



Safety and Health Management Report 2023

2023 HD Hyundai Heavy Industries (HD HHI) Safety and Health Management Report



This is the annual report of HD Hyundai Heavy Industries ("HD HHI") on safety and health management, issued to disseminate the value of Safety First ("S1") management and contribute to the spread of the safety culture and communication by providing stakeholders, as well as all employees, with broader understanding and information on overall activities in safety and health. HD HHI will continue to share and communicate its safety vision and the implementation progress of its business plans and the results thereof.



HD HHI, with its infinite potential, has been taking steps toward becoming a global leader in the shipbuilding industry through its creative wisdom, positive thinking, and unwavering drive.

**CREATIVE
WISDOM
POSITIVE
THINKING
UNWAVERING
DRIVE**



SAFE AND ECO FRIENDLY MANAGEMENT

HD HHI has grown into a sound enterprise that brings happiness and prosperity to people through its safe and green management.

HD HHI Business Units

SHIPBUILDING & OFFSHORE BUSINESS

The HD 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 design and purchasing to construction, transportation, installation, and testing of various types of plants, including fixed and floating plants for developing offshore oil or gas fields and other onshore plant facility modules. The Shipbuilding & Offshore Business Unit will continue to serve as a foundation for the Republic of Korea to develop as the world's best shipbuilder based on its innovative technology and cutting-edge systems.



NAVAL SHIPBUILDING BUSINESS

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 multi-purpose escort ships. They have also constructed next-generation destroyers and submarines and have contributed to the defense industry's export by acquiring naval vessel orders from abroad.



ENGINE & MACHINERY BUSINESS

HD HHI, the top engine manufacturer which holds a market share of approximately 35% in the global large engine market, succeeded in developing the innovative "HiMSEN Engine" with a maximum output of 36,000 horsepower. The Engine & Machinery Business Unit contributes to positioning HD HHI as a global engine manufacturer with world-class technologies based on HiMSEN Engine, the world's largest midsize engine.





PART.1

Safety and Health Policy

Safety Message from the Chief Executive Officer (CEO)



Lee Sang-kyun, President
HD HHI CEO

“Let the labor-management work together to create a safe workplace that is free of fatal accidents because of an enterprise-wide safety management system.”

At HD HHI, there is not one single task that must be undertaken at the expense of one’s safety. We are responsible and obligated to create a safe workplace so that all workers can come home from work in the same condition they came to work. We at HD Hyundai Group chose “Safety for All” as one of our 4 core values in commemoration of our 50th anniversary so we can promote the safety of our customers, society, and humanity by pursuing and abiding by the highest safety standards.

To make HD HHI a safe place for all this year, all organizations and levels of the Company must participate in establishing “enterprise-wide safety management” where all of their work is viewed from a “safety” perspective and all risk factors are identified and removed in advance.

As the CEO, I will ensure workplace safety and health as follows so that all employees of HD HHI can perform their jobs in a safe and pleasant environment: First, I will strengthen field-oriented risk assessment. I will ensure that the labor-management focus their capabilities together to identify and remove risk factors in advance through practical risk assessments in which workers participate and that work is performed in a safe environment.

Second, I will reorganize the site safety training system. While further customizing safety training for workers, I will establish an effective training system by strengthening safety competency at all levels, including supervisors.

Third, I will spare no support in creating a smart and safe working environment. I will secure a fundamentally safe working environment by applying safety-friendly design techniques through active exchanges between design and production organizations and by further upgrading the accident prevention system using DT technology.

Dear HD HHI colleagues,

“Safety first” is the highest management value that should be given priority in any change in the business environment.

The Company will focus all its capabilities this year to realize the abovementioned objectives to create a safe and pleasant working environment for all members of our workplace. I will amply support and invest the resources required for this process as much as possible. I ask all employees to actively participate in securing their safety and health, as well as their colleagues so that our workplace can be a safer and healthier workplace than ever this year.

Thank you.

이 상준

Safety Message from the Chief Safety Officer (CSO)



Noh Jin-yul, President
HD HHI CSO

“Let us establish a safety-first culture through the participation and efforts of all members.”

Despite commencing 2022 with a management policy of “safety first,” unfortunately, there were big and small accidents, including 2 fatal accidents. The Company analyzed the causes of accidents from various angles to establish highly effective measures to prevent similar accidents from recurring. In addition, it will continuously check and supplement the effectiveness of site operability.

In 2023, HD HHI puts “a safe workplace for all” as the first safety policy. We aim to establish a “safety-first culture” in which all members participate by making field-oriented risk assessment a way of life, improving the safety capabilities of all employees through improved safety training, building a smart safety management system through the use of DT technology, and establishing a shared growth system by strengthening the safety management of subcontractors and foreign workers.

As for risk assessment, in line with the direction of the “Serious Accident Reduction Roadmap” announced by the government in November last year, we will strengthen the existing periodic risk assessment, the “site risk assessment” where each worker identifies and takes action on daily risk factors before work through toolbox talks, and the “ad-hoc risk assessment” for non-routine and atypical work. As a result, we will have a systematic and effective “risk assessment” system in the field unique to HD HHI in which the labor-management participate.

Efforts to strengthen the safety consciousness and capabilities of all employees will also continue. We plan to continuously improve the enterprise-wide safety culture by introducing an integrated safety culture diagnosis program to identify the safety culture of each organization and establish and implement customized

improvement strategies based on the results.

The safety training system will also be innovatively reorganized to increase its effectiveness by developing various content, such as safety shorts, visual site safety posts, and safety mascots, and creating an experience/practice-oriented participatory environment.

This year, the reliability of the advanced risk prediction system will be further improved through the use of big data, which has been in progress since last year, and the advanced risk detection and monitoring function of high-risk situations with artificial intelligence (AI) control systems will be continuously expanded to build a smart safety system.

We will reinforce the prevention-oriented health management system by deriving management indicators using basic health information to enhance employee health and improve the advanced hazard assessment process by improving the hazardous chemical management system.

Dear HD HHI colleagues,

Safety should never be a pending issue. Safety is a must, not an option, to protect precious lives. To eradicate accidents at our sites, the participation of all employees, along with the commitment of the labor-management to prevent accidents, should be prioritized. This year, I ask all of you to always work safely so that no more precious lives are lost in our workplace. Thank you.

노진율

Health, Safety, and Environment (HSE) Policy and Objectives in 2023

HD HHI has set HSE management as its core corporate value, complying with fundamentals and principles and building a solid safety culture. In 2023, we have set “a safe workplace for all” as our priority and are making enterprise-wide efforts for sustainable safety management with the objectives of “establishing a safety-first culture through the participation of all members.”

2023 Policy on Health, Safety, and Environment

Under the firm belief that there is nothing more important than life, the labor-management collaborated to make it clear to all employees and stakeholders that HSE will be practiced as the top priority.

A safe workplace for all

- Creating a safety-first culture in all divisions
- Building a production-led responsibility and self-regulated safety management system
- Creating a DT-based smart, safe working environment

A pleasant and healthy workplace

- Operating and establishing a prevention-oriented health management system
- Building a healthy workplace through hazardous chemical management

An eco-friendly corporate culture

- Realizing green growth through low-carbon, green management
- Establishing an environmental pollution prevention and legal compliance system

Lee Sang-kyun, President & CEO 이 상 준
HD HHI Co., Ltd.

HSE Objectives in 2023

“Establishing a safety-first culture through the participation of all members”

Accomplishing the objectives of zero fatal accidents and an accident rate of 0.175 or less

- Making field-oriented risk assessment a way of life
- Reinforcing safety capabilities through customized safety training
- Eliminating risk factors in advance by improving safety-based design and construction methods
- Reinforcing support for subcontractors' safety and health for shared growth

Promoting employee health through prevention-oriented health management

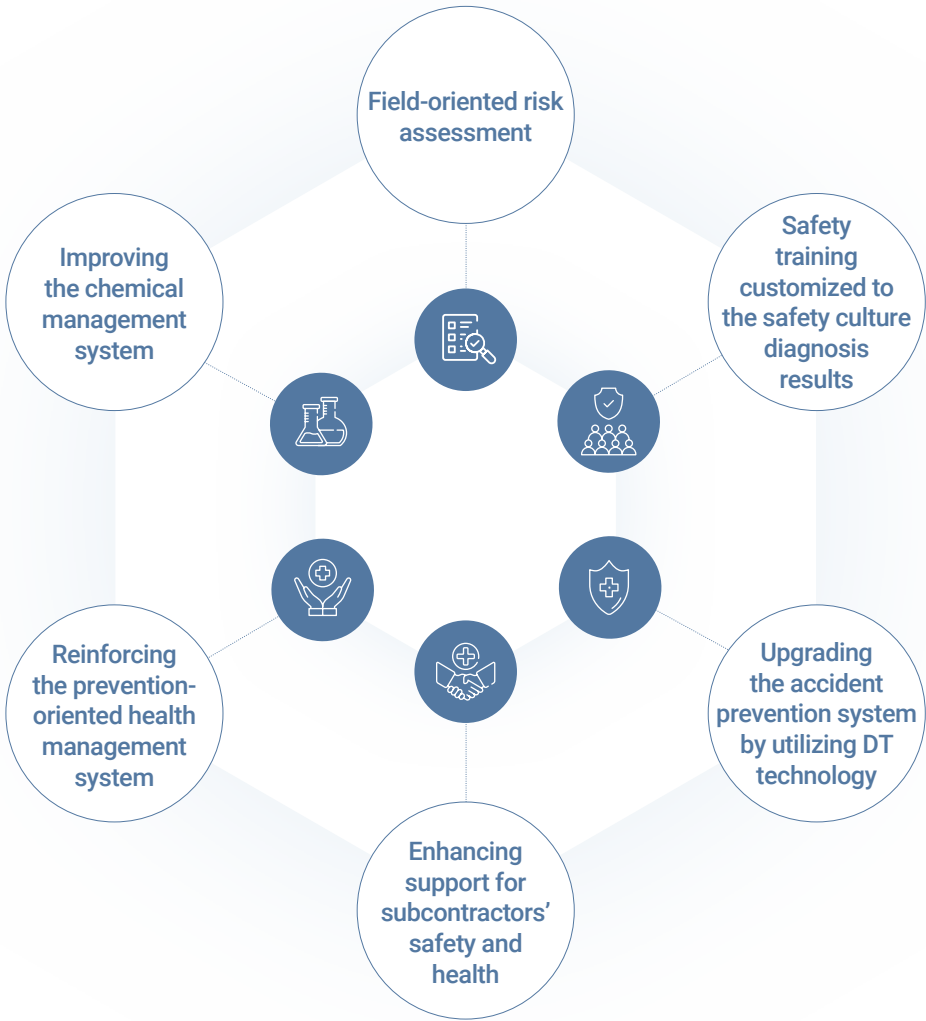
- Internalizing a prevention-oriented health management system
- Building a foundation for strengthening subcontractors' health management capabilities
- Advancing the management system by improving the chemical management system

Implementing a sustainable, green management system

- Reinforcing green management by strengthening the environmental management system
- Responding to climate crises by advancing eco-friendly technology

HD HHI's Key Initiatives for Promoting Safety

HD HHI has targeted zero fatal accidents and an accident rate of 0.175 or less, and it is promoting employee health through prevention-oriented health management as its safety and health objectives this year. We intend to exert every effort to preemptively manage safety 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 objectives. We will also strive to make HD HHI safer by collecting workers' opinions on safety and health, identifying risks, and developing a well-organized safety training system.





PART.2

Organization, Members, and Roles of the Safety and Health Management Group

Roles and Responsibilities of the Safety Division

HD HHI's Corporate Safety and Health Office consists of the Corporate Safety Department/Corporate Safety and Health Support Department and the Safety Departments of each Business Unit. The former organizations plan enterprise-wide safety and health policies and systems, operate the HSE management system, manage incident and accident statistics, and deal with labor-management and government relations, while the latter performs the line function, such as planning and implementing safety for Business Units, investigating accidents, establishing countermeasures, and managing site safety.

Main Functions

Corporate Safety Department/Corporate Safety and Health Support Department	Safety Departments in Each Business Unit
<ul style="list-style-type: none">• Safety policy-making, system planning, and business planning• Incident/accident statistics and reward management• Enterprise-wide safety and health training• Operation of the HSE Management System• Operation of safety management programs for subcontractors• Carrying out business affairs related to the Occupational Safety and Health Committee, labor-management relations, and government affairs• Firefighting/disaster response and the operation of the Safety Control Center• Process Safety Management (PSM)• Medical examinations, control of occupational diseases, prevention of infectious diseases, etc.• Operation of health promotion programs for workers• Improvement of the working environment and the control of hazardous chemicals	<p>Office staff: Safety planning, operations, training, and ship owner/client relations</p> <ul style="list-style-type: none">• Safety planning and safety and health training for Business Units• Managing site high-risk factors• Assisting subcontractors in safety activities (meetings, etc.)• Holding safety management meetings• HSE affairs for ship owners and clients; marketing assistance• Investigation of major incidents and establishment of countermeasures <p>Field safety supervisors: Site safety management</p> <ul style="list-style-type: none">• Site safety walkarounds and improvements• Approval of Permit to Work (PTW) and site inspections• Discipline for safety rule violations• Emergency response• Emergency response drills in different areas/situations

Functions of the Corporate Safety Department

Safety Planning Section

- Safety policy-making, system planning, and business planning
- Implementation and operation of the safety and health management system
- Safety and health management systems (ISO 45001) and safety standards and guidelines
- Safety Leading Indicators (SLI), integrated HSE management systems (Hi-SEs)
- Risk assessment (HI-STANDARD)
- Compliance with relevant laws (KEF, KOSHIPA)
- Operation of the Corporate Safety and Health Office

Safety Culture Section

- Planning and operation of safety training systems
- Building and operation of safety training management systems
- Development and implementation of safety training programs
- Development and implementation of educational content
- Planning and implementation of safety culture assessments
- Operational support for the Integrated Safety Training Center (ISTC) / Safety Experience Training Center (SETC)

Safety Risk Management (SRM) Section

- Operation of big data on safety and accident prediction systems
- Enterprise-wide safety improvement (Hi-SAFE) activities
- Risk identification and removal
- Supporting the Design / Production / Production Support sections to improve safety
- Incident and accident statistics management
- Conducting safety-related DT projects / Benchmarking external best practices

Safety Inspection Section

- Inspecting enterprise-wide high-risk process planning (themes) and improving site safety
- Taking immediate measures against site high-risk factors (securing safety authority, reporting safety risks)
- Safety inspection for high-risk work during vulnerable times
- Safety inspection and technical support for in-house/external subcontractors
- Inspection and improvement of compliance with safety-related laws and regulations
- Implementation and management of countermeasures against major incidents

Functions of the Corporate Safety and Health Support Department

Safety Supporting Section

- Occupational Safety and Health Committee
- Government affairs, labor-management relations, and joint labor-management inspections
- Firefighting, hazardous substance management / disaster response
- Lifesaving and rescue equipment management
- Operation of integrated video monitoring systems and control centers
- In-house traffic safety management and support for events

Health Management Section

- Health policy and system planning
- Medical examinations and follow-up management
- Operation of occupational disease control and health promotion programs
- Working environment monitoring and improvement
- Hazardous chemical management
- Protective and personal equipment management
- Prevention and management of musculoskeletal disorders (MSDs)

Corporate Safety Department/Corporate Safety and Health Support Department of the Corporate Safety and Health Office

Under the direct control of the CSO, the Corporate Safety Department / Corporate Safety and Health Support Department serve as a control tower for enterprise-wide safety and health management, reviewing and planning the overall HSE systems/policies and supporting the efficient safety activities and inspections of the safety departments in each business unit.

