summer

Inspected the quality of personal protective equipment and consumables provided to individuals

We conduct periodic quality inspections of personal protective equipment and personally provided consumables at the time of stocking or products provided at the worksite and take measures to improve or replace products that do not fulfill the standards. In 2021, non-conforming products found among 6-inch safety shoes and polar gloves were improved.

6-in Safety Shoes	Polar gloves
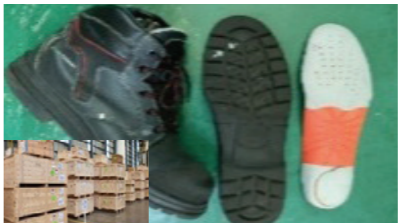
There was a risk of injury due to the rubber sole being pierced by a nail driven into the wood during lumber-unpacking work.

Nonconforming products were delivered. Stitching conditions and quality were substandard.

Remedies
Attached a sole plate 1 mm larger than the inner skin size of the safety boots' sole
Bonding after adhering to the edge as close as possible

Remedies
Collected and returned all delivered products
Improved the fit by adding spandex material to the existing products

Improved the standards for providing safety shoes to subcontractors

Although the subcontractors' employees were not entitled to additional safety shoes, unlike those provided regularly, the standards for giving safety shoes were increased to the same level as those in directly-controlled teams. New employees and workers with damaged shoes are to be immediately offered replacement shoes because safety accidents are very likely to occur when safety shoes are damaged.

Health   Safety

Environment

4-6
Management Performance of the Environmental Management Team

The Environmental Management Team develops a workplace environment policy to minimize the risk of environmental law violations based on the environmental management system (ISO 14001). The team strives to reduce the environmental impact of business activities through environmental authorization and permission, environmental facility management, etc. In addition, the team aims to improve the local community's environment through eco-friendly ecological activities, voluntary environmental patrol activities, etc. The team recognizes the significance of promoting the ESG environment management and carbon neutrality and plans to develop an eco-friendly corporate culture.

*The Environment Section was founded in November 2021. The management performance of the Environment Section contains only the results of the Environmental Management Team, which was previously affiliated with the Safety Management Group.

01
Environmental Management Team Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Enhancing response capabilities against environmental risks and promoting low-carbon activities	**Strengthening ESG environmental management** • Participating in the ESG committee: Participating in the establishment of the ESG environmental management system/strategy of group companies • Diagnosing and providing feedback on the current status of internal and external environmental management of the company • Establishing and implementing a plan to strengthen internal ESG environmental management: Goals, strategy, road map, role, etc.	**Strengthening ESG environmental management** • Participated in the ESG committee: Participated in the establishment of the ESG environmental management system/strategy of group companies • Diagnosed the current status of internal and external environment management of the company and participated in providing feedback on the environment area in ESG assessment • Established a plan to strengthen internal ESG environmental management and performed short-term tasks for 2021	Continually Continually Continually	The rates of participation in meetings and submission of data The rate of participation in feedback on assessment Whether to establish a plan and perform tasks	100 100 100		 To be reflected in the 2022 plan
	Systematic establishment and implementation of the environmental management system • Upgrading the environmental sector in the Integrated HSE Management System • Maintaining the certification of the environmental management system (ISO 14001): Evaluating the compliance with environmental laws and upgrading the system operation	**Systematic establishment and implementation of the environmental management system** • Upgraded the environmental sector in the Integrated HSE Management System: Established a system for monitoring the current status of facilities + the total quantity management system, etc. • Maintained the certification of the environmental management system (ISO 14001): Evaluated the compliance with environmental laws and upgraded the system operation	Continually Continually	Whether systems are developed Whether the ISO certification was maintained	100 100		 Whether the system is improved
	Promoting carbon neutrality • Participation in the Carbon Neutrality Committee of the shipbuilding industry: Direct and indirect participation in the government's policy on the carbon neutrality of the shipbuilding industry • Diagnosis and feedback on the current status of the company's carbon neutrality	**Promoting carbon neutrality** • Participation in the Carbon Neutrality Committee of the shipbuilding industry: Declaration of the challenge to achieve carbon neutrality in the shipbuilding industry by 2050 • Set carbon neutrality goals and established the company's plan for promotion: Organized presentations on carbon neutrality and conducted meetings by each department	Continually Continually	The rate of participation in the Committee and submission of materials Whether the plan was established and implemented	100 100		 Support for the task of reduction for carbon neutrality
	Compliance with the strengthened regulation under the Clean Air Conservation Act of 2021 • Investing in the high-risk group's facilities that are likely to exceed the permissible emission levels • Investing in facilities following the policy that imposes the self-measurement on facilities exempt from the installation of prevention facilities once a year and conducting such measurement	**Compliance with the strengthened regulation under the Clean Air Conservation Act of 2021** • Completed investing in the high-risk group's facilities that are likely to exceed the permissible emission levels • Applied for measurement exemption once a year for the facilities exempt from the installation of prevention facilities and conducting the measurement for the nonexempt one facility	Continually Continually	Whether invested Whether applied for measurement exemption and measured	100 100		Examining whether additional improvements are necessary
	Promoting the compliance with the Special Act on The Improvement Of Air Quality In Air Control Zones • Calculating total emission of pollutants subject to total emission control + managing carried-over/sold/purchased emissions • Planning to install a fuel flow meter in each facility and investing it in facilities	**Promoting the compliance with the Special Act on The Improvement Of Air Quality In Air Control Zones** • Calculated total emission of pollutants subject to total emission control in the preceding year and submitted a report on monthly nitrogen oxide emissions to the Ministry of Environment • Invested in facilities for installing a fuel flow meter in each facility	One time/month Continually	Whether materials were submitted monthly The rate of installation of a fuel flow meter in each facility	100 50	 Installing them successively until the legal deadline, which is by the end of 2022	To be operated and managed continuously To complete the installation in 2022
	Management of the greenhouse gas emissions trading scheme • Preparing and verifying the plan to calculate greenhouse gas emissions and the statement of emissions • Managing the current status of emission permits (carried over/sold/purchased) and verifying the results of the internal reduction	**Management of the greenhouse gas emissions trading scheme** • Prepared and verified the plan to calculate greenhouse gas emissions and the statement of emissions • Completed the carry-over and sale of surplus emission permits (profit from sale: KRW 4.19 billion)	Continually Continually	Whether submitted Whether implemented	100 100		To be operated and managed continuously To be operated and managed continuously
	Compliance with the law on chemical substances and appropriate operation of hazardous chemical substances handling facilities • Management of the handling/contracting hazardous chemical substances and periodic inspection for handing facilities • Hazard assessment of chemicals to be stocked and management of the pollutant release and transfer registers, statistical surveys, and hazardous chemical substances	**Compliance with the law on chemical substances and appropriate operation of hazardous chemical substances handling facilities** • Completed the reporting of the awarding of a contract for handling of hazardous chemical substances and passed the inspection on hazardous chemical substances handling facilities • Conducted the hazard assessment of chemicals to be stocked and managed the pollutant release and transfer registers, statistical surveys, and hazardous chemical substances	Occasionally When it occurs	Whether contracting was reported and passed the inspection The rate of assessment and the rate of submission of data	100 100		Intensification of management To be managed the operation continuously

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Enhancing response capabilities against environmental risks and promoting low-carbon activities	**Legitimate management of the discharge of wastewater and wastes /appropriate management of specified facilities subject to the control of soil contamination** • Checking TOC discharged from wastewater discharge facilities and managing the authorization and permission • Management of achievement of goals the resource circulation performance (minimizing waste disposal charges) • Conducting an inspection of soil contamination levels, a leakage inspection and surveys of the actual state of soil contamination	**Legitimate management of the discharge of wastewater and wastes /appropriate management of soil facilities** • Analyzed all pollutants for the management of new pollutants discharged wastewater discharge facilities • Achieved the goals (terminal treatment ratio, circular utilization ratio) for resource circulation performance • Results of the inspection of soil contamination levels (12 units in 6 locations) and the leakage inspection (3 units in 2 locations): Complying	One time/year Continually When it occurs	Whether measured Whether the goals were achieved Inspection rate	100 100 100		To be operated and managed continuously Achieving the goals for 2022 Conducting inspections on target facilities in 2022
	Communication with internal and external stakeholders and continuous participation in eco-friendly ecological activities • Preparing data on environmental information for publication, responding to requests for cooperation in the environmental area from the government, project owners, etc., and providing support for business operations • Conducting nature cleanup activities, including a quarterly campaign of "One Company, One River Care" • Systematic management for marine pollution prevention, including the operation of a volunteer marine pollution response brigades called "Hyunjung Dolphin" and private-public joint response training for preventing marine pollution (one time/year)	**Communication with internal and external stakeholders and continuous participation in eco-friendly ecological activities** • Published environmental information (the environmental information disclosure system, an integrated report, a business report) and provided support for business operations in the environmental area • Conducted nature cleanup activities, including the campaign of "One Company, One River Care" once or twice per quarter • Operated the volunteer marine pollution response brigades called "Hyunjung Dolphin" and conducted a response training for preventing marine pollution	Continually Quarterly Continually	Whether data was disclosed Whether participation was conducted Whether training was conducted	100 100 100		Maintaining the current state To be operated continuously To be operated continuously

02

Improving Response Capabilities Against Environmental Risks and Promoting Low-Carbon Activities

HHI strives to lessen the risks of law violations in all areas of the environment, such as air, water quality, and chemical substances, and reduce environmental pollutant emissions to enhance its status as an eco- friendly corporation. In addition, HHI recognizes the significance of reducing carbon emissions. HHI continued to improve its work process, invest in reduction facilities, and develop technologies, and will intensify low carbon activities.

Strengthening ESG environmental management

Environmental management is an essential management policy that a company should pursue. Its importance is being emphasized, and interest in the environment is growing. Hence, HHI strives to become an eco- friendly company by sharing environmental information to internal and external stakeholders through ESG evaluation, the environmental information disclosure system, business reports, etc.

Major changes: Establishment of the ESG committee and the promotion of the Environment Section

HHI established an ESG governance system by appointing a CSO, holding a directors' meeting, and establishing an ESG committee, laying the foundation for accelerating ESG management to strengthen ESG management.

In addition, as the importance of ESG environmental management has increased, the Environment Section was established within the Management Support Division in November 2021. Its teams will collaborate and conduct various tasks to strengthen environmental management.
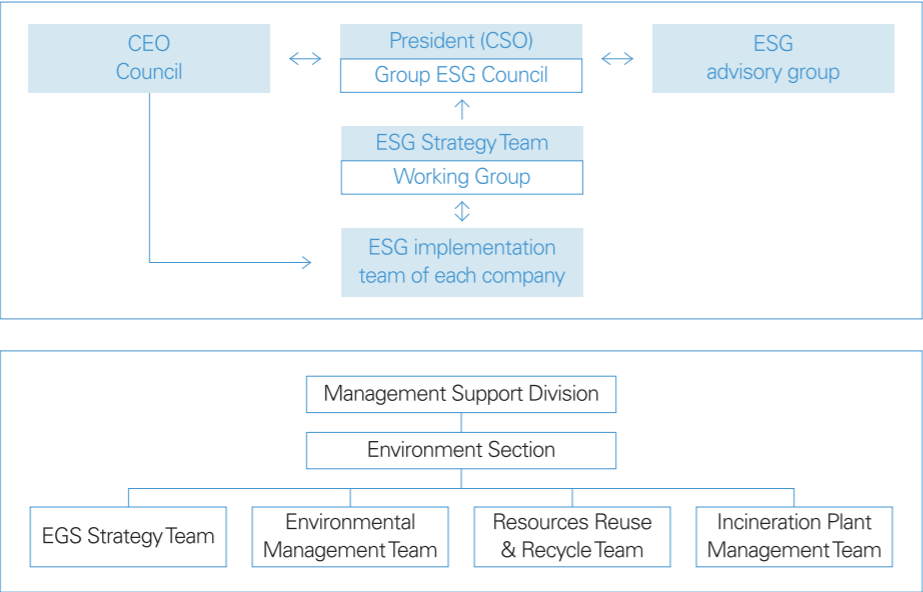
Deriving major tasks in the ESG environmental area and making a road map

The Environmental Management Team assessed the company's level of ESG environment management, organized new and supplementary tasks, and consulted with other external companies to refine tasks in the ESG Working Group. Based on the derived tasks, we plans to perform the environmental management tasks together with related departments.

Short-term/ long- and medium-term	Major ESG tasks
Short-term	Establishing corporate environmental goals and a plan
	Preparing a manual for responding to the environmental accident prevention system and conducting training
	Reviewing and amending regulations on environment and energy management
	Developing a plan for compliance with and management of domestic and foreign laws and regulations
	Declaring the goals for carbon neutrality / RE100 performance
	Preparing and publishing an manifesto for environmental management
Long- and medium-term	Expansion and management of environmental investment, such as environmental facilities and systems
	Promoting the integrated monitoring system for company-wide environmental pollutant emissions
	Improving the emission intensity by upgrading facilities
	Enhancing the management of chemical substances
	Expanding participation in activities for eco-friendly ecological activities, such as biodiversity conservation activities
	Formulating a road map for carbon neutrality / RE100 and publishing performance records regularly
	Establishing long- and medium-term goals for reducing each non-greenhouse gas pollutant, such as water and wastes
	Formulating a road map for reducing non-greenhouse gas and publishing performance records regularly

Systematic establishment and implementation of the environmental management system

Improvement of the environment system in the integrated HSE management system

As part of the ESG environmental management, the environmental area in the corporate integrated HSE management system was improved to upgrade law compliance management.

Category	Establishment and Improvement	Description
Common	Establishment	management of the monitoring system and the facility status record card of each facility
Air	Establishment	management of the current status of air pollutant measurement
	Improvement	supplementation of operation records and management of repair records
Total emission control system	Establishment	management of facility status and fuel consumption operation records and aggregation of emissions
Water quality	Establishment	management of the measurement of water pollutants
	Improvement	supplementation of annual operation status and operation records
Hazardous chemical substances	Improvement	enhancement of handling facility status
Effluent	Establishment	management of facility status and repair records
Soil	Establishment	management of facility status and facility subject to the inspection

• A facility monitoring system was established for each environmental area. it is now possible to identify the location, resources, etc. of each facility, managing facilities has become more convenient.

• As the Special Act On The Improvement Of Air Quality In Air Control Zones was newly enacted, a management system for facilities subject to the total emission control system was established. Thus, we increased our work efficiency through the computerized registration of fuel consumption operation records and the aggregation of pollutant emissions.

Renewal of ISO 14001 certification

We established an environmental management system based on the international standard for the Environmental Management System (ISO 14001), and we obtained the ISO 14001 certification from the certification institution to ensure transparency and objectivity in environmental management. The ISO 14001 certification was renewed in 2021 after passing the examination. In 2022, we intend to improve the quality of the ISO 14001 certification through system inspection.

Promotion of carbon neutrality

Carbon neutrality entails achieving a net emission of "0" so that the atmospheric concentration of greenhouse gases does not increase. Hence, HHI recognizes that the ecosystem and human society may be at risk because of climate change and will strive to pursue carbon neutrality in various ways.

Declaration of the challenge to carbon neutrality in the shipbuilding industry in 2050

In April 2021, the shipbuilding industry recognized the importance of responding to the climate change crisis, which is a global issue. It declared the "challenge for carbon neutrality in the shipbuilding industry" to participate in the 2050 carbon neutrality. Thus, we intend to discuss setting carbon neutrality goals with the government and the shipbuilding industry and managing them as long-term tasks under related objectives.

Presentation on carbon neutrality and self-diagnosis

In July 2021, we held a presentation on carbon neutrality to explain the carbon neutrality policy of the government and our carbon neutrality plan to the heads of departments (teams) who are performing tasks that are highly related to the promotion of carbon neutrality. Starting with the briefing session, we self-diagnosed our current level and established a plan for each task based on our internal capabilities. Based on the results of the goals discussed with the government, we plan to revise our goals for each period and implement them to achieve carbon neutrality.

Compliance with the strengthened regulation under the Clean Air Conservation Act

We installed optimal prevention facilities in air pollutant emitting facilities and managed concentration and quantities of emissions of air pollutants through periodic measurements to reduce air pollutants generated during the construction process.

Investment in air environmental facilities

Public concern for the air environment, such as fine dust, and related laws, such as the Clean Air Conservation Act, the Malodor Prevention Act, and the Special Act On The Improvement Of Air Quality In Air Control Zones, are gradually getting tighter. Thus, HHI continues to invest in facilities each year to prevent violations of laws and regulations, such as improving old facilities and replacing prevention facilities.

Category	Status of major investment in air environmental facilities in 2021
Shipbuilding & Offshore Business Unit	1. Replacement of an RTO (Regenerative Thermal Oxidizer) 2. Replacement of the boiler and gas heater in the painting plant
Engine & Machinery Business Unit	1. Replacement of indoor painting facilities and establishment of new prevention facilities 2. Replacement of prevention facilities in descaling and painting facilities
Management Support Division	1. Establishment of prevention facilities in the boiler/ absorption chiller-heaters (Low nitrous oxide (NOx) burners) 2. Installation of a cascade boiler and replacement of a decrepit boiler

Replacement of an RTO (Regenerative Thermal Oxidizer)

Replacement of prevention facilities in descaling and painting facilities

Replacement of a gas heater in the painting plant

Installation of a cascade boiler

Obtained approval for exemption application from the obligation to measure air pollutants
If we can always meet the permissible emissions levels of air pollutants without installing prevention facilities in air pollutant-emitting facilities, we are not required to establish prevention facilities. Facilities exempt from the obligation to install prevention facilities had no obligation to measure emitting pollutants. However, we are now obliged to measure emitting pollutants once a year based on the 2021 amendment of the Clean Air Conservation Act. If there is a valid reason for non-measurement, such as a physical or safety problem, the measurement may be exempted with the approval of a competent authority. We was granted an exemption from measurement of the relevant authorities. For some of our discharge outlets in 2021 because of safety problems, such as high temperature and the possibility that a confined space could not be maintained if a measuring hole was installed.

Promoting the compliance with the Special Act On The Improvement Of Air Quality In Air Control Zones
●

Total emission allowances of air pollutants control
Since the Special Act on The Improvement of Air Quality on Air Control Zones took effect in 2020, some HHI workplaces have been operating with permission for establishing places of business under the law.

Workplace subject to total emission allowances of air pollutants control	Nitrogen oxide	Sulfur oxide	Dust
main plant	Applicable	Non-applicable	Non-applicable
Incineration plant	Applicable	Applicable	Applicable

The facilities subject to total emission allowances of air pollutants control are primarily fuel-burning emitting facilities. We have made efforts to reduce the total amount of pollutants by investing in replacing old facilities and installing prevention facilities. In addition, we are installing fuel flow meter in facilities to accurately aggregate fuel consumption, which is the basic data for calculating the total amount of pollutants. Through such reduction efforts, the main plant generated a surplus because of its low nitrogen oxide emissions compared to the allowance in 2020 and 2021, and the surplus was carried forward to the following year. Hence, we will continue to reduce air pollutants through steady reduction activities.

Management of the greenhouse gas emissions trading scheme
●

The greenhouse gas emissions trading scheme is a system in which a company is granted a greenhouse gas emission allowance (emission permit) from the government and manages the reduction of greenhouse gas emissions at the workplace within the allowance. HHI is also taking the lead in reducing greenhouse gas emissions through various reduction activities.

Management of emission permits for the second commitment period and profit making
Since 2015, the plan period of the greenhouse gas emissions trading scheme has been divided into the first commitment period (2015~2017), the second commitment period (2018–2020), and the third commitment period (2021~2025). When HHI was separated from Korea Shipbuilding & Offshore Engineering in 2019, it was designated as a business entities eligible for allocation of emission permits because it was a newly established corporation. In 2019 and 2020, surplus emissions were generated because the amount of greenhouse gas emissions was lower than the given allowance and because of greenhouse gas reduction activities through fuel change, facility replacement, etc and construction reduction. Although we made a substantial profit by selling all surplus emission permits, we made a profit of approximately KRW 4.19 billion in 2021 by selling a part of surplus emission permits. Because we expected that the shipbuilding industry would recover in the third commitment period, we have been carried forward to the following year by the maximum limit.

Category	2019	2020	Notes
Allocated permits (Carbon dioxide equivalent(CO_2eq))	939,810	970,091	Initially allocated permits+carried-over permits
Emissions (CO_2eq)	509,537	523,116	These are the reference emissions during the emission permit submission, and they differ from actual emissions
Surplus(CO_2eq)	430,273	446,975	
Carry-over(CO_2eq)	278,273	199,658	
Sale(CO_2eq)	152,000	247,317	
Profit (in a million KRW)	5,212	4,186	

Allocation of emission permits for the third commitment period

The allocation of emission permits for the third commitment period (2021~2025) is based on the emissions during the preceding years (2017~2019). We expect that the shipbuilding industry will recover during the third commitment period. Thus we will strive to reduce greenhouse gas emissions to promote carbon neutrality because of increased greenhouse gas emissions more than the allotted permits in 2023 when estimating emissions with the planned construction.

Emission permits allocated (CO_2eq)	2021	2022	2023	2024	2025
	526,775	526,775	526,775	521,842	521,842
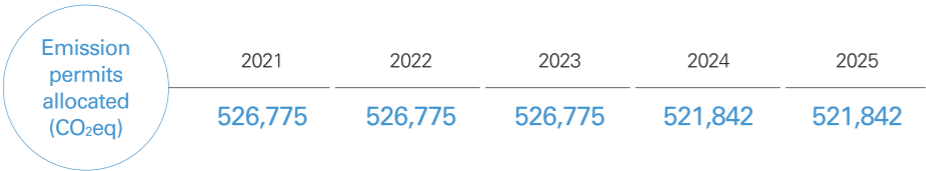
Compliance with the law on chemicals and appropriate operation of the hazardous chemical substances handling facilities

Before specific chemical substances are supplied, a hazard assessment determines whether HHI can handle them. Chemical substances are handled based on the legal procedures under the Chemical Substances Control Act and the Act on Registration and Evaluation of Chemical Substances.

Management of hazardous chemical substances handling facilities

Regular inspection results of hazardous chemical substances handling facilities in 2021

Classification of Facilities	No. of Facilities	Results of Inspection
Use	7	
Preservation storage	5	Passed
Total	12	

Chemicals in the workplace that are possibly hazardous and dangerous are classified as hazardous chemicals and must be handled by managers and handlers who have completed a mandatory training course in a safe handling facility. We conducted the self-inspection once a week and underwent an annual inspection by an external inspection agency since 2021 to ensure safety in the management of hazardous chemical substances handling facilities. In addition, when handling hazardous chemicals, we wear appropriate PPE and keep records of usage logs, etc.

Participation in the Valve, Flange, Switch (VALFS) campaign

As part of the prevention and management of chemical accidents, we have conducted the VALFS safety campaign with other workplaces in the Ulsan area. We posted banners and posters related to the VALFS campaign and attached campaign stickers to safety helmets, and had meetings about the importance of VALFS management with managers and handlers in charge of hazardous chemical substances. We will continue to strive to prevent chemical accidents through regular activities for preventing chemical accidents.

Legal management of the discharge of wastewater and wastes/appropriate management of soil facilities

HHI makes efforts to legally treat of wastewater and wastes generated from the workplace and reduce discharges by recycling resources, etc. In addition, for the management of the soil environment, we conduct soil inspections regularly on oil storage facilities and paint storage facilities which are specified facilities subject to the control of soil contamination, after granted permission from the relevant authorities.

Legal wastewater treatment

With permission from a relevant authority, HHI legally treats of wastewater discharged from the workplace by flowing it into a water pollution prevention facility, entrusting the treatment to an external treatment company, and discharging it directly into public waters while and discharging it continuously within the standards for effluent water quality

Wastewater Treatment Method by Facility	Self-Treatment	Entrusted Treatment	Direct Discharge
No. of wastewater discharge facilities	2	25	5
Major Process	Curving process, car wash	Pipe cleaning, propeller cleaning, engine hydraulic test	Pressure vessel hydraulic test, concentrated water of purified water construction facilities

Management of specific substance harmful to water quality

Since 2018, the "Examination of Discharge Quantity of Specific Substances Harmful to Water Quality" has been implemented in workplaces that discharge specific substance harmful to water quality more than the specified standards. HHI measures and controls pollutants discharged from each facility semiannually or twice monthly to improve the accuracy of the examination of discharge quantity of specific substances harmful to water quality. In 2021, we analyzed all items of all facilities to manage the discharge of new pollutants other than those that were permitted. In addition, the discharge of pollutants from water pollution prevention facility in which wastewater is self-treated or directly discharged is constantly regulated by setting internal standards that are 50% tighter than the legal standards. We will continue to control specific substance harmful to water quality through regular analysis of all water pollutant items.

Year	2019	2020	2021
No. of Measured Wastewater Discharging Facilities	18	18	21
No. of Measured Substances	42	48	57

Legitimate wastes treatment

HHI has a large worksite and diverse product range, including ships and engines, etc. Thus, various types of wastes are generated. Wastes generated during the construction process are either self-treated (incinerated at Hyundai Incineration Plant) by incineration, landfill, recycling, and other methods or treated through an entrusted company, depending upon the nature of wastes. We are striving to minimize the use of resources, promote the recycling of resources such as steel, and increase the proportion of wastes processed for recycling when wastes are generated to reduce wastes.

The proportion of wastes processed for recycling primarily at "the main plant+offshore plant" was 52.35% in 2019 and 51.08% in 2020. It is expected to be more than 50% in 2021, similar to the preceding years.

Implementation of resource circulation performance management system

Under the Framework Act on Resources Circulation, the resource circulation performance management system was implemented in 2018. It is a system under which we should strive to meet the goals for resource circulation performance set by the government while considering the conditions of resource circulation, the national goals for resource circulation, etc.

HHI achieved its goals in 2021 by modifying the process of treating waste soil, sand, or sludge and will continue to seek a plan to recycle resources from various aspects.

Category	Year	Goal	Result	Whether Achieved
Circular Utilization Ratio	2020	At least 28.07%	50.43%	Achieved
	2021	At least 48.47%	to be counted	Achieved
Terminal Treatment Ratio	2020	Not more than 24.97%	11.26%	Achieved
	2021	Not more than 12.59%	to be counted	Achieved

* The higher the recycling rate, the higher the achievability of circular utilization ratio.
  The lower the disposal (incineration/landfill) rate, the higher the achievability of terminal treatment ratio.

Management of specified facilities subject to the control of soil contamination

Under the Soil Environment Conservation Act, a facility that is likely to contaminate the soil must be installed, altered, or closed after being reported to the relevant authority as a specified facilities subject to the control of soil contamination. In 2021, we reported to the relevant authorities the change in the capacity of outdoor storage facilities in the Shipbuilding & Marine Business Unit, the establishment of new petroleum storage facilities in the Engine & Machinery Business Unit, and the extension of indoor storage facilities.

Year	Soil Contamination Level Test	Leakage Test	Results
2019	13 units in 6 locations	5 units in 2 locations	Complying
2020	7 units in 4 locations	Nil	Complying
2021	12 units in 6 locations	3 units in 2 locations	Complying

In addition, we are obliged to conduct the inspection of soil contamination levels and the leakage inspection at the specified facilities subject to the control of soil contamination periodically. An inspection of soil contamination levels checks the level of containing soil contaminants by collecting soil samples, and a leakage inspection determines whether stored materials are leaking because of damaged storage facilities and transport pipes. We conduct annual tests for each facility in compliance with the statutory cycle, and we plan to strive to prevent soil contamination through periodic testing and facility management.

Inspection of soil contamination levels
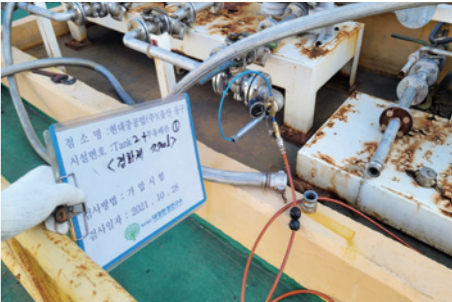
Leakage inspection

Communication with internal and external stakeholders and continuous participation in eco-friendly ecological activities
●

HHI is participating in various internal and external environmental activities, such as environmental cleanup activities and voluntary environmental patrol activities, to fulfill its corporate social responsibilities and achieve mutual development with local communities.

Participation in Quarterly River Cleanup Activities

Category	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Date of participation	Mar. 11	Apr. 5	Sep. 10 / Sep. 16	Oct. 12 / Nov. 2
Participation activities	River cleanup activities in Jujeon-cheon and Ungok-cheon / Collection of wastes and harmful plants around the rivers			

Voluntary environmental patrol activities

We formed a voluntary environmental patrol team with major companies in the Dong-gu and Buk-gu areas of Ulsan to conduct autonomous environmental patrol activities. From April to October, when malodor occurs frequently, we patrol every Tuesday morning to see any environmental pollution, such as malodor and river pollution, and share the relevant information and conduct preventive activities to avoid environmental pollution.

Conducting training for response to marine pollution accidents

In October 2021, we conducted a training for response to marine pollution accidents at Dock 3. The Environmental Management Team, the Navigation Control Department, and relevant subcontractors conducted the training and evaluated the results of the exercise. Based on these exercises, we will minimize marine pollution by quickly responding to it.

Performance of environmental management: based on the main plant

	Category	Unit	2019	2020	2021
Air pollutants	Dust	Ton	53	39	32
	Nitrogen oxide	Ton	0.552	0.442	22.510
Wastewater	Discharge quantity	Ton	5,854	20,403	3221
	Entrusted treatment quantity	m³	2864.9	2577.1	1751.3
Water pollutants	BOD	kg	12.63	49.29	5.69
	COD	kg	18.95	74.56	16.60
	SS	kg	7.47	19.70	4.70
	T-N	kg	11.67	14.07	2.56
	T-P	kg	0.42	2.01	0.04
Wastes[1]	Ordinary	Ton	59,478	63,108	54,967
	Designated	Ton	7,349	7,395	6,717
	Greenhouse gas[2]	tCO₂eq	509,780	523,352	542,585

* 1) Main plant + offshore plant   2) All HHI workplaces
* These are the data submitted to the Ministry of Environment, and the figures may change after the final verification of the Ministry of Environment. Some data may be changed to estimated values.

Have you heard about "Climate Refugees"?

Environmental Story

"Climate refugees" refer to people who are forced to temporarily or permanently leave their homes and migrate domestically or abroad because of the threat of rapid climate change to their living environment.

The UN Climate Change Conference (UNFCCC, 2009) anticipated that natural disasters caused by climate change may generate up to one billion refugees by 2050. The global average temperature has increased by more than one degree since the preindustrial times. Because of global warming, abnormal climate phenomena, such as heatwaves, heavy snowfalls, and wildfires, are occurring more frequently with greater intensity caused by such change. The damage is concentrated in developing countries, including Tuvalu in the South Pacific, Kiribati, Vanuatu, and the Maldives, and threaten their existence.

The Paris Agreement of December 2015 established the goal of keeping the global average surface temperature rise below the preindustrial level by 2 degrees Celsius, and further efforts are needed to keep it below 1.5 degrees Celsius. Furthermore, the "Special Report on the Impacts of Global Warming of 1.5 Degrees" published by the Intergovernmental Panel on Climate Change (IPCC) in October 2018 proposes to reduce greenhouse gas emissions by at least 45% compared to 2010 by 2030 and to achieve carbon neutrality with global net carbon emissions of "zero" by 2050 to control the increase in global average temperature to no more than 1.5 °C. Because carbon neutrality is essential for our coexistence with the planet, it is time to start with small efforts, such as conserving energy and using fewer disposables.
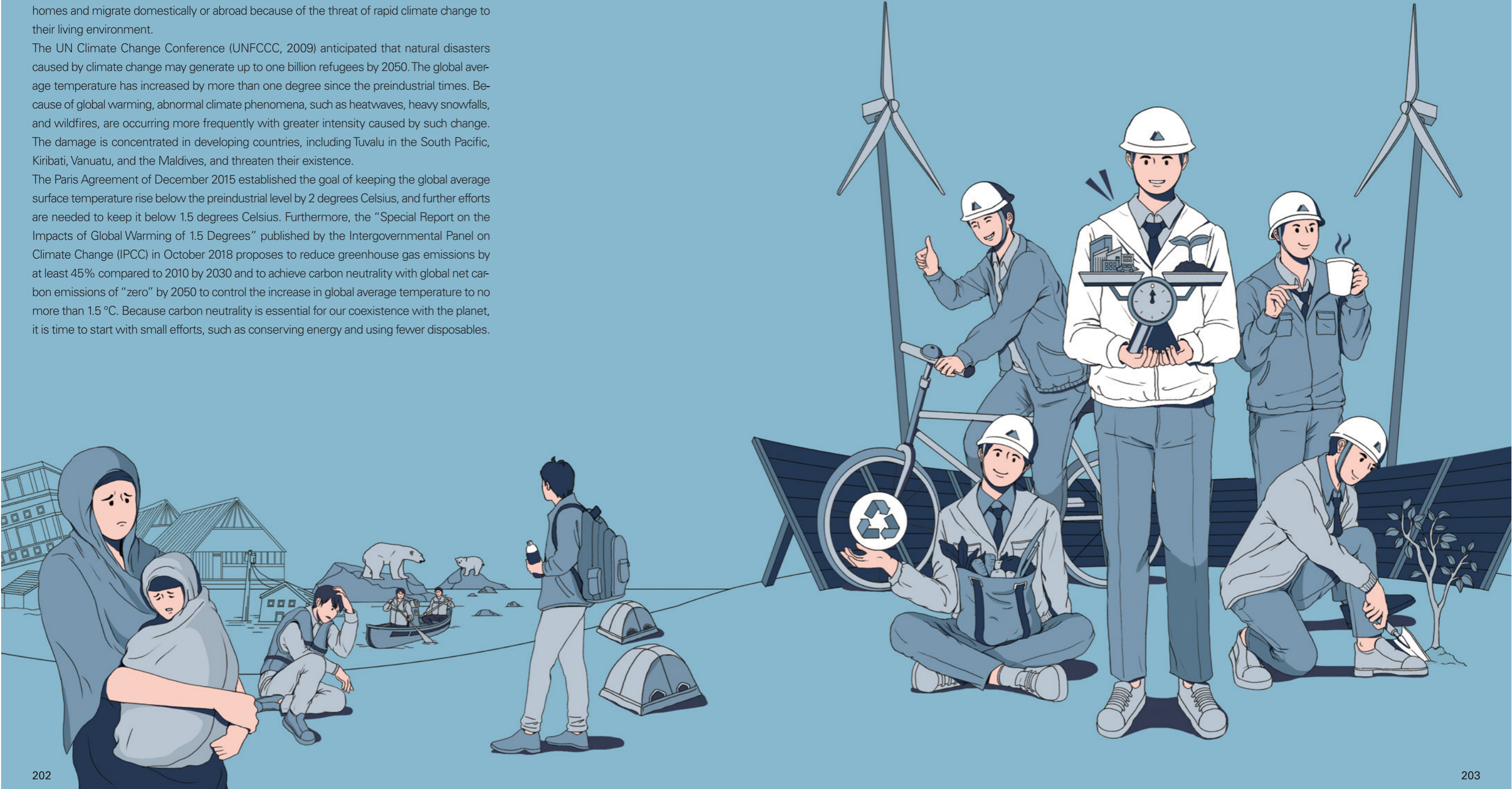
Health   Safety

Environment

Performance and Major Activities of Business Units for Safety

The safety organization of each business unit is developing a safety culture by communication and collaboration to make a safe workplace and conducting site-oriented safety improvement and inspection activities through accident prevention activities.

SHIPBUILDING & OFFSHORE BUSINESS UNIT

Shipbuilding & Offshore Business Unit

The Heart of the World's No.1 Shipbuilding and Offshore Industry

The Shipbuilding & Offshore Business Unit, equipped with the world's best shipbuilding capacity, builds various kinds of vessels of the best quality, ranging from ordinary merchant ships to special ships. Since 1972, HHI has achieved continuous growth by ranking first in the world in shipbuilding volume within 10 years of its establishment. The Shipbuilding & Offshore Business Unit has set the world's first and only record of achieving the ship construction of 100 million GT in 2012 and 2,000 ships in 2015. In addition, it constructs various types of facilities on a turnkey basis, from the design, purchase, manufacturing, transport, and installation to the commissioning for the development of offshore oil and gas fields. It has successfully delivered facilities for 170 projects from more than 30 customers worldwide.

01
Shipbuilding & Offshore Business Unit Safety Management Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Establishing a safety culture of communication and collaboration	**Promoting activities of safety intervention/communication** • Promoting communication in the work site by implementing the 1.3.5 and 4S campaigns, obtaining feedback on risks, and making improvements	**Promoting activities of safety intervention/communication** • Promoted safety intervention activities: Performed 62,053 times • Conducted supervisors' daily safety inspections Conducted 51,001 times • Received technical statements on safety risks: 72 cases • Held company-wide safety risk contests: 1,037 times • Safety open market: 33 times • Safety communication campaign in summer: Two weeks	Continually Continually Continually One time/year Continually One time/day	Number of safety intervention activities Number of supervisors' daily inspections Number of received technical statements on risks Number of entries Number of registered safety tasks Number of times conducted / Number of times planned	100 100 100 100 100 100		Maintaining the current state Maintaining the current state Maintaining the current state Maintaining the current state Maintaining the current state Maintaining the current state
	Technical guidance/support to subcontractors for enhancing safety competency • Providing technical guidance by the Safety Management to internal subcontractors • Operating a communication council of the subcontractors' safety officers	**Technical guidance/support to subcontractors for enhancing safety competency** • Providing technical guidance to subcontractors four times, quarterly • Subcontractors' safety and health council: Held a meeting with each subcontractor every month • Meetings with subcontractors' safety officers: Held a meeting with each subcontractor every month	One time/quarter One time/month One time/month	Number of actions / Number of occurrences Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100 100		Maintaining the current state Maintaining the current state Maintaining the current state
	Evaluation of subcontractors' safety management activities and incentives • Selecting and rewarding "outstanding" subcontractors (quarterly) • Assisting "substandard" subcontractors in improvement based on the results of safety management evaluation	**Evaluation of subcontractors' safety management activities and incentives** • Rewarding outstanding safety subcontractors quarterly and giving incentives to 20 subcontractors • Rewarding subcontractors' safety officers semiannually and giving incentives to 10 people	One time/quarter One time semi-annually	Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100		Maintaining the current state Maintaining the current state
Activities for preemptive prevention of accidents	**Promoting activities for preemptively preventing HIPO accident** • Inspecting whether each division/department performs measures to prevent HIPO accident • Establishing and implementing a plan to inspect items necessary for intensive safety management	**Promoting activities for preemptively preventing HIPO accident** • Number of established measures to be taken by each department for preventing serious accidents: 197 cases • Performed high-risk work management: Utilized a safety checklist • Operated safety clover (safety supervisor in construction departments): 35 persons	One time/year Continually Continually	Number of cases where measures were established Results of inspection Results of activities	100 100 100		Maintaining the current state Maintaining the current state Maintaining the current state
	Intensive target management of process/jobs with the risk of a significant accident • Intensive management of High, Heavy, Hidden (3H), and crash zone (caught-between) • Inspection and feedback on compliance with safety golden rule and priority control items/safety measures for preventing the recurrence of a HIPO accident • Quick response to changes in the site, such as nonroutine (rush) work, a new method, etc., and safety issues at a specific time	**Intensive management of process/ works with the risk of a HIPO accident** • Conducted a feed-100% inspection • Management of safety golden rule /priority control items: 267 cases/ 28 cases • Reviewed and reestablished the safety management standards for confined spaces • Revised and implemented Permit To Work system(PTW) • Established safety management standards for DF CNTR	Continually Continually One time/year One time/year When a change occurs	Results of inspection Number of cases of rule violation Results of revision Results of revision Results of the establishment of standards	100 100 100 100 100		Maintaining the current state Maintaining the current state Maintaining the current state Maintaining the current state Maintaining the current state
	Implementation of the safety forecast system • Issuing a forecast (watch/alert/warning) by applying the number of occurrences of accidents and the rate of violation of safety rules • Preemptive, intensive safety management by conducting special safety activities and selecting high-risk departments	**Implementation of the safety forecast system** • Number of issued safety forecasts: 3 cases (2 warnings, 1 watch) • Planned and conducted special safety activities by division/department: 3 times • Examined the safety culture of risky departments	When violated When violated When an object is designated	Number of issued forecasts / Standards for issuance Number of implementation cases / Number of issuance cases Results of inspection	100 100 100		Maintaining the current state Determining "the continuing of implementation" after reviewing the system's effectiveness Maintaining the current state

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Activities for preemptive prevention of accidents	**Strengthening safety management for blind spots and safety-vulnerable groups** • Strengthening the capacity of safety management for nighttime/holiday/ short-term work • Five vulnerable groups (old ages, sick persons, new employees, foreigners, women) • Prohibition assigning a worker alone to a high-risk work, and inspection the implementation of safe work	**Strengthening safety management for blind spots and safety-vulnerable groups** • Permission of work at nighttime: 153 cases / rule violations: 63 case • Revised and implemented guidelines for hazardous work management for short-term projects: 2,180 short-term works • Conducted safety training for new short-term work subcontractors: 19 times	Continually One time/year Continually	Number of PTW cases Number of rule violation cases Number of PTW cases Number of cases conducted	100 100 100		Maintaining the current state Maintaining the current state Maintaining the current state
	Intensive management of safety-vulnerable subcontractors • Planning and conducting inspections to safety-vulnerable subcontractors, such as subcontractors frequently violating safety rules / new and closure subcontractors	**Intensive management of safety-vulnerable subcontractors** • Inspecting "substandard" subcontractors based on the quarterly evaluation results of subcontractors: Conducted a quarterly inspection on 25 subcontractors selected as.	One time/quarter	Number of actions / Number of occurrences	100		Maintaining the current state
Site- based safety improvement activities	**Continuous review and supplementation about the appropriateness of the current safety regulations/systems** • Reviewing and improving the effectiveness of safety regulations to ensure compliance and practice in the worksite	**Continuous review and supplementation about the appropriateness of the current safety regulations/systems** • Reviewed and reestablished the validity of the safety management standards for confined spaces • Revised and implemented the Permit-To-Work system	One time/year One time/year	Results of revision Results of revision	100 100		Maintaining the current state Maintaining the current state
	Promoting technical safety improvement activities • Selecting quarterly safety improvement tasks and conducting them • Identifying and feedback the require items for safety improvement as design asepects	**Promoting technical safety improvement activities** • Performed Hi-SAFE improvement tasks: 94 cases • Provided feedback on safety design: 273 cases	One time/year Continually	Number of conduction / Number of plans Number of feedback cases	100 100		Maintaining the current state Maintaining the current state

02
Achievements in the Safety Management of the Shipbuilding & Offshore Business Unit in 2021

The Shipbuilding & Offshore Business Unit implemented various safety activities to prevent accidents, such as intensive safety management through fatality prevention measures, safety intervention, and the safety based on digital technology. However, we had a regrettable year because we had 54 accidents, including 3 fatalities. The accident rate recorded 0.271, an increase of 7.5% compared to 2020. Therefore, the Shipbuilding & Offshore Business Unit intends to preemptively respond to accidents, develop a safer workplace focusing on intensive management to high-risk work, and improve digital safety, aiming to make 2022 an accident-free year.

Summarized safety management performance

+34% compared to the management standard

+7.5% compared to the performance of 2020

······ Management standard for 2020   ─●─ Accident rate in 2020
······ Management standard for 2021   ─●─ Accident rate in 2021

0.271
0.252
0.203
0.165

January February March April May June July August September October November December
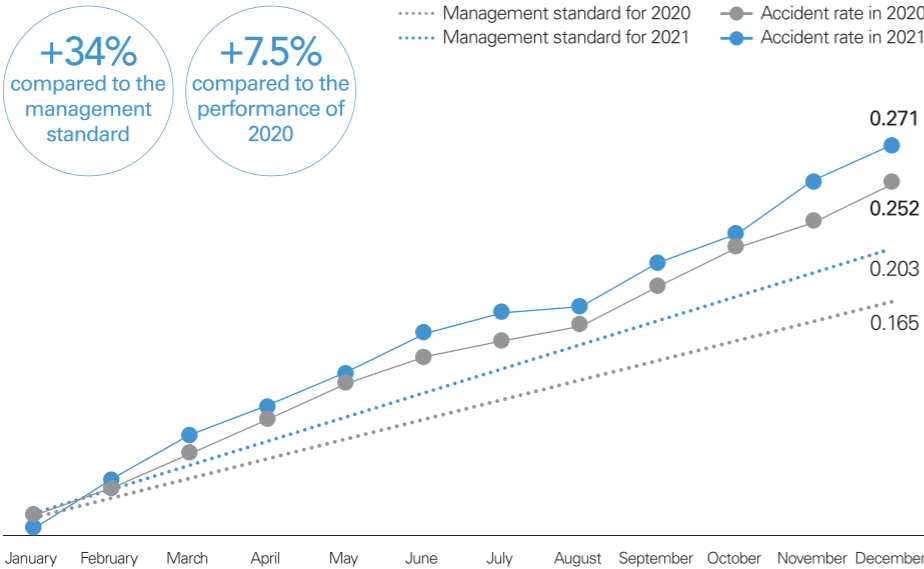
Category	2019	2020	2021
Fatality	1	3	3
Accident	39	52	54
Accident rate	0.194	0.252	0.271
Frequency (per one million)	0.932	1.199	1.284

03
Establishing a Safety Culture of Communication and Collaboration

The Shipbuilding & Offshore Business Unit, together with three shipbuilders, is working hard to preemptively prevent safety accidents by developing a safety big data platform to promote safety communication and intervention activities and manage safety coordinately. Furthermore, all executive officers, employees, and subcontractors are collaborating to identify safety concerns and challenges to establish a self-regulated safety culture.

Promoting activities of safety intervention/safety communication

Safety improvement meeting

The Head of Safety Management Group of the Shipbuilding & Offshore Business Unit, the Head of Safety Management Group of the Naval & Special Ship Business Unit, and executive officers (responsible for safety, design, indoor shop work, shipbuilding, outfitting, painting, LNG work, offshore work, special ship construction, and HHI MOS) attended the monthly safety improvement meeting to identify hazards and discuss improvements by sharing concerns. And it contributes to a construction-led safety culture.

Safety strategy meeting

The Shipbuilding & Offshore Business Unit organizes a safety strategy meeting every second week of each month to establish the safety management strategy, suggest a direction, and make strategic decisions on important safety issues. The Safety Management Group holds the safety strategy meeting to discuss management matters through agenda proposals

and the participation of executive officers responsible for construction. Furthermore, experts' viewpoints are considered in the presence of safety advisors, and training programs are provided periodically to executive officers to enhance their safety awareness.

The Shipbuilding & Offshore Business Unit is actively working to promote a safe workplace and prevent safety accidents by establishing a safety culture through worker and manager communication and collaboration.

Safety intervention activities

Supervisors are actively conducting safety interventions and inspections by eliminating unsafe factors in the workplace and unsafe behaviors to prevent accidents.

In safety inspections, supervisors conducted 51,000 safety inspections this year, at least one inspection per day, and the details of safety inspections are recorded and managed through Hi-SEs.

Safety Inspection Activities

Safety Intervention Activities
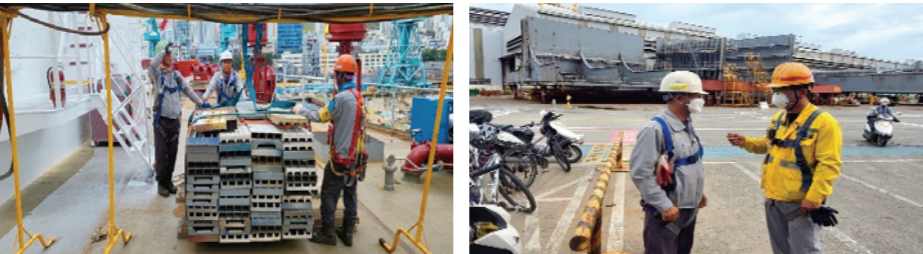
Number of safety intervention activities

January	February	March	April	May	June	July	August	September	October	November	December
2,928	4,217	5,319	4,924	4,927	6,149	6,566	3,765	5,033	5,876	6,094	6,255
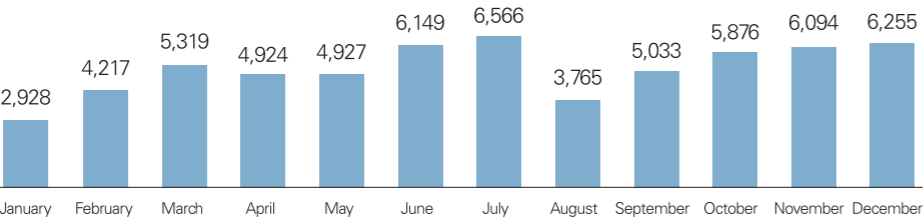
Reception of technical statements on safety risks at any time

The company has diversified its risk collection channels by gathering technical statements so that personnel in charge of construction or safety can identify and improve high-risk work factors.

A safety statement allows personnel in charge of construction or safety to identify and address persistent safety issues and high-risk work factors within the area they are in charge, under which safety issues are remedied through collaboration among personnel in charge of construction or safety from the formulation of an improvement plan to the application at the site. It registers items for which there is no improvement plan because of the site conditions or the relevant work or for which there is an improvement scheme. However, it is difficult to make improvements because of expenses or collaboration by other departments.

Reception and process of technical statements on safety

Reception of technical statements on safety at any time → Examination of the validity of improvement → List of technical statements on safety → Implementation of safety improvements → Application at the worksite (feedback)
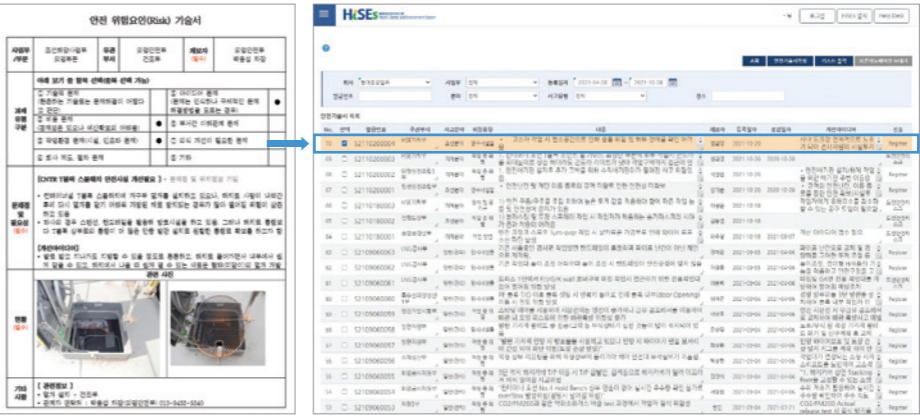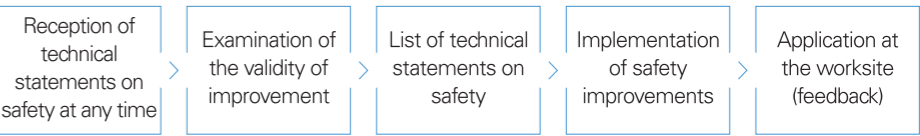
* Current status of reception of technical statements on safety in 2021: 72 cases

The current status of registration of a technical statement on safety and the progress of improvements can be viewed through the menu of safety improvements in the Web version of the Hi-SEs. We plan to provide a feedback service for the results of measures from the reception of the computer system until the completion of relevant measures to promote the reporting of risks and improvement activities.

Company-wide safety contests in 2021

The "Company Safety Risk Contest" was held for nearly two weeks, from August 30 until September 10. It allowed employees to directly identify potential workplace risk factors of serious accidents so that they may perceive or think about and propose improvement plans.

A total of 1,037 safety risks were received as a result of conducting online surveys and email and written submissions so that employees could easily participate. Various risk factors were identified throughout the site, from requests for immediate action to unsafe site conditions to matters requiring improvement of work methods and standards.

The company selected 30 persons whose proposals were outstanding and awarded each of them.

The received results are being resolved promptly through improved construction and safety, and problems that are challenging to solve will be improved through the "Safety Open Market," a participatory safety improvement platform where all executive officers and employees can collaborate to develop improvement plans.

Classification by direction of improvement

Immediate measures at the worksite (general)	483 cases
Improvement of work methods/standards	340 cases
Repair of decrepit (facilities/equipment)	111 cases
Improvement of internal road traffic	90 cases
Improvement/review of design	13 cases
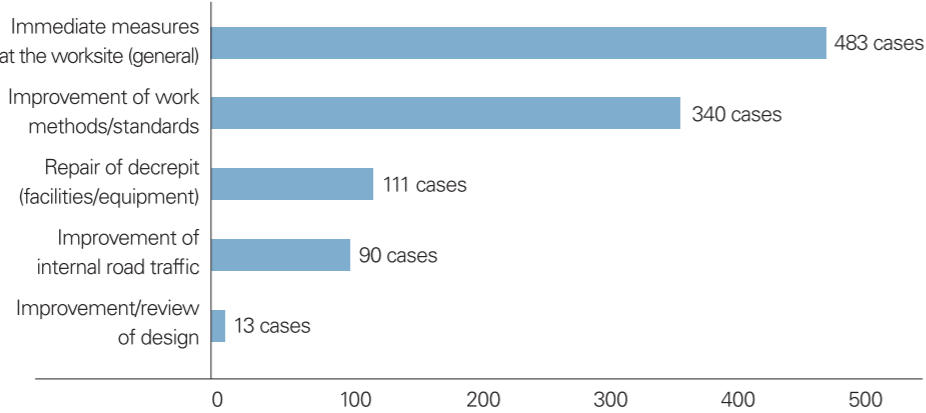
Integrated safety risk management - renewal and opening of the web version of Hi-SEs

The company launched the updated Web version of Hi-SEs (integrated safety management system) and established an integrated safety risk management platform. The integrated safety risk management platform has been developed to effectively address worksite safety problems based on the evaluation by integrating distributed safety improvement processes, such as company-wide safety improvement activities, safety risk contests, and the reception of technical statements on safety.

Web version of Hi-SEs   Current status of risks by type
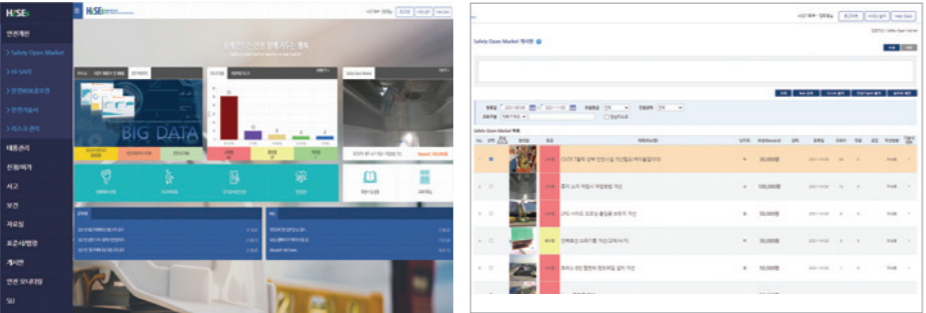
A new Safety Open Market bulletin board, an open safety improvement system, will also be launched within the platform. It will be used as a two-way communication medium for all executive officers and employees to develop improvement plans and share ideas about safety risks that are challenging to improve. In addition, the current status of safety risks is displayed so that they can be understood simply, and anyone can easily report safety risks and participate in improvement.

Current status of safety risks of each business unit   Current status of safety risks by type

Developed a safety big data platform for the three shipbuilders (safety accident prediction service)

For the first time in the industry, the three shipbuilders of HHI Group, HHI, Hyundai Mipo Dockyard, and Hyundai Samho Heavy Industries developed an AI-based model for the visualization of safety information and the prediction of safety accidents. The three companies collected, analyzed, and standardized data about safety accidents in the shipbuilding process over the past 10 years to establish an integrated data operation environment for preemptive safety management.

Visualization of big data about the safety of the three shipbuilders

In addition, it is characterized by presenting safety-related big data for intuitive understanding. Through the comprehensive status of safety accidents at group companies and the detailed status of safety accidents at each company, you can review specific information for each period and the type of accident. It is also anticipated to be of great assistance in preventing the recurrence of identical accidents by providing a summary of information on serious accidents. The AI–based model developed by the company for predicting safety accidents based on the analysis of past accidents will also be helpful to the preemptive prevention of safety accidents.

Safety accident prediction model and accident prediction service

Open innovation "Safety Open Market"

The "Safety Open Market" bulletin board in the integrated safety risk management platform was launched to develop improvement plans by attracting the attention and participation of all executive officers and employees. It is also intended to promote idea proposals by applying the Open Innovation technique to safety-related problems (risks) that are challenging to solve.

Safety Open Market bulletin board

Safety Open Market Process

| Long-unresolved safety risks | Registration of Safety Open Market tasks (by difficulty level) | Publicizing tasks through Hi-SEs and Hi-Office | Receiving ideas for improvement and giving awards for proposed feasible solutions | Risk reduction |

Risks that were challenging because of various problems, such as lack of ideas, technical limitations, and conflicts of interest between departments, are now registered in the "Safety Open Market" and classified into high, medium, and low grades based on difficulty and risk levels. A award of KRW 100,000 or less is given for an outstanding improvement proposal based on the grade of the outstanding idea. We expect that this process will eliminate long-unsolved safety risks and effectively establish a participatory safety improvement culture.

Materials for promotion of (the yard) Safety Open Market

Summer safety communication campaign

The Shipbuilding & Offshore Business Unit held a safety communication event with the management (the Head of the Business Unit, the Head of Safety Construction Division, and the Head of Safety Construction Group) to encourage workers suffering from the summer heat.
• Period: Jul. 20 (Tue)~Jul. 30 (Fri)
• Time: Afternoon break (14:50~15:10)
• Installed at temporary rest places and broadcasted safety videos
• Provided watermelon salads and 300 bottles of sports drink

Technical guidance and support for enhancing subcontractors' safety competency

Subcontractors' Safety and Health Council

We hold monthly meetings to present the company's safety policies to the subcontractors' representatives and to discuss about safety issues and difficulties. Through these meetings, we share safety performance and the direction of safety promotion, review major issues related to subcontractors' safety management, receive complaints, and discuss solutions.

Safety Meetings with Safety Officers between Directly-Controlled Teams and Subcontractors

Every month, we have opportunities to communicate for the efficient operation of the subcontractor safety officer system. Through regular meetings with the subcontractors' safety Officer officers, the R&R of safety officers is reaffirmed. the complaints is also discussed to enhance safety officers' competency.

Providing Technical Guidance to Subcontractors

We assist internal subcontractors with safety- and health-related technical guidance. The technical guidance was provided to project subcontractors and internal subcontractors, and the safety management level was evaluated with a focus on the ability to execute worksite safety. It increases the weight of the performance of safety intervention and the SSA and the TBM evaluation over document-based evaluation.

Results of Technical Guidance to Subcontractors

Legend: Quarter 1, Quarter 2, Quarter 3, Quarter 4

	Outstanding	Good	Moderate	Substandard
Quarter 1	44	25	17	21
Quarter 2	28	38	32	13
Quarter 3	33	50	24	6
Quarter 4	41	39	18	11
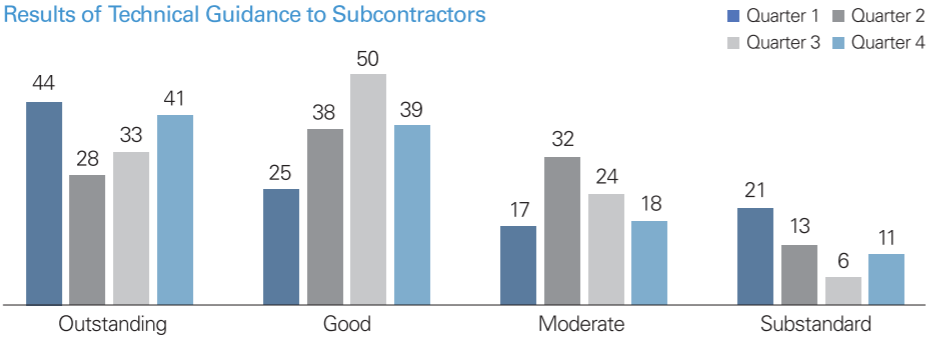
Furthermore, we are making significant efforts to enhance the safety management level of subcontractors by visiting those with substandard results of technical guidance to examine them and provide guidance and advice.

Evaluation of Subcontractors' Safety Management Activities and Incentives

Rewarding Outstanding Subcontractors in Safety

Rewards are given to five outstanding subcontractors every quarter based on the quarterly results of technical guidance. The evaluation criteria consist of 10 items, including accident, safety compliance, safety activities, and system management. When selected as an outstanding subcontractor, a certificate and a reward of KRW 10 million are given. Last year, 20 subcontractors were rewarded.

Rewarding Subcontractors' safety officers for Outstanding Performance

We reward safety officers of internal subcontractors based on the results of the safety management competency evaluation twice a year (semiannually). The evaluation criteria include accident, safety inspection activities, safety communication, job evaluation, improvement activities, and self-development. Winners receive KRW 500,000 and a certificate. This year, 10 outstanding safety managers were rewarded.

04
Preventive Activities for Accident Prevention

The Shipbuilding & Offshore Business Unit enforces safety golden rules, intensively manages the priority control items, conducts safety inspections with project owners, establishes safety management standards for confined spaces, revises the permit to work system, establishes safety management standards for DF CNTR, and provides safety demonstrations. It also conducts regular inspections to eliminate risk factors in site and implements the safety forecast system to prevent HIPO accidents and strengthen safety management for blind spots and high-risk groups.

Promoting Activities for preventing significant accidents

The Shipbuilding & Offshore Business Unit is conducting a number of preemptive activities to prevent accidents, such as operating Safe Clover and using a checklist for preventing HIPO accidents to cut the link of accidents and create a safe working environment by preventing HIPO accidents.

Establishing and utilizing measures for preventing HIPO accidents
All construction and support divisions of the Shipbuilding & Offshore Business Unit select high-risk works in each department to break the link of accidents and enhance the execution power to prevent HIPO accidents. It also creates safety management plans and inspection checklists for supervisors and Safe Clover, and safety officer conduct repeated inspections.

	Indoor shop Sector	Fabrication	Panel Assembly	Unit Assembly	Pre-Outfitting, Outfitting Construction	Chemical/ Engineering Equipment	Others
High-Risk Work / Preventive Measures		7 cases	9 cases	23 cases	14 cases	8 cases	7 cases

	Outdoor Work Sector	Hull Construction	Outfitting	Painting	Scaffold	LNG· CHS	Cabin (D/H)	Offshore	Others
High-Risk Work / Preventive Measures		21 cases	37 cases	9 cases	11 cases	9 cases	11 cases	15 cases	16 cases

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Representative High-Risk Work

• Loading bulwark	• Block T/O work
• Fit-up & cutting inside blocks	• Loading module units
• Installing SUS pipes	• Jointing of outer plates
• Painting in a confined space	• Loading vertical materials

Operation of safety clover (safety supervisor in construction departments)
The Shipbuilding & Offshore Business Unit operates a dedicated workforce to preventing HIPO accidents called "Safe Clover" to ensure that safety work is being performed based on the standard of work procedures and to continuously monitor the implementation of measures to prevent HIPO accidents in each department.
The main tasks of the Safe Clover include conducting inspections to prevent HIPO accidents, participating in TBM/risk assessments, and monitoring & improving performance results. It also revises the standard which is different from the site to improvements. It reflects them in the relevant departments' measures to prevent serious accidents after the construction and safety departments' review to create a safe working environment.