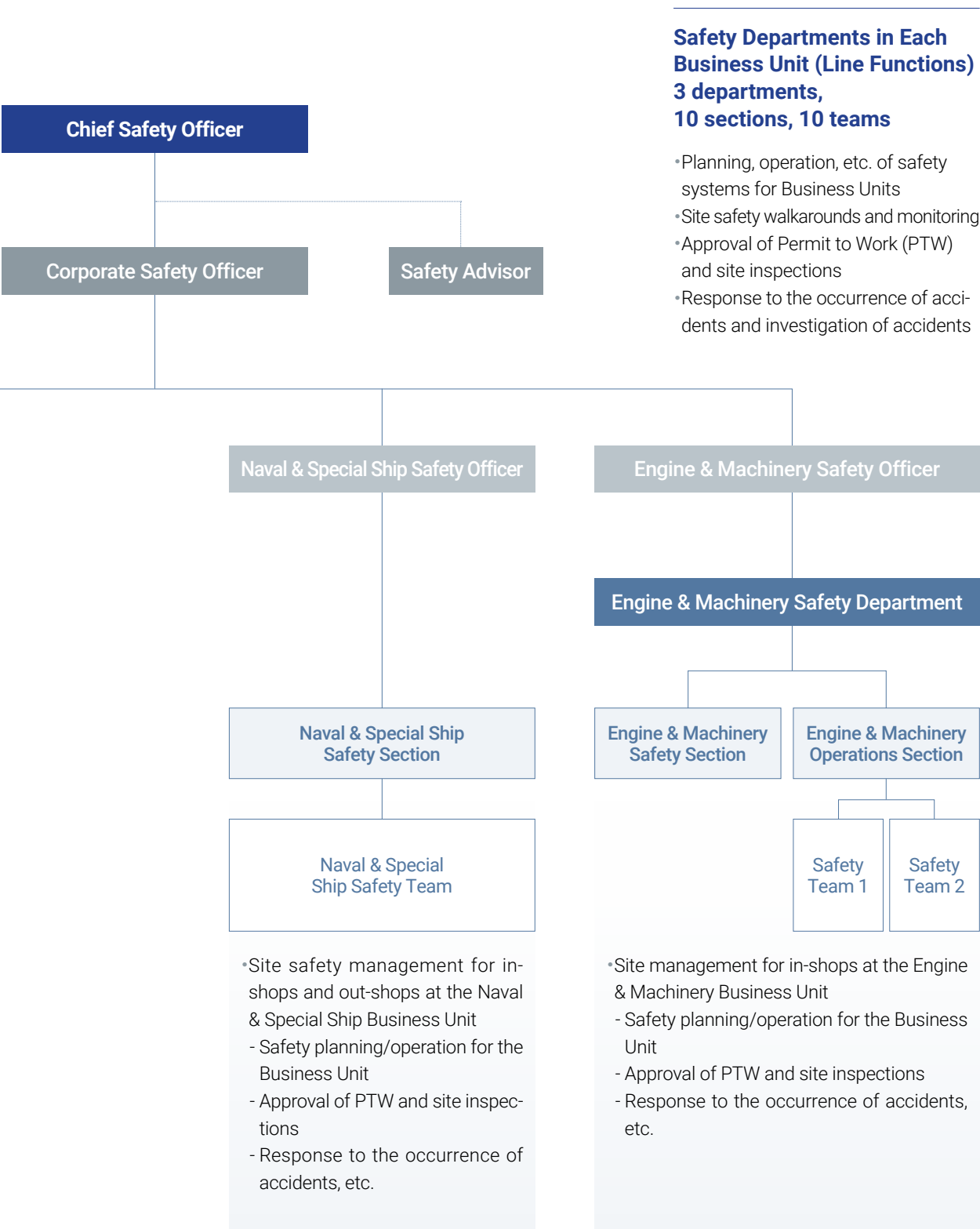
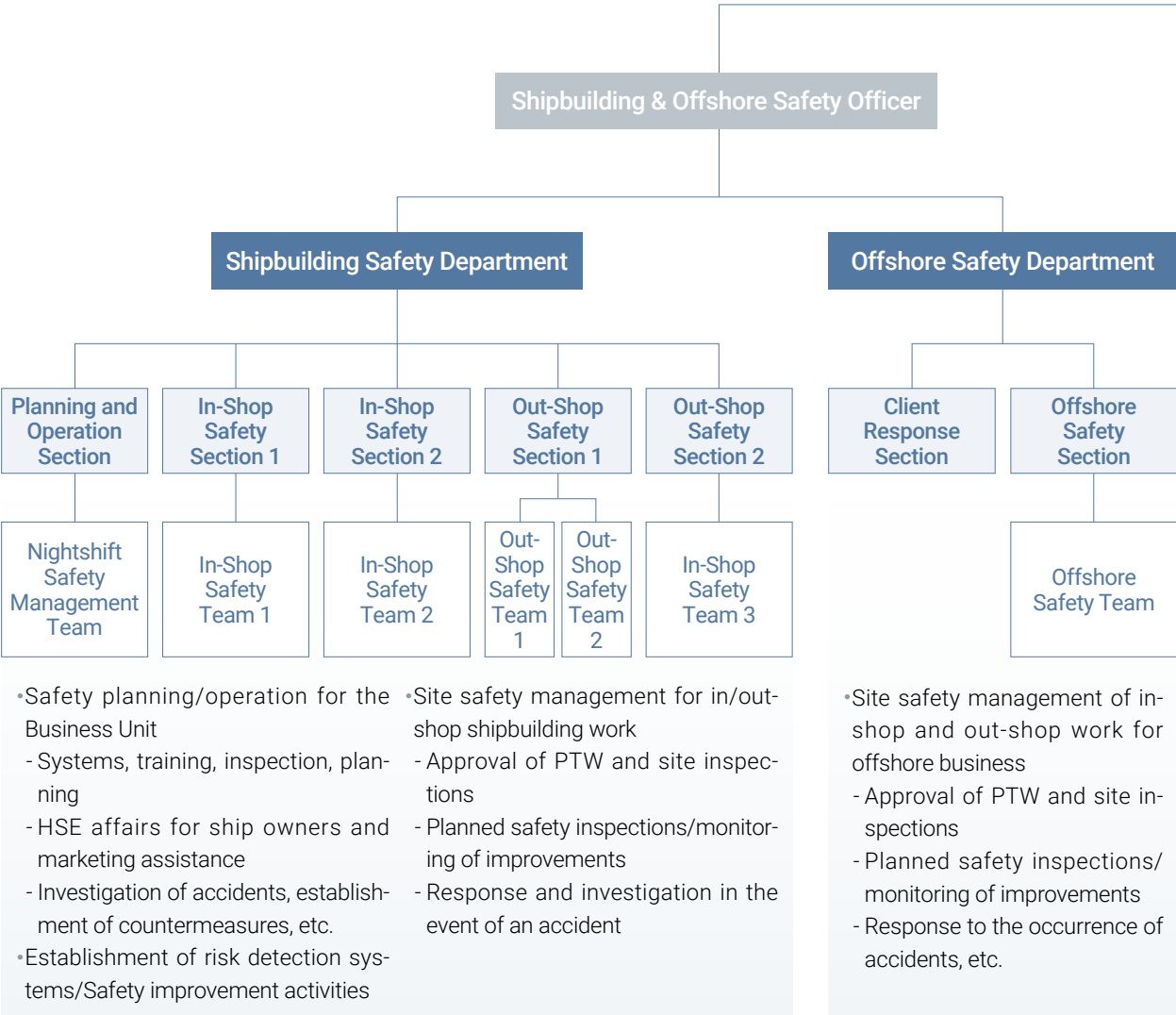


**Corporate Safety Department/
Corporate Safety and Health
Support Department
(Staff Duties)**
**2 departments, 6 sections,
2 teams**

- Review and planning of enterprise-wide HSE systems/policies
- Management of statistics of accidents and investigation of accidents
- Government affairs/labor affairs/response to and management of citizen complaints
- Management of enterprise-wide safety and health standards and guidelines
- Enterprise-wide health planning

Safety Departments in Each Business Unit of the Corporate Safety and Health Office

The safety departments in each business unit make the workplace safer by conducting safety activities and safety inspections and responsibly establishing a field-oriented and self-regulated safety management system through close site management.



Safety Departments in Each Business Unit (Line Functions) 3 departments, 10 sections, 10 teams

- Planning, operation, etc. of safety systems for Business Units
- Site safety walkarounds and monitoring
- Approval of Permit to Work (PTW) and site inspections
- Response to the occurrence of accidents and investigation of accidents

PART.3

Safety and Health Budgets and Facilities



Current Safety and Health Budgets

Safety and Health Budget Standards and Composition

Classification	Definitions	Details
Personnel Expenses	Human resource management expenses of the HSE organizations and safety and health work allowances for safety and health supervisors	Human resources assigned to safety and health management <ul style="list-style-type: none">• Safety Division: Safety and health management staff, field safety supervisors• Production Division: Safety Keepers (Safe Clover)• Subcontractors: Allowances to signalmen for cranes, T/Ps, etc., safety supervisors, fire watchers, and confined-space watchers of subcontractors Work allowances for supervisors <ul style="list-style-type: none">• Safety responsibility allowances for supervisors
Personal Protective Equipment (PPE)/Safety Consumables	Costs of purchasing, maintaining, and repairing statutory PPE and safety consumables for preventing accidents and health hazards	PPE <ul style="list-style-type: none">• Hardhat (to prevent the hazards of fall and electric shock: ABE)• Safety boots (8", 6", 4", blasting, nonslip, and anti-static)• Masks (dust masks / gas masks / dust/gas masks / air supply masks / electric respiratory protective equipment)• Safety harness• Safety glasses (ordinary/dust-proof/wearable with eyeglasses)• Earplugs (earmuffs) Other safety-related consumables <ul style="list-style-type: none">• Personal gear: Safety gloves, protective suits, face shields, heated vests, cooling jackets, cool sleeve protectors, ice jackets, fine-dust masks, etc. Installation of safety facilities (sub-materials) <ul style="list-style-type: none">• Installation of safety guard rails, fall prevention nets, manhole covers, lifelines, ropes, ventilation fans, etc., and the cost of materials
Safety and Health Training	Expenses for statutory or voluntary safety and health training programs for workers, supervisors, and safety and health personnel (including subcontractors)	Compulsory safety and health training <ul style="list-style-type: none">• New employees / supervisors /workers (regular) / workers with altered assignments• Safety and Health Officer / Safety Manager / Health Manager• Special safety and health training / hazardous chemicals / MSDS Internal safety and health training <ul style="list-style-type: none">• Newly appointed supervisors / returners / foreign workers / rule violators / traffic safety / Safety Academy• Safety and health training for union members / HSE promoters / leadership building for safety supervisors (including subcontractor safety supervisors)• Training on qualifications (for platforms, cranes, gondolas, forklifts, aerial work vehicles, etc.)• Special lectures on safety Other matters related to safety and health training <ul style="list-style-type: none">• (Outsourced) Operation of the Integrated Safety Training Center (ISTC) and Safety Experience Training Center (SETC)• Development of training programs, safety guidelines (manuals), safety and health management plans and reports, booklets on safety-related statutes and regulations, fees for internal safety instructors, etc.• Promotional materials: Safety signs/placards, printed materials, etc.

Classification	Definitions	Details
Safety Incentives/ Events	Expenses for incentivizing organizations/ individuals for outstanding safety performance and safety events	Incentives to organizations for outstanding performance <ul style="list-style-type: none">• Outstanding departments / outstanding teams / outstanding subcontractors Incentives to individuals <ul style="list-style-type: none">• Outstanding supervisors / outstanding subcontractor safety supervisors / outstanding safety supervisors / spot awards / incentives offered at safety events Safety events <ul style="list-style-type: none">• Safety events (risk contests, quiz contests, etc.), safety forums, etc.
Safety Inspection/ Consulting	Expenses for statutory and non-statutory safety and health inspections, tests, reviews, and advisory services on safety and health through external institutions (experts)	Inspections, tests, and consulting on safety and health <ul style="list-style-type: none">• Inspections on safety and health (by an external institution or internally)• Certification/inspection of dangerous machines and instruments• HSE Management System (ISO 45001, ISO 14001)• Consulting on safety and health (PSM, firefighting, safety management of subcontractors, etc.)• Safety Management Committee, Safety Innovation Advisory Committee
Health Promotion	Expenses for activities aimed at protecting and promoting workers' health	Medical examinations <ul style="list-style-type: none">• National examinations / special examinations / comprehensive examinations / others (temporary, occasional, etc.) Health promotion <ul style="list-style-type: none">• Operation of the Total Health Promotion (THP) program, rehabilitation programs, smoking-cessation / obesity clinics• Prevention and control of infectious diseases, prevention and vaccinations of influenza, etc.• Operation of an in-plant hospital (outsourced) / local medical office; operation of the oriental medicine clinic; operation of ambulances Management of working environments <ul style="list-style-type: none">• Monitoring of working environments; inspection of local ventilation (plans to prevent hazards and dangers), etc. Payment of medical benefits, etc. <ul style="list-style-type: none">• Payment of medical benefits for injuries on duty; medical treatment of musculoskeletal disorders (MSD) and incurable diseases; expenses for disinfection and sterilization; convenience facilities for hygiene and health, etc.
Safety Maintenance and Repair	Expenses for maintaining and repairing major safety devices and safety protection equipment	Maintenance and repair of major safety systems and safety protection equipment (consumables)

Classification	Definitions	Details
Investment in Safety Facilities	Investment in safety facilities, equipment, IT, and technology to protect against accidents, improve working environments, and promote workers' health	<p>Investment in safety facilities and equipment to prevent accidents and protect health</p> <ul style="list-style-type: none">• Introduction of safety facilities and systems aimed at preventing accidents• Production and purchase of safety equipment and jigs• Improvement of safety by replacing and repairing worn-out machines and equipment according to the results of safety and internal inspections of dangerous machines and equipment (such as cranes and working vehicles)• Development of safety training content and improvement of the training environment• Ventilation (local ventilators, dust collectors, air-conditioners, etc.) and lighting fixtures• Expansion of medical facilities for health promotion; purchase of medical instruments and equipment; replacement of worn-out instruments and equipment• Establishment of a system (such as gas detectors, fire detectors, ventilation systems) for safety management for high-risk areas (such as a confined space)• Purchasing, supplementing, and replacing firefighting/disaster prevention equipment• Control equipment and systems for workplace safety and traffic control (closed-circuit television [CCTVs]) and image analysis systems)• Construction of facilities in preparation for natural disasters (such as typhoons and earthquakes)• Equipment, vehicles, etc. for exclusive use in safety management activities for responding to emergencies <p>Investment in computer systems and technological development to prevent safety accidents</p> <ul style="list-style-type: none">• Safety design programs (such as simulators), models for prediction of risks with DT, etc.• Development of risk assessment-related systems• Development of technology for preventing accidents, such as a system for preventing collision of cranes/forklifts• Building, operating, and upgrading safety management programs, such as the integrated HSE management systems (Hi-SEs) <p>Investment in emergency safety improvement (activities including the elimination of high-risk factors in fieldwork and safety management)</p>



Current Safety and Health Facilities

Training,
Firefighting, and
Health Facilities

Training facilities

Classification	Size	Capacity	Numbers
Integrated Safety Training Center (ISTC)	Area of 3,591 m²	-	1
Safety Experience Training Center (SETC)	Area of 1,386 m²	120 persons	1
VR Safety Training Facilities	-	16-20 persons	3
Lecture Room	-	36-120 persons	8
Total			13

Firefighting Facilities

Classification	Quantity	Classification	Quantity
Fire extinguishers	22,600	Multi-purpose stretchers	15
Fire hydrants	2,680	Xenon search lights	11
Automatic fire detection systems	3,383	Smoke-penetrating lanterns	39
Sprinklers	120	Megaphones (portable)	4
Gas-type fire extinguishers	33	Electric winches	10
Air respirators	84	Thermal image cameras	2
Fire suits (coats and pants)	55	Automated external defibrillators (AEDs)	29
Fire helmets	47	Oxylators (portable)	3

Health-Care Facilities

Classification	No. of personnel	No. of facilities
Health Promotion Center	3 doctors and 5 nurses	1
	4 physiotherapists and 1 kinetic therapist	1
Offshore In-Plant Hospital	1 doctor, 2 nurses, 1 physiotherapist	1
Local medical offices	7 nurses	7
Oriental medicine clinic	2 oriental medicine doctors and 2 nurses	1
Psychological counseling office	2 psychological counselors and 1 clerk	1

Current Status of
Dangerous Machines
and Equipment

Classification		Total	
Cranes (rated load)	Overhead/ gantry	Below 10 tons	381
		Below 50 tons	360
		Below 100 tons	80
		200 tons or below	71
		500 tons or below	23
		Above 500 tons but not above 1,000 tons	2
		Above 1,000 tons but not above 1,500 tons	2
		Above 1,500 tons but not above 2,000 tons	2
		Subtotal	921
	Hoist	Below 5 tons	254
		5 tons or above	144
		Subtotal	398
	Tower	20 tons or below	57
		Above 20 tons	2
		Subtotal	59
	Jibs/others	Below 10 tons	93
		Below 50 tons	38
		100 tons or below	13
		Above 100 tons but not above 200 tons	6
		Above 300 tons but not above 400 tons	1
Subtotal		151	
Mobile cranes		34	
Total		1,563	
Pressure containers (internal volume)	Below 2 m³	604	
	Below 5 m³	180	
	Below 30 m³	25	
	Below 40 m³	0	
Total		809	
Shearing machines	Below 50 tons	8	
	50 tons or above but below 200 tons	5	
	200 tons or above but below 300 tons	0	
	300 tons but below 1,000 tons	0	
Total		13	
Gondolas		1,234	
Lifts		36	
Conveyors		111	
Industrial robots		3	
Grand total		3,769	





Current Status
of Equipment
subject to PSM

Division	Department	Process/Facility	Substance in Use	Remarks
Shipbuilding & Offshore	Pre-Painting Department	Painting shops (Shops 1-8)	Paint/NG	
		Yard 2 Painting Shops (Shops 1-6)	Paint/NG	
	H Dock Painting Department	Offshore Painting Shops (Shops 1-2)	Paint/NG	
Engine & Machinery	Engine PSM Management Department	Yard 1-1 LPG supply systems (fuel gas supply)	LPG	
		Yard 1-2 LNG supply systems (fuel gas supply)	LNG	
		Yard 1-3 methanol storage and supply systems	Methanol	
		Yard 2-2 LNG supply systems (fuel gas supply)	LNG	
		Yard HiMSEN 2 gas compressors	LNG	
		Yard HiMSEN 2 methanol storage and supply systems	Methanol	*Permission pending
	Engine Development and Test Department	Yard 1-3 LNG supply systems (fuel gas supply)	LNG	*Permission pending
Corporate Safety and Health Office	Facility Planning Department	Ethylene storage facilities	Ethylene	
Management Support	Logistics Support Department (HyukJin Co., Ltd.)	In-house filling stations (oil tanks)	petrol and kerosene	

Training Facility
(Integrated Safety
Training Center,
ISTC)

The ISTC is a comprehensive safety training facility designed to train job-specific safety work procedures through lectures, practices, and experiences in a simulated worksite.

- Operation: KNDI (on consignment)
- Composition of Training Facilities: 11 training facilities (Area: 3,591 m²)
- * Others: 3 VR experience systems

Classification	Current Status	Photos		
Theory (5)	1 lecture hall, 1 medium lecture room, 3 small lecture rooms			
Practice/ Experience (5)	#1 Welding, piping/ outfitting			
	#2 Fitting/fit-up, painting (blasting, spraying)			
	#3 Electrical and mechanical work			
	#4 Cranes, slings			
	#5 Scaffold, gondolas, longis			
Others (1)	VR experience systems			

*Instructors: 52 internal instructors (including field supervisors and safety sector personnel)
* Internal instructors in each field have at least 10 years of relevant experience.

Current Status of Training Courses (As of 2022)

Classification	Curriculum	No. of Courses	No. of Instructors (per session)	No. of Trainees (persons)
Statutory	Orientation for new recruits	1	237	9,336
	Training for supervisors	1	60	3,358
	Training for managers	1	2	112
Jobs	Practice/experiential training (for 8 high-risk jobs)	6	572	6,507
	Competency-building training for safety supervisors/subcontractor safety supervisors	2	11	331
Internal Qualifications	Crane signaling, gondolas, scaffolding	8	148	2,196
	Safety training for short-term work	1	24	1,125
	New supervisors	1	2	54
Others	Special safety lectures for officers	1	3	132
	Training for safety leadership improvement	2	2	26
	Special safety training for foreigners	1	16	442
	Special safety training for subcontractors' representatives	1	2	146
Total		26	1,079	23,765



Training Facility
(Safety Experience
Training Center,
SETC)

The SETC in the Technical Education Institute has contributed to accident prevention by offering basic safety training for new recruits and transferred employees. Trainees can recognize the importance of observing safety rules in the workplace by practicing and experiencing various situations, including climbing vertical ladders, walking on scaffolding, entering confined spaces, losing safety harnesses, firefighting, and using hand tools. Since its establishment in 2005, the center has provided training to over 350,000 individuals.