Reinforcing safety barriers against high-risk items to prevent HIPO accidents

Prevention and management of HIPO accidents by the chain-link of Supervisors (1st) → Safe clover (2nd) → Safety officers(3rd)

Supervisors

Strengthening the barrier and the role by each site

Safe Clover

Safety workers

Activity Process of Safe Clover

Preparing a checklist of measures to prevent HIPO accidents

Conducting daily checkups for HIPO hazard work

Inspecting the performance of measures to prevent HIPO accidents

Safety intervention in the site and identifying & improving risks

Reflecting feedback

Selection of Safe Clover: 35 persons (12 persons from indoor, 23 persons from outdoor)

Intensive management of process / work with the risk of a HIPO accident

Feed-100% Inspection

The Shipbuilding & Offshore Business Unit conducts Feed-100% inspection activities to prevent accidents by complex aspects, such as process status and related accidents. We intend to continuously reinspect until the risk factors completely disappear after inspecting the risk factors in the workplace, even if it is less than 0.1%.

Representative Inspection Items

Inspection Items	Air Supply Mask/ Air Jacket	SWL (Safety Weight Load) on Jigs	Registration worker's name on Lugs	Crane
Total number of inspections	669 cases	1,493 cases	282 cases	372 cases
Good	654 cases (98%)	1,019 cases (69.2%)	258 cases (91.5%)	349 cases (93.8%)
Substandard	15 cases (2%)	474 cases (30.8%)	24 cases (8.5%)	23 cases (6.2%)
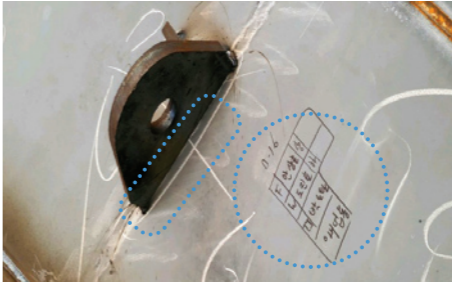
Management of Safety Golden Rules/Priority Management Items

The Safety Management Group of the Shipbuilding & Offshore Business Unit conducts intensive management of 12 safety golden rule items and 20 priority management items to prevent accidents. It is actively attempting to prevent accidents because of the unsafe behavior by workers.

Status of violations of absolute rules

267 cases

January 17 · February 10 · March 21 · April 26 · May 15 · June 24 · July 23 · August 34 · September 25 · October 35 · November 18 · December 19

Status of violations of priority control items

28 cases

January 0 · February 0 · March 3 · April 2 · May 1 · June 5 · July 5 · August 0 · September 3 · October 3 · November 3 · December 3
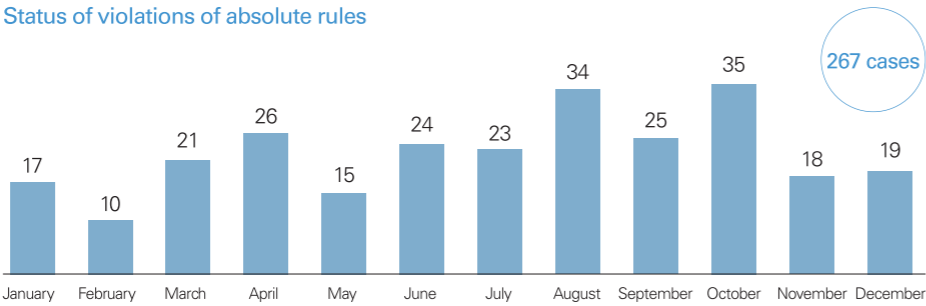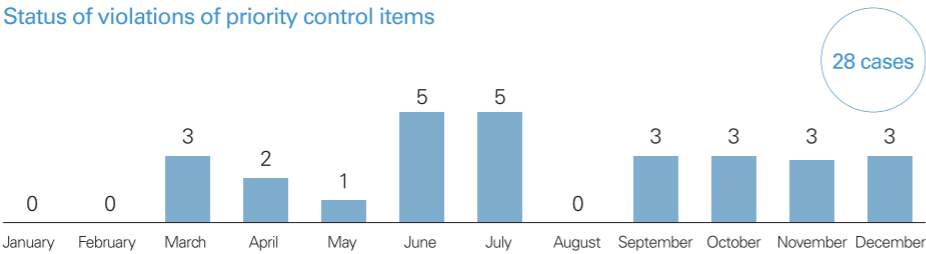
Joint HSE walk-through with project owners

The Safety Management Group of the Shipbuilding & Offshore Business Unit significantly contributes to securing a safe workplace and preventing safety accidents by conducting an HSE walk-through weekly or monthly with project owners and taking immediate measures for safety issues. It will continue to maintain and manage workplace safety by conducting the HSE walk-through.

HSE Walk-Through

Taking Measures for Problems
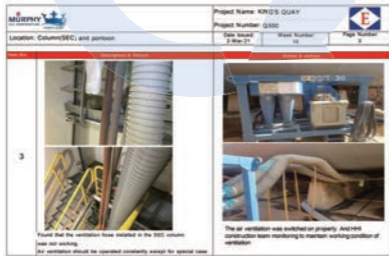
Preparing a Report and Sharing the Results of the Measures with Project Owners

Establishing safety management standards for confined spaces

The Safety Management Group of the Shipbuilding & Offshore Business Unit revised previous standards and systems to ensure on-site operability and effective management to prevent safety accidents in confined spaces.

Major improvements

- Reestablished the standards for confined spaces
- Differentiated the management standards for confined spaces based on the risks that are divided into 2 levels

Level	Standard	Safety Measures
Lv.1	① Work that required access to a confined space after purging the inert gas (Argon Nitrogen) ② Spray-painting	(Lv.2 Preventive measures)+ ① Measuring real-time concentration of oxygen and gas ② Positioning one designated watcher (a patrol watcher is unnecessary if a designated watcher is placed)
Lv.2	All work other than those at Lv. 1	① Attaching/preparing a CSE(Confined Space Entry) board for confined spaces ② Posting PTW (only for outdoor work) ③ Displaying the name tags of workers ④ Ventilation ⑤ Regular measurement of the concentration of oxygen and gas (four times a day) ⑥ Positioning of a patrol watcher

- Operation of the confined space registration system
- Establishment of general-purpose ventilation standards: The quantity and type of ventilation fans are determined by the formula for calculating ventilation volume

Lv. 1 confined spaces: Positioning a designated watcher

Lv. 2 confined spaces: Positioning a patrol

Revision of the Permit To Work(PTW) System

The Safety Management Group of the Shipbuilding & Offshore Business Unit analyzed the works which are PTW items and sorted high-risk works among them. The selected high-risk jobs were designated as those requiring on-site permission so that they could be performed after on-site safety inspection by safety officers. Presently, we are preventing HIPO accidents by categorizing PTW items into three categories: computerized permission, face-to-face permission, and on-site permission to increase the intensity of safety management on high-risk work.

Highlights

- On-site permission: High-risk work is performed after safety officers conduct a safety inspection at the site on the workday
- Work items to on-site permission: 18 items
  Examples) Work requiring entrance into the inside of a pipe after Argon purging/welding Injecting oil into a ship

| On-site permission | Registration of work in Hi-SEs (by the person in charge of the work) | Construction permit | Printout and face-to-face submission + Approval of permission | Attendance and inspection by safety officers on working day | Posting at the site and performing the work |

| Face-to-face permission | Registration of work in Hi-SEs (by the person in charge of the work) | Construction permit | Printout and face-to-face submission + Approval of permission | Posting at the site and performing the work |

| Computerized permission | Registration of work in Hi-SEs (by the person in charge of the work) | Construction permit | Checking while inspecting the site | Posting at the site and performing the work |

Establishing Safety Management Standards for DF CNTR

The Shipbuilding & Offshore Business Unit analyzes risks that may arise from the changes in the site, such as non-routine work and new construction methods, and implements safety measures. For example, new construction methods have been developed while building DF CNTR ships, which is a new type of ship. Therefore, the Safety Management Group of the Shipbuilding & Offshore Business Unit identified risks in each method and prepared safety management standards for such methods.

Highlights

- Standards for ventilation during Fit-up & welding in a DF Tank and wearing protective equipment
- Methods of preventing and controlling fire before/after loading a DF Tank or after loading a Deck and bunkering
- The method of managing simultaneous work(SIMOPs) carried out with flammable work or high-risk work in a hazard area
- Guidelines for the management of the persons onboard: Indicate the persons onboard on the dangerous work status board and their location
- Establishment of standards for safety management in bunkering

HSE Demonstration & Verification

If a certain department has no experience or record of performing a specific task or using a certain type of equipment, the Offshore Safety Section must conduct a preliminary risk assessment and perform demonstration, verification, and operation. It must also conduct a comprehensive examination with the relevant department to ascertain whether there is any safety issues before performing the task or using the equipment.

Demonstration of using the personnel transfer net when personnel for offshore test operations are on board

Demonstration of vertical hoisting after loading a cassian pipe or a riser pipe on a Clamp wire

Demonstration of whether it is possible to rescue (evacuate) from the lower part through a manhole in the Hull structure

Implementation of the Safety Forecast System
●

Operation of the Safety Forecast System

The safety forecast system is used to raise safety awareness in the organization (department, group, division) where an accident is likely to occur by issuing a safety forecast to the organization. It prevents HIPO accidents by planning and conducting special safety activities in each department.

Status of the Safety Forecast System   ■ Status of issuance of Safety Forecasts in 2021

One safety watch   Two safety warnings

0	1	1	0	1	0	0	0	0	0	0	0
January	February	March	April	May	June	July	August	September	October	November	December
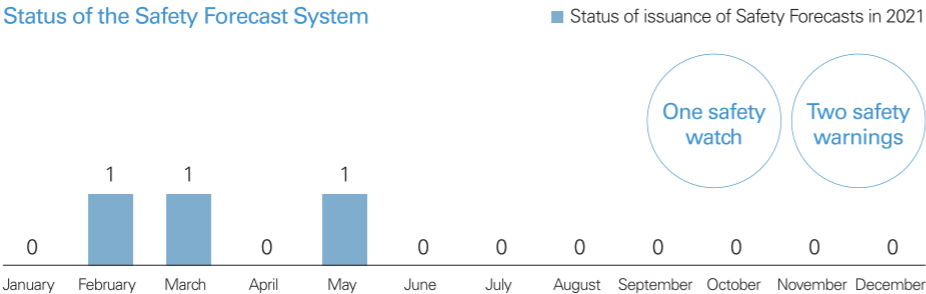
Special Safety Activities

Inspection of Wearing / Use of Protective Equipment

Strengthening safety management for blind spots and safety-vulnerable groups
●

Safety Management for Nighttime and Short-Term Work

To reinforce safety management for vulnerable groups (nighttime/short-term work), the Safety Management Group of the Shipbuilding & Offshore Business Unit operates a safety team for nighttime and requires permission & confirmation of the relevant construction department and the Safety Department before nighttime work or short-term work.

Operation of a nighttime safety team
• Reception and management of a PTW for hazardous nighttime work
• Conducting daily nighttime safety patrol at the site
• Sharing problems in site with construction/support departments
• Status of management of safety rule violations at nighttime: 53 cases

Conducting nighttime safety patrol at the site
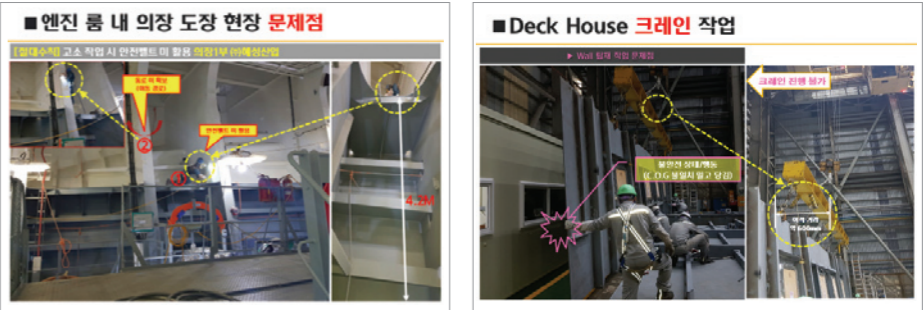
Sharing safety issues in site

Revision of the hazardous work management process for short-term works
• Automatically checking whether a short-term project involves hazardous work based on the work classification upon receiving an application for the short-term work through the Hi-SEs
• Requiring face-to-face permission after receiving an application for computerized permission if the work is subject to hazardous work
• The accessed company (working entity) prepares a permit for hazardous work, and the relevant department approves the permit after reviewing it
• Permission for hazardous work in a short-term work should be applied only by the computer system. The submission of a written application is restricted

F

Subcontractor
- Registration of the company
- Registration of workers
- Application for the project
- Registration of personnel → Personal identification → Completion of training
- Entry of project information → Designation of visiting personnel
- Risky work requiring permission → Prepare work permit

Responsible department
- Receiving a work application
- Review and entry of information → Selection of the relevant Safety Department
- Designation of the entrance, the entry time, and vehicle information
- ※ Vehicle information may only be entered if the work duration is not more than 14 days
- Approval by the head of the department
- ※ For hazardous work, approval may only be requested when the preparation of a permit is completed

Business Unit Safety Management
- Safety approval

Industrial Security Team / Department of issuing passes
- Approval by the General Affairs Department
- ※ Approval by the General Affairs Department is necessary only for entering a vehicle
- Issuing a pass
- Visitor pass — ※ For a work duration of not more than 14 days, each entrance
- Work support pass — ※ For a work duration of not less than 15 days, the issuing department of each business unit

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05
Yard-Based Activities for Safety Improvement

The Shipbuilding & Offshore Business Unit has been promoting technical safety improvement activities that are age-appropriate, including company-wide safety improvement activities (Hi-SAFE), the feedback on safety design, the upgrade of simulator-based construction safety work, the introduction of a pilot J/C smart collision prevention system, and the installation of a mobile welding robot speed control system, an intelligent control system.

Promoting Technical Safety Improvement Activities

Company-wide safety improvement activities (Hi-SAFE)

Hi-SAFE (HHI-Safety first & Accident-Free Everywhere)

The company-wide safety improvement activities improve potential risk factors and unsafe process procedures that may lead to serious (significant) accidents by assigning at least one task for each department regarding high-risk worksite factors under a system through which each field department is responsible for identifying high-risk factors and work improvements and conducting improvement activities.

Detailed Criteria for Evaluation of Improvement Tasks

Technical Statement of Improvement Subjects

Each department selects a high-risk and challenging fundamental solution as an improvement subject and initiates the improvements for approximately 10 months after obtaining feasibility permission through examination and evaluation.

Contest for Outstanding Tasks of Company-Wide Safety Improvement Activities (Hi-SAFE)

In 2021, the SRM Department finally selected 94 safety improvement tasks for all 72 design/construction support departments and conducted "company-wide safety improvement activities (Hi-SAFE)" for about 10 months from mid-January until the end of October 2021.
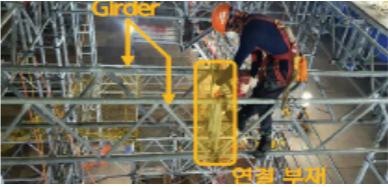
On October 28, after the careful screening of internal and external experts, including the CEO, the Head of the Ulsan Regional Headquarters of the Korea Occupational Safety and Health Agency, and the Head of the DNV Headquarters, 13 outstanding tasks were selected out of all improvement tasks for a contest. The Grand Prize, Best Prize, Excellent Awards, Participation Awards, and Safety Improvement Awards were awarded for these outstanding tasks. The System Design Department, which performed the "improvement to prevent falling while assembling/disassembling the LNG carrier truss (TRUSS)," was awarded the Grand Prize. In contrast, the LNG Work Department won the Best Prize for developing a carriage for preventing caught-between while fastening small-module TRUSS columns.

HHI intends to dedicate its company-wide resources to "S1 management" and identify and eliminate high-risk worksite factors through yearly safety improvement activities (Hi-SAFE) each year.

Tasks awarded at the contest for outstanding H-SAFE Tasks in 2021 and prize

Award	Prize	Department	Task
Grand Prize	KRW 10 million	System Design Department	• Improvement to prevent falling while assembling/disassembling TRUSS for CCS work
Best Prize	KRW 7 million	LNG Construction Department	• Development of a carriage for preventing caught-between while fastening small-module TRUSS columns
Excellence Prize	KRW 5 million	Hull Construction Department 2	• Improvement for preventing falling while closing HOLD OPENINGS in LNS hulls
		Propeller Construction Department	• Improvement for preventing falling while conducting the casting sand filling process
		Special & Naval Ship Hull Design Department / Special & Naval Ship Hull Construction Department	• Development of a system for providing information bespoke to each work process on the prevention of safety accidents by utilizing a smart assembly chart (3D)
Participation Prize	KRW 3 million	Hull Design Department	• Removal of risk factors while working by altering the interior structure of ships
		ITER Production Department	• Improvement for preventing suffocation while performing Argon purging work
		Outfitting Department 1	• Improvement for preventing suffocation by establishing standards for the ventilation of E/R zones
		Piping & Electrical Device Design Department	• Improvement of design standards for the safe installation of heavy piping materials
Safety Improvement Award	KRW 1 million	Outfitting Construction Department	• Improvement for preventing falling while installing/arraying SPY-1D FDN
		2-Stroke Engine Technology Department	• Improvement for preventing falling while performing piping work for WinGD X92-2's fuel leakage
		2-Stroke Engine Assembly Department 1	• Improvement for preventing being jammed while performing work in the interior of an Engine Chamber
		Heavy Equipment Support Department, HHI MOS	• Improvement for preventing the falling of blocks while unloading quay blocks

Grand Prize: Improvement to prevent falling while assembling/disassembling TRUSS for CCS work
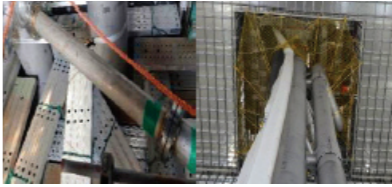
Minimizing reinforcement members connecting girders

Problem
The risk of falling from the height of 4 to 20 m while demolishing

Solution
Removing connecting members from sections where their installation is unnecessary

Effect of improvement
Work at height place has been reduced by 533 locations/vessels

Improvement of supports for 8.5-tier scaffolds in the Pump Tower

Problem
The risk of falling objects and falls while demolishing because of complicated installation of scaffolds

Solution
Installing a fall prevention net and adjusting the location, angle, and quantity of scaffold supports

Effect of improvement
Preventing falls and flying objects

Optimized installation of vertical/horizontal braces

Problem
The risk of falls while installing or demolishing a Brace where there is no plywood underneath

Solution
- Removal of columns at sections with no plywood underneath Tank No. 2/3/4 TRUSS
- Reduction of the quantity of installed braces by changing the type of some vertical braces

Effect of improvement
Work at height place has been reduced by 240 locations/vessels
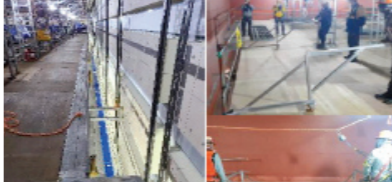
Improvement of column pins for mounting small modules

Problem
- Column deformation makes it difficult to join others
- Working in a high area for an extended period increases the danger of fall accidents

Solution
Application of new column pins in addition to cones in the existing Column Pins

Effect of improvement
- Securing safety for joining columns
- Reducing the risk of fall accidents by reducing the joining time

Development of a sliding deck for side bracket

Problem
- Separation of steel scaffolds for CCS work
- The risk of falls into the opening

Solution
(the construction of a prototype is in progress)
- Development of a deck structure that can slide with the side bracket
- Development of a jig suitable for working without approaching the opening

Effect of improvement
- Prevention of falls into the opening
- Improvement of the efficiency in the side bracket sliding work

Improvement of the Davit for demolishing Truss

Problem
- Unstable support structure underneath the jig
- The risk of falling objects caused by the destruction of a jig

Solution (it is being tested on the site)
- Remedying shortcomings in the installation of existing supports
- Establishment of standards for the installation of jig Supports

Effect of improvement
Reduction of the risk of falling objects caused by the destruction of a jig
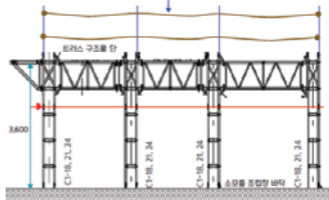
Best Prize: Development of a carriage for preventing caught-between while fastening small-module TRUSS columns

Improvement of the TRUSS assembly process

Before improvement | After Improvement
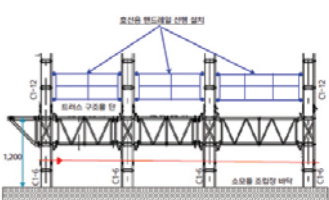
Automation using an electric carriage (under a trial test)

Safety design feedback for safety

The Safety Management Group of the Shipbuilding & Offshore Business Unit provides feedback on the design for more than 200 cases each year to improve worksite from the design stage as part of technological improvement. Issues at the site are reported to the relevant design department after ERP registration, and the system is programmed to provide feedback on improvements until the final stage. The Shipbuilding & Offshore Business Unit does its best to secure fundamental safety through safety improvement activities at the design stage.

Status of recent design feedback for safety

■ 2020 ■ 2021

196 cases in 2020

273 cases in 2021
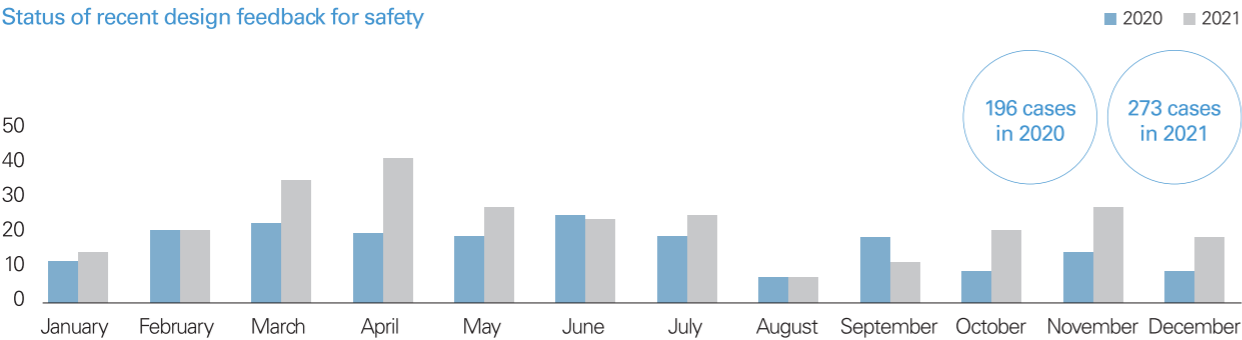
Number of cases of feedback by type of accident

Falling down	Passage	Slip	Struck by	Drop or flying objects
100 cases	27 cases	44 cases	40 cases	13 cases

Overturned block	Unsafe behavior	Caught between	Lifting	Others
11 cases	0 case	18 cases	8 cases	12 cases

Type	Exemplary Improvements	
	Before Improvement	After Improvement
Falling down	There is a risk of falling down when the workers release the shackles because of incorrect lug position after lifting	Changing the position of an lug

Type	Exemplary Improvements	
	Before Improvement	After Improvement
Struck by	The risk of colliding while moving because of the protruded R.P	Rotating the position of the R.P. by 90 degrees
Trip	The risk of trip while moving because of the installation of TMH on the Pipe Duct and Walkway	Relocating the direction of TMH by 30 cm toward the stern (this will be reflected in subsequent ships)
Caught between	The risk of colliding and caught between while moving between the longi at the part of a ladder for T.M.H. and pipe	Relocating the position of TMH (this will be reflected in subsequent ships)

Upgrade of simulator-based construction safety work

The company has developed and operated a simulator for safety work by applying design and ICT technology. Workers used to be exposed to safety accidents when jointing and lifting the block & M/Unit because they had to depend on field experience, but now, the simulator is used to examine and assess safety risks in advance to ensure safe operations.

Program for determining the position of fastening a M/Unit for lifting

Simulation of lifting based on the best fastening location

A Simulator minimizing rotation while lifting a curved block assembly
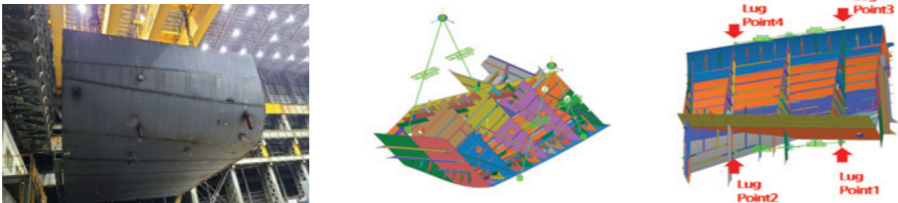
A Simulator of safe work for jointing of curved outer plates
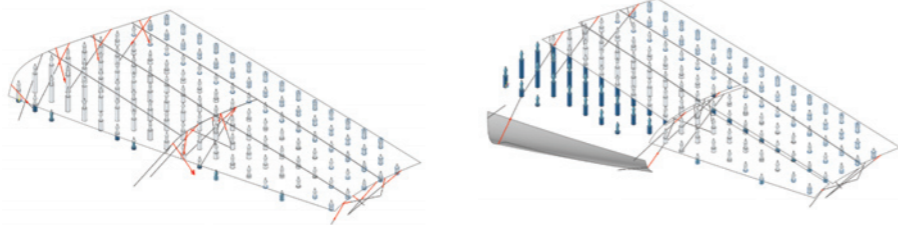
Introduction of a J/C smart collision prevention system

An intelligent collision prevention system was introduced for the jib cranes at Quay 1 (2 units) for pilot operation. The old analog system was digitized to facilitate operation, management, and maintenance, and a smart system was built to collect, store, and analyze various information generated during work.

The system also has a function designed to detect all collision risks with a crane and warn the operator by combining the latest information technology (IT) devices and technologies, such as light detection and ranging (LiDAR) sensors and image analysis technology, and a function to improve the quality of image information through AI learning to solve the problem of low discrimination, which troubled conventional visual monitoring.
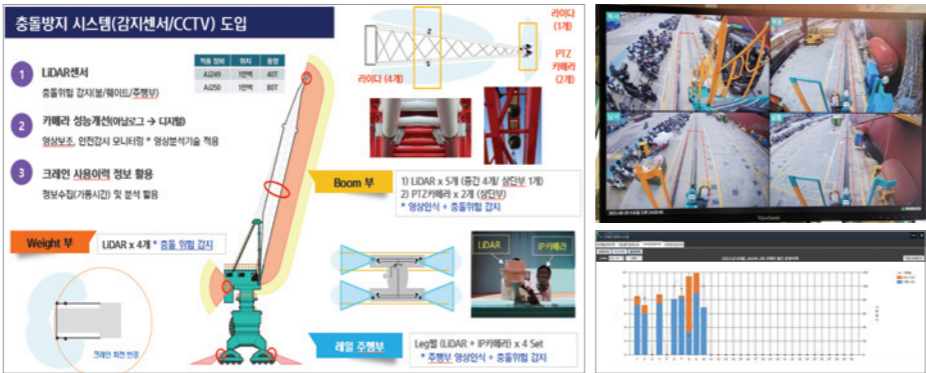
The launch of the Jib Crane Smart Collision Prevention System is significant because it effectively prevents crane collision accidents and ensures the long-term establishment of a smart integrated operating system.

* Promotion of the TFT for the Integrated Operating System of outdoor shop Cranes in 2022 (Nov. 2021)

Installation of the speed control system for mobile welding robots

According to the amended Occupational Safety and Health Act of October 2017, "industrial robots" are included in dangerous machines and instruments subject to safety inspection. The automatic welding system (15 welding robots) used in the Yard 2 panel assembly plant became subject to the safety inspection under the Act. However, it failed to fulfill the obligation to undergo the safety inspection. It is because of the failure to meet the safety inspection conditions, such as a failure to install a pendant operation permission device, safety measures, and a failure to install emergency stop devices, resulting in the imposition of an administrative fine and an order to stop the use of the system.

The company submitted a written proposal for the "rationalization of the objects and standards for safety inspection of industrial robots" with Daewoo Shipbuilding & Marine Engineering (DSME) and Samsung Heavy Industries (SHI), who are in the same situation, to the Ministry of Employment and Labor to address this issue.

The Ministry of Employment and Labor, the Certification Institute of the Korea Occupational Safety and Health Agency, and the Korea Offshore & Shipbuilding Association (KOSHIPA) derived an improvement plan through continuous consultation and **decided to exempt the system from the safety inspection on the conditions that a speed control system should be installed, and that Event Log Data should be submitted** (July 2021).

※ Related statutes and regulations
• Article 93 (Safety Inspection) of the Occupational Safety and Health Act and Article 78 (Machines, etc. subject to safety inspection) of the Enforcement Decree of that Act
• Article 223 (Risk in Operation) of the Rule on the Occupational Safety and Health Standards (standards for the installation of robot fence)

Promoting the improvement of safety management of the lower part of the magnet crane

Based on a proposal submitted to a risk contest held in the second half of 2020, when a crane in an indoor shop work plant is operated, a warning was given through warning lights and sound alarms. However, the effect of such warnings was reduced by the noise inside the plant. Hence, we developed a system to visually indicate the dangerous area under a hoisted object by installing LED safety lamps and sensors on the crane to improve the control limitations of workers at the lower part of the crane. We will gradually implement this system after the test application.

Improvements in the safety management of the lower part of the magnet crane

- Place: The 6 Bay AC 660 magnet crane at Yard 2 Processing Plant, 3 Bay Passage (congested area)
- Applied devices: LED lamps, distance sensors, warning lights, speakers, etc.
- Main function: The software is programmed to turn on safety LED lamps only when the crane is operated.

Sic bay magnet crane

Three bay congested area

In 2022, the company intends to install LED lamps on the magnet crane, verify the effect of the lamps, and expand the scope of application of the lamps to similar cranes in the indoor shop work plant.
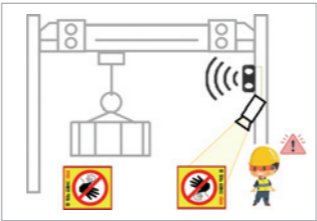
The System for Monitoring and Measuring Complex Gas in Confined Spaces

We developed a "system for measuring and monitoring complex gas during work in a confined space" to prevent safety accidents. We remotely measured the concentration of complex gas when working in a confined space and notified the supervisor and the confined space guard of the result. The system is used at Docks 8 and 9 for test operation and will be implemented throughout the company next year.

System Chart

System Operation Plan

Point of Time	Before working in a confined space	While working in a confined space	After working in a confined space
Operation Phase and Description	Selecting the place to be installed and installing the equipment	Operating the system	Removing the equipment from the site
	• Selecting a hull/area based on the shipbuilding schedule • Installing gas sensors (suction type: W.B.T.; diffusion type: E/R) • Entering information on the installation of equipment into the system	• Monitoring the gas sensing system (to respond at the site in an emergency) • Management of batteries for equipment and the conditions of communications	• Removing the equipment from the site and charging batteries • Entering information on the removal of the equipment into the system

System for automatic measurement of temperature and humidity of the inside of an LNG DF tank

The LNG DF Tank has a high risk of fall accidents when workers enter or move within the tank because they must enter it from time to time to check the temperature and humidity at eight locations for quality control. Hence, the internet of things (IoT) sensor-based system for measuring and monitoring temperature and humidity was established to prevent such accidents.

This allows the prevention of fall accidents by eliminating the need to measure temperature and humidity in the working at height area, reducing the work hours associated with temperature and humidity measurement, managing the history of each hull, and collecting real-time data. We intend to apply even the automatic control technology for an air conditioning system using IoT-based technology in the future.