- Location: Within HD HHI Technical Education Institute
- Establishment: 2005 / Improvement: 2021
- Size: 1,388 m² / Seating capacity: Maximum 90 persons



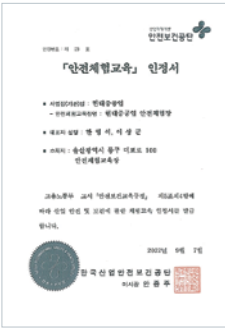
Integrated Safety Training Center (ISTC): Certified as a designated institution for training scaffolding work

The ISTC was certified as a “designated institution for training scaffolding work” for the first time in the shipbuilding industry in April 2019. To be certified, the center has undergone certification assessments on facilities, instructors, training content, and training plans of an external scaffolding training institution (the Korea Scaffolding Institution). It has maintained the stability of its training courses through an external audit each quarter since it was certified.



Safety Experience Training Center (SETC): Recognized as a private safety experience and training center

The SETC was recognized as a private safety experience and training center in September 2022. To be recognized as a private safety experience and training center, the SETC was assessed for suitability of the course operation plan, human resources, facilities, and equipment by the Korea Occupational Safety and Health Agency. When training is completed at an accredited training center, periodic training hours are double-counted as the statutory training hours (regular training for workers). The SETC provides safety experiences to various external agencies and organizations.



**Training Facilities
(VR Safety Training Facilities)**

Since the center introduced a virtual reality (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 4 different foreign languages (English, Chinese, Vietnamese, and Uzbek) to meet the trainees’ language requirements and facilitate the employment of the increasing number of foreign workers. In 2022, the center produced 9 types of new content to raise trainee satisfaction.

Shipbuilding VR training facilities	2 facilities	Offshore VR training facilities	1 facility
• Location: 1 facility each in Yards 1 and 2		• Location: 1 facility on the first floor of the Offshore Construction Technology Center	
• Seating capacity: Maximum 16 each		• Seating capacity: Maximum 20	

Composition of VR Content

Experiencing accidents (5 types)	Exercises (6 types)	
• Struck by (a broken lever puller)	• Working in a confined space (within a block)	① Argon purging of pipes
• Caught under (a material that fell while being hoisted by a crane)	• Hot work (cutting a lug)	② Assembling and disassembling trusses
• Caught in (a moving forklift)	• Painting (touch-up painting inside a tank)	③ Being caught in power-operated doors
• Electrocuted (by a live part in a distribution panel)	• Operating hand tools (grinder, lever puller, jack ram)	+ ④ Operating winches (cable laying)
• Falling (while dismantling scaffolding)	• Operating a crane, signaling (loading a block)	⑤ Working on and operating a cherry picker
	• Fire (evacuating from a fire on an LPG carrier)	⑥ Pressure testing
		⑦ Transporting sub-materials
		⑧ Operating cranes to assemble engines
		⑨ Hydraulic work for HiMSEN Engines

Annual Achievements in Training

Classification	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	Suspended because of the spread of COVID-19		
	2021	Suspended because of the spread of COVID-19		
	2022	2,106	933	3,039
	Total	30,062	5,461	35,523

Training Facilities
(Lecture Room)

In addition to the ISTC and SETC, the Corporate Safety and Health Office operates 7 lecture rooms: 2 at Corporate Safety, 3 at Shipbuilding, one at the Offshore, and one at the Engine & Machinery Business Unit.

Lecture Hall at the Corporate Safety Department

- Location: 4F, Health Promotion Center
- Seating capacity: Maximum 120 persons



Small lecture room at the Corporate Safety Department

- Location: 4F, Health Promotion Center
- Seating capacity: Maximum 60 persons



Lecture room in the Offshore Safety Department

- Location: 1F, Offshore Technology Center
- Seating capacity: Maximum 120 persons



Lecture room in the Engine & Machinery Business Unit

- Location: 2F, Main Building, Engine & Machinery Business Unit, (Annex to Machining Yard 1-1)
- Seating capacity: Maximum 40 persons



Lecture room in the Shipbuilding Business Unit

- Location: 2F, Production Technology Center 2
- Seating capacity: Maximum 50 persons



Lecture Hall 1 in the Shipbuilding Business Unit

- Location: 7F, Out-shop 1
- Seating capacity: Maximum 100 persons



Lecture Hall 2 in the Shipbuilding Business Unit

- Location: 7F, Out-shop 1
- Seating capacity: Maximum 100 persons



Safety Facilities
(Firefighting/
Rescue)

The Integrated Control Center broadcasts situations in real-time to respond quickly to an emergency and performs rescue operations. It monitors hazardous work through the 376 CCTVs and utilizes intelligent video analysis solutions to prevent quay accidents.



- Location: 1F, Future Building (area: 57.33 m²)
- Operation: Special Rescue Team (6 members) of the Corporate Safety and Health Office
- Current Status of Equipment: 376 CCTVs, 6 servers for control, 6 55" monitors, 5 neck-band cameras, etc.
- Current Status of Emergency Vehicles

Fire engines

Total of 3



- Location: Fire station garages
- Number of vehicles: 2 in the Main Shipyard; 1 in the Offshore Business Unit

Ambulances

Total of 3



- Location: Fire station garages
- Number of vehicles: 2 in the Main Shipyard; 1 in the Offshore Business Unit

Current Status of Firefighting Systems

Fire extinguishers	Fire hydrants	Automatic fire detection systems	Sprinklers	Gas-type fire extinguishers	Total
22,600	2,680	3,383	120	33	28,816

Current Status of Firefighting/First Aid Equipment

Air respirators		Firefighting suits (coats and pants)	Firefighting helmets	Multi-purpose stretchers	Xenon searchlights
For 50 minutes	Auxiliary masks				
SET	Spare containers	55	47	15	8
84	78	14			
Smoke-penetrating lanterns	Megaphones (portable)	Electric winches	Thermal image cameras	AEDs	Oxylators (portable)
39	4	10	2	29	3

Integrated Management System with Automatic Fire Detection

- Established 24-hr fire detecting and monitoring systems (153 locations in the Main Shipyard and the Offshore fabrication yard)
- 24-hr full-time outsourced management
 - Emergency mobilization and measures upon the signal of a fire from firefighting facilities
 - Planning and conducting 24-hr inspections on sites with fire alarm control stations
 - Shift type (1 team leader, 4 team members): Main shipyard (2 for daytime, 1 for weekends and evening)/ Offshore (1 for daytime)



Health Promotion Center and Medical Facilities

Current Status of Medical Facilities and Personnel

We operate an in-plant hospital, local medical offices, an oriental medicine clinic, and a psychological counseling office to provide health management services, including health counseling and medical treatment, to employees.

Classification		Number of Personnel	Remarks
Health Promotion Center	The In-Plant Hospital	3 doctors and 5 nurses	
	Physiotherapy/Rehabilitation Therapy Centers	4 physiotherapists and 1 kinetic therapist	
Offshore In-Plant Hospital	1F, Offshore Technology Center	1 doctor and 2 nurses	
Offshore Physiotherapy Center	1F, Offshore Technology Center	1 physiotherapist	
Local medical offices	Local medical offices (7 locations)	7 nurses	
Oriental medicine clinic	3F, Culture Building	2 oriental medicine doctors and 2 nurses	
Psychological counseling office	3F, Culture Building	2 psychological counselors and 1 clerk	Mind Garden

The In-Plant Hospital at the Main Shipyard

- Location: 2F, Health Promotion Center
- Medical treatment/Health counseling/First-aid response



Physiotherapy/Rehabilitation Therapy Center at the Main Shipyard

- Location: 3F, Health Promotion Center
- Physiotherapy and Rehabilitation Therapy



The Offshore In-Plant Hospital/Physiotherapy Center

- Location: 1F, Offshore Technology Center
- Medical treatment/Health counseling/First-aid response



Local medical offices at 7 locations in total

- Treatment and health counseling



Oriental medicine clinic

- Location: 3F, Culture Building
- Treatment with acupuncture, moxibustion, cupping, etc.



Equipped with automated external defibrillators

- Located in main buildings with a large number of internal and external visitors



Psychological counseling office

- Location: 3F, Culture Building
- Psychological treatment programs



The Itaewon disaster: Is it their fault that the accident happened?

Lemmings, which live in the grasslands of northern Norway, are immensely prolific, giving birth twice a year to five to 6 pups each time. After just a few years, the population grows exponentially. As population increases, they migrate in search of new habitats to avoid the threat of predators and find food. Lemmings are good swimmers, capable of swimming across most rivers with ease. So, when they encounter a river, they jump in without hesitation.

Then, they die unexpectedly. People see this superficially, thinking that they died because of stupid, blind, ignorant, and collective psychology.

When we are alone, we make rational decisions, but when we are in a group, we are ruled by crowd psychology and do not hesitate to act irrationally, which is sometimes called the "Lemming effect."

Some people said that the Itaewon disaster is a "stampede" caused by collective psychology, like ignorant lemmings.

However, this accident was not due to a "stampede" but a "crowd crush."

Stampede and crowd crush are 2 different concepts. While stampede expresses the irrational behavior of a crowd, reminiscent of one of the irrational animals, crush refers to a management and institutional error in the control of the crowd density.

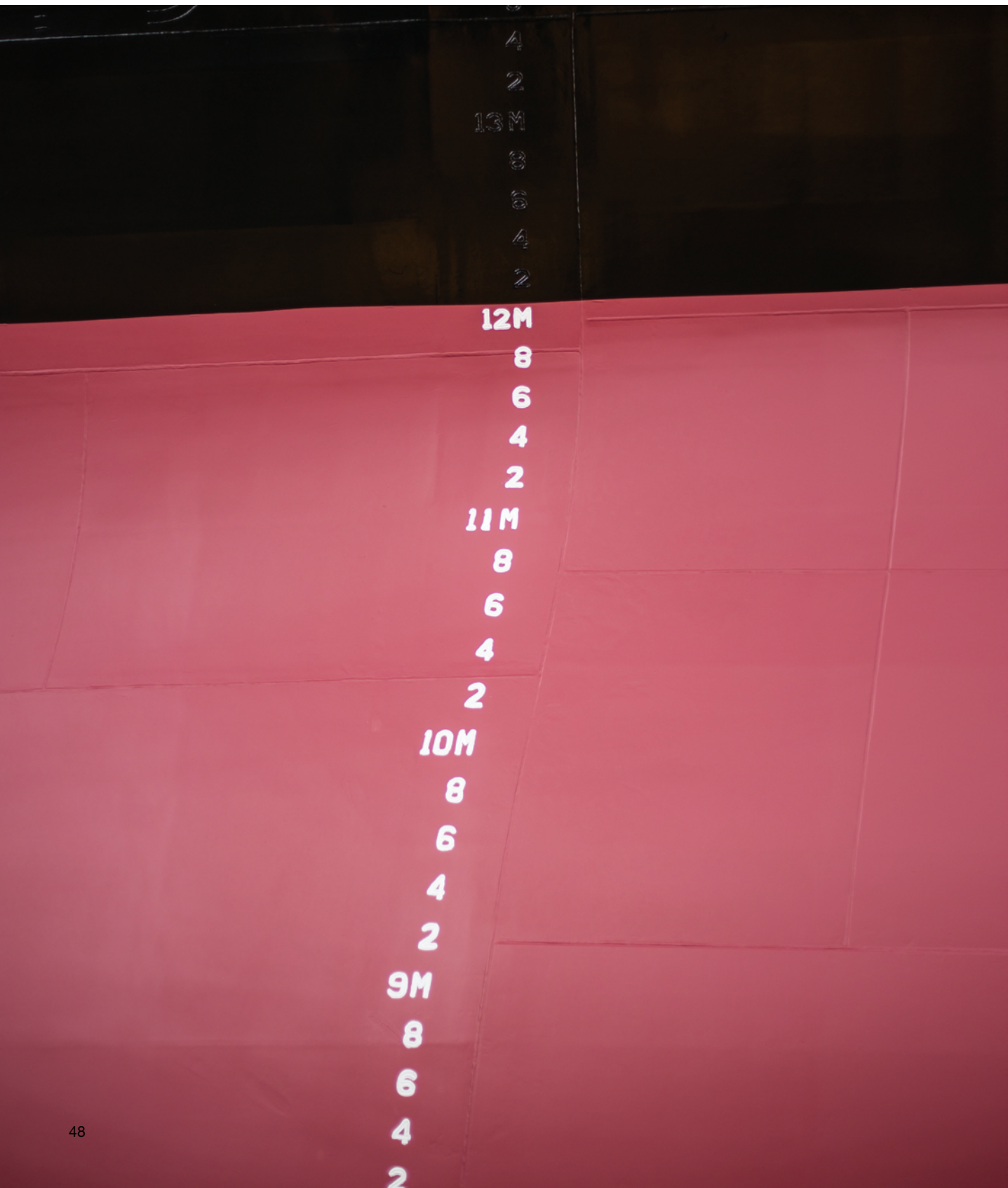
People cannot walk properly if 4 or more gather in a 1 m² area.

In contrast, the situation was so terrible that there were more than 6 people in a 1 m² area.

In addition, the accident scene was a two-way street, so people flocked from both directions.

It is not the people's fault; it is the system that is wrong. It reminds us that safety can never be overemphasized.





PART.4

Safety and Health Management Performance

SAFETY



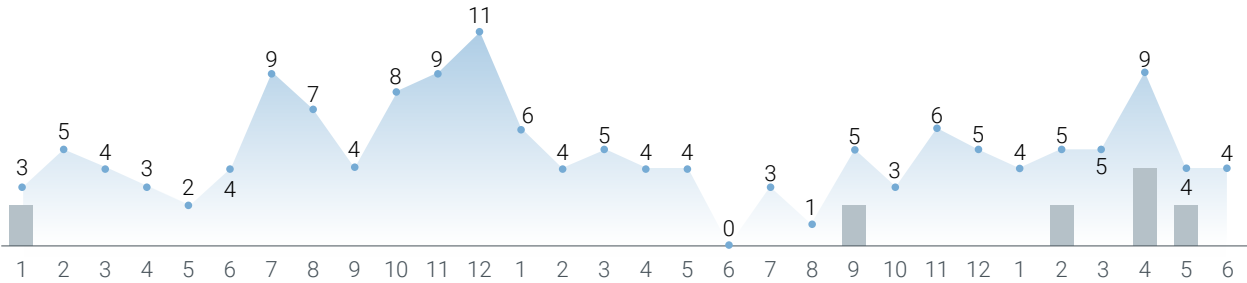
HEALTH

4-1

Safety Management Achievements

Celebrating the 50th anniversary of its founding, HD Hyundai Group has selected “safety for all” as one of its 4 core values. Its labor-management have been concentrating all capabilities for the safety of customers, society, and humanity. HD HHI will strive to maintain an enterprise-wide safety culture by introducing an integrated safety culture inspection program and inspecting the safety culture at each organization.

Safety Management Achievements over the Past 5 Years (2018-2022)



2018

February: Thorough safety inspections of overhead cranes
March: A ceremony of declaring "fair" safety practices
May: Established a nighttime safety management organization
July: Published revised safety guidelines
August: Installed a speed warning system on main roads in the premises
September: Conducted enterprise-wide Safety Moment
October: Developed a tool for examining the level of safety culture
December: Established the Integrated Safety Training Center

2019

January: A workshop for the safety divisions of the Shipbuilding & Offshore Business Unit
February: Examined the level of safety culture
May: Held an agreement ceremony for cooperation in safety management among prime contractors and subcontractors
June: Specialized consulting on Process Safety Management (PSM)
July: Improved the enterprise-wide safety incentive program
August: Established and operated the Offshore Management Center
October: Held an enterprise-wide safety forum
December: Conducted a program for training internal examiners on the safety culture of affiliates

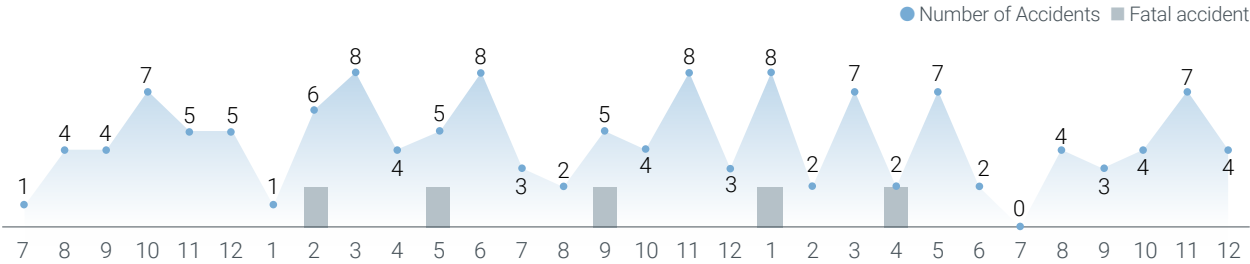
2020

April: Conducted enterprise-wide activities for safety improvement (Hi-SAFE)
June: Established comprehensive countermeasures for improving safety management
- Held a ceremony to declare new safety culture
- Reorganized to a safety-oriented business unit system (established the Safety Production Division / Responsible Safety Management System)
- Established the SRM Team and Standards Innovation Task Force (TF)
- Granted the "Securing Safety Authority (SSA)"
August: Conducted an enterprise-wide safety risk-identifying contest

HD HHI's Footprints

Accident Trends and Major Activities

Since 2016, HD HHI has made continuous efforts to prevent fatal accidents every year under the value of "Safety First (S1)" as the number one management policy. Despite various efforts, such as strengthening the safety of the 3 major safety facilities (scaffolding, lighting, and ventilation), site safety prevention activities at the officer level and above, and expanding and reorganizing the safety units, 2 fatal accidents unfortunately occurred in 2022. HD HHI prioritizes a safe workplace for all and removes site risk factors through risk elimination activities and listening to workers' opinions. In addition, it revised its Hi-STANDARD, the job standard procedure (JSP), to provide more in-depth instructions and risk assessments and strengthen the risk assessment system to focus on field-oriented individual risks, thereby building a self-regulated prevention system.



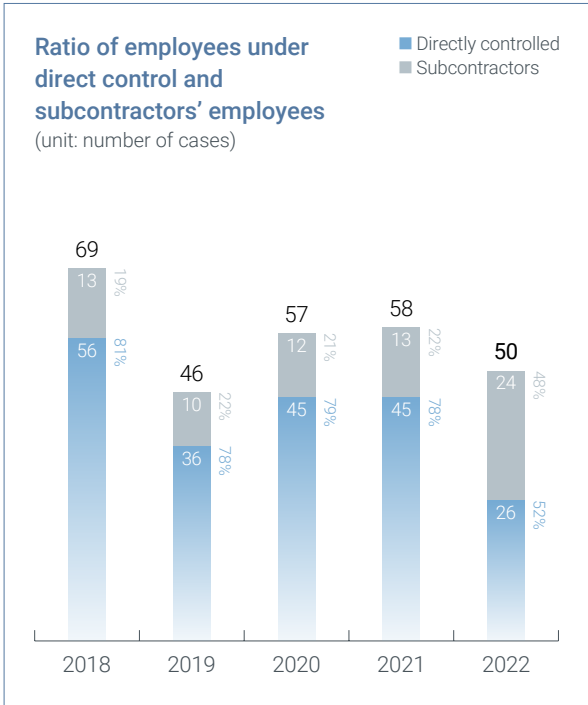
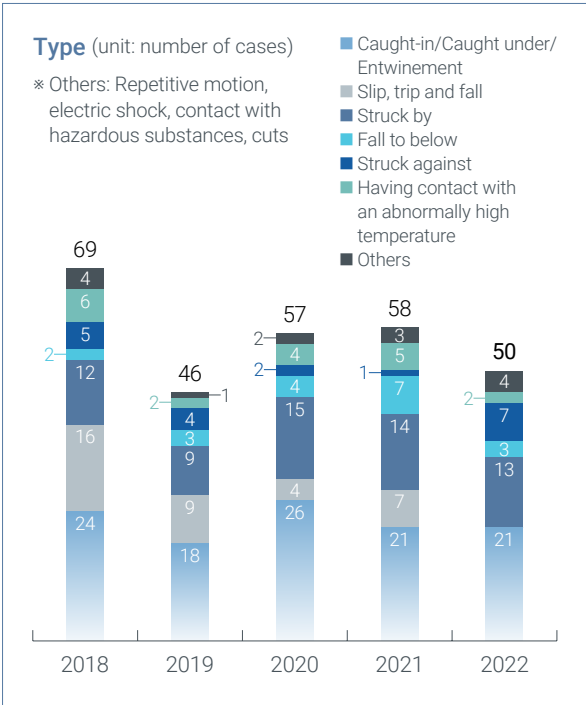
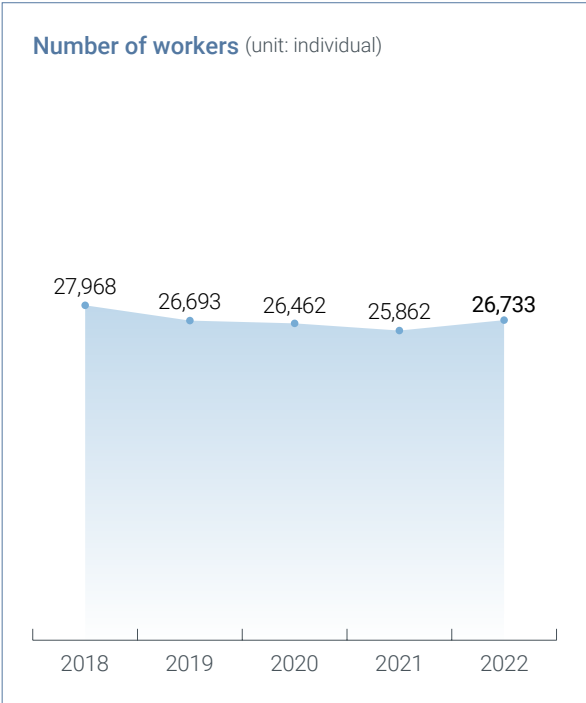
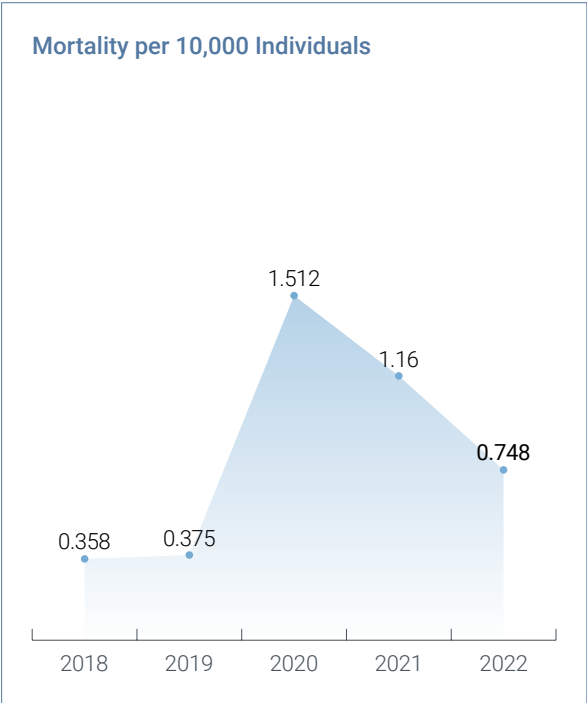
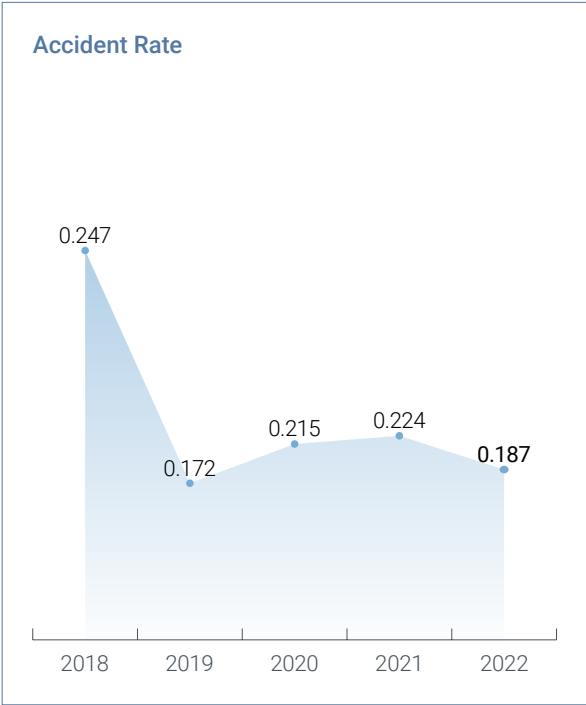
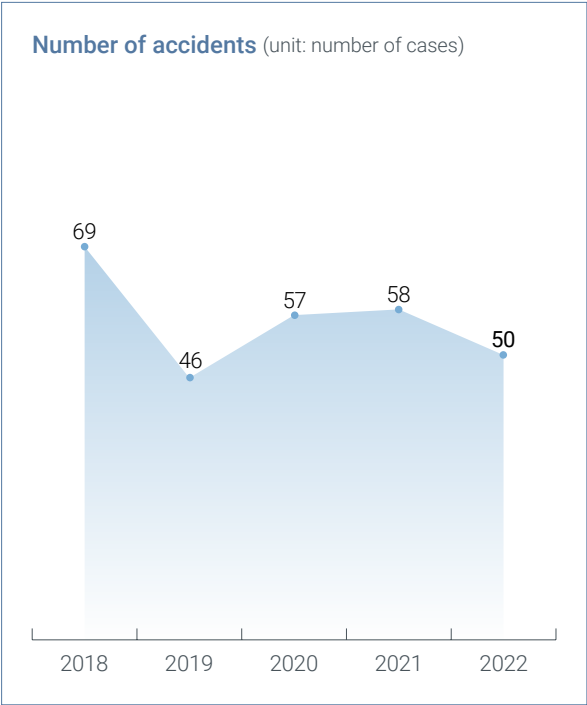
2021

April: Established a triple risk management system for high risks (supervisors – Safe Clover – safety supervisors)
May: Conducted practice/experiential training programs for high-risk work
June: Established comprehensive safety countermeasures to prevent fatal accidents
July: Conducted an enterprise-wide simulation exercise in preparation for typhoons
September: Examined the level of safety culture
October: Established a risk assessment system (Hi-STANDARD)
December: Opened a platform for proposing ideas for safety improvement

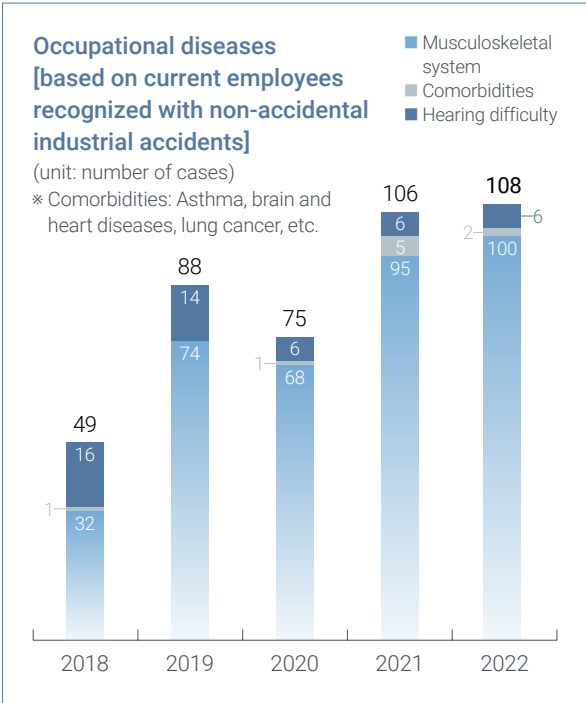
2022

March: Launched the Corporate Safety and Health Office (the president-level CSO appointed)/Established and operated a safety compliance system (the Safety Management Committee and the Safety-Production Deliberation Committee)
April: Conducted an enterprise-wide safety risk-identifying contest
July: Site safety management activities by all officers and department heads / Operated a mobile safety work instruction system
September: Conducted a safety short-form contest / Conducted a safety mascot naming contest
October: Promoted the use of SSA and rewarded best practices
November: Signed technical support agreements with outside subcontractors for safety management
December: Established the Safety Inspection Section

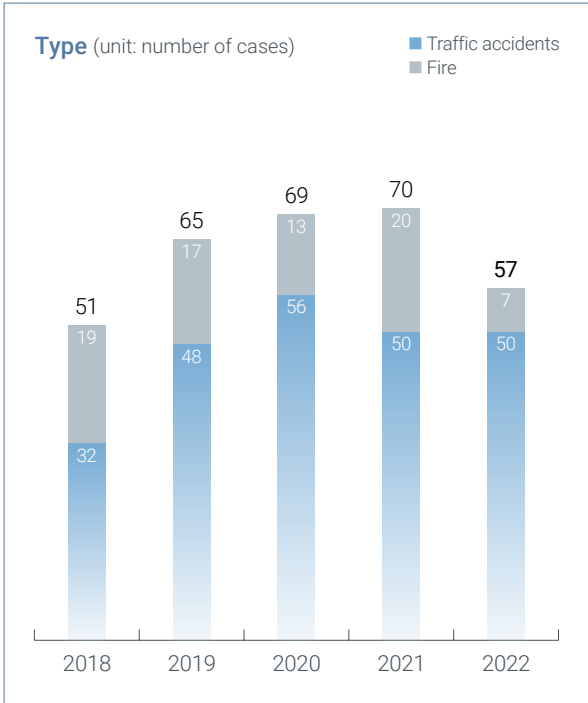
Industrial Accidents
(accident-related industrial accidents)



Industrial Accidents
(non-accidental industrial accidents)

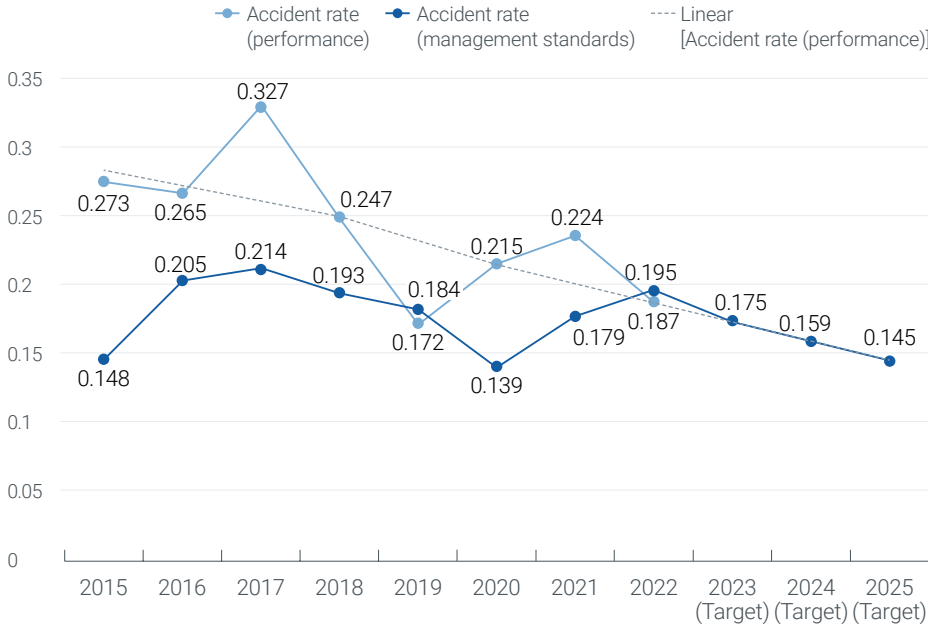


Reports Filed
(non-accidental industrial accidents)



Safety Management Achievements in 2022

Accident Rate
Control Target and
Performance



Fatal Accidents and Mortality Rate per 10,000 Individuals

Classification	2019	2020	2021	2022
Fatal accident (No. of individuals)	1	4	3	2
Mortality Rate per 10,000 Individuals*	0.375	1.512	1.160	0.748

* Mortality Rate per 10,000 Individuals: Deaths caused by industrial accidents per 10,000 workers

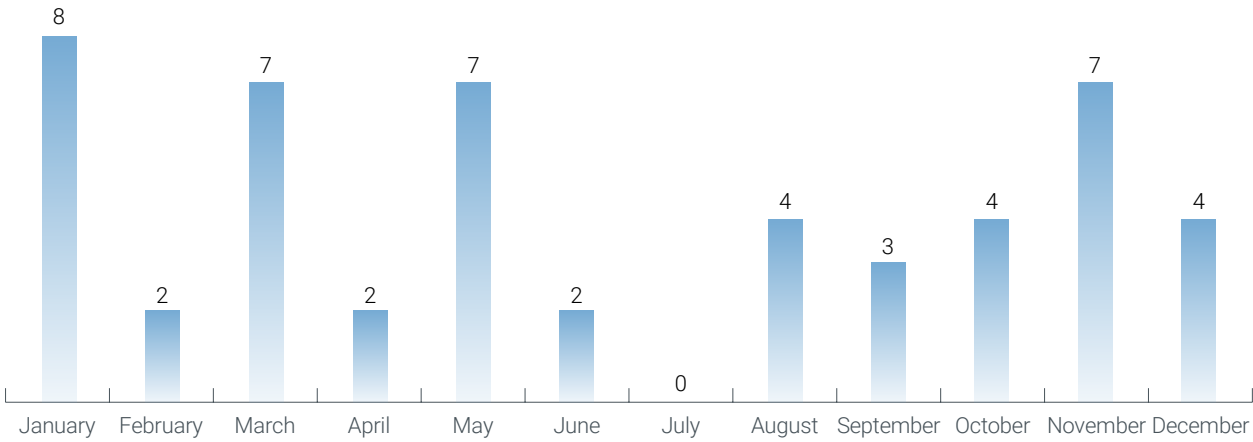
Industrial Accidents in 2022 (accident-related industrial accidents)

By Business Unit

Business Unit	Number of Accidents (unit: case)	Accident Rate	Mortality Rate per 10,000 Individuals	Number of Engaged Workers
Shipbuilding & Offshore	44(2)	0.211	0.959	20,838
Naval & Special Ship	3	0.158	0	1,904
Engine & Machinery	3	0.111	0	2,699
Management and Others	0	0	0	1,292
Total	50	0.187	0.748	26,733