System Chart

IoT Sensor-Based Monitoring

Collection of Information with Wireless Sensors	Real-Time Monitoring	Alarm and Remote Control
• Implementing a gateway • Temperature/humidity sensor node	• Installing a server for collecting information • Direct monitoring by the shipowner	• Real-time control of thresholds • Control of dehumidifiers
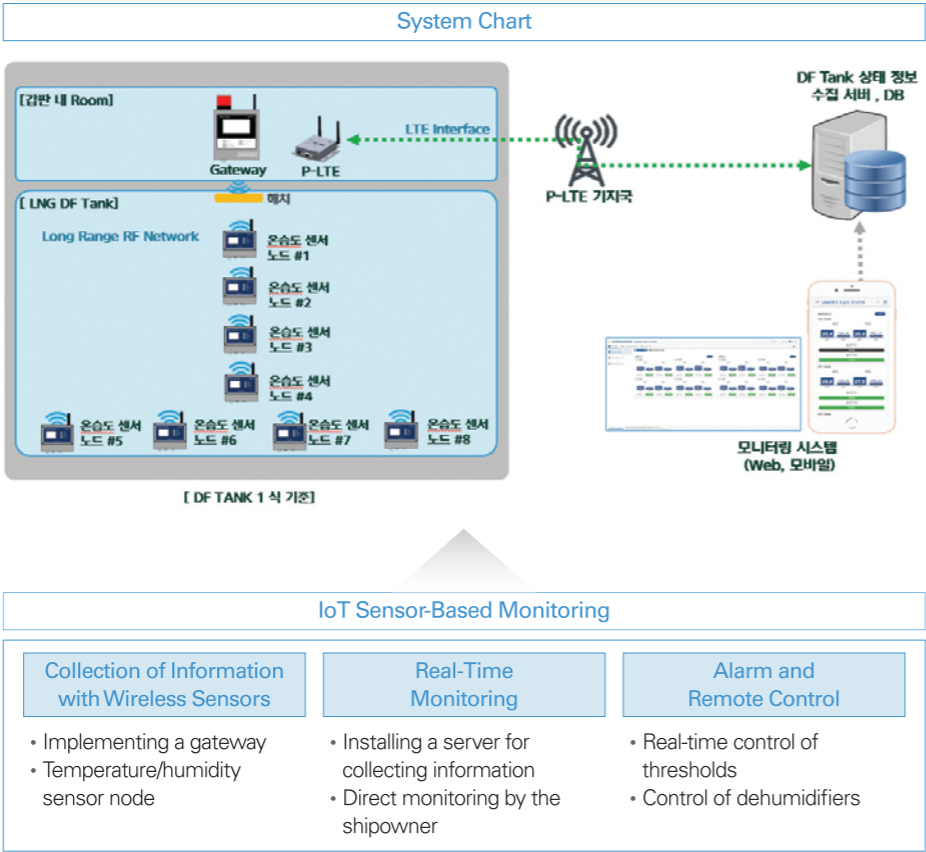
Development of a system for detecting the speed of a forklift and sensing obstacles of heavy equipment

Forklift accidents account for approximately 30 deaths each year in the country, making them the leading cause of fatal accidents. Therefore, HHI is initially applying ICT technology on forklifts and excavators to reduce accidents caused by heavy equipment.

Development of a system for detecting the speed of a forklift

Forklift speed measurement and notification device   Real-time forklift monitoring system

In the second half of 2021, we installed a speedometer and a GPS–based position monitoring system on forklifts to reduce accidents caused by forklift speeding. We introduced LoRaWAN technology to efficiently transmit and receive speed and position signals.
LoRaWAN technology will secure big data by allowing data related to safety and construction in the yards to be transmitted and received smoothly without cost.

Development of a system for sensing obstacles of heavy equipment

A system for sensing obstacles using intelligent image analysis technology was first installed on excavators with a high overall height and a lot of blind spots to prevent human collision accidents while operating heavy equipment. The system is expected to prevent accidents while in operation because it is designed to detect humans. We will gradually expand the installation of the system to other heavy equipment.

Development of an intelligent control system (Hi-CAMs)

We are developing a system that can effectively manage dangerous situations by detecting abnormal events, such as smoke and fire from multiple CCTV images, safety status of vehicles on the worksite, and dangerous situations for multiple people by utilizing a CCTV system that monitors the site situation.

Since March 2021, we have been developing and testing a fire/smoke detection system that can be installed at a flammable worksite as a mobile system that can identify objects, such as heavy equipment and worksite vehicles, applying deep learning technology.
The company intends to prevent serious accidents by continuously developing an intelligent control system to detect all risk factors and build a system that responds instantly.

Mobile Flame / Smoke Detection System   Screen of Detecting Fire / Smoke at the Site
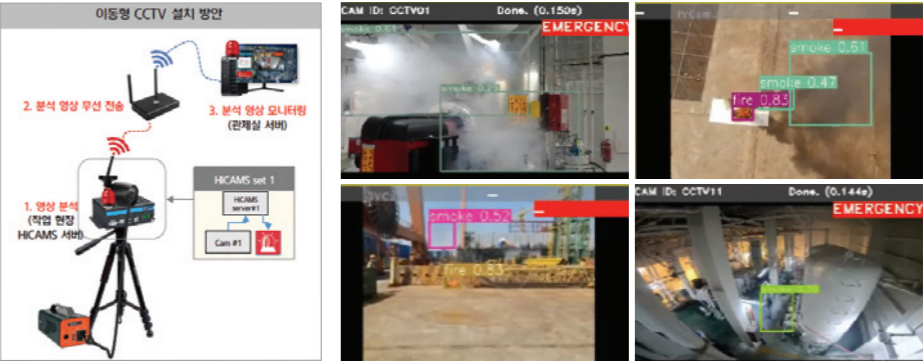
06
Emergency Evacuation Drill

The Shipbuilding & Offshore Business Unit is strengthening its response capabilities by conducting regular drills to safely and quickly extinguish a fire and evacuate in an unexpected accident. We are doing our best to prevent infectious diseases by conducting thorough disinfection inspections against the COVID-19, implementing the response manual, providing information on the current status of the COVID-19 in the company, and establishing a noncontact disinfection system.

Shipbuilding Yards

We conduct regular firefighting and emergency evacuation drills to timely and safely extinguish a fire and improve evacuation capabilities. Considering the nature of each place, we are enhancing the quality of training and responsiveness by composing and applying scenarios for various situations, such as buildings, shops, PE area, and vessels, during each training session. Last year, the Shipbuilding & Offshore Business Unit conducted emergency evacuation drills 11 times by conducting them based on the social distancing stages.

Category	Plant	Hull	Notes
Date	Nov. 18, 2021 (Thu)	Nov. 3, 2021 (Wed)	An exercise was conducted selectively for the compliance with the COVID-19 disinfection rules
Location	Unit-Assembly Plant 2 U-3 Bay	Quay 4 Hull 3145	
Activities			

Offshore Yard

For specific firefighting equipment, firefighting exercises are conducted regularly every year under relevant laws and regulations. For offshore construction projects, various emergency exercises, such as rescue exercises, firefighting exercises, and evacuation exercises, are conducted after consulting with the project owners on the method, time, etc.
In King's Quay Construction Project, an exercise was conducted to evaluate all personnel while assuming a fire or an explosion during bunkering (oil transfer).

Firefighting and Fire Suppression

Life Search and Rescue (Transportation)

Emergency Evacuation / Assembly and Identification of Personnel

COVID-19 response

Manual and guidelines for the COVID-19 response

As the COVID-19 pandemic persists, we have produced and implemented a manual in Korean and English to respond to COVID-19 and prepare for situations where our employees, visitors, and shipowners' employees become infected at any moment. In addition, when the government's social distancing guidelines changed based on the vaccination rate, we did our best to prevent COVID-19 in the company by promptly updating the company's response guidelines, providing information, and implementing preemptive response measures.

COVID-19 guidelines in Korea

Internal disinfection guidelines

Providing information on the current status of COVID-19 in the company

To prevent COVID-19, we are informing shipowners and others on the current status of COVID-19 in our company and the Ulsan area (infection routes, the current status of infection, etc.). We have successfully prevented the further spread of COVID-19 by promptly informing shipowners and others of the current status of persons with COVID-19 in the company and the current response status through the text message service whenever a person in our company is diagnosed with a disease.

Providing information on the weekly status of COVID-19
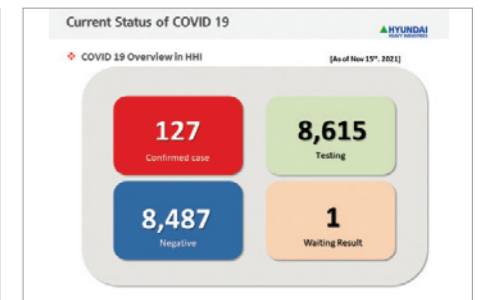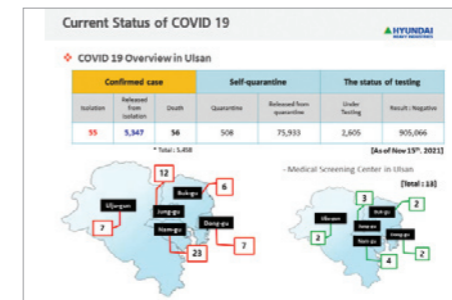
Providing information about confirmed case in the company
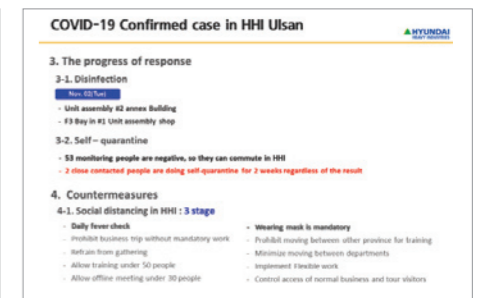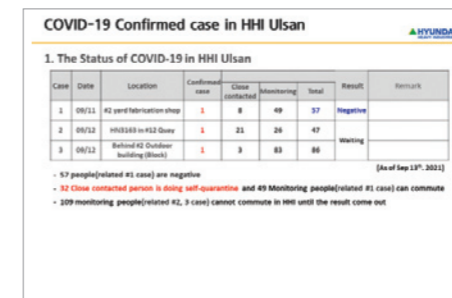
Response to COVID-19 for test operation

We have prepared a COVID-19 response manual for the commissioning. We use it in case one of our employees, external engineers, and shipowners' employees is confirmed with COVID-19 while on board a ship for a test operation. This year, we were vaccinated against COVID-19. Therefore, some manuals have been revised to reflect the current status of vaccination.

Major responding measures

Before boarding	For commissioning
• Vaccinated person: A COVID-19 test is unnecessary (the PCR test is conducted for the test run of gas commissioning depending on the situation) • Unvaccinated person: A self-test kit is used before boarding (the PCR test is conducted for the test run of gas commissioning) • Providing disinfection goods: Masks, protective clothes, thermometers, hand sanitizers, etc.	• The temperature and health of people are examined, and the inside of the hull is disinfected • If a person is suspected of infection: The person is separated to the designated quarantine space and disembarked • If a person is confirmed: All passengers are quarantine and must wait after docking at a location designated by KCDC

Action Guidance against COVID-19 for Sea Trials

Vessels disinfection activities

Checking the result of the self-test kit of persons boarding for a test operation

Disinfecting the inside of a hull

Daily temperature checking

Establishment of a noncontact disinfection system

The company has prepared for COVID-19 by installing a noncontact, round-the-clock disinfection system in the Main Building.

The disinfection system installed at seven entrances of the Main Building and checks each person's body temperature and detects whether a person wears a mask by automatically sensing the person's face. It prevents the spread of COVID-19 by completely blocking the entry of a person with an abnormal body temperature and a person who does not wear a mask.

| Simultaneous detection of abnormal body temperature | Gates (restriction on concentration) | Automatic temperature checking (data collection) | Measuring precise body temperature of persons with fever |

In addition, the noncontact disinfection system enables us to prevent group infection and respond promptly by identifying the movement of a confirmed individual and its facial recognition feature.

Noncontact disinfection system at the Main Management Building

NAVAL SHIPBUILDING BUSINESS UNIT

Naval & Special
Ship Business Unit

Korea's Naval Shipbuilding Industry's Base Camp Advancing Internationally

The Naval & Special Ship Business Unit, playing a pioneering role in the independence of Korea's shipbuilding industry from the development of Korea's first domestic battleship "Ulsan" in 1975, developed the Aegis-class destroyer "King Sejong the Great," submarines, and various state-of-the-art naval ships with its technology. The Naval & Special Ship Business Unit is actively advancing in the world market and is being recognized for its technological prowess. The Naval & Special Ship Business Unit, which established itself as the pride of HHI, will continue to expand its world-class technological capabilities by partnering with domestic and foreign research institutes and combat system manufacturers based on its professional human resources and cutting-edge technology.

01
Naval & Special Ship Business Unit Safety Management Performance in 2021
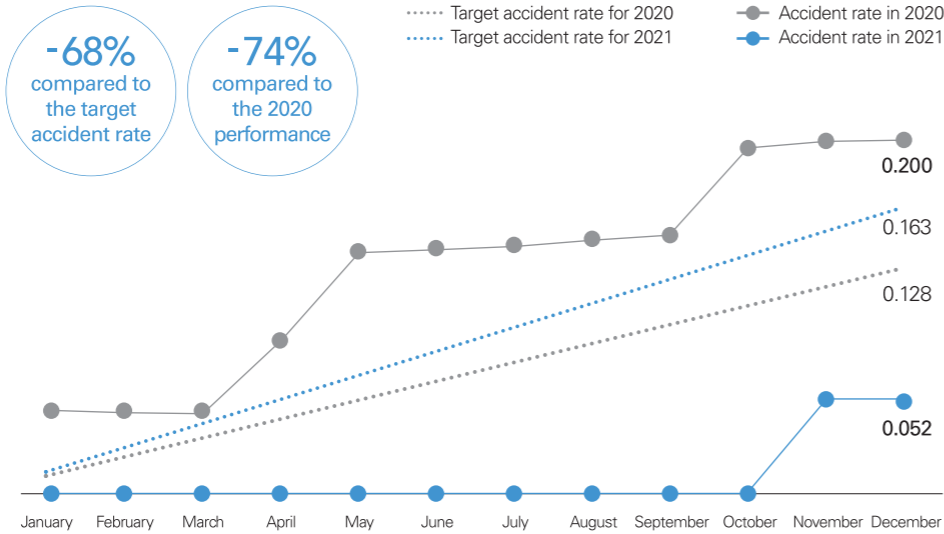
Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Safety Activities focused on prevention of Serious Accidents	**Establishment/Implementation of Multiple Safety Measures for Preventing Serious Accidents in each Worksite** • Selecting high-risk jobs in each worksite (updating once a month) • Checking whether safety measures for each high-risk job are taken on-site (using a separate checklist)	**Establishment/Implementation of Multiple Safety Measures for Preventing Serious Accidents in each Worksite** • Reviewing multiple safety measures for high-risk jobs in each worksite (once a quarter) • Conducting daily inspections using the checklist on Daily high-risk work	Once a month Continually	Whether updated once a month Whether the checklist is used in inspections	33% 100%		
	Tightening Safety Discipline • Applying the no-tolerance principle to violations for priority control items in Naval & Special Ship Business Unit and giving instant rewards for preventing serious accidents • Checking whether safety measures for preventing serious accidents were taken before starting work • Conducting intensive inspections in a two-month cycle and remedying violations • Conducting risk assessments before starting work such as nonroutine work or change in progress • Tightening safety discipline with the 1·3·5 Campaign and 4S activities	**Tightening Safety Discipline** • Detected violations of HHI 12 Safety Golden rules and priority control items: 9 cases • Inspections conducted on Daily High-risk work using the checklist (organized a separate inspection team and inspected high-risk jobs individually) • Conducted inspections in a monthly cycle and remedied violations • Improving methods and conducting risk assessment before starting work such as nonroutine work or change in progress • Daily performance reports on the 1·3·5 campaign and 4S activities: 99 cases	Continually Continually Once a week Occasionally Continually	Whether rule violation was detected Whether special inspections were conducted Whether periodic inspections were conducted Whether risk assessments were conducted Whether daily performance reports were written	100% 100% 100% 100% 100%		
Promotion for Preemptive Safety Management Activities	**Continuation of Safety Improvement Activities** • Active support of each business unit's Safety Management Group for promoting Hi-SAFE (company-wide safety improvement activities) • Design Feedback for safety activities • Identifying high-risk factors in the workplace mainly by safety workers • Selecting safety improvement tasks quarterly and making improvements (led by the Safety Section Manager)	**Continuation of Safety Improvement Activities** • Company-wide safety improvement activities Grade A: 10 cases / Grade B: 11 cases / Grade C: 2 cases • Safety design activities: Holding hull construction meetings / Providing information on preventing safety accidents in drawings / Design feedback for safety activities • Identifying high-risk factors in the workplace: 59 cases / 13 persons • Selecting safety improvement tasks quarterly and making improvements (led by the Safety Section Manager)	Continually Continually 1 case per quarter 1 case per quarter	Results of company-wide safety improvement activities Whether design for safety feedback activities were conducted Number of cases identified / Number of cases planned Number of cases identified / Number of cases planned	100% 100% 100% 100%		
	Continuous Implementation of the Naval & Special Ship Business Unit's Safety Forecast System • Applying the number of accidents and the ratio of violations for 12 safety golden rules and priority control items • Conducting special safety management activities on each department/responsible executive officer/division	**Continuous Implementation of the Naval & Special Ship Business Unit's Safety Forecast System** • Issuing safety forecasts to construction departments where two or more accidents occurred concerning the work process • Conducting special safety management activities on each department/responsible executive officer/division	Continually Continually	Whether forecasts were issued according to the standards Checking whether countermeasures were taken upon the issuance of a forecast	100% 100%		
	Safety Management Activities for Change of workforce and time • Tightening up risk management following the transfer of the Submarine Construction Department workforce to Special Ships Construction Department • Sharing intensive safety management points by season, time to Construction Department and site management	**Safety Management Activities for Change of workforce and time** • Tightening up risk management following the transfer of the Submarine Construction Department workforce to Special Ships Construction Department • Sharing intensive safety management points by season, time to Construction Department and site management: 4 cases	Continually Once a quarter	Whether management points were shared	100%		
	Support for Strengthening Subcontractors' Capabilities • Holding subcontractors' safety and health council (monthly) • Holding meetings with Safety managers on subcontractors (monthly) • Providing technical guidance and evaluation to subcontractors (quarterly) • Selecting and rewarding outstanding subcontractors' safety officers (quarterly)	**Support for Strengthening Subcontractors' Capabilities** • Holding subcontractors' safety and health council (monthly) • Holding meetings with Safety managers on subcontractors (6 times a year) • Providing technical guidance and evaluation for subcontractors (quarterly) • Selecting and rewarding outstanding subcontractors' safety officers (quarterly)	Once a month Once a month Once a quarter Once a quarter	Number of actions / Number of occurrences Number of actions / Number of occurrences Number of actions / Number of occurrences Number of actions / Number of occurrences	100% 50% 100% 100%	Reduced meetings due to COVID-19	

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Safety Activities for Strengthening of Execution	**Establishment/Revision of Safe Job standards (Standardization, Clarification)** • Preparing a safety management report of each hull to record management points of safety workers (surface ships, submarines) • Preparing and registering safety guidelines by identifying high-risk work items in the Naval & Special Ship Business Unit • Supporting the Establishment of Job Standard Procedure/Risk Assessment System in the Naval & Special Ship Business Unit	**Establishment/Revision of Safe Job standards (Standardization, Clarification)** • Produced safety guide book of hull construction for Special ships and submarines under construction/test operation: 3 cases • Prepared safety guidelines: 12 cases • Planning to review risk assessments in 2022 according to the progress of Preparing for Job Standard Procedure	Continually Continually Continually	Whether Safety guide books on representative hulls were prepared Whether items were identified Results of the Establishment of Job Standard Procedure/Risk Assessment System	100% 100% 0%	Establishment of Job Standard Procedure/Risk Assessment System is operating	
	Motivating safe work through Safety Rewards • Rewards for outstanding team of safety performance • Rewards for outstanding Supervisor • Selecting Outstanding Tasks and giving rewards related to Hi-SAFE (company-wide safety improvement activities)	**Motivating safe work through Safety Rewards** • Rewards for outstanding team of safety performance : 12 teams in total • Rewards for outstanding Supervisor: 8 persons in total • Selecting outstanding tasks and giving rewards related to Hi-SAFE (company-wide safety improvement activities): 2 teams (1 excellence award, 1 for safety improvement award)	Once a quarter Once a quarter Once a year	Number of teams rewarded / Number of teams planned Number of supervisors rewarded / Number of persons planned Number of actions / Number of occurrences	100% 100% 100%		
	Enhancement of Safety supervisors' abilities • Continuous learning about current safety regulations and countermeasures for preventing the recurrence of accidents (training sessions conducted by section managers/team leaders) • Sharing problems identified by each safety supervisors at the site and other Business Unit sites and conducting training sessions	**Enhancement of Safety supervisors' abilities** • Conducted training sessions during the afternoon assembly on preventive countermeasures for the recurrence of major accidents • Shared problems identified by each safety supervisors at the site and other Business Unit sites and conducting training sessions	Twice a month Twice a month	Number of sessions conducted / Number of sessions planned Number of sessions conducted / Number of sessions planned	100% 100%		

02
Achievements in the Safety Management of the Naval & Special Ship Business Unit in 2021

In 2021, the number of accidents caused by accidents at the Special Ship Business Unit was only 1, which records an accident rate of 0.052. In 2021, safety activities focused on serious accident prevention were carried out based on the priority control items selected for each worksite and establishment and implementation the multiple safety countermeasures to prevent serious accidents. As a result, neither significant nor serious accidents have occurred for more than one year and eight months to date. We plan to create an accident-free workplace in 2022 by establishing advanced safety management plan for high-risk jobs.

Summarized Safety Management Performance

- -68% compared to the target accident rate
- -74% compared to the 2020 performance

Legend:
- ······ Target accident rate for 2020
- ······ Target accident rate for 2021
- —●— Accident rate in 2020
- —●— Accident rate in 2021

Chart values: 0.200, 0.163, 0.128, 0.052

Months: January, February, March, April, May, June, July, August, September, October, November, December

Category	2019	2020	2021
Serious accident	0	1	0
Work related Accident	3	4	1
Accident rate	0.128	0.200	0.052
Frequency (per one million)	0.614	0.953	0.300

03
Safety Activities Focused on Serious Accident Prevention

The Naval & Special Ship Business Unit establishes safety discipline by implementing and checking multiple safety measures to prevent serious accidents in high-risk jobs in each worksite, intensively managing 12 safety golden rules and priority control items, conducting intensive inspections in a monthly cycle, and promoting the 1·3·5 campaign and 4S activities.

Establishment and Implementation of Multiple Safety Countermeasures to Prevent Serious Accidents in each work site

Selecting High-Risk Jobs in each Worksite

To prevent serious accidents in 2021, we divided the Naval & Special Ship Business Unit worksites into seven zones, selected high-risk jobs (31) for each zone, and established multiple safety countermeasures for the jobs. In addition, by reflecting on multiple safety measures for high-risk jobs, we strive to create a workplace free from serious accidents by establishing and revising Job Standard Procedure and training for the workers.

High-Risk Jobs in each Worksite

Worksite	High-Risk Jobs	Notes
Hull Assembly Shop	4 items in addition to the loading of vertical members and the prevention of overturning	
Submarine Shop	4 items in addition to the loading of heavy materials into narrow spaces	
Dry Dock/Quay	6 items in addition to flammable work of revised drawings for welding/cutting	Special ship
Lifting Dock/Quay	4 items in addition to the operational tests of machines/equipment in narrow spaces	Submarines
Pre-construction shelter/PE area/Others	2 items in addition to working with Argon gas	
Material Logistics	2 items in addition to the loading and unloading with forklifts	
Common	2 items in addition to the working at height with no safety facilities	

Examples for Establishment of Multiple Safety Countermeasures

High-Risk Job	Basic Safety Initiative	Additional Safety Countermeasures
Butt jointing work for blocks of curved outer plates on pin jigs	① Selecting the flattest plates as reference ② Installing plate supports (reverse-curved: all quantity/right-curved: blocks curved by 25 or more degrees) ③ Separating crane from reference plates after fine-tuning of reference plate with lever pullers ④ Marking the area where plate supports are installed as a restricted dangerous area (1 m) ⑤ Fixing lever pullers for each plate shape (2 ~ 4 locations)	⑥ Taking double safety measures to prevent overturning at the outer plate zone using pin jigs ⑦ Installing lever pullers for additional adjustment during separate adjustments (removing lever pullers for fixing is prohibited)

Inspection of Safety Countermeasures Taken for each High-Risk Job

An inspection checklist was based on multiple safety countermeasures for the high-risk jobs selected for each worksite. We aim to minimize the gap between management and supervision by ascertaining the application of safety countermeasures through relay inspections on safety and construction before, during, and after working on Daily High-risk work using the checklist.

Inspection of High-Risk Jobs by Safety sector

① Checking the current status of daily high-risk jobs
② Inspecting high-risk job at the site using checklist
③ Identifying and writing additional safety countermeasures to be checked further, if any, on the Permit To Work(PTW) and action to be taken on the site
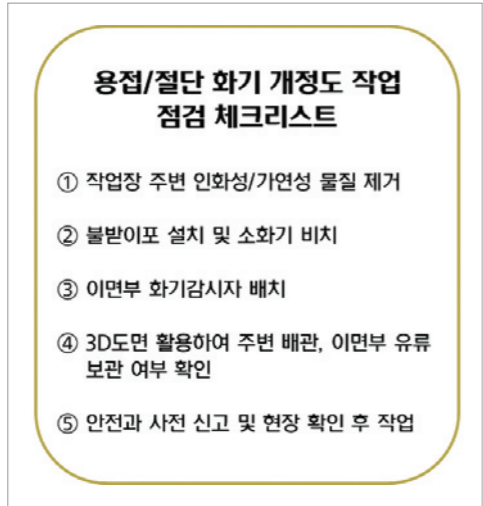
Checklist for the inspection of high-risk job
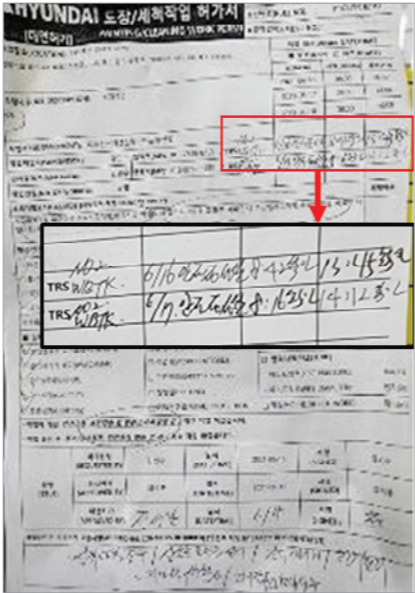
Signing on a Permit To Work(PTW)
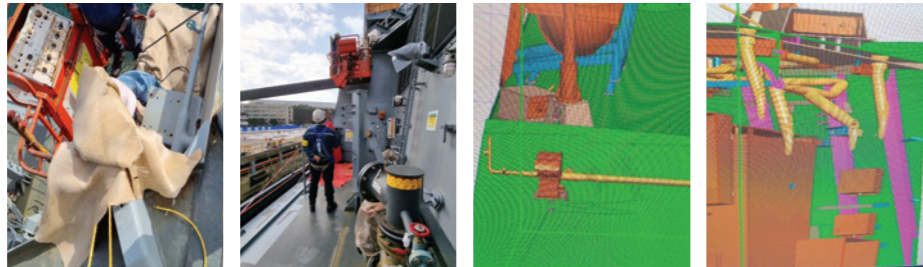
Additional safety countermeasures taken

Process of High-Risk Job Inspections by Construction Departments

① Checking and sharing the current status of daily high-risk jobs
② Inspecting high-risk jobs before, during, and after work
③ Sharing the results of the work inspection

Checking and Sharing the Current Status of Daily High-Risk Jobs

Inspection Before Starting to Work and Sharing the Results
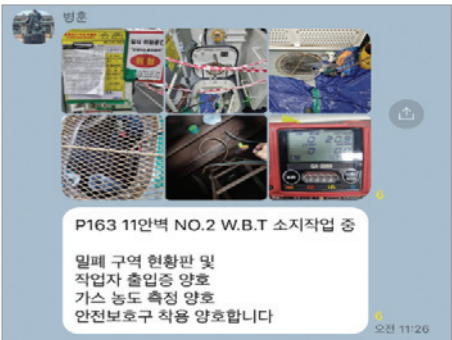
Inspection by Safety supervisors in Construction Department and Sharing the Results

Sharing the Results of Daily Inspections by the Manager

Tightening Safety Discipline
●

Intensive Management of 12 safety golden rules and Priority Control Items

We plan to prevent serious (significant) accidents or disasters within the Naval & Special Ship Business Unit by applying rules to personal violations and establishing countermeasures to prevent the recurrence of violations in each department. This is done through the continuous enforcement of the 12 safery golden rules (12) and priority control items for preventing serious (significant) accidents (12) at the worksites where serious (significant) accidents are likely to occur.

Rule Violations Status in the Naval & Special Ship Business Unit in 2021

- Violations of 12 safety golden rules
- Violations of priority control items
- Violations of general rules

	January	February	March	April	May	June	July	August	September	October	November	December
	1	3, 1	2, 1	1, 1	9	2	2, 1	2		1, 2	1, 1	
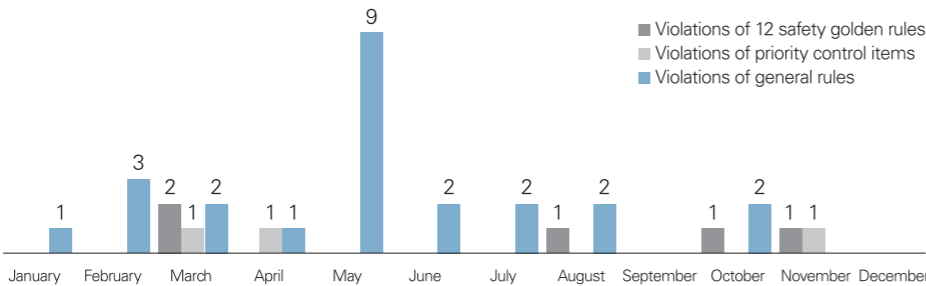
Item	Safety Golden Rules	Priority Control Items	General Rules
Number of Violation Cases	5 cases	3 cases	24 cases

Major Violation Cases

- Fall risk: Working at height without a safety harness
- Fire risk: Insufficient preventive measures against fire while performing flammable work
- Working without personal protective equipment appropriate for the relevant job

Intensive Inspections in a Monthly Cycle

To prevent accidents in Naval & Special Ship Business Unit worksites, we conduct weekly intensive inspections in a monthly cycle to prevent serious accidents. This is done after reviewing the items subject to weekly intensive inspections conducted in a bimonthly cycle as part of preemptive safety management and by reselecting the items following the high-risk items currently applied for preventing serious accidents.

Intensive Inspection (in a Bimonthly Cycle) in the past	
Week 1	Fall prevention
Week 2	Forklifts/cranes
Week 3	Confined space
Week 4	Fire, explosion
Week 5	Jack rams/falling objects
Week 6	Gas hose/nipples
Week 7	Electric shock prevention
Week 8	Prevention from overturning of vertical structures/cherry pickers
Week 9	Lug welding/pressure tests
9 items in total	

Improved Intensive Inspection (in a Monthly Cycle)	
Week 1	Loading of heavy materials
Week 2	Loading of Curved outer plate blocks/ vertical members and the prevention of overturning
Week 3	Fire, explosion
Week 4	Machine operation tests
Week 5	Jack ram/lug welding
5 items	

Results of Weekly Intensive Inspections in a Monthly Cycle

Item	Number of Inspections	Number of Defects	Defect Rate
Loading heavy materials	312	5	1.6%
Loading of Curved outer plate blocks/ vertical members and the prevention of overturning	382	4	1.1%
Fire and explosion	646	9	1.4%
Machine operation tests	29	0	0%
Jack ram/lug welding	197	1	0%

1·3·5 Campaign and 4S Activities

We strive to prevent accidents by observing high-risk work over a long period for more careful safety management and identifying the aspects that need improvement. In addition, the 1·3·5 campaign promoted having conversations on safety with 5 persons while safety workers and construction supervisors conduct field inspections three times a day.

4S Activities Examples (Block Loading Work)

Safety Conversations	A request for an additional revision of the Job Standard Procedure regarding safety measures

Risk Assessment on Non-Flow Work in the Worksite

We will prevent accidents that may occur by conducting a risk assessment before commencing a new or a non-standard work for which the work method or procedure was newly established or revised, and by establishing safety countermeasures after identifying causes of hazards and dangers that may occur while working and providing training programs to workers based on the results of such risk assessment.

Examples of Risk Assessment before Commencing a New work

04
Promoting Proactive Safety Activities

The Naval & Special Ship Business Unit also participates in company-wide safety improvement activities, promotes safety-friendly design activities, and identifies and improves high-risk factors in the worksite. In addition, we actively implement the safety forecast system, share safety management points timely and perform site management, and support subcontractors in strengthening their capabilities.

Safety Improvement Activities

Company-Wide Safety Improvement Activities (Hi-SAFE)

The Naval & Special Ship Business Unit conducts improvement activities for a total of 23 cases (construction/design) in connection with company-wide safety improvement activities conducted to block serious (significant) accident risks that may be caused by chronic, high-risk factors or methods; among them, two cases were selected as outstanding improvement activities. We will strive to preemptively improve high-risk work in the Naval & Special Ship Business Unit by continuously applying the relevant systems.

Risk Grade	A (Improvement of High-Risks	B (Improvement of Medium Risks)	C (Improvement of Low Risks	Total
2020	9 cases	11 cases	0 case	20 cases
2021	10 cases	11 cases	2 cases	23 cases

Excellence Award

스마트 조립도를 활용한 공정별 맞춤형 안전사고 예방 정보 제공 시스템 개발

Safety Improvement Award

SPY-1D FDN Alignment, 설치 및 배열 작업시 떨어짐 사고 방지 대책

Safety-Friendly Design Activities

Regarding the design sector, we plan to reduce the frequency of serious accidents exposure by providing information bespoke to each process for preventing accidents, identifying safety risk factors from the drawing preparation stage before starting fieldwork, eliminating on-site speculation, repetitive work by reflecting risk factors in drawings, and performing work according to clear standards.

Regarding the safety sector, we strive to secure fundamental safety inside identical or similar hulls by conducting activities for safety and design feedback for safety to improve the risks identified in the site from the design stage.

Identification and Improvement of High-Risk Factors in Worksites

We plan to make our workplace safer by identifying and improving potential high-risk factors at the site in addition to the high-risk jobs selected in each worksite as part of the preemptive safety management activities eliminating potential risk factors in advance.

Status of Identification of High-Risk Factors

Number of Persons	Number of Cases with Identified High-Risk Factors				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
13	28	12	13	6	**59**

Examples of Identification of Potential High-Risk Factors

Life rope + safety harness for the installation of a hatch on a submarine ➡ An additional safety net was installed for fall protection	Life rope + safety harness for the final working without handrails on the Funnel Top ➡ An additional safety net was installed for fall protection

Implementation of the Safety Forecast System

Safety Forecast System

To prevent accidents in the worksites of the Naval & Special Ship Business Unit, we will make our workplace safer by cutting the chain of accidents by issuing safety watches to the departments in which two or more accidents occurred in connection with the work process in June 2021 to raise awareness of the safety of the organizations and by conducting special safety activities.

Examples of Issuance of Safety Watches

- Period: Jun. 30, 2021 ~ Jul. 9, 2021
- Target: Submarine Construction Department of the Naval & Special Ship Business Unit
- Reasons for Issuance: Two or more accidents occurred in connection with the work process in the Submarine Construction Department during one month
- Special Safety Activities
  - Training programs on the causes and preventive countermeasures of accidents in the first half of 2021
  - Identification and management of safety risk factors according to weekly work plans
  - When TBM conducted, Training for identified safety risk factors
  - Relay safety inspections by supervisors in high-risk jobs and intervention activities

Operating Standards for the Safety Forecast System

Stage	Criteria for Issuance	Unit of Issuance	Issuance Authority	Period of Validity
Safety Watch	• 2 accidents a month related to the work process or 1 significant accident a month • Where the violation rate of the priority control items / 12 safety golden rules is 0.5 or more	Department	Head of Safety Department	Until safety is established (minimum one week)
Safety Alert	• 3 accidents a month related to the work process or 2 significant accidents a month • Where the violation rate of the priority control items / 12 safety golden rules is 0.5 or more	Responsible Director	Safety Director	Until safety is established (minimum two weeks)
Safety Warning	• 3 Significant accidents a month	Business Unit		Until safety is established (minimum three weeks)

Sharing Intensive Safety Management Points by Time / Site Management

We strive to prevent accidents by sharing safety management points with construction departments and managing them at the site after producing intensive safety management points according to the relevant risk factors. This is done by identifying risk factors that may occur by season and time in addition to the safety management of high-risk jobs performed in each worksite to prevent serious accidents in the Naval & Special Ship Business Unit.

Month	Safety Management Points
January	Safety Management Plan for 2021
March	Intensive safety management from March until May during which accidents (serious accidents) frequently occur
July	Intensive safety management before and after holiday leave
October	Safety management for fire prevention in winter
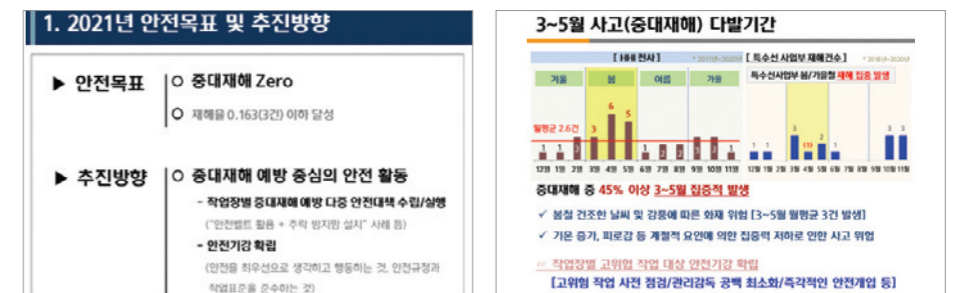
January / Safety Project Plan

March / Intensive safety management during the period when accidents (serious accidents) frequently occur

July / Safety management before, during, and after holiday leave

October / Safety management for fire prevention in winter

Support for Strengthening Subcontractors' Safety Competency

As part of the measures to prevent accidents at the workplace, we are actively supporting subcontractors to equip them with self-regulated safety management competency by conducting various activities, such as the safety and health council, meetings, and rewards to outstanding subcontractors, to improve their safety and health level.

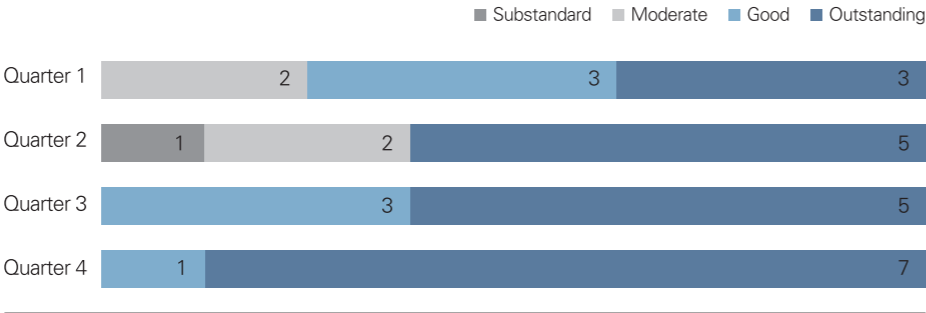### Subcontractors' Safety and Health Council and Safety Managers' Meetings

We help subcontractors strengthen their safety management competency by sharing the latest policies and issues on safety and health through monthly meetings with the Council and with subcontractors' safety officers and strive to make our workplace safe by sharing subcontractors' ideas on safety improvement.

Technical Guidance to Subcontractors and On-Site Safety Inspection

We provide internal subcontractors with technical guidance on systems and on-site safety management quarterly and help them strengthen their safety management competency by sharing the latest policies and issues on safety and health.

Results of Technical Guidance and Safety and Health level assessment on Subcontractors

■ Substandard ■ Moderate ■ Good ■ Outstanding

Quarter 1	2	3	3
Quarter 2	1 / 2		5
Quarter 3	3		5
Quarter 4	1		7

05
Safety Activities for Strengthening the Power of Execution

The Naval & Special Ship Business Unit has produced a safety guide book on safety management as a manual for on-site safety management, has thoroughly reviewed the Job Standard Procedure on high-risk jobs at each worksite, and has also produced and utilized safety guidelines. In addition, we are creating a safety culture through the implementation of various safety rewards.

Establishment / Revision of Safe Job standards

Safety guide book on Safety Management of the Naval & Special Ship Business Unit

As a part of safety activities to strengthen the safety execution of special ships, the naval ships built by the Naval & Special Ship Business Unit are largely divided into special ships, submarines, and ships at the trial operation stage. We have produced and managed safety guide books on safety management as a guide for on-site safety management, including safety management schemes for the work conducted in the relevant naval ships.

※ Production of safety guide book: safety guide books were completed for the construction and test operation of special ships, respectively / the production of safety guide books on submarines is in progress.

Thorough Review of Job Standard Procedure on High-Risk Jobs in each Worksite of the Naval & Special Ship Business Unit

We have thoroughly reviewed the appropriateness of the Job Standard Procedure maintained for each construction department regarding high-risk jobs selected for each worksite. We will conduct preemptive safety activities by revising and teaching the Job Standard Procedure after reviewing whether countermeasures for preventing serious (significant) accidents are reflected, where there are safety countermeasures that should be contained more specifically, and other factors.

The number of revisions of the Job Standard Procedure: 33 times in addition to the revision on flammable work

Number of departments	revisions
Hull Construction Department	8 times
Outfitting Construction Department	6 times
Submarine Construction Department	3 times
Test Operation Department	16 times

'21년 작업장별 중대재해 차단대책 관련 표준작업지도서 적정성 여부 검토 결과(의장생산부)

표준작업지도서	재검토 필요사항						링크	
	1.빈도/강도	2.위험요인/ 대책 모호	3.표준작업 지도서 없음	4.과거 사고/ 대책 누락	5.작업순서	6.개략도	개정 전	개정 후
중량물 탑재/이동			O				-	(수심함- 2)
SLIDING DOOR 설치 및 검사	O	O			O	O	(수심함- 3.1)	(수심함- 3.1_R1)
CPP PROPELLER SHAFT 탑재		O				O	(수심함- 4.1)	(수심함- 4.1_R1)
CPP BLADE 조립						O	(수심함- 4.2)	(수심함- 4.2_R1)
LOAD TEST 설치	O	O			O	O	(수심함- 5)	(수심함- 5_R1)
TIG 용접 주의사항	O						(선행- 1)	(선행- 1_R1)
무선 천정 크레인 사용						O	(선행- 2)	-

Producing Safety guideline for High-Risk Work

We have produced and have been using safety guidelines based on the Job Standard Procedure reviewed regarding high-risk works so that we can refer to the guidelines easily at a glance.

• Production of new guidelines: 11 cases in addition to the safety guidelines for the operation test of machines in a special ship

Motivation for Safe Work through Safety Rewards

Implementing the safety reward system as part of safety activities for creating a culture where safety is a top priority, the Safety Management of the Business Group gives rewards to the individuals who have actively performed safety activities at the site and creates a self-regulated safety culture of organizations, as well as of individuals, through various rewards at the level of organizations.

Category	Description	Reward Amount
Reward to Individuals	• Complimentary coupon (on-site instant reward)	KRW 5,000 per person
	• Outstanding supervisor (responsible section manager/ construction team leader)	KRW 1 million per person
	• Outstanding safety manager of a subcontractor	KRW 500,000 per person
Reward to Organizations	• No-accident reward	KRW 5,000~7,000 per person
	• Reward to a construction organization (team) for outstanding safety performance	KRW 100,000 per person
	• Reward to a subcontractor for outstanding safety performance	KRW 10 million

ENGINE & MACHINERY BUSINESS UNIT

Engine & Machinery Business Unit

Growing Into the World's Best and Largest Engine Manufacturer

HHI's Engine & Machinery Business Unit, whose share in the global large engine market amounts to 35%, has achieved the production of 170 million horsepower and 11,000 HiMSEN engines in 2017, growing into the world's largest engine manufacturer. In particular, we are playing a leading role not only in the shipbuilding industry but also in the general industry by supplying land-based engine power generation facilities (EPP), including portable power generation facilities (PPS) to domestic and overseas markets. In addition, we produce various products for ships, such as large and medium-sized engines and gas fuel supply systems, gas regasification/reliquefaction equipment, nitrogen reduction equipment, ballast water treatment equipment, propellers, ship propulsion systems, and supply them to domestic and overseas shipbuilders as strategic products for a driving force of our future growth and also contribute to the creation of safety culture by solidifying our commitment to safety technology and Safety First.

01
Engine & Machinery Business Unit
Safety Management Performance in 2021

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Strengthening the Safety Implementaion through Caring Activities	**Top Management Site-Oriented Caring Activities for Practicing Safety** • Business Unit Heads/Division Heads' Participation in TBM of each team in rotation	**Top Management Site-Oriented Caring Activities for Practicing Safety** • On-site inspection and instant rewards by the Business Unit Heads/Directors (performed 90 times / planned 90 times)	3 times a week	Number of actions / Number of occurrences	100		
	Caring Activities of Production Departments for Safety Implementaion • Inspecting and removing (serious) risk factors in advance through risk assessments	**Caring Activities of Production Departments for Safety Implementaion** • Risk assessment on non-flow non-routine work at the worksite	Continually	Number of actions / Number of occurrences	100		
	Preemptive Activities by the Safety Department to Prevent Accidents • Inspecting the performance of the countermeasures to prevent the recurrence of serious (significant) accidents and compliance with the standard work manual for high-risk processes • Conducting weekly intensive inspections (such as inspections of cranes, forklifts, safety rails, openings, auxiliary machinery areas, and vulnerable areas)	**Preemptive Activities by the Safety Department to Prevent Accidents** • Inspected compliance with the standard work manual for high-risk processes and made proposals to the Safety Committee • Conducted weekly inspections according to the 2021 Safety Inspection Calendar and shared the results during Tea-Time meetings	Once a week Once a week	Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100		
	Intensive Management of High-Risk Processes to Prevent Serious (Significant) Accidents • Tightening up safety management of gas facilities inside and outside plants • Conducting safety measures before starting casting work for materials and propellers	**Intensive Management of High-Risk Processes to Prevent Serious (Significant) Accidents** • Conducted training programs for the operation of Hi-GAS and establishing a gas safety culture • Occasional participation by safety workers in cast pouring work	Once a year Continually	Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100		
	Tightening Up Safety Training for High-Risk Jobs • Conducting supplementary training programs for qualifications of operators and forklift and crane guardians • Tightening up pretraining programs for short-term project workers	**Tightening Up Safety Training for High-Risk Jobs** • Completed supplementary training programs for qualifications for equipment and relay training programs for forklifts (461 persons) / cranes (191 persons) • Checked dangerous work permits before starting short-term projects and provided training programs to workers	Once a year Continually	Attendees / Persons subject to training Attendees / Persons subject to training	100 100		
Enhancing the Safety Culture through Communication	**Promoting Communication between the Safety Sector and the Production Sector** • Promoting immediate communication and joining improvement activities between the Safety Department and Production Departments on the occurrence of any safety problem at the site • Encouraging on-site feedback between the Safety Department and Production Departments through safety meetings	**Promoting Communication between the Safety Sector and the Production Sector** • Exchanged feedback on improvements between the head of the Safety Department and the heads of Production Departments at Tea-Time every Monday • The Division Head held safety meetings (by sectors, such as materials, processing, assembly, and test operation)	Once a week Once a week	Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100		
	Site-Based Activities of Practicing Safety Communication • Announcement and sharing of safety inspections results and the improvement performance (Safety Committee)	**Site-Based Activities of Practicing Safety Communication** • Announced the improved performance and shared major safety issues through the Safety Committee every other Thursday	Twice a month	Number of actions / Number of occurrences	100		
	Reinforcing Workers' Commitment to Safety • Identifying and sharing risk factors through workers' presentations of their own experiences at the TBM	**Reinforcing Workers' Commitment to Safety** • Site safety supervisors' participation in TBM every day and shared risk factors and exchanged opinions regarding daily risk of the jobs	Continually	Number of actions / Number of occurrences	100		
	Conducting Training Programs and Campaigns for Enhancing Awareness of Safety • Conducting an Accident-Free 365 Days Safety Campaign occasionally	**Conducting Training Programs and Campaigns for Enhancing Awareness of Safety** • Conducted an Accident-Free 365 Days Safety Campaign with the attendance of executive officers, department heads, responsible section managers, and representatives of internal subcontractors	Throughout the year	Number of actions / Number of occurrences	100		

Main Activities	2021 Management Plan	2021 Management Performance	Implementation Cycle	Criteria for achieving goals (Calculation Method of the Achievement Rate)	Achievement Rate (%)	Reason	Future Plan
Establishment of Discipline through Strict Safety Management	**Tightening Up the Control of Violations of Safety Rules** • Strict criteria application for imposing sanctions on violators upon the occurrence of an accident or a violation	**Tightening Up the Control of Violations of Safety Rules** • Gave caution to departments that violated safety rules at the weekly process meetings and discussed improvement schemes	Once a week	Number of actions / Number of occurrences	100		
	Tightening Up Safety Management of Gas Facilities Inside and Outside Plants • Rigorous use of designated protective equipment and non-sparking tools and instruments	**Tightening Up Safety Management of Gas Facilities Inside and Outside Plants** • Checked the use of non-sparking tools and instruments and the compliance with standard work procedures at the time of safety patrol	Continually	Number of actions / Number of occurrences	100		
	Definite Rewards for Outstanding Safety Performance • Instant rewards to outstanding individuals/teams in the execution power of safety/performance	**Definite Rewards for Outstanding Safety Performance** • Rewarded outstanding task force teams in Safety One Point / outstanding department in the SLI / outstanding internal subcontractors in safety management	Once a month	Number of actions / Number of occurrences	100		
Improving Subcontractors' Safety Management Systems	**Strengthening the Responsibilities and Role of Safety Management of Representatives of Subcontractors** • Appointment of subcontractors' safety managers: All 17 subcontractors appointed safety managers • Announcing the current status and results of safety management (subcontractors' council)	**Strengthening the Responsibilities and Role of Safety Management of Representatives of Subcontractors** • Held meetings of the subcontractors' safety managers • Held meetings of the subcontractors' council	Once a month Once a month	Number of actions / Number of occurrences Number of actions / Number of occurrences	100 100		
	Safety Management Led by Supervisors (Site Managers, Foremen) • Inspection/removal of (serious) risk factors in advance	**Safety Management Led by Supervisors (Site Managers, Foremen)** • Supervisors conducted and recorded activities as safety supervisor in construction departments	Continually	Number of actions / Number of occurrences	100		
	Strengthening Competency of Subcontractors' Safety Managers • Hold meetings between the Safety Department and subcontractors' safety managers	**Strengthening Competency of Subcontractors' Safety Managers** • Held safety meetings with internal subcontractors: announced safety improvements and disseminated information to be shared	Once a month	Number of actions / Number of occurrences	100		

02
Achievements in the Safety Management of the Engine & Machinery Business Unit in 2021

In 2021, the Engine & Machinery Business Unit implemented the preemptive prevention of accidents by strengthening the safety implementation through caring, the enhancement of the safety culture through communication, the establishment of discipline through strict safety management as priority tasks, and the occurrence of three accidents and the accident rate of 0.102 exceeding 3% in comparison to the management standards for 2021.

In 2022, we will make our workplace free from accidents by selecting 3H (high place work, entanglement by heavy objects, and fire/explosion) as the priority management tasks, focusing on significantly high-risk jobs, complying with standards, and actively executing triple management (safeguards, supervisors, safety workers) through the promotion of safeguards.

Summarized Safety Management Performance

-6.4% compared to the management standard

-168% compared to the 2020 performance

.... Management standard for 2020   ●── Accident rate in 2020
.... Management standard for 2021   ●── Accident rate in 2021

0.115
0.109
0.102

0.038

January February March April May June July August September October November December
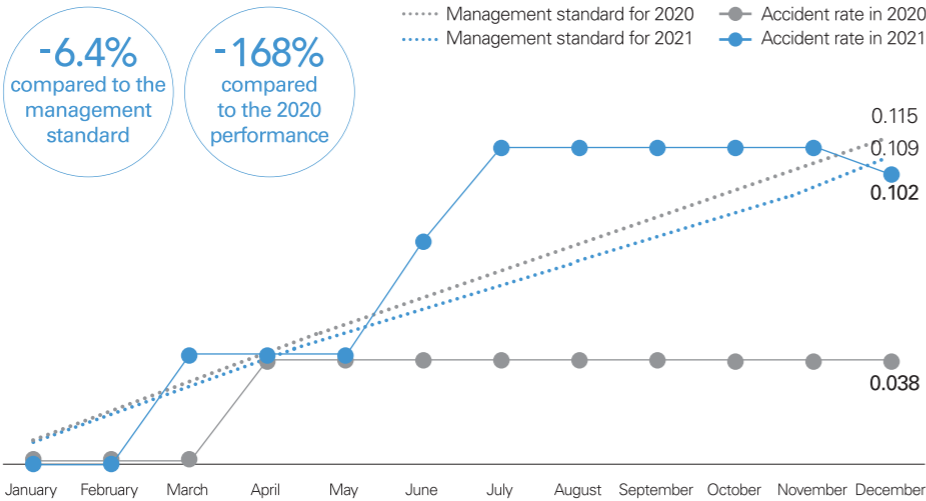
Category	2019	2020	2021
Serious accident	0	1	0
Work related Accident	4	1	3
Accident rate	0.143	0.038	0.102
Frequency rate of accident (per 1 million)	0.700	0.180	0.630

03
Strengthening the Power of Execution for Safety Through Caring

The Engine & Machinery Business Unit conducts site-oriented safety practices for caring, such as the attendance of TBM by the management and supervisors, individual pointing and calling, and the risk assessment of non-flow work and preemptive accident prevention activities (such as the intensive inspection of high-risk, standard work and the implementation of Hi-STANDARD). In addition, we have strengthened intensive management of high-risk processes and safety training to prevent serious accidents.

Site-Oriented Caring Activities for Safety Practice

Attendance of TBM and Site Inspection by Executive Officers and Department Managers of the Engine & Machinery Business Unit

The management and supervisors of the Engine & Machinery Business Unit attend TBM, stay at the site full time, and conduct periodic safety inspections to strengthen the power of preemptive execution for safety through care at the site. Furthermore, they contribute to the spread of the practice of the safety culture by practicing individual pointing and calling together with workers. We preemptively practice the safety culture by spreading the management's firm commitment to safety to each corner of the site through the aforementioned activities.

Habituation of Individual Risk Pointing and Calling

We contribute to the prevention of safety accidents by moving to the working area after TBM and conducting individual pointing and calling before or during work to confirm our commitment to the safety practice. In addition, we encourage pointing and calling by marking the pointing and calling zones so that workers can become aware of risk factors in advance. Furthermore, all executive officers, supervisors, and workers participate in individual pointing and calling to contribute to the spread of the voluntarily practiced safety culture.

Intensive Management of High-Risk Processes to Prevent Serious (Significant) Accidents
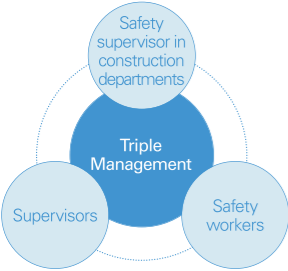
Safe Guards' Activities to Prevent Serious (Significant) Accidents

From December 2021, production departments have implemented the safety supervisor in construction department system for responsible safety activities of seniors in each job. This system enables safety supervisor in construction departments of each department to establish a triple safety management system through organic collaboration, communication, and information sharing with supervisors and safety workers.

Safety supervisor in construction departments

Triple Management

Supervisors

Safety workers

Material sector

Processing sector

Assembly sector

Test operation sector
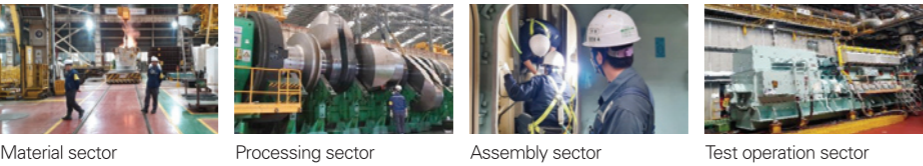
Process

Safety supervisor in construction departments' Process

Appointing Safety supervisor in construction departments Before Working

Conducting Inspections According to a Checklist

Safety supervisor in construction departments' Full-time Stay at the Site

Major Process

Casting

Working Inside the Engine Chamber

Oil Pressure Joining

Frame Box Turnover

Preemptive Activities to Prevent Accidents

Intensive Inspection on High-Risk Standard Work and Safety Inspection on the Establishment or Revision of Standard Work Manual

The high-risk jobs of each production department were selected and listed separately to prevent safety accidents. The standard work manual was revised by checking first whether any hazardous risk factor in each process was omitted regarding the selected high-risk jobs, and accidents are prevented by checking compliance with the standard work manual to ensure the performance of standard work.

Safety Inspection on the Performance of Standard Work in the Cases of Serious (Significant) Accidents and Disasters

Regarding serious (significant) accidents and disasters that have occurred, we checked whether the existing or revised countermeasures to prevent recurrence had continuously been included in the standard work manual and whether they had been continuously and horizontally implemented at the site. We also prevented the recurrence of identical accidents by ensuring that safety training on standard work before starting work had been conducted. Furthermore, we established a more thorough management system by implementing Hi-STANDARD to solve problems arising from decreased use of the safety inspection items on the performance of the relevant measures and the difficulty in sharing such information.

Risk Assessment on Non-Routine Work in the Worksite

We identify dangerous factors that may occur while working and establish an alternative plan in advance by conducting a risk assessment before starting initial work or non-standard work. We prevent safety accidents by requiring our people to conduct a risk assessment before starting work and proceeding with a project after establishing a standard work manual.

Tightening Up Safety Training for High-Risk Jobs

We prevent safety accidents by providing a regular safety training program once a year to crane operators/guardians and forklift operators/signalmen, those whose job is classified as high-risk. As this training program is provided to qualified persons, it contributes to fundamentally blocking the occurrence of accidents caused by the operation by unqualified persons as their qualifications are renewed through evaluation after supplementary training and they are compulsorily placed inside the company as qualified persons.

• Forklift operators/guardians (482 persons)
• Crane operators/signalmen (222 persons)
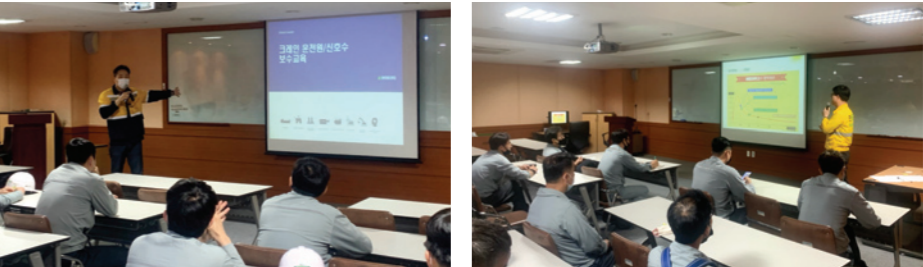
04
Enhancing the Safety Culture through Communication

The Engine & Machinery Business Unit promotes communication by holding safety meetings between the Safety Department and production departments and meetings of the Safety Committee. We also enhance the awareness of safety by encouraging workers' commitment to safety through safety workers' attendance of TBM and various safety inspections and by conducting an accident-free 365 days campaign.

Promoting Communication between the Safety Sector and the Production Sector

Safety Meetings between the Safety Department and Production Departments

The Head of the Safety Production Group presides a safety meeting between the Safety Department and Production Departments once every month (4 times/month) for each sector to discuss differences in opinions between the safety sector and the production sector regarding major agenda items selected by the Production Departments. The discussion on each agenda item proceeds in the form of brainstorming, and the minutes of the discussion is taken in order and shared by relevant departments.

Such discussions contribute to the establishment of an accident-free worksite as opportunities for narrowing differences in opinions between the Safety Departments and Production Departments and communicating with each other.

Site-Based Activities of Practicing Safety Communication

Safety Committee

The Head of the Business Unit presides over discussions with executive officers and department managers in charge of safety, production, support, management, technology, or research on the technological approach to safety and the improvement of the safety culture. The main topic of the discussions is the follow-up of ① the safety management plan and the results of the implementation of the plan, ② safety improvement activities of each department, ③ the status of performance of standard work, etc. All executive officers and department managers from every sector of the Business Unit participate in such activities, preemptively control problems on the site through the PDCA (Plan/Do/Check/Act) management, and take the lead in establishing a safety culture.

Reinforcing Workers' Commitment to Safety

Safety Workers' Participation in TBM

Safety workers are working in the area assigned to each of them in each plant to secure safety according to the nature of each process. Safety workers attend TBM every morning to share risk factors of the day's work, listen to workers' opinions on safe work methods, and make individual commitments to safety to think about safety once again.

Campaigns for Enhancing the Awareness of Safety

Conducting an Accident-Free 365 Days Safety Campaign

To advocate the Business Unit's commitment to the achievement of zero accidents and encourage participation, the Business Unit conducts a campaign once a month with the attendance of responsible superiors in production and support departments, subcontractors' managers, and safety workers.

We use the zero accident campaign as a stepping stone for enhancing safety awareness by reminding workers of the principle of zero, the principle of preemption, and the principle of participation and emphasizing the observance and practice of basics and principles.

05
Establishing Discipline Through Strict Safety Management

The Engine & Machinery Business Unit promotes its safety activities by implementing various reward programs for outstanding safety performance to motivate the establishment of a safety culture.

Weekly / Planned / Occasional Safety Inspection

We identify dangerous factors to make our workplace safer by specifying items subject to weekly inspections (such as the inspection of cranes/forklifts, the inspection of safety rails and openings, and the inspection of auxiliary machinery areas/vulnerable areas) and planned inspections (such as firefighting facilities, aerial work vehicles, big doors, and carriages) on a monthly / quarterly / semi-annual basis depending upon the nature of the objects.

We intensively manage feedback on the items related to absolute rules / significance / general safety rules during such inspections.

Definite Rewards for Outstanding Safety Performance

Safety Reward System

Focusing on independent safety activities, we realize a "worksite worthy of safety" by setting up a safety reward system that is praised for compliance with various safety systems and activities.

The entities eligible for safety rewards given by the Business Unit include the departments and subcontractors that achieved an outstanding safety leadership index (SLI) and the outstanding teams in the safe production. Workers are encouraged to voluntarily conduct safety activities by practicing the safety culture. Furthermore, safety activities are not distant, and we create a safety culture that is voluntarily practiced based on our thoughts and attitudes.

We also encourage workers to do safety activities by providing instant rewards through the Business Unit's system that issues complimentary mobile stickers for safety activities.