* () : Fatal accidents

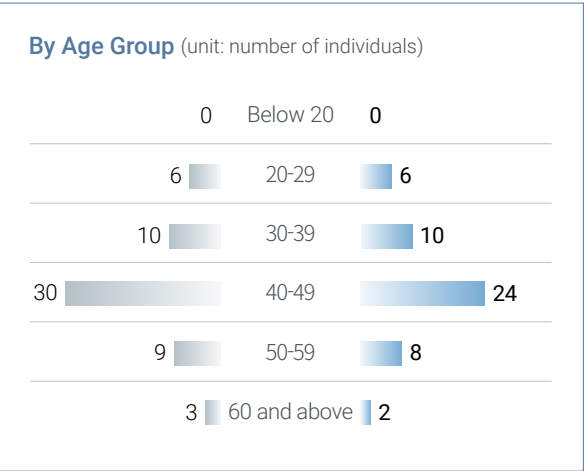
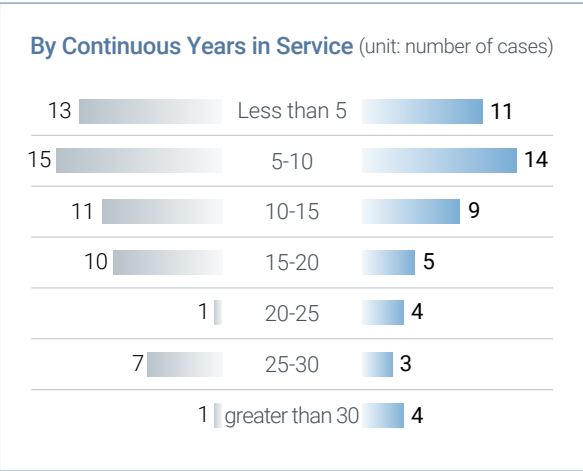
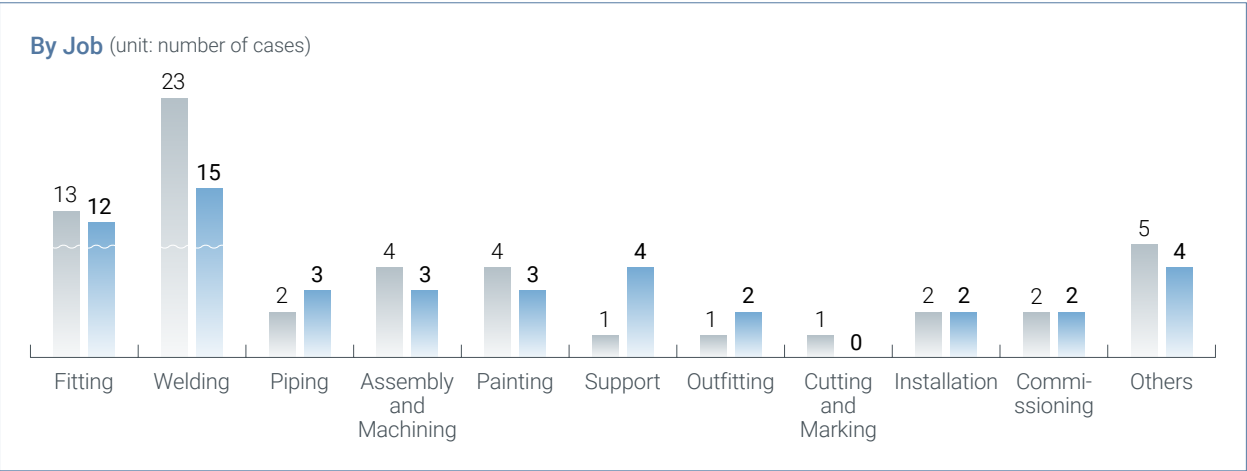
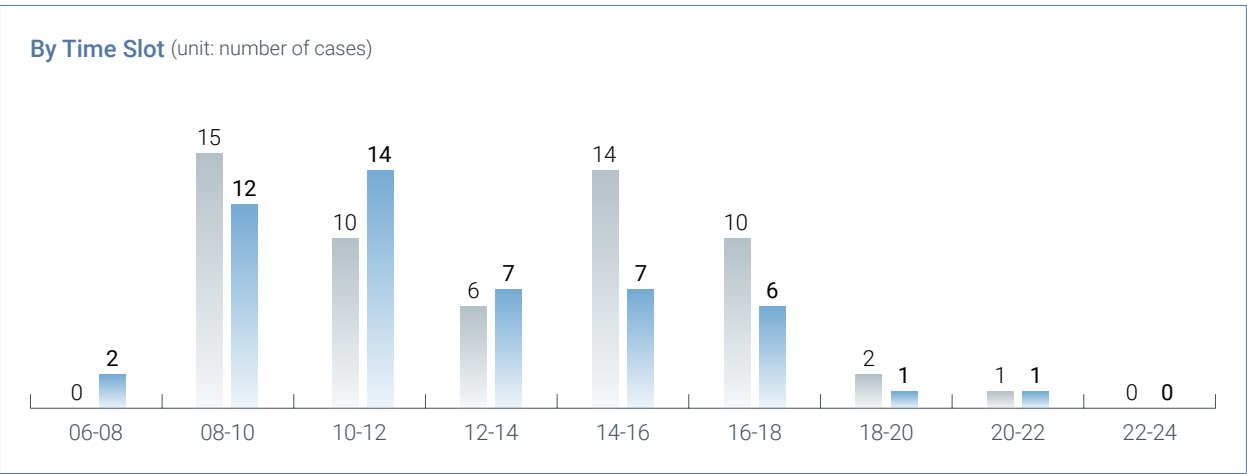
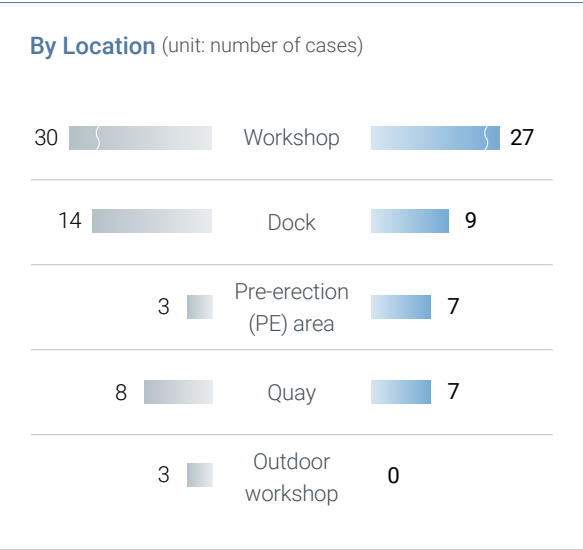
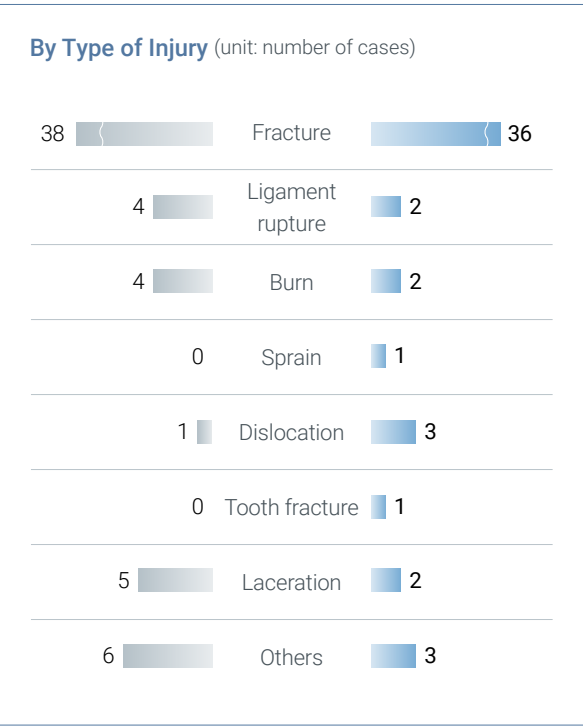
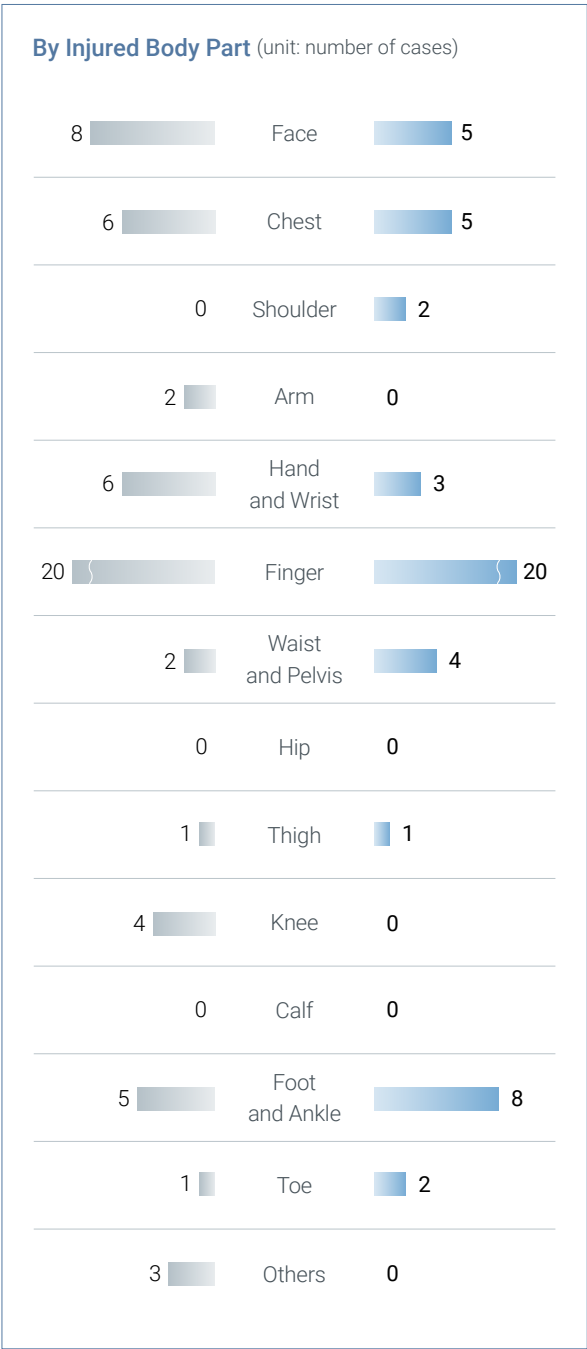
Number of Accidents by Month



Classification	1	2	3	4	5	6	7	8	9	10	11	12	Total
Number of Accidents	8	2	7	2	7	2	0	4	3	4	7	4	50

Industrial Accidents in 2021-2022 (accident-related industrial accidents)

58 cases in 2021 50 cases in 2022



SAFETY

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HEALTH

4-2

Management Performance of the Safety Planning Section

The Safety Planning Section strives to establish the enterprise-wide safety system by developing safety policies and planning systems. In addition, it supports the establishment of a practice-oriented safety management system at production sites, including subcontractors, through the operation of the HSE management system.

Major Achievements of the Safety Planning Section in 2022

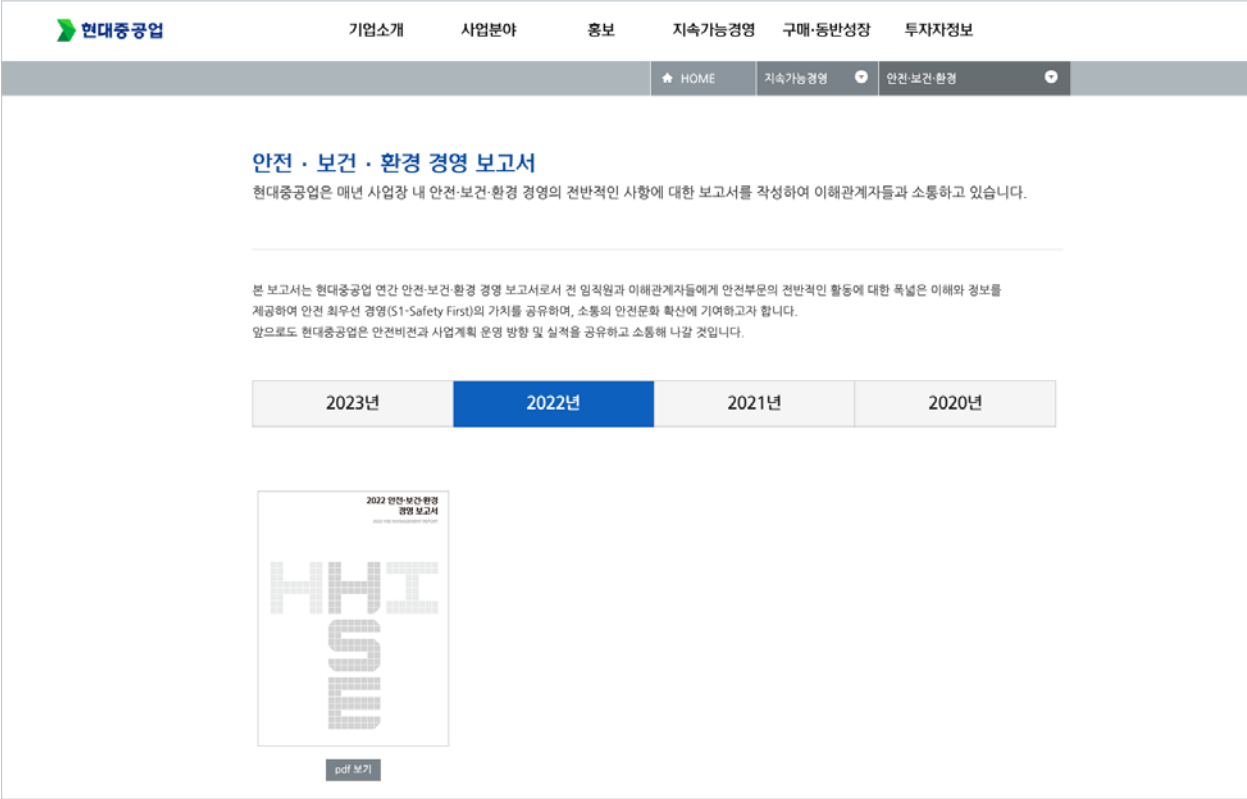
Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Establishing a self-regulated safety management system focused on operability	Improving safety key performance indicators (KPIs) of officers / department heads <ul style="list-style-type: none">Developing a safety leadership tool and reviewing the method of calculating KPIs to improve them	Annual	Improved the safety KPIs	100%	
	Implementing the enterprise-wide safety incentive program <ul style="list-style-type: none">Improving the reward program by reflecting opinions collected from the site and working-level staff	Annual	Reviewed the enterprise-wide safety incentive program and improved the supervisor evaluation index	50%	Improved the enterprise-wide safety incentive program based on the review results
	<ul style="list-style-type: none">Awarding safety incentives [outstanding organizations, teams, and individuals (supervisors, safety supervisors, and subcontractor safety supervisors)]	At all times	Incentivizing subcontractors with outstanding safety performance (3/4 times) Incentivizing outstanding subcontractor safety supervisors (once/twice) Incentivizing teams with outstanding safety performance (3/4 times)	67%	
	Improving the SLIs <ul style="list-style-type: none">Continuously converting leading safety activities into SLIs (risk assessment, toolbox talks, safety improvement proposals, etc.)	Annual	Reviewed the reflection of leading safety activities into SLIs to coincide with the improved Hi-SEs considering the achievement rate of each department	20%	Delayed in the Hi-SEs improvement (the Hi-STANDARD and department-specific key initiatives' achievement rate to be reflected)
	Improving accident management and the usability of statistical data <ul style="list-style-type: none">To be linked with the corresponding work standards & risk assessment (Hi-STANDARD) systems when an accident occurs → to be continuously evaluated	Annual	Hi-STANDARD is being upgraded (screen configuration)	100%	
	Conducting a full review of safety and health standards and guidelines <ul style="list-style-type: none">Review of the feasibility of the safety and health standards	Annual	The feasibility is reviewed by the person in charge of each team	80%	Ongoing
	<ul style="list-style-type: none">Reviewing the improvements for the operation of safety guidelines (feasibility, classification by theme, provision of search service, improvement of mobile service, etc.)	Annual	Reviewing the improvements for the operation of safety guidelines (completed)	100%	
	<ul style="list-style-type: none">Distribution of booklet-form safety guidelines	Annual	Circulated the safety guidelines	100%	
	Maintaining the safety and health management certification (ISO 45001) and establishing a system for reinforcing site operability <ul style="list-style-type: none">Preparing a biannual performance report following the quantitative objectives set in the management plan of the Corporate Safety and Health Office (including the preparation of management's review)	Biannual	Documented management plans and performance reports	100%	
	<ul style="list-style-type: none">Following up on item-specific requirements: risk/opportunity assessment, checking laws and regulations / assessing the level of compliance, etc.	Annual	Registered performance results, such as HSE achievements, risk and opportunity assessments, compliance level assessments	100%	
Systematizing the risk assessment	<ul style="list-style-type: none">Conducting internal and external audits on the safety and health management systems and taking remedial measures for nonconformities.	Annual	Took corrective action following an internal audit in May; Conducted an external audit in June	100%	
	Following up on whether the safety and health management plan is published and implemented <ul style="list-style-type: none">Prepared the Safety and Health Management Report and posted it on the website in line with the Serious Accidents Punishment Act and the ESG management strategy	Completed in January	Distributed the report and posted it on the website	100%	
	<ul style="list-style-type: none">Posted the English version of the Safety and Health Management Report on the English website	Completed in May	The English version of the report is being proofread	100%	
	<ul style="list-style-type: none">Reporting to the Board of Directors (BOD) on the safety and health management plan following Article 14 of the Occupational Safety and Health Act	Early February	Reported to the BOD	100%	
	Building and operating a risk assessment system <ul style="list-style-type: none">Review of the risk assessment procedure → Reflecting the requirements of the Occupational Safety and Health Act and the Serious Accidents Punishment Act	Annual	Revised the work standards and risk assessment procedure for the 14th time	100%	
	<ul style="list-style-type: none">Establishing and implementing a periodic risk assessment plan	Annual	The periodic risk assessment was completed in the first and second halves of the year (100% achievement rate).	100%	
	<ul style="list-style-type: none">Review of the plan to raise interest and motivate the site workers' participation → Linking with department-specific risk assessment performance, SLI, and incentive programs	At all times	Considering its reflection into SLI and safety incentive programs	50%	Reflection into SLI and safety incentive programs under review (selecting matrices)
	Reinforcing the ad-hoc risk assessment at the time of the occurrence of a safety accident <ul style="list-style-type: none">Establishing standards and procedures for ad-hoc risk assessments (reflecting them to the procedure)	At all times	Revised the Work Standards and Risk Assessment Procedure for the 14th time	100%	
	<ul style="list-style-type: none">Monitoring whether the ad-hoc risk assessment is performed when a safety accident occurred	At all times	The rate of the ad-hoc risk assessment conducted when a safety accident occurred	100%	
	<ul style="list-style-type: none">Developing an additional screen for accidents in Hi-SEs (providing information on risk assessments linked to accidents)	At all times	Configuring the screen to develop a risk assessment information system	50%	Reviewing the linkage with the accident screen when Hi-SEs are further developed