Category	Description	Reward Amount
Reward to Individuals	• Complimentary coupon (on-site instant reward)	KRW 5,000 per person
	• Outstanding supervisor (responsible section manager/ production team leader) KRW 1 million per person	KRW 1 million per person
	• Outstanding safety manager of a subcontractor	KRW 500,000 per person
Reward to organizations	• No-accident reward	KRW 5,000~7,000 per person
	• Reward to a construction organization (team) for outstanding safety performance	KRW 100,000 per person
	• Reward to a subcontractor for outstanding safety performance	KRW 10 million

Operation of Hi-GAS and Establishment of Gas Safety Culture

The Engine and Machinery Business Unit performs safety management more systematically through the FGSS (Fuel Gas Supply System) called "Hi-GAS." As interest in gas engines increases, we additionally established new gas supply facilities (LPG, LNG FGSS) and developed a systematic gas safety management system by establishing gas safety rules. Even a small defect may cause a big accident in dangerous facilities, and such a management system contributes to the creation of a safe workplace.
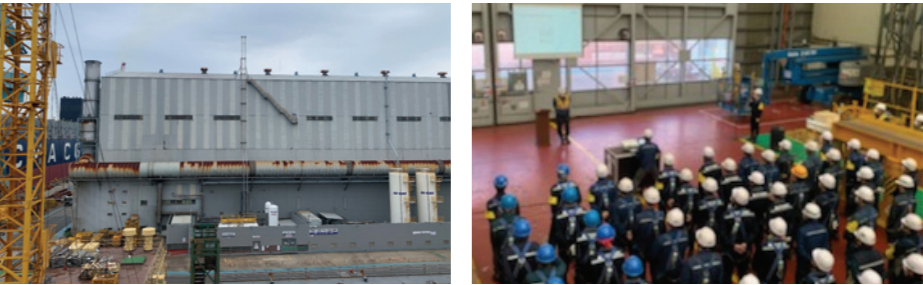
Vital Gas Safety Rules	General Gas Safety Rules
❶ Compliance with PPE(Personal Protective Equipment) Rules • Wearing an anti-static uniform • Wearing safety hats, safety goggles, and gloves • Carrying a gas detector	❶ Emergency Evacuation Exercises • Securing/checking emergency exits • Conducting emergency evacuation (disembarkation) exercises
❷ No Flame • Isolating flammable substances from the surroundings • Prohibition of the use of electronic products	❷ Compliance with the procedure for the operation of an engine/gas facility • Compliance with the engine/facility operation procedure • Compliance with the high-pressure gas bunkering rules
❸ Use of Designated Equipment and Tools • Using explosion-proof equipment and tools	❸ Access Control (No Access for Unauthorized Persons) • Permission/approval for access to a restricted area • Carrying a detector to a dangerous gas area

Category	Relevant Law	Legal Requirements	Relevant Facility	Status of Application	Notes (Specifications)
Act on the Safety Control of Hazardous Substances (Hazardous Chemicals)	Storage Facilities for Hazardous Substances Act on the Safety Control of Hazardous Substances Article 41: Firefighting system / Article 42: Alarm system	• Fire hydrants (indoor: 25 m, outdoor: 40 m) • Water spray system or form fire extinguishing system • Fire detectors → A building with a floor area of 500㎡ or more	Large/ HiMSEN engine plant		• Form fire extinguishers: Aqueous film forming foam (oil), Alcoholic foam (methanol)
	Facilities Handling Hazardous Substances Act on the Safety Control of Hazardous Substances Article 41: Firefighting system / Article 42: Alarm system	• Fire hydrants (indoor: 25 m, outdoor: 40 m) • Water spray or sprinkler • Fire extinguishment difficulty level 1 (our company)	Large/ HiMSEN engine plant		• Solid aerosol: Potash salts (potassium nitrate, etc.) → Environment-friendly / no harm to human bodies
Gas-Related Statutes	High-Pressure Gas Safety Control Act (KGS FP112)	• Gas detector (1 unit per 10m2 of the area surrounding a facility)	LNG Supply Systems for Plants 1-2 / 1-3 / 2-2		• Detection of 0~100% LEL (range of explosion: 5~15%) *20% LEL: Alarm 40% LEL: Stopping the Operation of a Facility
	Urban Gas Safety Control Act (KGS FU331)	• Gas detector (1 unit per 20m2 of the area surrounding a facility)	HiMSEN Engine Plant 2		• Detection of 0~100% LEL (range of explosion: 5~15%) *15% LEL: Stopping the Operation of a Facility
	Liquefied Petroleum Gas Safety Control Act (KGS FU551)	• Gas detector (1 unit per 10 m2 of the area surrounding a facility) • Water spray system * Maintenance of the tank temperature (spraying 5 L/m in 30 minutes per 1 ㎡)	LPG Supply Systems for Plant 1-1		• Detection of 0~100% LEL (range of explosion: 2.1~8.4%) *20% LEL: Alarm 40% LEL: Stopping the Operation of a Facility

Hi-GAS Safety Operation Rules

Hi-GAS is a gas (dangerous material) supply system for supplying various gases (LNG, LPG, CNG, etc.) and a dangerous material (MeOH) as fuel oil to engines for propulsion and power generation of ships; therefore, the system must satisfy national legal regulations on the installation and operation of on-land facilities. Hence, the design, installation, construction, and test operation of the system were completed in strict compliance with legal requirements, and the system is operated at present under the principle of Safety First.

Hi-GAS Safety Equipments

In the case of gases and dangerous substances, the role of safety equipment is of utmost importance as even a small fire can lead to a large accident. We operate various safety equipment, such as gas and flame detectors, firefighting equipment, and CCTVs, and conduct activities to constantly monitor risk factors and establish and implement plans for the maintenance and repair of such equipment to fundamentally block risk factors in advance.

Training of Hi-GAS Operators

As determined, blocking human errors is a shortcut to accident prevention, we occasionally or regularly conduct training programs, mandatory, voluntary, or outsourced to specialized external institutions, and issue qualifications to the persons who complete such training programs for the operation of the Hi-GAS system. By eliminating potential risk factors through test operation and timely maintenance and repair by experts in the system, we have been operating the system safely without a single accident by far.
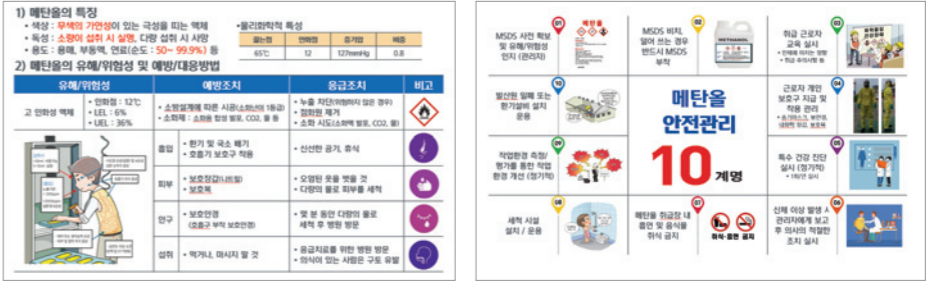
Establishment of Hi-GAS Smart Safety System

The safety operation of the Hi-GAS system is also smartly changing following the business trend in which projects for establishing a Smart Yard/Factory using IoT and Big Data are implemented as the company-wide key tasks. Hence, we will complete the establishment of a safety control center this year as the first goal and will additionally develop a computer system for maintenance and repair.

Establishment of Gas Leakage Detectors & Monitoring System

We installed gas detectors and a real-time monitoring system to prevent fires or explosions that may be caused by gas leakage in a gas handling worksite. Detectors sense the concentration of gas in the air and convey an alarm to the monitoring system if any problem is detected; the monitoring system contributes to the prevention of accidents by making it possible to intuitively identify the area where a problem occurred to take prompt measures.

06
Emergency Response Activities

We conduct firefighting exercises periodically for fire suppression at an early stage, which is important in firefighting, and we have built up the capability of promptly responding to fire through demonstrations on fire extinguisher use and the Hi-GAS system operation.

Improvement of Emergency Response Capability

Habituation of Initial Countermeasures, such as Fire Suppression and Evacuation, to Fires in each Plant

We conduct firefighting exercises periodically to improve the capability of promptly extinguishing and evacuating from a fire at an early stage. We raise the efficiency of exercises by crafting various scenarios according to the characteristics of each place and improve our emergency response capability through such exercises.

Firefighting Exercises Led by the Safety Department of the Engine & Machinery Business Unit

The Safety Department improves the capability of extinguishing a fire quickly and accurately through exercises led by the department, such as commanding, conducting victim search and rescue at the scene of a fire, understanding the situation, maintaining contact with each team, finding workers involved and eyewitnesses, and facilitating fire investigations.

07
Improving Subcontractors' Safety Management Systems

To improve the subcontractors' safety management capabilities and for them to listen to their opinions on safety and health, the Engine & Machinery Business Unit holds meetings with the subcontractors' council and their safety managers and provides technical guidance to share various information and hear their difficulties.

Strengthening the Responsibilities and Role of Safety Management of Subcontractor Representatives

Subcontractors' Council

Monthly meetings of the subcontractors' council are held with the attendance of representatives from each subcontractor, the Head of the Safety Management of the Engine & Machinery Business Unit, and the responsible Directors. Two subcontractors per month horizontally deploy on-site safety improvement cases through their representatives, and the Engine & Machinery Business Unit conducts relay training programs on risks at the site and exemplary improvement cases. These meetings contribute to the enhancement of the Engine & Machinery Business Unit's safety awareness.

Meetings of Subcontractors' Safety Managers and Technical Guidance

Monthly meetings are held with subcontractors' safety managers to discuss differences in opinions between subcontractors and the Safety Department on safety work. Two subcontractors per month make presentations on exemplary improvement cases, and the Safety Department shares information on the latest safety-related policies and issues. These meetings also contribute to narrowing differences in opinions on safety and enhancing safety management capabilities.

# "Baseball Girl": Musculoskeletal Disorders

A Movie on Health

The movie titled "Baseball Girl" is the story of Joo Soo-in (Lee Joo-young), the only girl on a high school baseball team who gained the nickname "genius baseball girl" because of her top pitching speed of 134 km and the strength of her ball rotation.

In the movie, pitchers who lead the flow of a game suffer considerable strain on their shoulders as they throw the ball with their entire body weight every time they pitch. This is because the intense contraction and relaxation of the shoulder muscles are repeated in the process of tilting the arm behind the back for pitching or throwing the ball. It is not uncommon to find news reports of a player who received attention in high school, who is left frustrated without making his professional debut due to frequent shoulder injuries. What frequently occurs to such pitchers is called shoulder impingement syndrome; when the shoulder is frequently used, friction occurs between the acromion and shoulder muscles, which causes pain whenever the shoulder is moved in daily life. In particular, the pain gets worse when the arm is turned or lifted to shoulder height; the main symptom of shoulder impingement syndrome is a rattling, rubbing, or scratching sensation whenever the arm is moved. If this condition persists for a long time, it can lead to a rotator cuff tear. Such musculoskeletal disorders are also common in industrial workers, and it is important for employees of HHI who also do work that frequently uses their shoulders to prevent shoulder impingement syndrome by frequently stretching and changing lifestyles.

TIP. How to Prevent Shoulder Impingement Syndrome

- Rotate your shoulders frequently in and out in circular motions.
- Do not let your shoulders sag or bend forward.
- Use a low, hard pillow.
- It is good to place a warm wet towel on each shoulder alternately for 5 minutes.
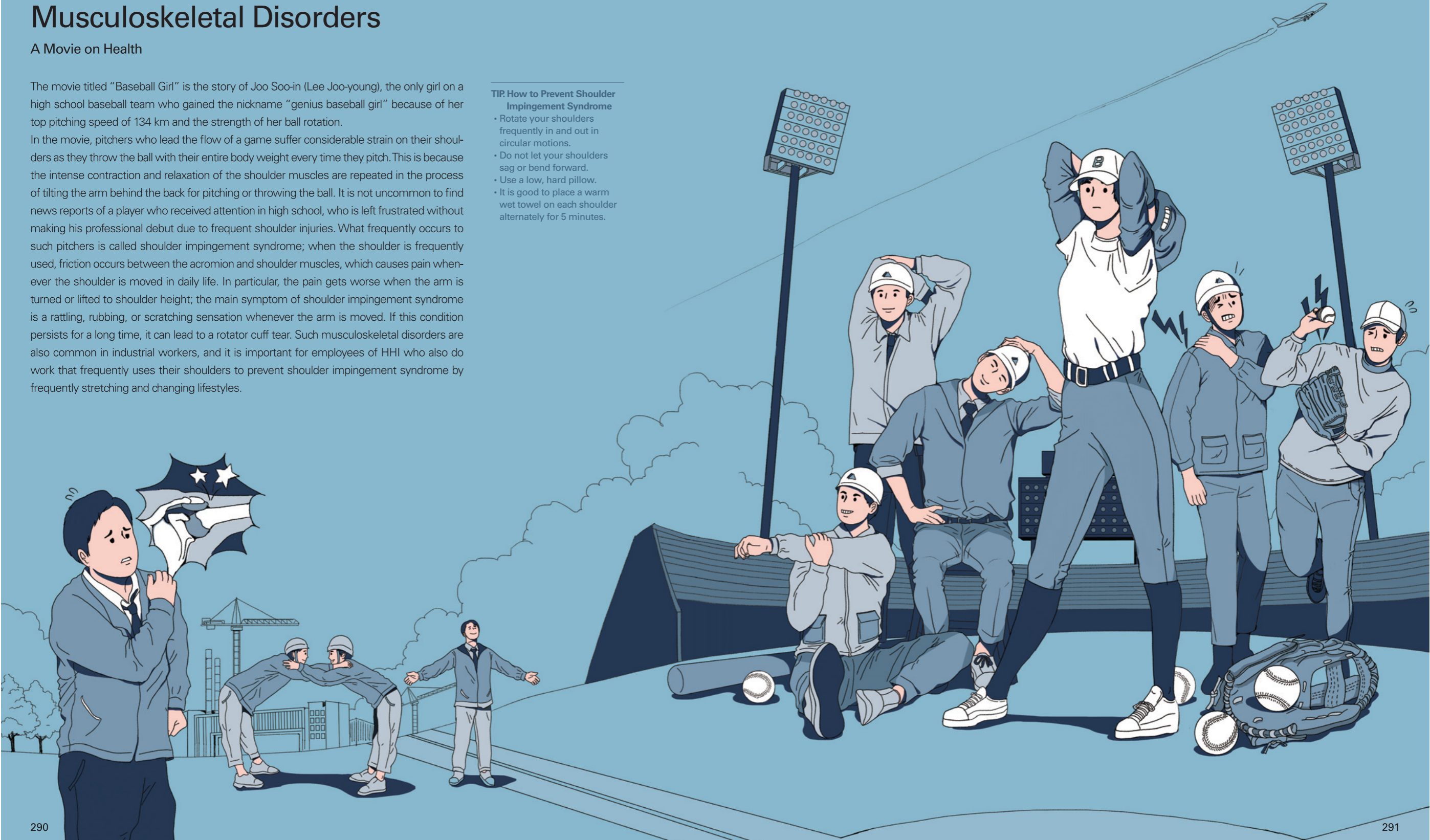
Health   Safety

Environment

4-8
**Safety Management Group
Management Plan 2022**

In the Safety Management Group, the Safety Planning Team, Safety Management Team, Safety Culture team, SRM team, Health Management team, and Environment Management team join forces to establish a solid safety culture, practicing zero serious accidents in HHI by implementing a plan meticulously to solidify health, safety, and environmental management in 2022.

Goals of the Safety Management Group / the Environment Management Group (Environment Management Team) for 2022

Corporate Goals for Health, Safety, and Environment

Safety	Health	Environment
Accomplishing the goal of zero serious accidents and an accident rate of 0.195 or less	Realizing the enhancement of employees' health through prevention-focused health management	Laying a foundation for the transition to sustainable, environment-friendly management

Priority Tasks

1. Establishing a "triple risk management system" for high-risk working processes

2. Improving the risk assessment system based on job standards (Hi-STANDARD)

3. Upgrading the accident prevention system by utilizing DT technology

4. Expanding experience/practice-based safety training programs and diversifying training content

5. Improving the quality of health promotion programs and promoting the extended operation of such programs

6. Strengthening the system for on-site management of chemicals

7. Establishing and implementing goals for responding to climate change and promoting a road map

8. Reinforcing responses to high-risk groups that are likely to violate environmental laws

Corporate Management Indicators
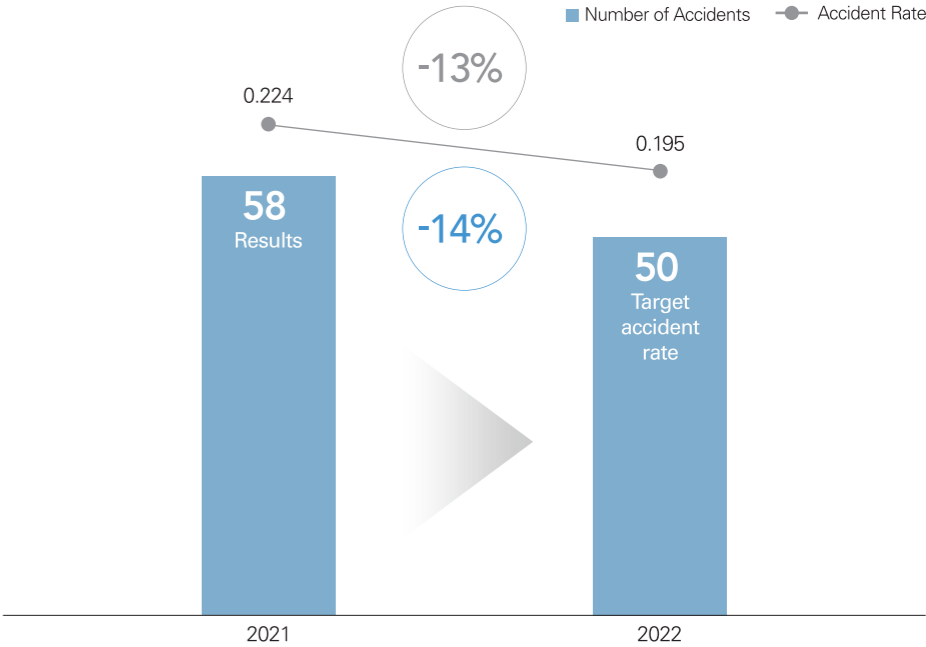
■ Number of Accidents   ● Accident Rate

-13%

0.224

0.195

58
Results

-14%

50
Target accident rate

2021

2022

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Safety Planning Team
The person responsible for implementing the plan: Head of the Safety Planning Team

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Evaluation Category Quantitative	Evaluation Category Qualitative	Q1-Q4 (months 1-12)
Establishment of a Self-Regulated Safety System Focused on Operability	**Improvement of Safety KPIs of Executive Officers/Head of Department Managers** • Developing tools for safety leadership and considering the improvement of the KPI calculation method (the method of applying the results of evaluation depending on the availability of subcontractors, etc.)	Development and application of tools (Quarter 1)	10	Once a year	Time of application (100% in Quarter 1, 75% in Quarter 2, 50% in Quarter 3, 25% in Quarter 4)		○	
	Implementation of the Company-Wide Safety Award System • Improving the award system by reflecting opinions collected from the site and working-level staff	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	• Giving safety awards (Outstanding organizations, teams, and individuals such as supervisors, safety workers, and subcontractors' safety officers)	Awarding	5	Continually	Number of actions / Number of target actions	○		
	Improvement of SLIs • Continue to consider the conversion of leading safety activities into indicators (risk assessment, TBM, safety improvement proposals, etc.)	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	Management of Accidents and Increase of the Usability of Statistical Data • Improving users' accessibility by computerizing statistics of accidents (connecting with the big data system)	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	• Connecting with the relevant job standard/risk assessment system (Hi-STANDARD) upon the occurrence of an accident → Conducting an occasional assessment	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	Full Review of Safety and Health Standards and Guidelines • Full review of the systems of standards and guidelines on safety and health	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	• Review the validity of the safety and health standards	Review on overall validity (once a year) / 100%	5	Once a year	Implementation rate, Implementation rate / Target implementation rate	○		
	• Review on improvements for the operation of guidelines (review on validity, classification by theme, provision of search service, improvement of mobile service, etc.)	Implementing an Improvement plan (once a year) / 100%	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan	○		
	• Distribution of safety guidelines booklets	Distributing	5	Once a year	Distributing (Distributed: 100%, Undistributed: 9%)		○	
	Maintenance of Certification of the Safety and Health Management System (ISO 45001) and Establishment of a System for Reinforcing On-Site Operability • Preparing a semi-annual performance report following the quantitative goals of the business plan established by the Safety Management Group (including the preparation of the management's review)	Preparing a performance report (semi-annually)	5	Twice a year	Number of actions / Number of target actions	○		
	• Following up requirements of major Items: Risk/opportunity assessment, evaluation of management/observance of statutes and regulations, etc.	Conducting an evaluation (annually)	5	Once a year	Number of actions / Number of target actions	○		
	• Conducting training programs for HSE promoters	Conducting a training program (annually)	5	Once a year	Number of actions / Number of target actions	○		
	• Conducting external and internal inspections on the safety and health management system and taking actions for nonconformities	Remedial measure rate: 100%	5	Once a year	Remedial measure rate / Target measure rate	○		
	Issuance of a Report on the Health, Safety, and Environment Management Plan and Follow-up of the Performance of the Management Plan • Producing the Report on the Health, Safety, and Environment Management Plan following the Serious Accidents Punishment Act and the ESG management strategy and posting the report on the website	Completing the Production and Distribution of the Report and Posting it on the Website	5	To be completed within one month	Number of reports distributed / Number of reports produced	○		
	• Translating the Report on the Health, Safety, and Environment Management Plan into English and posting the English report on the website	Completing the translation of the report into English and posting it on the Website	5	To be completed by May	Completed the translation of the report into English and posted it on the Website	○		
	• Reporting to the Board of Directors on the safety and health management plan under Article 14 of the Occupational Safety and Health Act	Completed reporting to the Board of Directors	5	Early February	Approval by the Board of Directors	○		
	Operation of Safety Innovation Advisory Committee • Establishment of a plan for the operation of the Safety Innovation Advisory Committee in 2022	Implementing an Improvement plan	5	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○	
	• Operation of the Safety Innovation Advisory Committee	At least twice a year	5	Twice a year	Number of times conducted / Number of times planned (2)	○		

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Systematization of the Risk Assessment System	**Establishment and Operation of the Risk Assessment System** • Review the operating standards (detailed rules) on risk assessment → Reflecting requirements of the Occupational Safety and Health Act and the Serious Accidents Punishment Act	Review and improvement	10	Once a year	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○
	• Establishment and implementation of a plan for regular risk assessment	Establishment and execution of an implementation plan	10	Once a year	Regular risk assessment rate %		○
	• Review a scheme to promote attention and participation of field departments → Considering the link between the performance of risk assessment of each department, SLIs, and the award system	Reflecting SLIs or evaluation items for safety awards	10	Continually	SLIs and evaluation items for safety awards		○
	Reinforcing occasional risk assessments upon the occurrence of a safety accident • Establishing the standards and procedures for occasional risk assessments (reflecting them in detailed rules)	Reflecting on detailed rules	10	Continually	Whether detailed internal rules were reflected		○
	• Monitoring whether an occasional risk assessment was conducted upon the occurrence of an accident	Conducting a risk assessment 100% whenever an accident occurs	10	Continually	The average rate of occasional risk assessments conducted upon the occurrence of an accident %	○	
	• Developing additional screening for accidents in Hi-SEs (providing information on risk assessments linked to accidents)	Development of a risk assessment information system	10	Continually	Whether the risk assessment information system was developed		○
	Expansion of Training Programs on Risk Assessment for Supervisors and Workers (subject to consulting with the Safety Culture Team) • Design/operation of training courses for risk assessment as part of mandatory safety and health training programs	Conducting a training program (twice a year)	5	Twice a year	Number of times conducted	○	
	• Addition/operation of training courses on risk assessment as part of job training programs for production workers or technicians (subject to consultation with the Technical Training Team)	Conducting a training program on every occasion	5	Continually	Number of times conducted	○	
	Strengthening Management of Groups Vulnerable to Risk Assessment (Internal Subcontractors, Short-Term Projects, Non-Routine Work) • Improving convenience in the use of Hi-STANDARD for internal subcontractors	Improving the number of risk assessments on subcontractors by 20%	5	Continually	Number of registered risk assessments on subcontractors	○	
	• Preparing a scheme to manage risk assessments for short-term projects and non-routine work	Establishing a management scheme	5	Continually	Reports		○
	Upgrading the Hi-STANDARD Computer System • Improving the risk assessment process (link with the organization units subject to risk assessment, assessment screen, accident cases, guidelines, etc.)	Whether improved	5	Continually	Review (33%), preparation (67%), implementation (100%) of an improvement plan		○
	• Developing new screening for the management of assessment records (verification of training performance by connecting with Hi-SEs, etc.)	Whether improved	5	Continually	Review (33%), preparation (67%), implementation (100%) of an improvement plan		
	• Improving users' convenience according to the results of risk assessment (the function of printing the results of the assessment in one sheet, visibility, etc.)	Whether improved	5	Continually	Review (33%), preparation (67%), implementation (100%) of an improvement plan		
	• Current status of assessment and improvement of the monitoring screen	Whether improved	5	Continually	Review (33%), preparation (67%), implementation (100%) of an improvement plan		
Enhancing Subcontractors' Self-Regulated Safety and Health Capabilities	**Continuous Operation of Programs for Improving Subcontractors' Capabilities of Safety Management** • Conducting a training program (8 hours) for raising safety awareness for subcontractors' representatives	Conducting the training program once (in the first half of each year)	15	Once a year	Number of times conducted / Number of times planned	○	
	• Conducting a training program (8 hours) for improving job competency for subcontractors' safety officers	Conducting the training program once (in the second half of each year)	15	Once a year	Number of times conducted / Number of times planned	○	
	• Evaluating subcontractors' safety management level	Average evaluation score of 90 points or more (85.9 accumulated as of Quarter 3 of 2021)	20	Once a quarter	Average evaluation score / Target evaluation score (90)	○	
	• Evaluating capabilities of subcontractors' safety officers	Average evaluation score of 85 points or more (81.6 as of the first half of 2021)	20	Once semi-annually	Average evaluation score / Target evaluation score (85)	○	
	• Supporting the recognition of outstanding companies in risk assessment (under the auspices of the Korea Occupational Safety and Health Agency)	A recognition rate of 90% or more	20	Continually	Recognition rate (actual) / Target recognition rate (90%)	○	
	Evaluation of the Cooperation Level between Prime Contractors and Subcontractors in the Shipbuilding Industry • Preparing and evaluating the cooperation level between prime contractors and subcontractors in the shipbuilding industry	Acquisition of Outstanding Grade in Evaluation	10	Once a year	Excellent (100%), Good (75%), Moderate (50%), Substandard (25%)	○	

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Response to the Serious Accidents Punishment Act	**Establishment of a Compliance System in Response to the Serious Accidents Punishment Act**						
	• Conducting regular audits on the performance of the obligations under relevant statutes and regulations	Conducing an audit (semi-annually)	20	Twice a year	Number of actions / Number of target actions	○	
	• Operation of the Safety Management Committee: Reporting at a meeting presided by the President & CEO on the results of activities related to the performance of obligations for safety and health and feedback on the measures taken (quarterly)	Operating the Committee (quarterly)	20	Once a quarter	Number of actions / Number of target actions	○	
	• Reporting to executive officers on the obligation to secure safety and health	Preparing a report (semi-annually)	20	Twice a year	Number of actions / Number of target actions	○	
	Improvement and Continual Supplementation of the System for Responding to the Serious Accidents Punishment Act						
	• Checking and evaluating the safety and health performance compared to goals	Preparing a performance report (semi-annually)	5	Once a quarter	Number of actions / Number of target actions	○	
	• Establishing the goals for safety and health management expenses and preparing a report on the results	Preparing a performance report (quarterly)	5	Once a quarter	Number of times preparing a performance report / Number of times planned	○	
	• Checking and inspecting the performance of countermeasures to prevent the recurrence of an accident	Preparing a performance report (quarterly)	10	Once a quarter	Review (25%), preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan	○	
	• Preparing standards for the evaluation of safety and health general managers and supervisors and conducting the evaluation	Conducing an evaluation (semi-annually)	5	Twice a year	Number of actions / Number of target actions	○	
	• Checking the performance of the safety and health obligations under statutes and regulations	Conducting an inspection (quarterly)	5	Twice a year	Number of actions / Number of target actions	○	
	• Improving and operating a subcontractors' council (to listen to opinions of subcontractors' workers and make improvements with the attendance of the President & CEO in rotation, etc.)	Conducting an inspection (quarterly)	5	Once a quarter	Number of actions / Number of target actions	○	
	• Preparing guidelines for securing subcontractors' safety and health and conducting evaluations (capabilities and technology for taking safety and health measures, safety and health expenses, the shipbuilding period, etc.)	Conducting an evaluation (quarterly)	5	Once a quarter	Number of actions / Number of target actions	○	
Increase the Utilization of the Integrated HSE Management System	**Development of a New Hi-SEs (Web version)**						
	• Developing a system for the management of records of safety and health activities under the Serious Accidents Punishment Act (1st development item)	Completion of the development of the system	30	The first half of every year	Developed the system that meets the requirements of six subparagraphs among nine subparagraphs of Article 4 of the Enforcement Decree of the Serious Accidents Punishment Act		○
	• Improving the production departments' (users) convenience by improving accessibility to the system and making an intuitive system (2nd development item)	User satisfaction level of 60% or more in a questionnaire survey	20	The second half of every year	User satisfaction level in a questionnaire survey	○	
	• Developing a safety schedule management system (text, mail, or messenger service notification function), such as safety meetings and safety inspections (2nd development item)	Completion of the system development and users' satisfaction level of 60% or more in a questionnaire survey	10	The second half of every year	User satisfaction level in a questionnaire survey	○	
	• Providing the old version's functions used by production departments of the HI-SEs system as the functions of the new Hi-SEs (Web version) (2nd development items)	The review of the system (25%), the establishment of a system improvement plan (50%), the composition of the system (75%), the completion of the development of the system (100%)	10	The second half of every year	Completion of establishment by stage	○	
	• Reflecting the results of safety and health activities related to the Serious Accidents Punishment Act in SLIs (2nd development items)	Adding 6 or more indicators to be reflected in SLIs	10	The second half of every year	Number of additional indicators reflected in SLIs	○	
	• Establishing a system for real-time reviewing/reflecting on the countermeasures for preventing the recurrence of an accident by connecting the system with Hi-STANDARD (2nd development item)	Review, reflection rate 100%	20	The first half of every year	Number of cases reviewed and reflected in Hi-STANDARD / Number of cases for which countermeasures were taken to prevent the recurrence of an accident	○	
Inspection of the Performance of Comprehensive Safety Improvement Measures	**Continuous Implementation of Comprehensive Safety Improvement Measures**						
	• Continuous monitoring of each promoted item	Inspection and reporting of the current status of implementation of countermeasures	50	Bimonthly	Number of actions / Number of target actions	○	
	• Improvement measures according to the results of monitoring	Taking measures	50	Continually			○
Workforce Increase for the Safety Sector	**Workforce Increase for the Safety Sector**						
	• Continuous increase of workforce for strengthening safety management	To increase 50 persons by 2022	100	Continuous	Number of persons increased / Number of persons planned	○	

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Safety Management Team

The person responsible for implementing the plan: Head of the Safety Management Team