PART 4 Safety and Health Management Performance					
Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
	Reinforcing the risk assessment for vulnerable groups (in-house subcontractors, short-term construction work, and non-routine work)				
	• Improving convenience in the use of Hi-STANDARD for internal subcontractors	At all times	Improving convenience for subcontractors by improving Hi-STANDARD (improving the output formats and method of requesting approval)	100%	Reviewed the linkage with the screen for the management of assessment records in preparation for the further Hi-SEs development
	• Devising management plans for assessing risks for short-term and non-routine work	At all times	Simplified templates for ad-hoc risk assessments	100%	
	Upgrading the Hi-STANDARD computer system				
	• Improving the risk assessment process (linkage with the organization units subject to risk assessment, assessment screen, accident cases, and guidelines)	At all times	Risk assessment processes improved (improved the assessing organizations and the assessment screen)	100%	
	• Developing a new screen to manage assessment records (verification of Hi-SEs–linked training performance)	At all times	Reviewed the plan to develop a screen for the management of assessment records (verification of Hi-SEs–linked training performance)	50%	
	• Improving user convenience in viewing risk assessment results (the one-sheet printing function and legibility)	At all times	Developed the one-sheet output function showing risk assessment results	100%	
	• Improving the screen showing the status of assessment and the monitoring screen	At all times	Current assessment status and monitoring screens improved	100%	
Enhancing subcontractors' self-regulated safety and health capabilities	Continuous operation of programs for improving subcontractors' safety management capabilities				
	• Evaluating subcontractors' safety management level	Quarterly	Completed quarterly tasks	100%	
	• Evaluating capabilities of subcontractor safety supervisors	Biannual	Completed biannual tasks	100%	
	• Assisting subcontractors to be accredited as an Excellent Workplace for Risk Assessment [by the Korea Occupational Safety and Health Agency (KOSHA)]	At all times	85 out of 101 subcontractors accredited in October (8 subcontractors to be reviewed for accreditation in December)	100%	
Responding to the Serious Accidents Punishment Act	Establishing a system to comply with the Serious Accidents Punishment Act				
	• Conducting regular audits on the performance of the obligations under relevant statutes and regulations	Biannual	Completed the biannual statutory inspections under safety and health-related laws and regulations	100%	
	• Operation of the Safety Management Committee: Reporting to the CEO on the safety and health activities and actions taken (quarterly)	Quarterly	Quarterly meetings of the Safety Management Committee	100%	
	• Reporting on the responsible management personnel's duties to secure safety and health	Biannual	Reported to the responsible management personnel biannually	100%	
	Improvement and continual supplementation of the system to comply with the Serious Accidents Punishment Act				
	• Checking and assessing the safety and health performance against targets	Quarterly	Inspected and assessed the safety and health performance against targets quarterly	100%	
	• Establishing the objectives for safety and health management expenses and preparing a report on the results	Quarterly	Budgeting was planned; quarterly monitoring was in progress	100%	
	• Checking and inspecting the performance of countermeasures to prevent the recurrence of accidents	Quarterly	Completed the inspection of the performance of countermeasures to prevent the recurrence of major incidents	100%	
	• Preparing standards for assessing (general) safety and health officers and supervisors; assessing according to the standard	Biannual	Devised the standards for assessing (general) safety and health officers and supervisors; completed the biannual (1H and 2H) assessments	100%	
	• Checking the performance of obligations under safety and health-related laws and regulations	Biannual	Checked the biannual performance of obligations under safety and health-related laws and regulations (1H and 2H); Conducted an inspection for the second half of the year	100%	
	• Improving and operating a subcontractor safety and health committee (to listen to opinions of subcontractors' workers and make improvements with the attendance of the President & CEO in rotation, etc.)	Quarterly	Inspected the council operation biannually (1H and 2H); Made improvements based on subcontractors' workers' opinions	100%	
	• Preparing guidelines for securing subcontractors' safety and health and inspecting assessments (capabilities and technology for taking measures for safety and health, safety and health expenses, and the period of shipbuilding)	Quarterly	Prepared a standard to secure subcontractors' safety and health; Completed the biannual inspections (1H and 2H)	100%	
Increasing the usability of the integrated HSE management system	Development of a new Hi-SEs (web version)				
	• Developed a safety and health activity recording/management system in line with the Serious Accidents Punishment Act (the first-round development item)	First half	Planning a system reflecting organization-specific requirements upon forming a system development TF	20%	The development plan to be completed, and a developer to be selected by January 2023
	• Improving the convenience of production departments (users) by improving accessibility to the system and making an intuitive system (the second-round development item)	Second half	To be implemented in the first half of 2023	0%	To be completed by the end of 2023
	• Developing a safety schedule management system for safety meetings and safety walkarounds (the notification function by text, mail, or messenger services) (the second-round development item)	Second half	To be implemented in the first half of 2023	0%	To be completed by the end of 2023
	• Providing the functions used by production departments among the items in the old version of the Hi-SEs system as the functions of the new Hi-SEs (web version) (the second-round development item)	Second half	To be implemented in the first half of 2023	0%	To be completed by the end of 2023
	• Reflecting the results of safety and health activities related to the Serious Accidents Punishment Act in SLIs (the second-round development item)	Second half	To be implemented in the first half of 2023	0%	To be completed by the end of 2023
	• Establishing a system enabling real-time review/reflection of the accident recurrence prevention measures by connecting it with Hi-STANDARD (the second-round development item)	First half	Planning a system reflecting organization-specific requirements upon forming a system development TF	20%	The development plan to be completed, and a developer to be selected by the first quarter of 2023
Inspecting the performance of comprehensive safety initiatives	Continuously implementing the comprehensive safety initiatives				
	• Continuously monitoring each implementation item	Every alternate month	Regularly inspect the implementation status of the measures to prevent the recurrence of fatal accidents established in 2019	100%	
	• Improving the measures according to the monitoring results	At all times	Ongoing improvements according to the monitoring results	100%	

Establishing an Operability-Oriented, Site Self-regulated Safety System

Publishing the Safety and Health Management Report and reporting to the BOD

Publishing and posting the Safety and Health Management Report on the website
We published the Safety and Health Management Report containing the 2022 safety and health management performance and the 2023 safety and health management plan. The report elaborates on the performance against the plan in 2022 and the management plan for 2023, together with the HSE management policy, organizations, budgets, and facilities. The report is used as important data to understand HD HHI's safety and health status and is disclosed on the website. In addition, the English version is useful for the marketing activities of shipbuilding and offshore projects. HD HHI will continue to publish management reports and inspect the safety and health management status and upcoming initiatives to make it a workplace free from fatal accidents.



Safety and Health Management Reports posted on the website

Safety and Health Management Plans reported to the BOD

Results of reporting to the BOD
HD HHI reports the status of safety and health plans, budgets, facilities, and personnel to the BOD under Article 14 of the Occupational Safety and Health Act. On February 7, 2022, the BOD meeting was held to approve the 2022 safety and health management plan. The main content of the plan includes the safety and health management policy, organizations and their roles, budget and facility status, performance, and plans. It was approved by a unanimous vote of the board with sufficient justification. The 2022 Safety and Health Management Plan will be faithfully implemented according to the BOD approval and reported to the BOD in 2023.



HSE Management System Certification

The Current Status of HSE Management System Certification
The Company maintains international HSE management system certifications (ISO 45001 for safety and health; ISO 14001 for the environment). To substantiate the operation of the HSE management system, we have continuously upgraded the integrated HSE management system (Hi-SEs) so that the main requirements of standards can be written and managed electronically. Through this, we have strengthened monitoring and feedback functions. In addition, internal audits are conducted by an inspection team composed of professional personnel who have completed ISO internal auditor training to identify the current safety and health level of each department to guide them, thereby complying with the requirements of the ISO standards and improving the system stability and field operability.



- The Current Status of Internal Audits
- Results of the 2022 internal audit under the HSE management certification**

Classification	Details
Audit Period	May 16–20, 2022 (5 days)
Auditors	Total of 10 (8 from the Corporate Safety and Health Office and 2 from the Environmental Management Section)
Auditees	53 design/production/support departments
Audit Results (Number of Cases)	65 nonconformity cases

Main deficiencies noted

Classification	Nonconformity
Training/Objectives	The annual training plan was unprepared; training on HSE objectives was not provided.
Subcontractor management/ Environmental impact assessment	Subcontractors' opinions were not heard; environmental impacts were not assessed.
Emergency Drills	The evacuation plan/organization chart was not registered; drills were not conducted.
Risk Assessment/ Management	The plan to assess risks/opportunities and the improvement plan were inadequate.
Risk Assessment	Risks were not assessed, or the assessment rate was poor.

※ Rectified 65 nonconformity cases.

• The Current Status of External Audits

Results of the 2022 external audit under the HSE management certification

Classification	Details
Audit Period	June 20–24, 2022 (5 days)
Auditors	Auditors specialized in DNV professional auditors (7 persons)
Auditees	57 departments and teams, including 56 Research/Design/Production/Support and 1 plant in Naengcheon
Audit Results (Number of Cases)	No non-conformities, 15 observations, 30 corrective action requests

Main deficiencies noted

ISO 45001
• Risk Assessment: Inadequate details and omitted assessments • Emergency Drills: Inadequate record management for emergency preparedness and emergency rescue drills in confined spaces
ISO 14001
• Environmental Objectives: Inadequate details of the environmental objectives (assessment centered on office work)

Results of remedial measures

Classification	Nonconformity	Observation	Corrective Action Requests	Total
Number of Findings	0	15	30	45
Number of Corrections	0	15	30	45
Completion (%)	-	100%	100%	100%

Establishing and
Revising the Safety
Guidelines

Current Status of the Established and Revised Safety Guidelines

The safety guidelines, first established in 2016, are used for site safety management and mainly contain detailed standards related to safety. Therefore, safety and site supervisors must be familiar with them. It is constantly being revised or supplemented according to changes in the field environment, construction method, or equipment. This year, user convenience was improved by elaborating on the classification system of the safety guidelines and organizing the contents of the existing guidelines into common themes. In addition, search and manage functions have been added to advance accessibility on mobile devices and desktop computers.

Total of 278 items (including 7 new items and 155 revised items)

Aerial/Falling object	Hoisting/Crane	Fire/Gas	Equipment/ Facility	Tools
15	37	23	28	8
Painting	Electrical	General	Health	Environment
6	6	76	15	15
Confined space	Test/Inspection	Tripping prevention	Engine check	Others
6	7	8	19	9

Participatory Safety Activities through Efficient Operation of the Enterprise-Wide Safety Incentive Program

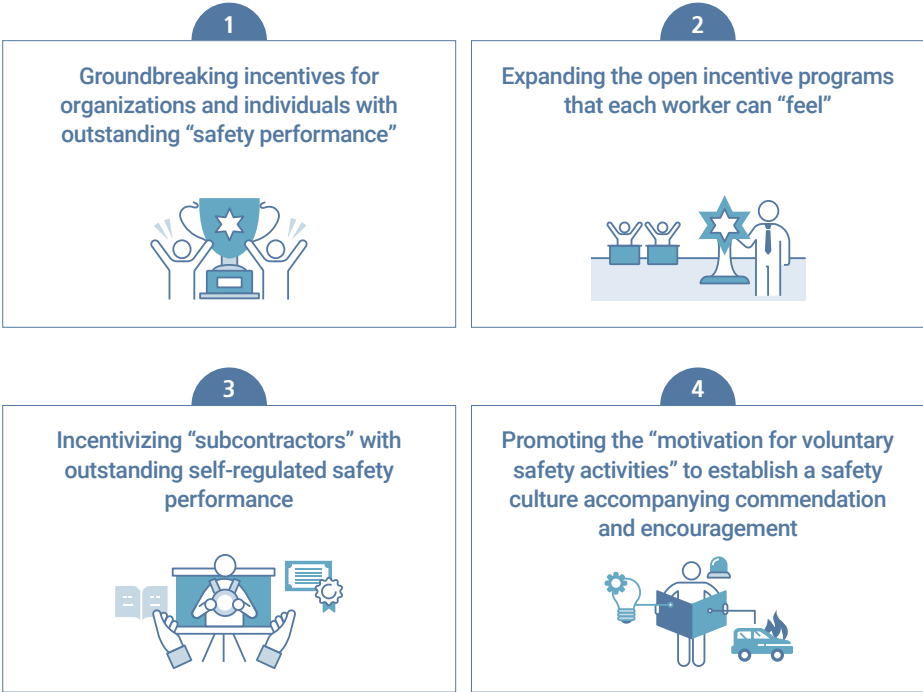
Performance and Improvement in the Operations of the Enterprise-Wide Safety Incentive Program

The Company has prepared various incentive programs to create a safety culture where workplace safety is secured, and employees are motivated to put each other's safety first. Through organizational incentives, members of each organization set safety objectives, and organizations that have achieved outstanding safety performance are incentivized. In addition, safety activities are encouraged by incentivizing individuals.

Status of safety incentives

The Company operates an enterprise-wide safety incentive program with the goal of “establishing a safety culture in which everyone participates.” Outstanding performance is incentivized reasonably, and individuals’ participation is encouraged through substantial incentives. The resulting safety performance of the organization and individual is incentivized. In addition, the Company motivates its subcontractors to establish a safety management system by incentivizing their excellent system. The Company encourages practice-oriented safety activities and spreads a culture of self-regulated safety management through the enhanced incentive program. Furthermore, it improves the program’s effect and satisfaction by fine-tuning it, laying the groundwork for a safety culture.

Strategy and direction of safety incentives



Improvements in safety incentive programs

- Improved the method of issuing safety praise coupons (paper to mobile coupons)
- Improved the assessment criteria for subcontractors’ safety performance and the method of paying incentives
 - KRW 10 million (KRW 5 million as an interim payment + KRW 5 million worth of safety sub-materials)



Incentives to organizations

Incentive Program	Description	Incentive	Cycle
Teams with outstanding safety performance	Quarterly incentives for directly-controlled teams with outstanding safety performance	KRW 100,000 per member	Quarterly
Subcontractors with outstanding safety performance	Subcontractors’ self-regulated safety management systems are improved through the incentives	KRW 10 million per subcontractor	Quarterly
Accident-free award	Inducement to achieve accident-free target Days	KRW 5,000–7,000 per individual	Monthly
Hi-SAFE Contest	The winning departments at the contest with safety improvement projects are incentivized	KRW 1 million – 10 million	Annual

Incentives to Individuals

Incentive Program	Description	Incentive	Cycle
Spot awards (Praise Coupon)	Praising outstanding safety supervisors site	KRW 5,000 per coupon	All year round
Incentivizing those who contributed to disaster prevention	Praising those who have prevented major incidents	Grade 1: 2-night hotel vouchers; Grade 2: KRW 200,000; Grade 3: KRW 100,000	All year round

Incentives to Supervisors

Incentive Program	Description	Incentive	Cycle
Encouraging excellent supervisors	Managers and production team leaders to act safely and feel a sense of responsibility	KRW 1 million per individual	Biannual
Subcontractor safety supervisors	Praising outstanding subcontractor safety supervisors biannually	KRW 500,000 per individual	Biannual
Outstanding, directly controlled safety supervisors	Praising outstanding, directly controlled safety supervisors biannually	KRW 500,000 per individual	Biannual

Incentivizing Teams with Outstanding Safety Performance

The performance of each production team is assessed quarterly according to each Business Unit's safety performance assessment standards, covering rule violations, the performance of safety activities, and spot awards. Outstanding teams are given CEO-level incentives based on the assessment results, and each team member receives KRW 100,000 as a cash award and a certificate of commendation.



Status of incentives by business unit

Classification		Shipbuilding & Offshore	Naval & Special Ship	Engine & Machinery
1st Quarter	Team	18 teams	2 teams	5 teams
	Cash incentives	KRW 26.5 million	KRW 3.5 million	KRW 4.8 million
2nd Quarter	Team	18 teams	2 teams	5 teams
	Cash incentives	KRW 24.4 million	KRW 3.1 million	KRW 5.2 million
3rd Quarter	Team	18 teams	2 teams	5 teams
	Cash incentives	KRW 30.7 million	KRW 2.9 million	KRW 4.9 million
4th Quarter	Team	18 teams	2 teams	5 teams
	Cash incentives	KRW 26.2 million	KRW 2.9 million	KRW 5.5 million
Total		100 teams (Cash incentives: KRW 140.6 million)		

Incentivizing Subcontractors with Outstanding Safety Performance

Outstanding subcontractors are incentivized quarterly by assessing their disaster indicators, safety systems, and the level of site safety management. Outstanding subcontractors so selected receive safety management incentives worth KRW 10 million, half in cash and half in safety sub-materials.



Status of incentives by business unit

Classification		Shipbuilding & Offshore	Naval & Special Ship	Engine & Machinery
1st Quarter	Subcontractors	5	-	1
	Cash incentives	KRW 50 million	-	KRW 10 million
2nd Quarter	Subcontractors	5	1	1
	Cash incentives	KRW 50 million	KRW 10 million	KRW 10 million
3rd Quarter	Subcontractors	5	-	1
	Cash incentives	KRW 50 million	-	KRW 10 million
4th Quarter	Subcontractors	5	1	1
	Cash incentives	KRW 50 million	KRW 10 million	KRW 10 million
Total		Total of 26 subcontractors (Total incentives: KRW 260 million)		

Accident-free Award

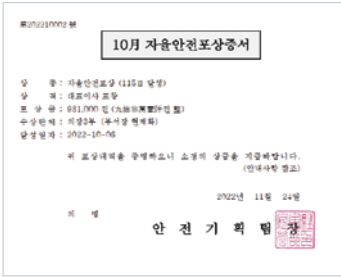
Organizations that have achieved the targeted number of accident-free days among the Production and the Production Support departments are incentivized. Incentive-free awards are given to an organization whose members have achieved the targeted number of accident-free days and demonstrated outstanding safety performance.

Accident-free Target Days

Number of members (individuals)	Less than 100	100-199	200-299	300-399	400 or more
Accident-free Target Days	100 days	90 days	80 days	70 days	60 days

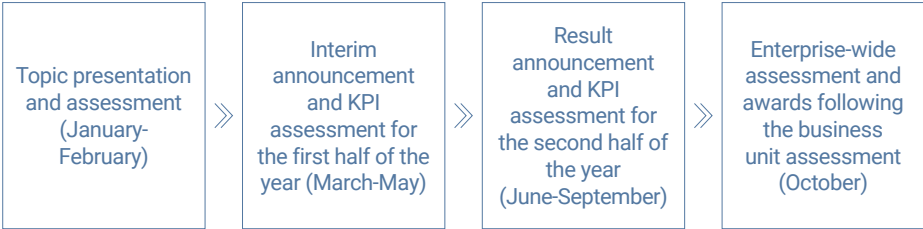
Cash incentives paid in 2022 (January-December)

Business Unit	Number of Departments	Amount of Incentives
Shipbuilding & Offshore	103	KRW 108,676,000
Naval & Special Ship	13	KRW 13,931,000
Engine & Machinery	34	KRW 20,391,000
Management Support	26	KRW 2,472,000
Grand Total	176	KRW 145,470,000



Hi-SAFE Incentives

Enterprise-wide safety improvement activities (Hi-SAFE) are conducted by the Design, Production, and Production Support departments (including HD HHI MOS), and outstanding projects are selected and awarded at the presentation.