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Strengthening Activities for Internal and External Safety Management	**Management of Government Affairs** • Complying with an improvement order issued by the Ministry of Employment and Labor (supervision of safety and health, various inspections, etc.)	Complying with an improvement order	30	Continually	Number of remedial actions / Number of remedial orders	○	
	• Responding to a criminal complaint or accusation	Collecting factual evidence and responding to a criminal complaint or accusation	20	Continually	Number of investigations / Number of accusations	○	
	Management of Labor Union Affairs • Operation of the Occupational Safety and Health Committee	Holding meetings of the Occupational Safety and Health Committee (quarterly)	20	Once a quarter	Number of actions / Number of target actions	○	
	• Continuous management of the performance of the agreements made in the Occupational Safety and Health Committee (occasional working-level consultation on current affairs)	Reporting of implementation results (semi-annually)	20	Twice a year	Number of actions / Number of target actions	○	
	• Labor-management joint inspections	Labor-management joint inspections (monthly)	10	16 times a month	Number of actions / Number of target actions	○	
Prevention of Major Industrial Accident through Process Safety Management (PSM)	**Elevating the Grade (M+ → S) Through the Improvement of PSM and Enhancing the Capability of Performing the 12 PSM Guidelines** • Conducting inspections under the direction of the Ministry of Employment and Labor on the current status of PSM performance	Conducting an inspection once	20	Once a year	Number of actions / Number of target actions	○	
	• Conducting internal audits on the current status of the operation of PSM in the workplace	Conducting an audit once	20	Once a year	Number of actions / Number of target actions	○	
	• Conducting a special inspection of the high-risk facilities by the management in the workplace	Conducting an inspection once	10	Once a year	Number of actions / Number of target actions	○	
	• Holding business meetings with persons in charge of PSM	Holding a meeting once	15	Once a year	Number of actions / Number of target actions	○	
	• Conducting specialized job training programs	Conducting the training program once	20	Once a year	Number of actions / Number of target actions	○	
	• Preparing and submitting a checklist for the PSM danger alert system	Preparing and submitting a checklist four times	15	Once a quarter	Number of actions / Number of target actions	○	
Enhancement of Emergency Response Capabilities through Preemptive Safety Management	**Improving Emergency Response Capabilities** • Obtaining the business accident certification (Business Continuity Management System/ISO 22301)	Obtaining the business accident certification	20	Within 2022	Whether the accident certification was obtained		○
	• Reviewing and supplementing the manual and standards for responding to accidents in an emergency	Reviewing and supplementing the manual and standards once	10	Once a year	Number of actions / Number of target actions	○	
	• Reviewing and supplementing the response manual related to the Serious Accidents Punishment Act	Reviewing and supplementing the manual and standards once	10	Once a year	Number of actions / Number of target actions	○	
	• Establishing and upgrading systems related to accident prevention	Establishing and upgrading the system	10	Within 2022	Whether the establishment or upgrade was completed		○
	• Enhancing the capabilities of fire fighting and fire suppression: Support for exercises in the facilities subject to PSM, firefighting exercises by the Business Unit Safety Management, etc.	Conducting an audit once	5	Once a year	Number of actions / Number of target actions	○	
	• Continuous management of firefighting and rescue equipment (air respirators, thermo-graphic cameras, Xenon searchlights, megaphones, waterproof cloth, etc.)	Conducting an inspection once	5	Once a year	Number of actions / Number of target actions	○	
	Enhancing the Capability of Responding to Accidents Through the Stable Operation of the Integrated Control Center • Water rescue exercises (aquatic lifesaving, operation of powered water equipment, etc.)	Conducting exercises 12 times (the first half/second half of each year)	5	Once a month	Number of actions / Number of target actions	○	
	• Exercises on how to respond to each type of emergency (including vertical rescue exercises)	Conducting exercises 12 times (the first half/second half of each year)	5	Once a month	Number of actions / Number of target actions	○	
	• Training the company's fire brigade	Improving the capability of rescue from an accident	10	Once a month	Number of actions / Number of target actions	○	
	• Experiencing and exercising fire suppression, rescue, and relief in a special hull	Improving the capability of rescue from an accident	5	Continually	Number of actions / Number of target actions	○	
	• Safety training for response to accidents	Whether the program was completed as requested	5	Continually	Number of times conducted / Number of times required	○	
	• Installing safety facilities for workers at blind spots and monitoring safety intervention for workers engaged in a high-risk job, etc.	Whether the plan was implemented	10	Continually	Number of times conducted / Number of times occurred	○	

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Evaluation Category		Quarter 1			Quarter 2			Quarter 3			Quarter 4		
						Quantitative	Qualitative	1	2	3	4	5	6	7	8	9	10	11	12
Strengthening Practice-Based On-Site Safety Management	**Improving Firefighting and Safety Management of Hazardous Substances**																		
	• Enhancing job competency through completion of mandatory job training programs for safety managers in charge of firefighting/dangerous materials	Mandatory job training on firefighting and dangerous materials	5	Once a year	Persons to be trained / persons who completed	○													
	• Maintaining firefighting facilities in a normal operating condition by conducting mandatory inspections (comprehensive close inspections and inspections of operating functions)	Mandatory inspection of firefighting facilities	10	Once a year	Number of actions / Number of target actions	○													
	• Maintaining and managing all automatic fire detection systems, etc., in the company in normal operating conditions (24-hour maintenance, repair, and management of firefighting facilities)	24-hour maintenance and management of automatic detection facilities	10	Once a month	Number of actions / Number of target actions	○													
	• Stabilizing facilities by checking whether all hydraulic firefighting facilities and fire pumps in the company are in normal condition	Inspection of hydrants and hydraulic firefighting facilities	5	Once a month	Number of actions / Number of target actions	○													
	• Conducting mandatory inspections on the hazardous substances subject to regular inspections and preparing regulations on the prevention of dangerous materials (annually)	Fixing problems after inspections	10	Once a year	Number of actions / Number of target actions	○													
	• Promoting the legalization of the places in which dangerous materials are handled in the Painting Plant and dock quays	Obtaining permission for installation from the competent authorities	10	Within 2022	Whether the installation was permitted	○													
	• Promoting the legalization of the places in which dangerous materials are handled in the Engine Test Operation Area (four places)	Obtaining permission for installation from the competent authorities	10	Within 2022	Whether the installation was permitted	○													
	• Conducting a fire insurance inspection to calculate fire insurance premium rates	Due diligence inspections by public insurers at the site	5	Once a year	Number of actions / Number of target actions		○												
	• Complying with an improvement order issued by fire authorities (investigations of fire safety information, special inspections of firefighting/dangerous materials, etc.)	Complying with an improvement order	4	Continually	Number of remedial measures / Number of remedial orders	○													
	Preventing Traffic Accidents by Supplementing Internal Road Traffic Facilities and by Guidance or Regulation																		
	• Intensifying guidance to/regulation of traffic violators	50 cases/month	10	Continually	50 cases per month	○													
	• Tightening up safety management in internal road traffic safety (traffic control at crossings, mitigation of road traffic congestion, maintenance of basic order, etc.)	Whether the plan was implemented	5	Continually	Whether the plan was implemented		○												
	• Inspecting icy areas in advance during winter to prevent and control traffic accidents	Whether the plan was implemented	5	December / January / February	Whether the plan was implemented	○													
	• Management of main roads and facilities for traffic safety (psychedelic warning lights, speed bumps, etc.)	Whether the plan was implemented	5	Continually	Whether the plan was implemented	○													
	• Assistance in traffic control for various events (christening ceremonies, visiting VIPs)	Whether conducted as requested	2	Continually	Number of times conducted / Number of times requested	○													
	• Assistance in traffic control for conducting traffic accident investigations, issuing immediate reports, or mobilizing an ambulance (in an emergency)	Whether the plan was implemented	2	Continually	Number of actions / Number of occurrences	○													
	• Checking drunken drivers (at each entrance during lunchtime) at the stabilization stage of COVID-19	Once a month	2	Once a month	Number of actions / Number of target actions	○													

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Safety Culture Team

The person responsible for implementing the plan: Head of the Safety Culture Team

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Operation of Compulsory Safety and Health Training Programs	**Mandatory Safety and Health Training Programs for New Employees** • Conducting mandatory safety and health training programs for new employees (SCP-1, Step-1)	Satisfying the requirements of the Occupational Safety and Health Act on training hours	15	Five times a week	Number of actions / Number of target actions	○	
	• Conducting speciality safety training programs (including training for a job change and safety training on hazardous chemicals)	Satisfying the requirements of the Occupational Safety and Health Act on training hours	10	Once when a new case arises	Completion of the relevant training program for not less than the designated hours	○	
	• Changing the team responsible for the training courses for short-term projects (Business Unit Safety Management → Safety Culture Team)	Curriculum including the provisions of relevant acts	5	-	Whether the responsible team was changed		○
	Improving the Effect of Mandatory Regular Safety and Health Training Programs for Workers • Conducting mandatory safety and health training programs for office workers (non-production departments, SCP-1, Step-2)	Satisfying the Occupational Safety and Health Act requirements on training hours	15	Three hours per quarter	Number of actions / Number of target actions	○	
	• Conducting mandatory safety and health training programs for employees (production/support departments, SCP-1, Step-2)	Satisfying the Occupational Safety and Health Act requirements on training hours	15	Six hours per quarter	Number of actions / Number of target actions	○	
	Mandatory Safety and Health Training Programs for Supervisors • Conducting mandatory safety and health training programs for supervisors (SCP-2, Step-2)	Satisfying the Occupational Safety and Health Act requirements on training hours	20	16 hours per year	Number of actions / Number of target actions	○	
	Mandatory Safety and Health Training Programs for Managers and Legal Appointees • Conducting mandatory safety and health training programs for managers (SCP-2, Step-3)	Satisfying the Occupational Safety and Health Act requirements on training hours	10	Six hours per year	Number of actions / Number of target actions	○	
	• Conducting training programs for new legal appointees	Satisfying the Occupational Safety and Health Act requirements on training hours	5	34 hours when a new case arises	Completion of the relevant training program for not less than the designated hours	○	
	• Conducting supplementary training programs for legal appointees	Satisfying the Occupational Safety and Health Act requirements on training hours	5	24 hours per two years	Completion of the relevant training program for not less than the designated hours	○	
Improving the Quality of Non-Mandatory Safety and Health Training Programs	**Enhancing Management's Mindset of Safety and Raising the Level of Knowledge** • Training programs for enhancing newly appointed executive directors' safety awareness (SCP-3, Step-1)	Conducing the training programs once a year (the first half of every year)	10	Once a year	Number of actions / Number of target actions	○	
	• Special safety lectures for executive officers (SCP-3, Step-2)	Conducing the training programs twice a year (the first/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	• Workshops on safety management strategy in the production sector (SCP-2/3, Step-3)	Conducing the training programs twice a year (the first half/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	• Training programs for enhancing safety awareness of subcontractors' representatives	Conducing the training programs twice a year (the first/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	Enhancing Supervisors' Mindset of Safety and Raising the Level of Knowledge • Training programs for enhancing new supervisors' safety awareness (SCP-2, Step-1)	Conducting the training programs twice a year (the first half/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	Enhancing Safety Managers' Safety Mindset and Raising the Level of Knowledge • Training programs for improving site safety supervisors' job competency (SCP-S)	Conducting the training programs twice a year (the first half/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	• Training programs for improving job competency of subcontractors' safety officers	Conducting the training programs twice a year (the first half/second half of each year)	10	Twice a year	Number of actions / Number of target actions	○	
	Safety and Health Training Programs for Foreigners • Conducting safety and health training programs for foreign instructors	Conducting the training program once a year (the first half of each year)	10	Once a year	Number of actions / Number of target actions	○	
	• Conducting safety and health training programs for foreign workers	Conducting the training program once a year (the first half of each year)	10	Once a year	Number of actions / Number of target actions	○	
	Improving the Mindset of Safety Rule Violators • Conducting training programs in the Safety Academy	Conducting the program once every month	10	12 times a year	Number of actions / Number of target actions	○	

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Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Upgrading Practice/Experience-Based Safety Training Programs	**Operation of Practice/Experience-Based Safety Training Programs** • Providing practice/experience-based safety training programs to employees engaged in a high-risk job	Providing safety training programs suitable to each job category	30	Continually	Whether training programs were provided		○
	• Collecting and reviewing feedback on training and reflecting it in improvements	Improving training programs by utilizing feedback	10	Continually	Whether training programs were improved		○
	Upgrading Practice/Experience-Based Safety Training Programs • Establishing the infrastructure for 4D-experience safety training programs	Establishing infrastructure	15	-	Whether established		○
	• Operating 4D-experience safety training programs	Reflecting on practice/experience-based safety training programs	15	Continually	Whether training programs were operated		○
	• Producing new VR safety training programs	Producing new video products for training	15	13 products a year	Number of Products Made / Number of Products Planned	○	
	• Producing teaching materials for micro-learning safety training programs	Producing new video products for training	15	1 product a month	Number of Products Made / Number of Products Planned	○	
Improvement of Safety and Health Training Programs	**Improvement of the Safety Training Management System** • Increasing user and manager convenience by fully improving the safety training management system	Establishing a system based on the combination of WEB/CI	25		Whether the system was established		○
	• Eliminating training omissions by constantly checking individual training plans/performance	Achieving a 100% safety training completion rate	10		Training completion rate	○	
	Developing and operating the Safe Career Pass system (SCP) • Designing training courses in detail by stage	Completing the development of 58 courses	20	-	Number of courses developed / Number of courses planned	○	
	• Selecting and training instructors for each course	Providing training programs to selected instructors	15	-	Number of times conducted / Number of times planned	○	
	Improvement of Training in the Safety Academy • Increasing the frequency of opening training courses	Minimizing the period between the time of the violation and the time of training	10	-	Whether the training frequency was increased		○
	• Improving the effect of training	Reducing training hours and reviewing courses	10	-	Whether training courses were improved		○
	Improvement of Internal Qualifications Training • Raising the effect by fully improving and reviewing training courses	Improving the content and hours appropriate for each course	10	-	Whether training courses were improved		○
Promotion of the Safety Culture	**Examining the level of safety culture** • Online questionnaire survey	Conducting for all related departments (the first half/second half of each year)	40	Twice a year	Number of actions / Number of target actions	○	
	• Analysis of results and feedback	Conducting for all related departments (the first half/second half of each year)	20	Twice a year	Number of actions / Number of target actions	○	
	Production and Use of Safety Characters • Producing characters	Producing characters	20	-	Whether measures were taken		○
	• Launching and use	Using the characters in teaching and publicity materials	20	Continually	Whether used		○
Inspecting Dangerous Machines and Instruments in Advance and Reinforcing Preventive Measures	**Conducting safety inspections on dangerous machines and instruments** • Conducting regular safety inspections on each machine and instrument	Conducting the training programs twice a year (the first half/second half of each year)	80	Twice a year	Number of units subject to inspection / Number of units inspected	○	
	• Conducting self-regulated safety inspections on hoists for less than two tons	Conducting the inspections on all related equipment	20	-	Number of units subject to inspection / Number of units inspected	○	

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Safety Risk Management Team

The person responsible for implementing the plan: Head of the SRM Team

Task	Implementation Plan	Goal	Portion	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Improvement of Digital Security	**Upgrading the Big-Data-Based Accident Prediction System** • Improving the quality of safety data (improving the process of entering accident data in Hi-SEs), increasing data usability, and improving visualization (UI)	Upgrading the safety big data platform		Occasionally	Improving the UI for the big data platform (functions/visualization, etc.)		○
	• Expanding machine-learning-based services for predicting and alerting safety accidents	Providing accident prediction services for each sector and each job		Occasionally	Establishing and implementing a scheme to expand accident prediction services		○
	Data-Based Risk Management • Upgrading the web version of Hi-SEs and the Hi-SEs-based integrated risk management	Identifying and improving risks based on the web version of Hi-SEs		Occasionally	Improving the UI, such as Hi-SAFE in the web version of Hi-SEs, SOM, and Risk Contests		○
	• Improving unsolved risks by operating the Safety Open Market	Promoting the SOM and improving unsolved risks		Three cases per quarter	Awarding outstanding proposers and improving risks in three or more cases every quarter	○	
	• Establishing the Design Risk Gate Process and the management of computerization	Establishing a process of examining safety in advance at the design stage		Occasionally	Registering Risk Gate in the web version of Hi-SEs and reflecting the function of review		○
	Strengthening DT-Based Safety Management • Introducing the safety management system for dangerous work using DT technology	Expanding the application of intelligent CCTVs of HiCAMs		Occasionally	Expanding the application of intelligent CCTVs of HiCAMs (the cargo hold of an LNG ship, an incineration facility)		○

* As the SRM Team was transferred from the Safety Department of the Shipbuilding & Offshore Business Unit to the Safety Management Group on January 17, 2022, its performance record for 2021 is included in the record of the Safety Department of the Shipbuilding & Offshore, but its management plan for 2022 is separately stated in this report.

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Health Management Team

The person responsible for implementing the plan: Head of the Health Management Team

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Expansion of Health Promotion Activities Focused on Prevention	**Upgrading the Health Examination Follow-up System and Improving the Quality of Health Promotion Activities** • Expanding and improving THP (Total Health Promotion) programs (health management bespoke to each executive officer and employee)	Expanding and improving programs	15	Continually	Review of the integrated operation scheme and the implementation of the scheme (25%), preparation (50%), implementation (75%), and monitoring (100%) of the improvement plan		○
	• Operating health promotion programs, such as obesity and smoking-cessation programs	The operation of the health promotion programs and the participants' success rate of 70%	5	Once a year	Whether conducted and the participants' success rate (70%)	○	
	• Supplementing teaching materials for health examinations' follow-up management	Supplementing at least 10 kinds of teaching materials	5	Once a year	Preparing teaching materials related to health management and providing information in 10 cases	○	
	• Strengthening the monitoring of follow-up management (strengthening the management of priority departments, increasing the health counseling rate, etc.)	The counseling/improvement rate: At least 80%	5	Continually	Persons who received health counseling services compared to the persons subject to follow-up management	○	
	Conducting Health Examinations More Efficiently • Appropriate health examinations: General (once a year), special (once or twice a year), comprehensive examinations (once every two years), examinations before assignment, etc	The medical check-up rate: 100%	10	Continually	Persons who received a medical check-up vs. persons who need the medical check-up	○	
	• Improving the company's medical check-up system (Hi-SEs)	Improvement and operation of the system	5	Continually	Review on the improvement of the system (33%), the preparation (66%), and implementation (100%) of an improvement plan		○
	• Improving the medical check-up cycle management system	Improvement and operation of the rules	10	Continually	Review on the improvement of the management system (25%), the preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan		○
	• Introducing a mobile record of the results of general/special check-ups	Streamlining and operation of the medical check-up system	5	Continually	Review on the use of the mobile record of the results of check-ups (33%), the preparation (66%), and implementation (100%) of an improvement plan		○
	Establishing the Standards for Strengthening Job Stress Control and Operating Programs • Preparing and implementing job stress control programs	Establishing and implementing programs	15	Continually	Review the job stress control scheme and the implementation of the scheme (25%), the preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan		○
	• Operating internal training programs related to job stress	Establishing and implementing a training plan semi-annually	5	Semi-annually	Establishing a plan (50%), Number of times conducted / Number of times planned (50%)	○	
	• Upgrading the utilization scheme according to the results of the job stress assessment	Establishing a scheme to utilize the results of the job stress assessment	5	Continually	Review on the improvement of the system (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	Operation of the Health Promotion Center • Operating and managing the company's attached clinic, infirmaries, physical therapy room, rehabilitation therapy room, and Korean medicine hospital	The operation rate of the attached medical clinic and the number of users	10	Continually	The results of the operation of the attached medical clinic and the number of persons compared to the preceding year	○	
	• Operating the offshore-attached medical clinic	Reoperating the offshore-attached medical clinic	5	Once a year	Whether the offshore-attached medical clinic was reoperated		○
Strengthening Support for Subcontractors' Health Management	**Improving Subcontractors' Health Management** • Strengthening the connection with health management service providers (sharing information on health measures and other measures determined as substandard or as those that need supplementation)	Holding meetings for feedback semi-annually	20	Twice a year	Number of actions / Number of target actions	○	
	• Monitoring of the current status of work-related diseases and persons with diagnosed diseases in subcontractors	Monitoring the current status and preparing an additional management scheme	30	Once every other month	The monitoring rate of the current status (70%), management measures (30%)		○
	• Providing technical guidance to subcontractors vulnerable to health management	Providing technical guidance semi-annually	15	Twice a year	Number of actions / Number of target actions	○	
	• Monitoring small subcontractors and increasing technical guidance	Providing technical guidance to small subcontractors semi-annually	15	Twice a year	Number of actions / Number of target actions	○	
	Health Management of Vulnerable Persons • Improving and supplementing the health management system of vulnerable persons (eligible persons: subcontractors' new employees)	Improvement and system operation	10	Continually	Review on the improvement of the system (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Strengthening the management and monitoring of the follow-up health management plan for vulnerable persons	The rate of registration in the management plan and the rate of relevance to redetermination (20%)	10	Once a month	The rate of registration in the management plan (50%) and the rate of relevance to redetermination (50%)	○	

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Strengthening a system for on-site management of chemicals	**Establishment of Standards for Appropriate Management of Stocked Chemical Products** • Establishing the R/R of each department regarding the guidelines for appropriate management of stocked chemicals and reflecting them in the standards (detailed rules on the management of chemicals)	Establishing internal guidelines and reflecting them in standards	15	Continually	Whether internal guidelines were established and reflected in standards - Establishment of internal guidelines 50%, amendment of standards 50%		○
	• Strengthening the management of suppliers of chemicals	Providing information and training programs at the time of supplying chemicals	10	Once a year	Number of actions / Number of target actions	○	
	• Operating and monitoring the special inspection period on the compliance with the standards for appropriate management of chemicals	Implementing a special inspection period twice a year	10	Twice a year	Number of actions / Number of target actions	○	
	• Establishing and implementing a procedure for the management of products brought in by subcontractors	Establishing related procedures and reflecting them in standards	10	Continually	Whether related procedures were established and reflected in standards - Establishment of related procedures (50%), amendment of standards (70%), implementation (100%)		○
	Minimizing the Risk of Keeping Highly Hazardous Chemicals • Promoting the replacement of highly hazardous chemicals handled inside the company (specially controlled substances and substances subject to permissible criteria)	Identifying and replacing replaceable substances	15	Continually	Whether a replacement plan was established and replacement was done - Whether a replacement plan was established 50%, whether the replacement was done 100%		○
	• Strengthening the monitoring and guidance for the status of management of the working environment of departments handling highly hazardous chemicals	Conducting inspections at the site and taking follow-up measures according to the results of inspections	10	Twice a year	Number of actions / Number of target actions	○	
	• Preparing and distributing guiding materials of the OPL (One Point Lesson) for safe handling of highly hazardous chemicals	Distributing guiding materials	5	Once a year	Preparing and distributing guiding materials	○	
	Supplementing the Chemical Management Process • Upgrading the procedure for examining the hazards of new chemicals (paints) in advance	Revising and implementing relevant procedures/systems	10	Continually	Review on the improvement of the system (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Operating the labor-management council for discussing schemes for the proper handling of paints	Operating the council regularly	10	Continually	Whether the council was operated regularly		○
	• Operating the chemical management system and conducting risk assessments	The rates of conducting and completing risk assessments	5	Once a year	Number of times conducted / Number of times planned	○	
Improving the Quality of the Management of the Working Environment/ On-Site Health	**Appropriate Measurement of the Working Environment** • Regular measurement: Semi-annually; measurement in a shortened cycle: Once in 3 months	Rate of measuring the working environment: 100%	16	Continually	Number of measurements completed / Number of measurements planned	○	
	• Monitoring and management of hazardous factors exceeding the exposure standards for the measurement of the working environment	Excess rate of measuring the working environment: Not more than 4.2%	5	Continually	Number of excess cases / Number of measured cases	○	
	• Improving the operating system for the measurement of the internal working environment (Hi-SEs)	Implementing an operating system for improvement	5	Continually	Review on whether the system was improved (33%), the preparation (66%), and implementation (100%) of an improvement plan		○
	• Strengthening on-site management for the measurement of the working environment (occasional inspections on the conditions of wearing sample collectors, working position, etc.)	Number of on-site inspections conducted (90% or more)	5	Continually	Number of inspections conducted / Number of inspections planned	○	
	Upgrading the Management of Confined Spaces • Rearranging and updating the current status/list of confined spaces	Progress rate of rearrangement of the current status/list: 100%	20	Continually	Current status/Number of rearranged lists / Number of lists planned (the number of omitted lists is separately reflected)	○	
	• Improving and operating programs for work in confined spaces	Improving, distributing, and implementing manuals	15	Continually	Review on whether the program was improved (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Improving the procedure for evaluating the results of the implementation of programs for work in confined spaces	Rate of evaluation of the results of improvement and implementation of procedures	10	Once a year	Improvement of procedures (50%), Number of cases evaluated / Number of cases subject to evaluation (50%)	○	
	Strengthening Activities for Health and Hygiene Management • Implementing the plan to prevent hazards and dangers in ventilation systems	Rate of passing the examination of the prevention plan: 100%	10	Occasionally	Number of cases that passed an examination / Number of examined cases	○	
	• Conducting internal and external inspections on local ventilating systems and managing such systems (Objects: All local ventilating systems, Cycle: Annually)	Rate of conducting/passing safety inspections: 100%	3	Occasionally	Number of cases that passed an inspection / Number of inspected cases	○	
	• Disinfection and sterilization: Regular disinfection (all year round), special disinfection (May-August), additional disinfection (occasionally), Inspections on hygiene for mass feeding facilities	Rate of conducting disinfection and sterilization: 100%	3	Continually	Number of times of disinfection / Number of times planned	○	
	• Improving the current status of management of local ventilation systems (rearranging and updating the current status/list)	Whether the current status of management was improved	3	Occasionally	Review on whether the program was improved (33%), preparation (66%), and implementation (100%) of an improvement plan		○
	• Strengthening on-site health and management activities in extreme summer/winter weather	Whether site improvement activities in extreme summer/winter weather were conducted	5	Continually	Whether improvement activities in extreme summer/winter weather were conducted Establishing (50%) and conducting (100%) improvement activities in extreme summer/winter weather		○

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Evaluation Category		Quarter 1			Quarter 2			Quarter 3			Quarter 4		
						Quantitative	Qualitative	1	2	3	4	5	6	7	8	9	10	11	12
Strengthening Activities of Preventing Work-Related Diseases	**Strengthening Activities of Preventing Musculoskeletal Disorders**																		
	• Conducting regular surveys on hazardous factors to musculoskeletal disorders	Conducting and completing	20	Once a year	Review on whether the management system was improved (25%), preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan		○												
	• Conducting occasional surveys on hazardous factors to musculoskeletal disorders	Rate of conducting and completing: 100%	5	Occasionally	The number of cases conducted, the number of cases completed within the deadline, etc.														
	• Operating and supplementing programs for the prevention and management of musculoskeletal disorders (training, site improvement, etc.)	Whether conducting and completing were	5	Continually	Review on whether the supplementation of activities of prevention and management was (33%), preparation (67%), and implementation (100%) of an improvement plan		○												
	• Improving the operation of internal and external rehabilitation programs	Preparing a scheme to improve the operation	10	Continually	Review on whether the rehabilitation programs were improved (33%), preparation (67%), and implementation (100%) of an improvement plan		○												
	Prevention and Control of Work-Related Diseases																		
	• Conducting site surveys/epidemiological surveys on work-related diseases	Rate of conducting site surveys/epidemiological surveys	10	Occasionally	Number of surveys conducted / Number of surveys required	○													
	• Conducting earplug suitability tests to prevent noise deafness	Rate of tests conducted: 100%	5	Once a year	Number of persons tested / Number of persons who need the tests	○													
	• Improving the management system for preventing lung diseases and conducting tests on the suitability of protective equipment for breathing	Rate of preparing a management scheme and conducting tests: 100%	5	Once a year	Preparation of a management scheme (50%), Number of persons tested / Number of persons who need the tests (50%)	○													
	• Establishing a scheme to promote the operation of the hearing preservation program and the respiratory system protection program	Establishing and implementing a scheme to promote programs	5	Continually	Review on whether the implementation of the management system was (25%), preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan		○												
	• Strengthening the pre-management of persons who need monitoring of a work-related disease (to prevent the contraction of occupational disease)	Rate of contraction: 10% or less	5	Continually	The ratio of contraction of occupational disease of persons who need monitoring	○													
	System for Responding to Infectious Diseases																		
	• Operating an emergency room to respond to COVID-19	Operating a prompt response system in preparation for the occurrence of diagnosed persons	20	Continually	Rate of operating the situation room		○												
	• Establishing a system for prompt response to infectious diseases and upgrading the procedure for such purpose	Amending and updating manuals	10	Once a year	Whether the manuals were amended and updated		○												
Improving the Quality of Management of Protective Equipment for Preventing Accidents/ Diseases	**Improving the Management System for Personal Protective Equipment and Safety Consumables**																		
	• Establishing and monitoring the new operating system for personal protective equipment/ safety consumables	Monitoring and supplementing the new operating system	25	Continually	Monitoring of whether the improvement and implementation of the system were(30%), preparation (70%), and supplementation and implementation (100%) of an improvement plan		○												
	• Establishing guidelines for wearing personal protective equipment/safety consumables	Materials for training and publicity on the guidelines/methods of wearing protective equipment	10	Continually	Review on whether the implementation of the guidelines for wearing was (33%), preparation (67%), and publicity/training (100%) of a proposed guideline		○												
	• Operating the procedure for pre-approval at the time of registering new safety consumables	Rate of review on adequacy: 100%	20	Continually	Number of cases reviewed / Number of cases subject to review	○													
	• Improving the system related to personal protective equipment (periodic provision of safety boots, etc.)	Whether a system for personal protective equipment was improved and implemented	10	Continually	Review on whether the improvement of the system was(33%), preparation (67%), and the implementation (100%) of an improvement plan		○												
	Quality Management of Personal Protective Equipment and Safety Consumables																		
	• Improving the quality of personal protective equipment/safety consumables	Number of improved products: 12 or more	15	Occasionally	Number of improved products	○													
	• Monitoring the performance, quality, conditions of use, safety, etc. of personal protective equipment/safety consumables	Rate of products monitored: 100%	15	Occasionally	Number of products tested for quality management / Number of products planned	○													
	• Providing major personal protective equipment adequately (safety boots, prescription safety goggles)	Rate of products provided periodically: 100%	5	Semi-annually	Number of times provided / Number of times planned	○													

Detailed Implementation Plan to Achieve the Goals for Health, Safety, and Environment Management in 2022

Environmental Management Team

The person responsible for implementing the plan: Head of the Environmental Management Team

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Promoting Sustainable Environmental Management	**Strengthening ESG Environmental Management** • Improving the quality of the environment management system certification (ISO 14001): Evaluating the compliance with environmental law (semi-annually) and upgrading the system operation	Maintaining the certification of ISO 14001 and improving the system	25	Continually	Improving the system: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Management, feedback, and improvement of the current status of performance indicators related to the reduction of pollutants in the ESG environment area	Improving the performance indicators of the pollutant reduction	25	Continually	Improving performance indicators: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Improving the response manual for preventing environmental accidents and establishing training plans and implementing training : Chemical substances, marine pollution, etc.	Improving the response manual for preventing environmental accidents	10	Continually	Improving the manual: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	Promoting Carbon Neutrality • Participation in the conferences on greenhouse gas reduction: Direct or indirect participation in preparing a scheme to reduce greenhouse gas in the shipbuilding industry	Active participation in conferences on greenhouse gas reduction	20	Continually	Rate of participation in conferences on greenhouse gas reduction	○	
	• Assisting in performing the tasks for carbon-neutrality: Calculating greenhouse gas reductions for each task and reviewing the methodology for internal and external projects	Establishing a method of calculating greenhouse gas reductions for each task	20	Continually	Establishing a method of calculating greenhouse gas reductions for each task: Review (33%), preparation (66%), and implementation (100%) of a method		○
Minimizing Environmental Risk	**Risk Management on Violations of Environmental Law** • Conducting surveys on the current status of high-risk groups exposed to violations of law in each sector and preparing a scheme to reduce risks	Conducting surveys on the current status and preparing a scheme to reduce risks	50	Continually	Improving high-risk groups: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Establishing a management process for (occasional or regular) evaluation of details of the enactment or amendment of environmental law	Improvement and operation of the management process	10	Continually	Improving the management system: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Promoting the improvement of unreasonable environmental law through participation in the Shipbuilding & Offshore Safe Environment Center of the Korea Offshore & Shipbuilding Association	Improvement of unreasonable environmental law	15	Continually	Number of proposals / Number of cases that need improvement	○	
	Responding to Environmental Complaints and Raising the Efficiency of the Environment Inspection System • Operating the volunteer marine pollution response brigeds called "Hyunjung Dolphin" and conducting private-public joint response training for preventing marine pollution	Conducting response training periodically	5	Continually	Number of actions / Number of target actions	○	
	• Active response to individual complaints and preventing such complaints from becoming environmental issues through organic consultation with relevant authorities	Active response to individual complaints	10	Continually	Number of complaints responded / Number of complaints received	○	
	• Issuing a Environmental Non-conformance and corrective Action Requisition and the management of the record of improvement completion	Improving nonconformities in the results of an environmental inspection	10	Continually	Number of cases improved / Number of non-conformance and corrective cases	○	
Strengthening External Cooperation	**Responding to Internal and External Stakeholders and Support for Business Operations** • Responding to requests for activities of the environment area from the government, project owners, etc., and assisting with such activities	Active participation in the task requests/assistance in the environmental area	35	Continually	Number of cases performed / Number of cases requested	○	
	• Preparing environmental information to be released to the public: The environmental information disclosure system, integrated reports, business reports, etc.	Disclosing environmental information and data	50	Continually	Number of times responded / Number of times requested	○	
	• Expanding participation in eco-friendly ecological activities, including the "One-Company, One-River Care" campaign and nature cleanup activities	Participation at least once quarterly	15	Continually	Number of actions / Number of target actions	○	
Improving the Quality of the Air Environment Management	**Compliance with Regulation under the Clean Air Conservation Act and Management of Fine Dust Emissions (dust, NOx, SOx, VOCs)** • Systematizing the measurement of air pollutants and tightening up the control of pollutant emissions	Improvement and operation of the management process	10	Continually	Improving the management system: Review (25%), preparation (50%), implementation (75%), and monitoring (100%) of an improvement plan		○
	• Investing in high-risk facilities that are likely to exceed the permissible emission levels : Minimizing the payment of emission charges	Operating a related task force and improving facilities	10	Continually	Improving facilities: Review (33%), preparation (66%), and the implementation (100%) of an improvement plan		○
	• Performing of the voluntary agreement on fine dust reduction: Reducing fine dust emissions by 40% in 2022 compared to 2014	Achieving the goals for fine dust reduction	10	Continually	Rate of achieving the goals for fine dust reduction	○	
	• Taking measures to reduce fine dust when the Emergency Reduction Measures for fine dust is issued and managing the record of such measures	Performing Emergency Reduction Measures: 100%	5	When an order is issued	Number of cases where Emergency Reduction Measures were taken / Number of cases where the Emergency Reduction Measures for fine dust was issued	○	
	Compliance with Regulation under the facility management standards for the Management of HAPs fugitive emission facilities • Compliance with the facility management standards: Installing facilities for reducing VOCs from the painting plants by at least 50,000 m3 or using eco-friendly paints	Rate of passing regular inspections: 100%	10	Continually	Number of facilities passing inspections / Number of facilities subject to inspections	○	
	• Considering the application of exemption from facility management standards of fugitive emission facilities to shut down facilities and managing licenses and permits	Legal Management of Licenses and Permits	5	When it occurs	Number of facilities that are issued licenses and permits / Number of facilities that need licenses and permits	○	