2022 Hi-SAFE Awards

Classification	Business Unit	Department	Topic	Amount of Award
Grand Prize	Engine & Machinery	Crank Construction Department	• Improved the balance weight to prevent it from breaking away from a single shrink-fit product	KRW 10 million
Top Prize	Shipbuilding	Shipbuilding Department 2	• Mitigated the risk of fatal accidents inside an enclosed or confined space	KRW 7 million
	HD HHI MOS	Heavy Equipment Support Department	• Prevented the hydro crane tripping	
Excellence Prize	Shipbuilding	Electrical Device/Cabin Design Department	• Prevented the risk of falling by diagnosing neglected tasks likely to cause a fatal accident; • Improved the access/traffic design for safe passage	KRW 5 million
	Naval & special ship	Outfitting Design Department	• Improved safety in mast block work	
Participation Prize	Shipbuilding	Electrical Device/Design Department	• Developed a structural validation program to secure safety in the lifting of heavy E/R materials	KRW 3 million
	Shipbuilding	UNIT Production Department	• Improved the size of the 2-level surface plate of the LNG Manifold Unit	
	Offshore	H Dock Support Department	• Improved the inspection method for portable panel boards and gas manifolds	

※ In addition to the abovementioned prizes, KRW 5 million prize money was awarded to five departments that received the “Safety Improvement Prize.”



Spot awards

This scheme is to empower a safety or production supervisor to instantly reward a person exhibiting exemplary behaviors at site. It plays a major role in establishing a culture of self-regulated safety activities within the organization and strengthening site safety management through safety intervention. Mobile coupons are replacing paper-form coupons to enhance user convenience in and outside the Company.

Improving the method for issuing coupons

	Current	In Progress (Proposed)
Issuance method		
Usable at	Hyundai Culture and Arts Center, Hanmaeum Center, shops in and outside the Company, Vezzly	Directly controlled [HD HHI Welfare Mall (usable inside the Company)] and subcontractors (paid as part of an interim payment)

Spot awards paid per Year

Year	Number of Incentives	Amount
2017	71,499	KRW 357,495,000
2018	47,860	KRW 239,300,000
2019	59,815	KRW 299,075,000
2020	91,236	KRW 456,180,000
2021	88,141	KRW 440,705,000
2022	93,659	468,295,000

Rewarding Accident Prevention Contributors

An award is given based on the contribution level after internal deliberation by the Corporate Safety and Health Office, along with a certificate of commendation issued by the CSO, to a person who has contributed to minimizing damage from an accident by taking initial measures upon fire or personal injury or preventing an accident by taking measures against a risk factor identified in the worksite.

Reward Procedure



Major rewards in 2022

- Shipbuilding & Offshore Business Unit, 1 person (January 13, 2022)
 - For instant corrective action (welding) undertaken after finding an omission of lug welding on the mounting block
- Shipbuilding & Offshore Business Unit, 1 person (March 8, 2022)
 - For contribution to early fire extinguishing at Yard 2, Outfitting Shop 5



Incentivizing Outstanding Supervisors

We have promoted active safety intervention and fostered a self-regulated safety culture by recognizing supervisors for their outstanding safety performance.

Reward Procedure



* Scoring system: Rule violation (50) + Safety accident (30) + Safety activities (20) + SLI (minus points)

Status of incentives by business unit

Classification		Shipbuilding & Offshore	Naval & Special Ship	Engine & Machinery
First half	managers	10	2	2
	Production team leaders	16	2	4
Second half	managers	10	2	2
	Production team leaders	16	2	4
Total	(No. of individuals)	52	8	12
	(Amount)	KRW 52 million	KRW 8 million	KRW 12 million

* Selected 36 individuals each in the 1H and 2H, and each received KRW 1 million



Incentivizing Outstanding Subcontractor Safety Supervisors

We raise the subcontractors’ safety capability level by selecting and recognizing their safety supervisors for their remarkable safety competency and safety management activities.

Scale of awards

Classification	First Half	Second Half	Total
Awardees	7 individuals	7 individuals	14 individuals
Cash incentives	KRW 3.5 million	KRW 3.5 million	KRW 7 million

※ Selected 14 individuals in the 1H and 2H, and each received KRW 500,000.

Assessment items and results in 2022

Classification	Distribution of Points	Criteria	Points
Accident index	20	Number of safety accidents (applied the grade / headcount weight)	19.5
Job competency	20	Supervisor competency / Capability (conducted through the Business Unit Safety Assessment)	14.7
Safety walkaround	20	Checking the supervisor's work journal (standard: 2 cases/day)	18.2
Site management	10	Planning and practicing daily site safety management	7.3
SNS safety communication	10	Discovering/sharing potential risks, notification of safety matters	7.3
Subcontractor assessment	20	Subcontractors' safety management level assessment in the first half of the year	14.8
Safety improvement/qualification	(10)	Safety improvement activities and new acquisition of a certificate of safety qualification	2.2
Total	110	Assessment items (100 points) + bonus points (10 points)	82.3

Incentives paid to the subcontractors’ outstanding safety supervisors in 2022

Classification		Shipbuilding & Offshore	Naval & Special Ship	Engine & Machinery	Total
First half	Number of individuals	5	1	1	7
	Amount	KRW 2.5 million	KRW 500,000	KRW 500,000	KRW 3.5 million
Second half	Number of individuals	5	1	1	7
	Amount	KRW 2.5 million	KRW 500,000	KRW 500,000	KRW 3.5 million
Total	Number of individuals	10	2	2	14
	Amount	KRW 5 million	KRW 1 million	KRW 1 million	KRW 7 million

Incentivizing Outstanding Safety Supervisors of Directly Controlled Teams

We improve the safety expertise and communication capabilities of directly-controlled safety supervisors by assessing their job competency and incentivizing their outstanding performance.

Reward procedure



※ Scoring system: Safety Performance (40) + Performance Evaluation (30) + Safety Qualifications (20) + Competency Evaluation (10)

Evaluation results

Classification	Grade S	Grade A	Grade B	Grade C	Grade D	Total
First half of 2022	8 (6%)	58 (40%)	65 (45%)	11 (8%)	2 (1%)	144 (100%)

Classification	Grade S	Grade A	Grade B	Grade C	Grade D	Total
Second half of 2022	8 (6%)	68 (47%)	59 (41%)	7 (5%)	1 (1%)	143 (100%)

※ Selected 16 individuals in the 1H and 2H, and each received KRW 500,000.



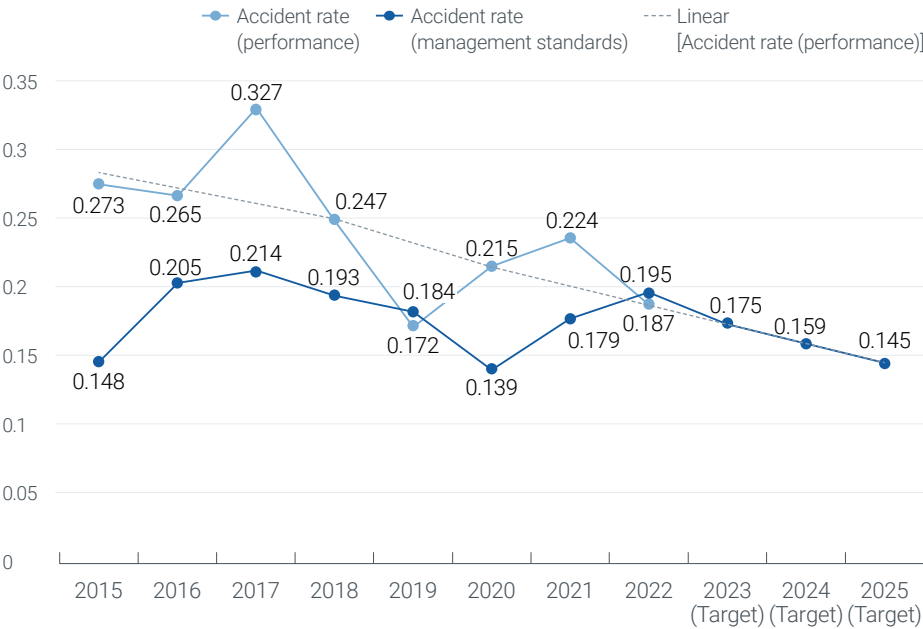
Establishing
Annual Accident
Rate Management
Standards

Setting Standards for the Management of Target Accident Rates for the Next Year
based on the 10-Year Trend

HD Hyundai Group's 3 shipyards [HD HHI, Hyundai Mipo Dockyard (HMD), and Hyundai Samho Heavy Industries (HSHI)] implement a standardized method of setting accident rate management standards. In 2021, the Group applied a linear regression model to set accident rate management standards. In 2022, we targeted the accident rates 0.195, 0.165, and 0.120 for HD HHI, HSHI, and HMD, respectively.

In 2022, HD HHI achieved its target by attaining an accident rate of 0.187 against the accident rate management standard of 0.195. Based on the performance in 2022, the target accident rate for 2023 was set at 0.175. To achieve the 2023 target, we will make unsparing efforts to establish a safety-first culture in all sectors and build a safe workplace for all.

Accident rate targets based on accident rate trend (linear regression model)

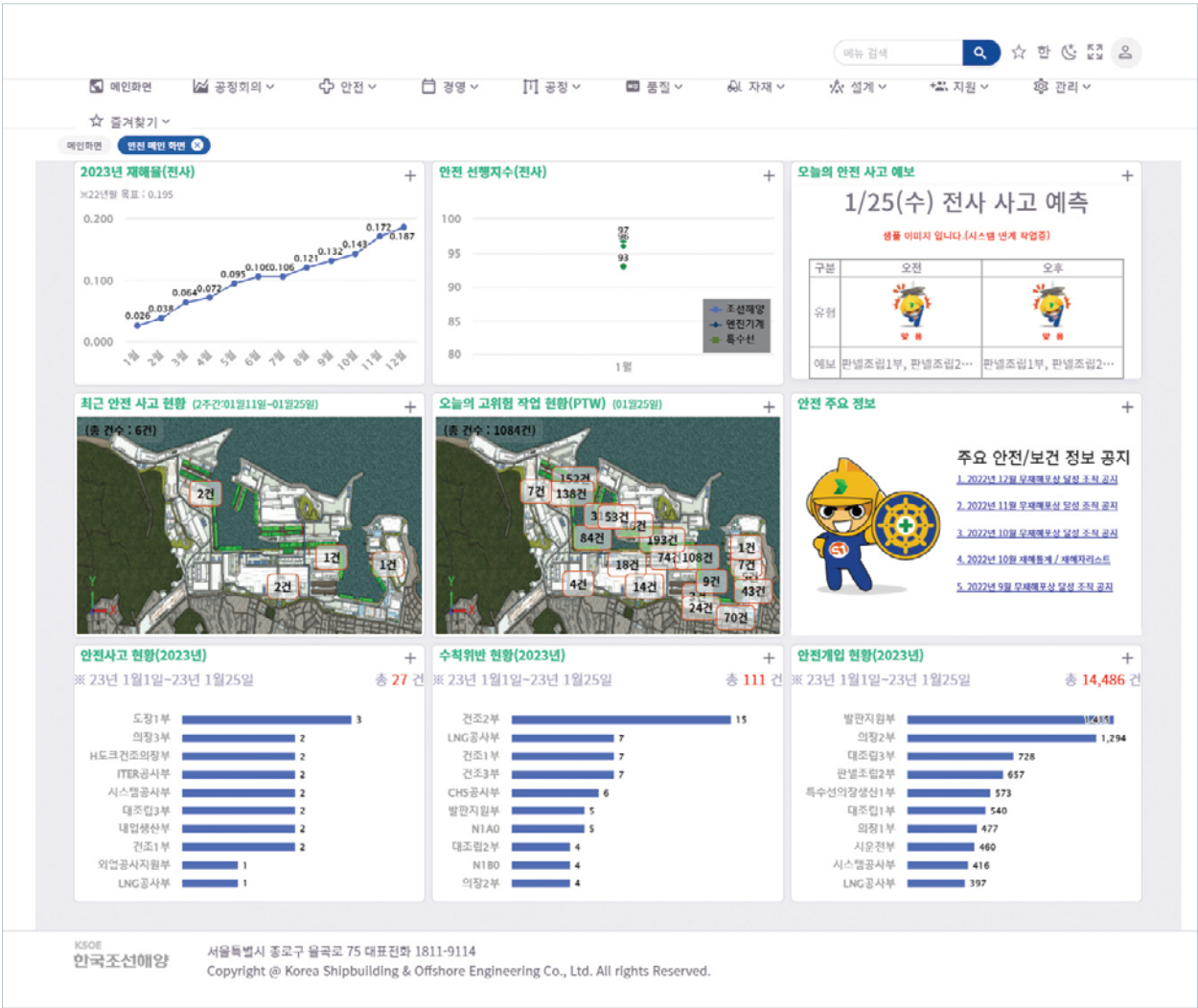


Improving User
Accessibility with an
Accident Statistics
Dashboard

Computerizing Safety Accidents and Utilizing a Dashboard

The Company manages safety accidents in real time through the integrated HSE management system. In addition, users can realize the safety dashboard on TwinFos to easily check the accident rate, SLIs, and safety accident status by department therefrom.

In 2023, the integrated HSE management system will be upgraded to the next level to computerize safety accident-related processes. Through this effort, a real-time safety dashboard utilizing big data will be realized, and a preemptive risk prediction system will be available to expand user utilization concerning safety.



Systematizing the Risk Assessments

Operating a Computer System-Based Risk Assessment

Conducting regular and ad-hoc risk assessments

Regular risk assessments were performed in the first and second halves of 2022. In addition, ad-hoc risk assessments in response to safety accidents and changes in processes and construction methods were conducted. A total of 12,839 items were added or revised to the work standards, and a total of 12,322 risk items were assessed. In particular, 3,395 risk factors classified as “critical” with a score of 8 or higher were registered with special mitigating measures and operated with risk reduction activities under the P-D-C-A procedure.



Risk assessment screen



Special mitigating measures for critical risks

Risk assessment results in 2022

Classification	Details
Assessment period	May (for the first half assessment), December (for the second half assessment), and other ad-hoc assessments
Assessed organizations	Production and Production Support Departments and in-house subcontractors
Assessment results	A total of 6,325 items in the (directly controlled) work standards and 6,325 risk factors were assessed (Subcontractors) A total of 6,514 items under the work standards and 5,997 risk factors were assessed

Registration on Hi-STANDARD (based on the directly-controlled entities)

Classification		Work Standards	Risk Assessment
Shipbuilding & Offshore	In-shop 1	545	545
	In-shop 2	250	250
	In-shop 3	330	330
	Other in-shops	321	321
	Out-shop 1	191	191

Classification		Work Standards	Risk Assessment
Engine & Machinery	Out-shop 2	289	289
	Out-shop 3	165	165
	Cabin	201	201
	Painting	242	242
	Machinery/Commissioning	418	418
	Other out-shops	55	55
	H Dock	394	394
	Offshore Out-shop	395	395
	Quality	60	60
	Subtotal	3,856	3,856
Engine & Machinery	Materials/Propeller	105	105
	Crank/Machining	49	49
	Large Engine Assembly	191	191
	Commissioning/Performance	150	150
	Engine-Others	46	46
	Subtotal	541	541
Naval & Special Ship	Naval & Special Ship	1,787	1,787
Management	Management Support	34	34
Safety	Assets	107	107
Total		6,325	6,325

Risk Assessment Training for Supervisors and Workers

Conducting Risk Assessments during Regular Safety and Health Training

Risks are assessed with all workers participating in regular safety and health training sessions. In addition, workers are trained on major risk factors, risks, and safety measures derived from risk assessment.

Risk Assessment Training during On the Job Training for Production Technicians

Risk assessment training is added to OJT for production technicians. The Company strives to ensure effective risk assessment by providing ongoing training on the concept, procedure, and significance of risk assessments.

Status of OJT and basic competency training as of November 2022
(Technical Education Institute): Total of 2,062 individuals

Job Type	Welding	Fitting	Electrical Assembly	Painting	Piping	Installation	Machining	Others
Number of trainees	716	428	226	207	172	101	57	155

Risk Assessment Committee Composition

Operation of the Risk Assessment Committee by Each Department

The Risk Assessment Committee, composed of proficient risk assessors in each department, is operated to identify omitted risk factors and assess risks by reviewing risk assessment results. The committee, composed of steering and executive members, reviewed the risk assessment results of each department and made necessary improvements for areas that needed them. It is expected that carefully reflecting on the field risk factors will make risk assessments more effective.

	Production Department (including subcontractors)	Risk Assessment Committee	Safety Division
Presurvey	<ul style="list-style-type: none"> Organizing assessment teams; designing responsible personnel <ul style="list-style-type: none"> - Designing responsible personnel for each job standard procedure - Organizing assessment teams (Production Team leaders and workers) Establishing a risk assessment plan for each department 	<ul style="list-style-type: none"> Composing a risk assessment committee for each department <ul style="list-style-type: none"> - One chairperson and one executive member each from the labor-management Review of risk assessment plans 	<ul style="list-style-type: none"> Establishing enterprise-wide risk assessment plans Providing risk assessment training <ul style="list-style-type: none"> - Professional training for risk assessors and executive committee members - Providing risk assessment training to workers
Identification of risk factors	<ul style="list-style-type: none"> Identifying risk factors <ul style="list-style-type: none"> - Conducting risk assessments for each organization 		
Risk estimation/determination	<ul style="list-style-type: none"> Calculating risk (frequency/intensity) scores 	<ul style="list-style-type: none"> Reviewing risk (frequency/intensity) assessment results 	
Risk reduction measures	<ul style="list-style-type: none"> Establishing risk reduction measures Implementing reduction measures and re-assessing risks 	<ul style="list-style-type: none"> Reviewing the adequacy of risk reduction measures 	
Monitoring the implementation	<ul style="list-style-type: none"> Registering major risk reduction measures and performance Complying with work standards and continuously implementing reduction measures 	<ul style="list-style-type: none"> Monitoring risk assessment results 	<ul style="list-style-type: none"> Inspecting the implementation of reduction measures site Reporting risk assessment results to management

Advancing Computer Systems for Work Standards and Risk Assessment

Improving the Risk Assessment Output Format

The Hi-STANDARD system has been upgraded to facilitate the establishment and revision of work standards and the use of risk assessment results. The output format of the risk assessment results has been improved for easier visibility so that any worker can check the work methods, risk factors, and risks at the production site at a glance. In addition, by adding the function of summarizing and outputting the risk assessment results in a table, field usability has been strengthened so that it can be used for new employee orientation and other safety training.