Task	Implementation Plan	Goal	Weight	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative
Improving the Quality of the Air Environment Management	**Promoting the Compliance with the Special Act On The Improvement Of Air Quality In Air Control Zones** • Calculation of pollutant emissions subject to the total emission control + Management of the carry-over, sale, and purchase of permits total emission allowances	Proper management of allocated emissions (sale/purchase/carry-over)	10	Continually	Performing the management plan for allocated emissions: Establishment of a plan (33%), calculation of emissions (66%), and sale/purchase/carry-over (100%)		○
	• Managing installation status of fuel flow meters at each facility by the end of 2022	Rate of installation of a fuel flow meter in each facility: 100%	10	Continually	Number of cases completed installation / Number of cases subject to installation	○	
	Management of the Greenhouse Gas Emissions Trading Scheme • Preparation and verification of a plan to calculate greenhouse gas emissions and a statement of emissions	Submission of all plans and statements : 100%	15	Continually	Number of cases completed submission / Number of cases subject to submission	○	
	• Management of the carry-over, sale, and purchase of emission permits and management of the results of greenhouse gas reduction in connection with carbon-neutrality	Proper management of emission permits (sale/purchase/carry-over)	15	Continually	Performing the emission permits management plan: Establishment of a plan (33%), calculation of emissions (66%), and sale/purchase/carry-over (100%)		○
Establishment of a Chemical Substances Management System	**Compliance with the Law on Chemical Substances and Appropriate Operation of the Hazardous Chemical Substances Handling Facilities** • Participating in the task force for new designated hazardous chemical substances (Copper oxide, etc.) and establishing the guidelines for the management of hazardous chemical substances handling facilities in public waters	Participating in the task force and expressing opinions	25	Continually	The rates of participation in meetings and submission of data	○	
	• Management of the handling/contracting of hazardous chemical substances and periodic inspection for management of handling facilities	Rate of passing regular inspections: 100%	25	Continually	Number of facilities that passes the inspection / Number of facilities subject to the inspection	○	
	• Hazard assessment of chemicals to be stocked and managing the pollutant release and transfer registers, statistical surveys, and hazardous chemical substances	Completing the evaluation and the submission of data: 100%	25	Continually	Rate of completion of the evaluation and the submission of data	○	
	• Management of the registration of chemical substances and the management of business permits for hazardous chemical substances, plans for prevention and management of chemical accidents, and specifications of ingredients of imported chemical substances	Proper management of registration, permits, and declarations	25	When it occurs	Number of cases completed / Number of cases subject to the management	○	
Systematization of Management of Wastewater and Wastes	**Compliance with Reinforced Regulation under the Water Environment Conservation Act and Proper Management of industrial wastes** • Improving the quality of the management for measurement of discharged water pollutants: Monitoring whether new pollutants are discharged and the concentration of discharged pollutants	Compliance with the leagal discharging concentration limits	30	Continually	Number of cases that meet the statutory discharging concentration limits / Number of cases subject to the measurement of discharge concentration	○	
	• Checking whether perfluorinated compounds are discharged and the management of licenses/permits: The water pollution prevention facilities and the process of direct discharge to public waters	Fully checking whether discharged	15	Once a year	Number of cases inspected / Number of cases subject to the inspection	○	
	• Management of wastes reduction to achieve the goals for the resource circulation performance management (terminal treatment ratio ↓, circular utilization ratio ↑)	Achieving the goals for the resource circulation performance management	30	Continually	Rate of achieving the goals for the resource circulation performance management	○	
	• The management of hazard information data of wastes and proper management of firms collecting, transporting, or disposing of wastes	Legal Management of firms of wastes treatment	15	Continually	Number of firms inspected / Number of firms subject to the inspection	○	
	• Proper management of persistent organic pollutants: Conducting a total inspection on machines/instruments until June 2022	Completing the total inspection of machines/instruments	10	Continually	Number of worksites completed / Number of worksites subject to the inspection	○	
Tightening Up the Management of Soil/Effluent Facilities	**Management of Soil/Effluent Facilities** • Conducting an inspection of soil contamination levels, a leakage inspection and surveys of the actual state of soil contamination	Conducting a thorough inspection : 100%	50	When it occurs	Number of facilities inspected / Number of facilities subject to the inspection	○	
	• Inspecting the status of operation of the effluent vacuum pump station, repairing the pump station, maintaining and repairing old facilities, and cleaning sludge and excretion	Proper management of effluent facilities	50	Continually	Number of facilities repaired / Number of facilities that need repair	○	

Health   Safety

          Environment

4-9
**Each Business Unit's Safety
Activity Plan 2022**

Each Business Unit of HHI will upgrade the safety management system this year and improve the quality of internal job standards and risk assessment. The Business Unit will also promote subcontractors' safety management by supporting their safety and health and intensively managing work that is likely to cause serious accidents at the site to transform our workplace into a place where safety culture is established as routine.

Shipbuilding & Offshore Business Unit Goals for 2022

Safety Goals

Goal 1	Goal 2
Zero Serious Accident	Achieving the Accident Rate of 0.219 or Less

Direction of Promotion

Direction 1	Direction 2	Direction 3
Selection and Concentration	Improving Subcontractors' Safety Management	Safety Activities Based on Risk Prediction

Management Indicators

■ Number of Accidents   ━●━ Accident Rate

0.271

-19%

0.219

54
Results

-19%

44
Target accident rate

2021   2022
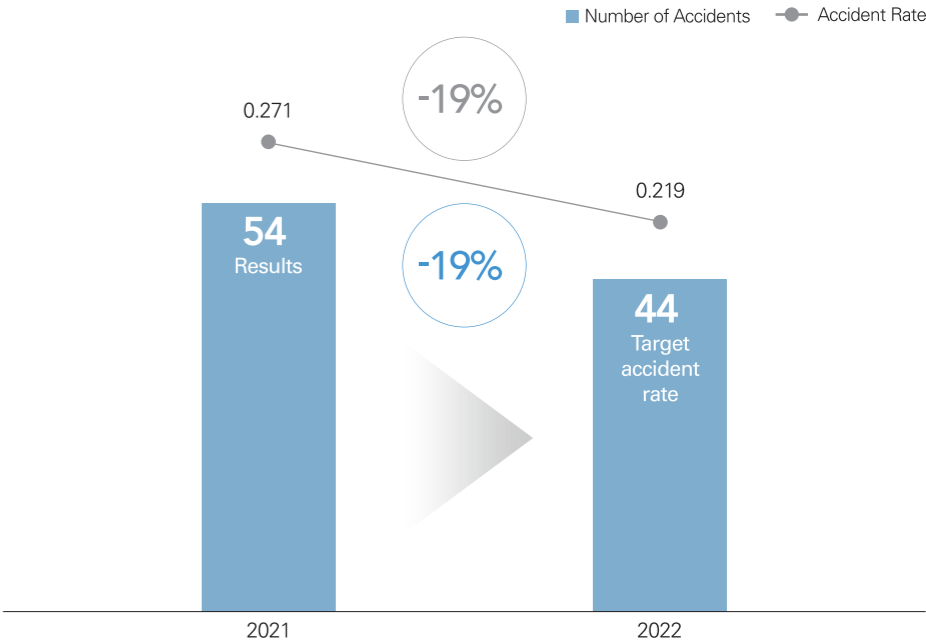
2022 Safety Activity Plan of the Shipbuilding & Offshore Business Unit

Shipbuilding & Offshore Business Unit

The person responsible for implementing the plan: The Head of the Shipbuilding Safety Department, The Head of the Offshore Safety Department

Task	Implementation plan	Goal	Implementation Cycle	Evaluation Indicator and Performance Measurement Criteria	Quantitative	Qualitative	Quarter 1–4 (Months 1–12)
Intensive Management of the Work with a Risk of Serious Accidents	**Thorough Management of Feedback on the Countermeasures to Block Serious Accidents and Prevent the Recurrence of Serious Accidents** • Establishing measures to be taken by each department to prevent serious accidents	• Establishing countermeasures for blocking serious accidents in all production/support departments	Once a year	• Number of cases where countermeasures were taken to block serious accidents	○		
	• Inspecting the performance of the countermeasures to block serious accidents and prevent the recurrence of serious accidents (using the Hi-SEs performance inspection system)	• Inspecting countermeasures for preventing the recurrence of serious (significant) accidents during the past five years	Twice a year	• Number of inspections conducted on the performance of countermeasures for preventing the recurrence of serious (significant) accidents	○		
	• Operating the triple (supervisors/SAFE Clover/safety workers) safety management system for significantly dangerous work	• Weekly performance inspection (at least once a day)	Weekly	• Number of weekly inspections conducted to prevent serious accidents (Hi-SEs performance record)	○		
	Safety Management of High-Risk Work subject to Permit-to-Work (PTW), Based on Selection and Concentration • Continuously supplementing and improving the PTW system	• Reviewing the effectiveness of the PTW system	Once a year	• Reporting the results of the review on the effectiveness of the PTW system		○	
	• Tightening up the on-site/face-to-face inspections for PTW	• Preventing safety accidents at work subject to PTW	Continually	• Number of PTWs issued face to face or at the site (Hi-SEs performance record)	○		
Improving the Quality of the Job standards/Risk Assessment	**Preparing a Safe Production System Based on Standard Work** • Upgrading the Hi-STANDARD job standards and making regular/occasional risk assessments routine • Management of the establishment and implementation of the safe work plan for changes at the site, such as non-routine (rush) work and new methods	• Conducting regular risk assessments: 100% • Conducting occasional risk assessments: 100%	Twice a year Occasionally	• Number of regular risk assessments • Number of occasional risk assessments	○ ○		
Raising the Safety Management Standards for High-Risk Work	**Establishing Multiple (double, triple) Safety Countermeasures for High-risk Work** • Establishing double/triple safety measures for jobs depending upon personal protective equipment after identifying such jobs as high-risk	• Strengthening safety management standards for high-risk work	Occasionally	• Number of high-risk jobs for which safety management standards were strengthened	○		
	Continuing Company-Wide Hi-SAFE Improvement Activities • Selecting improvement tasks of each production or support department and conducting improvement activities	• Improving high-risk work at the initiative of each department	Once a year	• The results of Hi-SAFE improvement activities by stage (planning - completion)	○		
Operating Programs for Supporting Subcontractors' Safety Management	**Operating Programs for Supporting Subcontractors' Safety Management** • Enhancing the capabilities of safety management through support and technical guidance to internal and external subcontractors	• Enhancing subcontractors' capabilities of safety and health management	Once a quarter	• Number of times of technical guidance for safety	○		
	• Evaluating the level of subcontractors' safety and health and awarding outstanding subcontractors	• Improving the level of subcontractors' self-regulated safety and health management	Once a quarter	• Results (scores) of safety level evaluations and the number of awards to outstanding subcontractors	○		
	Enhancing Subcontractors' Safety Leadership • Holding regular safety communication meetings with subcontractors' representatives (safety and health council, safety meetings, etc.)	• Enhancing the safety mindset of subcontractors' representatives	Once a month			○	
	Enhancing the Capabilities of Safety Managers, Focusing on the Prevention of Serious Accidents • Enhancing new safety managers' capabilities of safety management at the early stage of mentoring	• Earlier adaptation of new safety managers to their duties	Occasionally	• Number of mentoring safety managers	○		
	• Improving the role of safety managers through monthly meetings presided by the Manager of the Safety Section	• Strengthening the competency of subcontractors' safety officers	Once a month	• Number of monthly safety meetings	○		
Improvement of Digital Security	**Strengthening DT-Based Safety Management** • Tightening up risk management of each job for which a mobile safe work instruction system was introduced	• Developing/applying a mobile safe work instruction system	Occasionally	• Phase 1 development and application (replacing a written work instruction with a mobile instruction)		○	

Naval & Special Ship Business Unit Goals for 2022
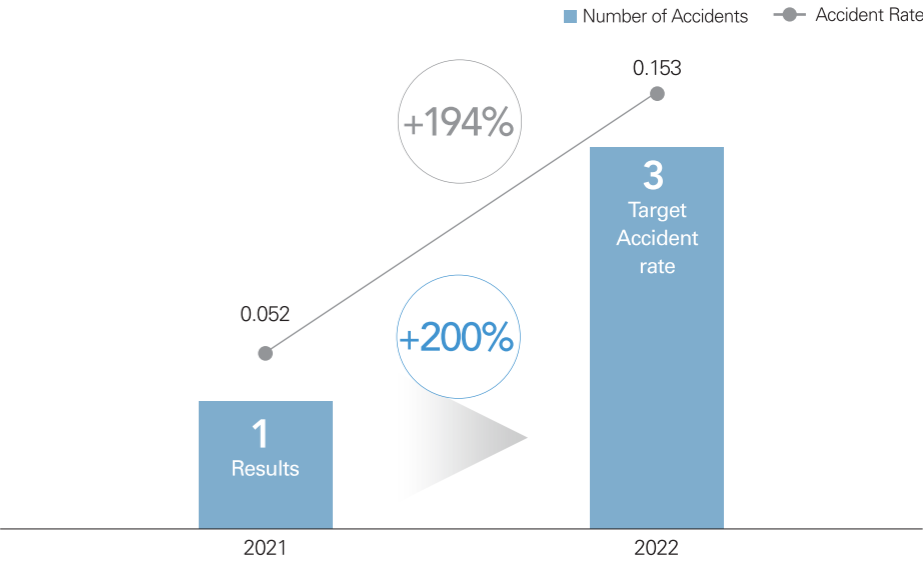

Safety Goals
•

| Goal 1	Goal 2
Zero Serious Accident	Achieving the Accident Rate of 0.153 (3 Accidents) or Less

Direction of Promotion
•

Direction 1	Direction 2	Direction 3
Upgrading the Safety Management System Focusing on the Prevention of Serious Accidents	Improving Subcontractors' Safety and Health Management Level	Establishing a System for Compliance with the Serious Accidents Punishment Act

Management Indicators
•

■ Number of Accidents   ●— Accident Rate

+194%

0.153

3
Target Accident rate

0.052

+200%

1
Results

2021   2022

※ As the performance of the Naval & Special Ship Business Unit in 2021 (1 accident; 0.052) successfully exceeded the target accident rate for 2021 (3 accidents; 0.163), the goals for the target accident rate for 2022 are set similarly to the target accident rate for 2021.
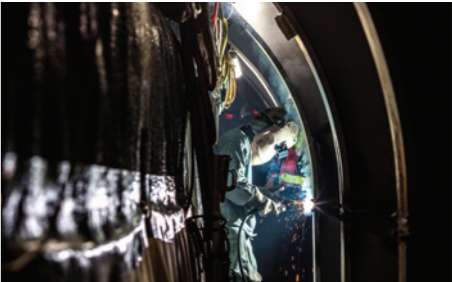
2022 Safety Activity Plan of the Naval & Special Ship Business Unit

Naval & Special Ship Business Unit

The person responsible for implementing the plan: The Manager of the Special Ship Safety Section

Task	Implementation plan	Performance Cycle	Criteria for achieving goals (Method of Calculating the Achievement Rate)	Quarter 1 (1 2 3)	Quarter 2 (4 5 6)	Quarter 3 (7 8 9)	Quarter 4 (10 11 12)
Upgrading the Safety Management System	**Safety Management Focused on the Prevention of Serious Accidents** • Continuing to implement the safety management system for preventing serious accidents • Monitoring the serious accident prevention system	Continually Continually	Recording inspections on each entity Results of monitoring				
	Establishing a Job Standard Procedure System • Reviewing the appropriateness of Job Standard Procedure/risk assessment (approximately 5,700 cases) • Minimizing human errors through the link in visual training courses for high-risk work (producing teaching materials for micro-learning on standard safety work methods for high-risk jobs in each worksite)	Continually Continually	Number of actions / Number of occurrences Number of teaching materials produced for micro-learning				
	Continuation of Safety Improvement Activities • Conducting safety-friendly design activities (providing design information customized for each process and conducting design feedback for safety activities) • Identifying and improving high-risk factors in worksites	Continually One case per quarter	Results of design feedback for safety Number of cases identified / Number of cases planned				
Improving Subcontractors' Safety and Health Level	**Applying the Same Safety Management System for Preventing Serious Accidents** • Triple safety management of each subcontractor's high-risk work (including multiple safety countermeasures) under the current safety management system • Expanding the application of the Job Standard Procedure system to internal subcontractors	Continually Continually	Recording inspections on each entity Results of the job standard task force				
	Support for Enhancing Subcontractors' Capabilities of Safety Management • Enhancing the role and competency of safety managers focusing on activities for blocking significant accidents • Sharing information on changes in safety regulations and systems / promoting execution	Continually Continually	Number of cases conducted / Number of cases planned Number of cases shared / Number of cases planned				
	Evaluating Subcontractors' Capabilities of Safety Management and Rewarding • Feedback management through regular technical guidance and evaluation • Selecting and rewarding outstanding subcontractors (safety managers)	Once a quarter Twice a year	Number of actions / Number of occurrences Number of actions / Number of occurrences				
	Hearing Opinions on the Improvement of Subcontractors' Safety and Health and Giving Feedback	Once a month	Number of actions / Number of occurrences				
Compliance with the Serious Accidents Punishment Act	**Inspection of Hazardous or Dangerous Factors** • Management of risk assessments (regular/occasional) • Inspecting high-risk work by each entity (construction manager, safety supervisor in construction department, safety supervisor, etc.) and keeping records	Continually Continually	Whether risk assessments were conducted Recording inspectionsresults on each entity				
	Opinion gathering from employees • Gathering opinions from employees periodically and conducting improvement activities • Inspecting and managing the performance of the agreement made with the Occupational Safety and Health Committee	Continually Once a quarter	Hearing opinions and managing improvement activities Inspecting and managing the agreement's performance				
	Implementing countermeasures to prevent the recurrence of an accident • Inspecting the performance of countermeasures to prevent the recurrence of each type of accident	Continually	Number of cases where measures were taken / Number of accident cases occurred an accident has recurred				
	Emergency Response Measures • Establishing an emergency response manual • Preparing scenarios for each major accident situation and conducting drills (linked with construction)	Once Continually	Preparing an emergency response plan Number of actions / Number of occurrences				
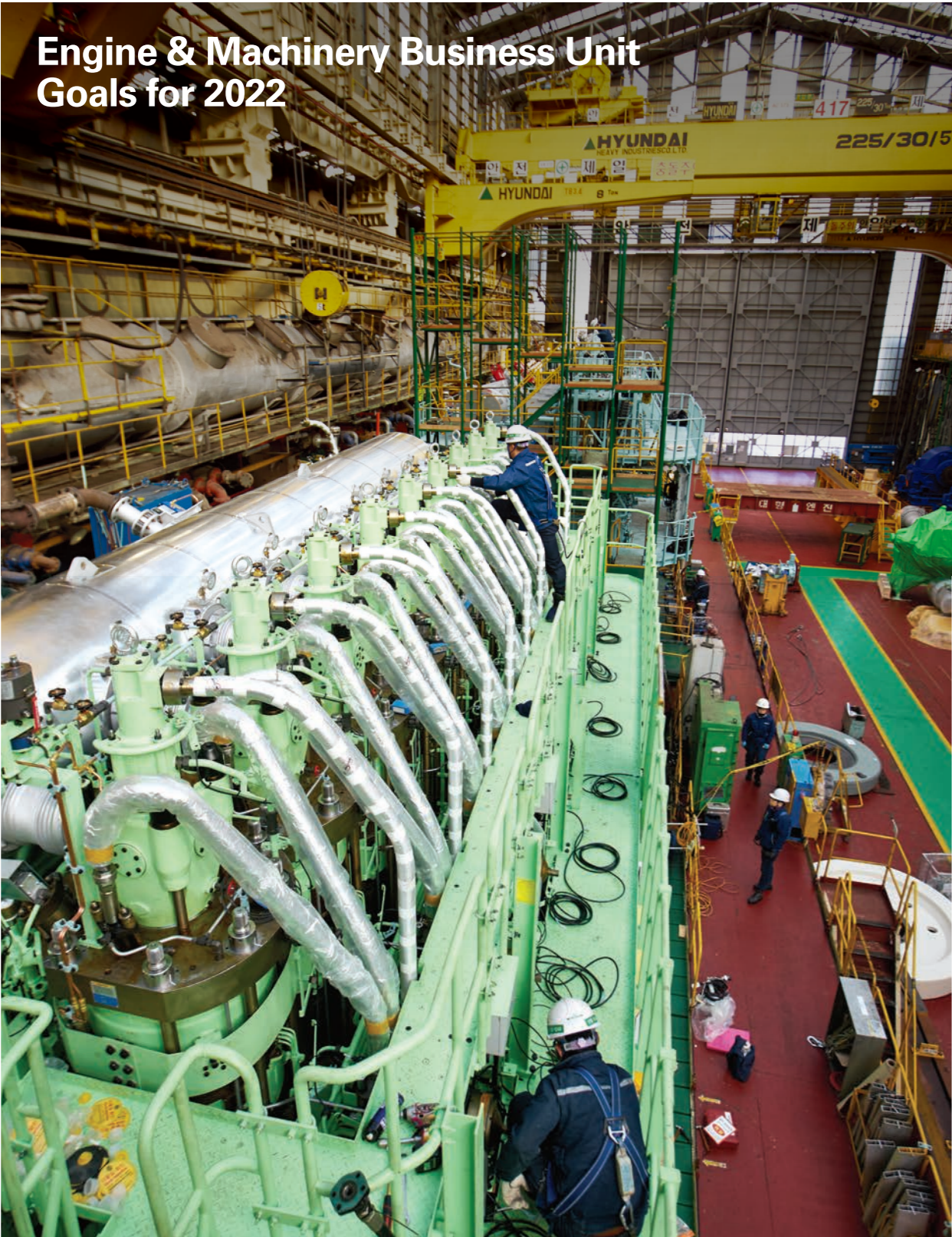
Engine & Machinery Business Unit Goals for 2022

Safety Goals

Goal 1	Goal 2	Goal 3
Maintaining a Workplace with No Serious Accident	Realizing an Accident-Free, Safe Workplace	Achieving the Accident Rate of 0.112 or Less

Management Indicators

■ Number of Accidents ―●― Accident Rate

+10%

0.102   0.112

| 3 Results (2021) | 0% | 3 Target Accident rate (2022) |
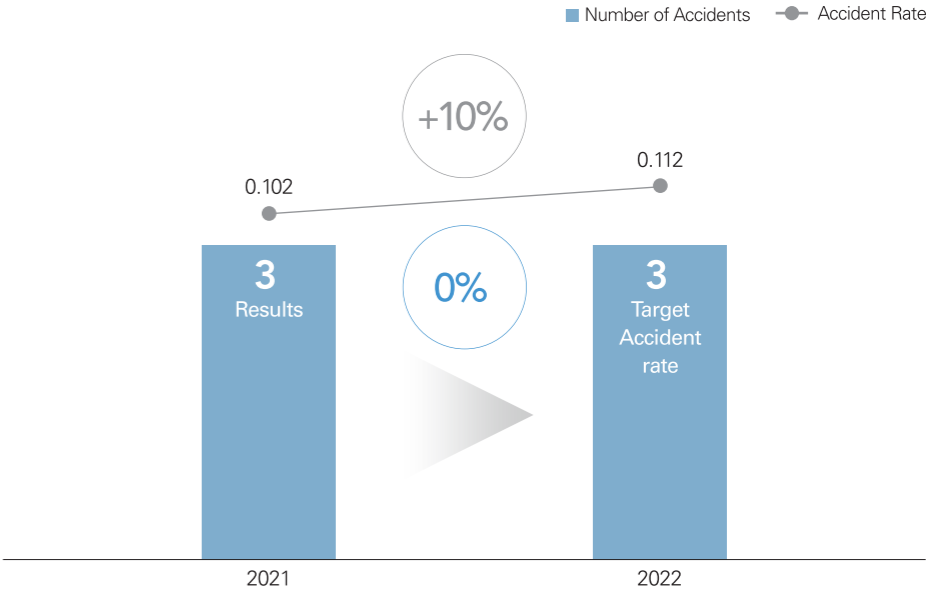
※The performance (3 accidents; 0.102) of the Engine and Machinery Business Unit in 2021 attained the accident management standards for 2021 (3 accidents; 0.109), and the goals for the accident management standards for 2022 are set similarly to the previous year.

2022 Safety Activity Plan of the Engine & Machinery Business Unit

Engine & Machinery Business Unit

The person responsible for implementing the plan: The Head of the Engine & Machine Safety Department

Task	Implementation plan	Criteria for achieving goals (Method of Calculating the Achievement Rate)	Quarter 1 (1 2 3)	Quarter 2 (4 5 6)	Quarter 3 (7 8 9)	Quarter 4 (10 11 12)
Intensive Gas Safety Management	**Absolute Compliance with the Standard Work Procedure for the Operation of Gas Facilities** • Reviewing the standard work procedures for each unit work for the operation/maintenance of gas facilities • Reviewing manuals on the operation of gas facilities • Thorough risk assessment on maintenance work	Number of cases reviewed / Number of procedures Number of cases reviewed / Number of manuals Number of cases conducted / Number of cases worked				→
	Thorough Management of the Performance of Ventilation and Detection Facilities (Safety Control) • Periodic, thorough inspection of the performance of ventilation and detection facilities • Testing and calibrating gas leak detection equipment • Periodic, thorough safety inspection of the safety control room	Once a month Once a month Once a month				→
	Rigorous Utilization of the Designated Personal Protective Equipment and Non-Sparking Tools and Instruments • Rigorous utilization of anti-static uniforms and non-sparking tools and instruments • Carrying a detector to a dangerous gas area • No assess for unauthorized persons, strict access control	Number of cases utilized / Number of cases inspected Number of cases carried / Number of cases inspected Number of violations / Number of cases inspected				→
	Establishing a fire Response System for Environment-friendly Facilities and Underground Auxiliary Machinery Pits • Establishing a manual for a fire response system in an emergency • Conducting firefighting/evacuation exercises in various environments • Periodic, thorough inspections of firefighting facilities	Number of cases prepared / Number of cases subject to the manual Number of cases conducted / Number of cases planned Once a month				→
Maintaining the Balance between Strictness and Caring in Safety	**Rigorous Compliance with Regulations for Preventing Serious (Significant) Accidents** • Intensive management of three main risks: crane/ working at height/fire and explosion • Thorough inspection of the performance of standard work for high-risk work • Strict management and execution of safety golden rules/significant items	Number of inspections conducted / Number of inspections planned Number of inspections conducted / Number of inspections planned Rate of violation by sector and by department				→
	Strengthening Supervisors' On-Site Safety Activities • Continuous safety intervention focused on high-risk work • Sharing the results of safety activities and thorough management of performance • Participation of executive officers/department managers in TBM by the team in rotation and safety communication	Number of intervention cases Weekly aggregation Once a week				→
	Promoting Safe Guards' Activities • Identifying high-risk work in each department/process in advance and sharing the list of such work • Identifying high-risk work utilizing the high-risk worklist • Sharing the results of measures and thorough management of performance	Number of cases listed / Number of cases planned Weekly aggregation Weekly aggregation				→
	Strengthening Workers' Safety Activities through "Emotional Safety" Activities • Caring for employees with a concerned mindset for employees and a willingness to help them + promoting the eye-contact campaign • Conducting a three-behavior campaign (being prudent, asking, and not hastening) for safe working • Promoting feedback through safety meetings between safety/construction departments	Number of intervention cases Number of intervention cases Number of cases conducted / Number of cases planned				→

Task	Implementation plan	Criteria for achieving goals (Method of Calculating the Achievement Rate)	Quarter 1 (1 2 3)	Quarter 2 (4 5 6)	Quarter 3 (7 8 9)	Quarter 4 (10 11 12)
Rigorous Response to the Serious Accidents Punishment Act	**Implementation of the Safety Compliance System** • Thorough management of the P(Plan) D(Do) C(Check) A(Act) Cycle • Thorough review, maintenance, and management of Hi-STANDARD • Rigorous confirmation of on-site practice through special inspections at specific times • Inspections and feedback on compulsory activities of field departments (compliance) • Management and maintenance of the results of monitoring and the results of feedback/improvement	Number of cases conducted / Number of cases planned Number of cases conducted / Number of cases planned Number of inspections conducted / Number of inspections planned Number of cases conducted / Number of cases planned Number of cases improved / Number of feedback			→	
	Continuous Supplementation and Improvement of Deficiencies/Problems • Improving deficiencies according to the results of monitoring the system and applying the results • Hearing opinions to supplement the system (in the form of questionnaires)	Number of cases improved / Number of cases with deficiencies Twice a year			→	
	Elimination of Safety Blind Spots • Rigorous compliance with the risk work permit for vulnerable work (non-routine work, the maintenance of equipment, etc.) • Periodic inspection/management of vulnerable areas (auxiliary machinery areas, underground pits) • Removal of gaps in safety management during vulnerable hours (nighttime, holidays)	Number of cases conducted / Number of cases planned Number of cases conducted / Number of cases planned Number of cases conducted / Number of cases planned			→	
Improving Subcontractors' Safety Management Systems	**Strengthening the Responsibilities and Role of Safety Management of Representatives of Subcontractors** • Establishing a safety management plan through the subcontractors' council and announcing the results of the plan implementation	Once a month			→	
	Strengthening Standard Record/Management • Thorough review, maintenance, and management of Hi-STANDARD • Evaluating subcontractors' standard work manual and confirming feedback	Number of cases conducted / Number of cases planned Once a year			→	
	Strengthening Competency of Subcontractors' Safety Managers • Hold meetings between subcontractors' safety managers and the Safety Department and share and disseminate improvements • Inspecting standard performance of high-risk work or managing and maintaining the records of results of inspections	Once a month Number of cases improved / Number of feedbacks			→	

Health, Safety,
and Environment (HSE)
Management Report 2022