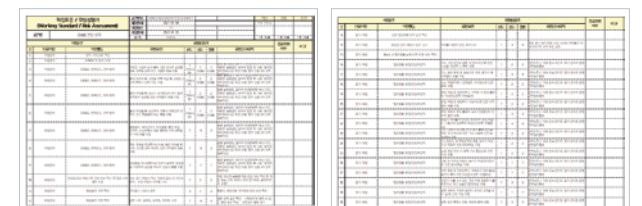
Example: Previous output format (36 pages long)



Detailed risk assessment
(approximately 10 pages
long)



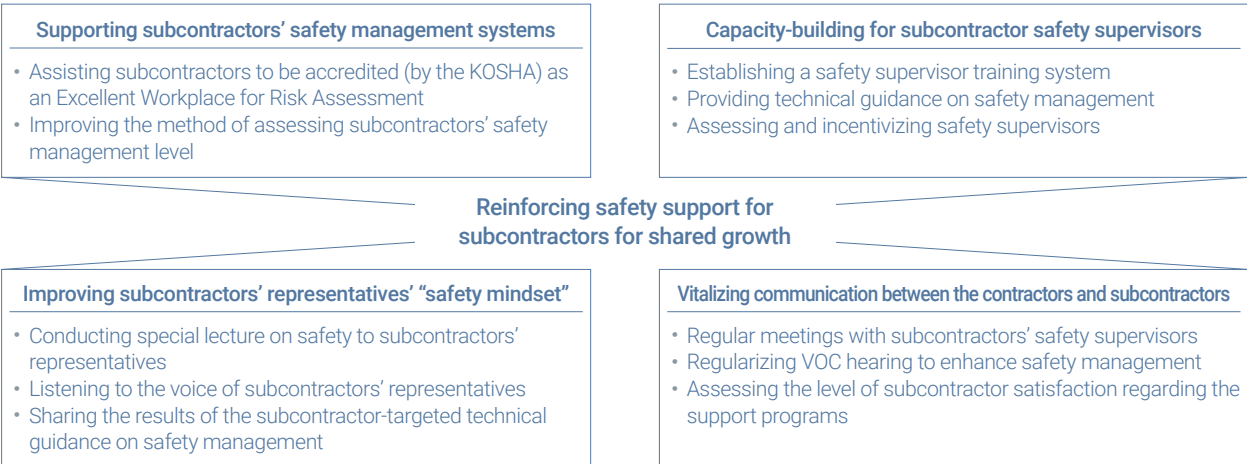
Risk assessment summary



Enhancing Subcontractors’ Self-regulated Safety and Health Capabilities

Operating Safety Management Capacity-Building Programs for Subcontractors

Through the screening, supporting, assessment, and monitoring processes, the Company fosters professionally qualified subcontractors in both productivity and safety and supports their safety activities. Responsibilities and obligations as the contractor to its subcontractors, comprising in-house subcontractors and project partners, are fulfilled. The Company operates comprehensive and systematic programs for safety management, encouraging subcontractors’ voluntary and autonomous participation rather than as a party subject to safety management. HD HHI recognizes all its subcontractors as valuable partners and provides maximum support for their safety and health activities.



Imposition of the obligation to be accredited as an “Excellent Workplace for Risk Assessment” by the KOSHA and support therefor

HD HHI makes it mandatory for its in-house subcontractors to be accredited as an “Excellent Workplace for Risk Assessment” by the KOSHA and provides necessary support to establish the risk assessment system. The accreditation program is available to small establishments with less than 100 employees.

Classification	All Subcontractors	Establishments with less than 100 employees	Accredited	Accreditation Rate
Shipbuilding & Offshore	125	79	63	80%
Naval & Special Ship	7	6	6	100%
Engine & Machinery	18	16	16	100%
Grand Total	150	101	85	84%

Compliance with the Serious Accidents Punishment Act

Establishment of a compliance system to respond to the Serious Accidents Punishment Act

Reorganizing the safety and health management system to comply with the Serious Accidents Punishment Act

In order to respond to the Serious Accidents Punishment Act and enhance the safety and health management system, the system was internally inspected. As a result of the inspection, we reorganized the safety and health management system by rectifying insufficient items. Safety and health head officers are evaluated once a half year by preparing work evaluation standards, and measures are taken to improve insufficient items. In particular, we reorganized the subcontractor management system to support their safety and health activities proactively. We have improved the way the committee operates, such as preparing a procedure to listen to the safety and health- related opinions of subcontractors' employees. And if necessary, we review what we have listened to and take necessary improvement actions. In addition, we operate separate safety and health sub-materials accounts for subcontractors to supply sufficient quantities without delay whenever requested. We will continue to check the performance of safety activities through biannual inspections under the Serious Accidents Punishment Act and strive to improve the safety and health management system.

Measures concerning the establishment and implementation of the safety and health management system under Article 4 Subparagraph 1 of the Act

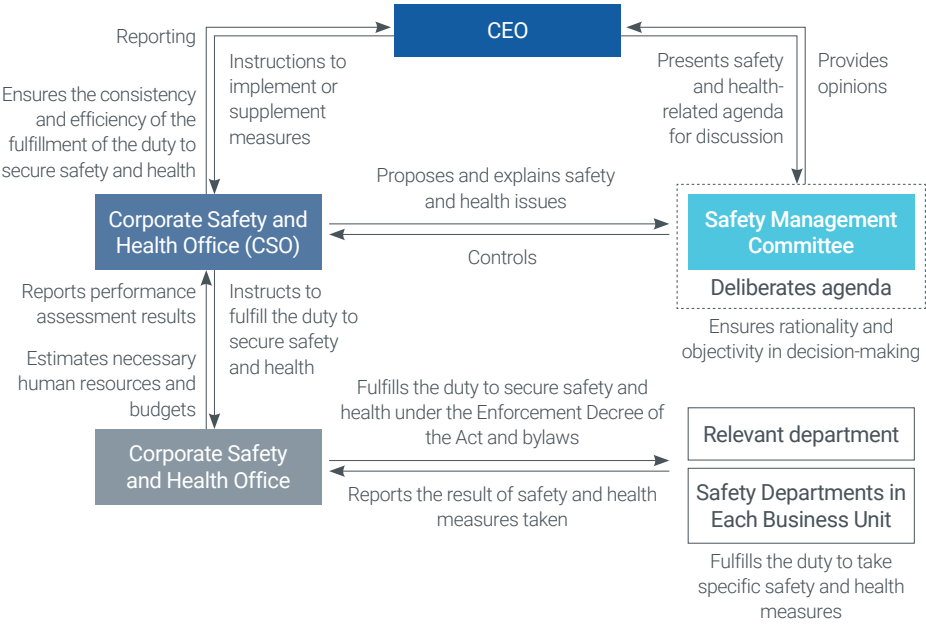
Enforcement Decree of the Act	Activity	Report Content
[Item 1] Establishing safety and health objectives and policies	Enterprise-wide Safety and Health Objectives and Policies	<ul style="list-style-type: none">Content of the enterprise-wide safety and health objectives and policiesPerformance against goals (such as the achievement level by major task)
[Item 2] Forming an organization exclusively responsible for the overall control and management of safety and health affairs	Operation of Corporate Safety and Health Office and Safety Organizations in Each Business Unit	<ul style="list-style-type: none">Organizational chart, composition of employees, and work allotment of Corporate Safety and Health Office and safety departments in each business unit
[Item 3] Identifying risk factors and monitoring for improvement	Work Standards and Risk Assessment (Hi-STANDARD)	<ul style="list-style-type: none">The detailed rules concerning Work Standards and Risk AssessmentRisk assessment results<ul style="list-style-type: none">- Results of regular risk assessments- Results of ad-hoc risk assessments following an accident
	High-Risk Work Inspection	<ul style="list-style-type: none">Results of high-risk worksite inspections<ul style="list-style-type: none">- Triple (supervisor-Safe Clover-safety supervisors) inspections- Results of inspection on implementation of major accident prevention measures- Results of supervisors’ daily inspections

Enforcement Decree of the Act	Activity	Report Content
	Hi-SAFE Activities	• Results of the enterprise-wide safety improvement activities by department
	Safety-Production Deliberation Committee	• Results of the Safety-Production Deliberation Committee operations
	Chemical Management	• Identification and hazard assessment of chemical substances • Chemical risk assessment
[Item 4] Setting and spending a budget necessary for accident prevention	Operation of the Safety and Health Management Budget	• Safety and health expense items - labor, operating, major items per facility investment • Planned and actual safety and health expenses by item
[Item 5] Taking measures to enable safety and health officers and supervisors to perform respective duties	Safety and Health Officer Assessment	• Safety and health officer assessment criteria and assessment results
	Supervisor Assessment	• Supervisor assessment criteria and assessment (incentives) results
[Item 6] Assigning statutory safety officers	Statutory Assignment of Safety and Health Personnel	• Assignment of statutory officers, such as safety and health managers, and their completion of training
[Item 7] Hearing the opinions of workers on safety and health and taking necessary improvement measures	Occupational Safety and Health Committee	• Operating standards for the Occupational Safety and Health Committee • Agreements and measures taken by the Occupational Safety and Health Committee
	Subcontractor Safety and Health Committees	• Opinions heard and measures are taken concerning safety and health through subcontractor safety and health committee meetings
	Enterprise-Wide Risk Contest	• Opinions gathered and measures are taken
[Item 8] Preparing a manual for taking measures against major industrial accidents or imminent risks	Manual for Emergency and Crisis Management	• Manuals for emergency and crisis management and emergency planning by business units • Results of emergency preparedness planning by the organization
[Item 9] Establishing standards and procedures if any work is contracted, outsourced, or entrusted	Operation of the Subcontractor Selection Committee	• Subcontractor selection criteria • Results of subcontractor selection deliberation/redeliberation
	Assessment of Subcontractors' Management	• Results of subcontractors' management assessment
	Assessment of Subcontractors' Safety and Health Level	• Criteria and results of the assessment of subcontractors' safety and health level
	Criteria concerning the Adequacy of the Shipbuilding Period	• Criteria concerning the shipbuilding period to secure safety and health when a subcontractor is contracted



Operation of the Safety Management Committee

We operate a Safety Management Committee composed of top management and external experts to establish and implement effective safety policies. The Safety Management Committee convenes quarterly, reviews major safety management issues, such as the enterprise-wide safety and health activity implementation status, and discusses improvement directions. The major issues discussed in the committee include the results of mandatory inspections on responsible management personnel's duty to secure safety and health in the first half of the year, plans for implementing improvements, and directions for improving risk assessment.



Summary of the Safety Management Committee Operation

Classification	Details
Composition of the Committee	• Chairperson: CEO • Members (inside the Company): Head of Business Units / Division Heads, CSO, Head of Finance Division, Corporate Safety / Asset Officer, Legal Team Leader • Members (outside the Company): Head of the Occupational Safety Bureau of KOSHA, a professor at Pukyong National University
Cycle	• Quarterly
Roles	• Inspection/confirmation of major safety activities under related laws and regulations • Deliberation of major agenda items related to safety and health systems at establishments; deducing improvement plans
Main issues reported	• Status of the fulfillment of safety and health objectives • Significant accidents and implementation of their countermeasures • Results of the quarterly inspection of safety activities • Inspection of whether the responsible management personnel has secured safety and health and whether issues have been followed up

Inspection of the Fulfillment of Duties under Safety and Health-Related Laws

Once every 6 months, we check compliance with the Serious Accidents Punishment Act and whether the obligations under the safety and health-related laws are fulfilled to secure the safety and health of workers and compliance with the Serious Accidents Punishment Act. Safety and health-related laws refer to those requiring establishments to secure the safety and health of workers, including the Occupational Safety and Health Act, laws on hazardous substances, firefighting, and chemicals and waste management. During the inspection in the first half of 2022, we commented on 299 items to 65 departments, while 361 items to 70 departments were commented on in the second half. We strive to secure workers' safety and health by establishing and implementing plans to rectify the issues raised.

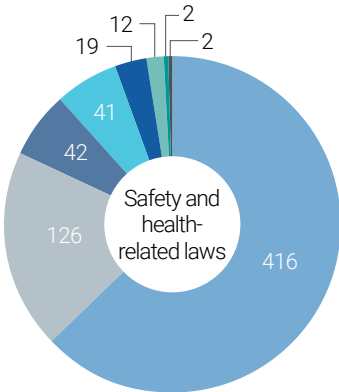
※ Those to be improved in 2023 among the findings made on 660 items during the first and second halves of 2022. Action for all issues, except 6, have been resolved.

Result of the inspection of whether statutory obligations under safety and health-related laws have been fulfilled

Classification	1H 2022			2H 2022			Remarks
	Findings (%)	Measures Taken (%)	Administrative Fines (KRW 10,000)	Findings (%)	Measures Taken (%)	Administrative Fines (KRW 10,000)	
Applied because the Occupational Safety and Health Act/Enforcement Decree	87(29)		40,350	138(38)		54,300	Rules have been violated on at least 3 occasions
Occupational Safety and Health Management Standard	181(61)	296 (99)	-	203(56)	358 (99)	-	Fines imposed following a summary prosecution by the prosecution
Related laws (laws on hazardous substances, firefighting, and chemicals and waste management)	23(8)		15,920	19(5)		3,920	
Others	8(3)		-	1(0)		-	
Total	299		56,270	361		58,220	

Analysis of the findings arising from the inspection of compliance with safety and health-related laws

- Safety and health measures
- Hazardous risk prevention measures
- Hazardous substances/chemicals
- Measures against hazardous substances
- Accident prevention in contract business
- Safety and health training
- Safety and health management system
- Protective measures against hazardous machinery



SAFETY

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HEALTH

4-3

Management Performance of the Safety Culture Section

The Safety Culture Section innovatively reorganizes the safety education process to strengthen employee safety management, develops various educational content such as short-form videos, visual site safety posts, and safety mascots, and creates a participatory education environment centered on experience and practice. Through these efforts, the Section aims to establish a safety culture in which the accident rate is lowered and “zero fatal accidents” is attained.

Major Achievements of the Safety Culture Section in 2022

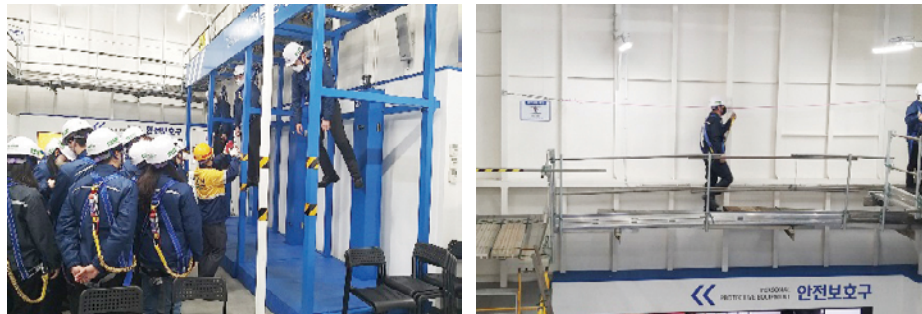
Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Plans
Operation of Statutory Safety and Health Training Programs	Statutory Safety and Health Training Programs for New Recruits <ul style="list-style-type: none">• Providing statutory safety and health training to new recruits (SCP-1, Step-1)• Providing special safety training (including training for job changes and safety training on hazardous chemicals)• Courses on short-term work; the responsible organization is changed (from the Business Unit's Safety Departments to the Corporate Safety Department)	5 times a week	Completed as planned (5 times a week, excluding holidays)	100%	
		Whenever needed	Completed as planned (exceeding the designated duration)	100%	
		-	From November 21, 2022, it was supervised by the Corporate Safety Department. Training performance and effectiveness are under review.	100%	
	Regular Safety and Health Training for Workers <ul style="list-style-type: none">• Providing statutory safety and health training for office workers (nonproduction departments, SCP-1, Step-2)• Providing statutory safety and health training for employees (production/support departments, SCP-1, Step-2)	3-hr/quarter	Completed as planned (3 hrs per quarter); Training with updated content will be available in 2023.	100%	
		6-hr/quarter	Completed as planned (6 hrs per quarter); The effectiveness of training in 2022 is under review, and a plan to improve the effectiveness will be established.	100%	
	Statutory Safety and Health Training for Supervisors <ul style="list-style-type: none">• Providing statutory safety and health training for supervisors (SCP-2, Step-2)	16-hr/year	Training in the 1 hr and 2 hrs is completed. (November 7 – December 9)	100%	
	Statutory Safety and Health Training for Managers and Statutory Assignees <ul style="list-style-type: none">• Providing statutory safety and health training for managers (SCP-2, Step-3)• Providing statutory safety and health training for new statutory assignees• Providing statutory refresher training for statutory assignees	6-hr/year	Completed in May and December 2022	100%	
		34-hr/whenever needed	Completed as planned	100%	
		24-hr/every other year	Completed as planned	100%	
	Enhancing the Management's Safety Mindset and Raising the Level of Knowledge <ul style="list-style-type: none">• Safety awareness training for new officers (SCP-3, Step-1)• Special lectures for executive officers on safety (SCP-3, Step-2)• Workshops on safety management strategy in the production division (SCP-2/3, Step-3)	Annual	Completed the content development	20%	To be provided to coincide with the training schedule of the Human Resources Development Institute in January 2023
Improving the Quality of Non-statutory Safety and Health Training		Twice/year	A session was held at the end of 2021 and the beginning of 2022 (for executive officers and department heads)	50%	To be available after the necessary content is ready by the end of 1Q 2022
		Twice/year	Completed the content development	20%	The improved schedule will be reported in early 2023, and they will be held on an ongoing basis.
	Enhancing Supervisors' Safety Mindset and Raising the Level of Knowledge <ul style="list-style-type: none">• For new supervisors to raise their safety consciousness (SCP-2, Step-1)	Twice/year	Completed a session in the first half	50%	To be provided quarterly from 2022
	Enhancing Safety Managers' Safety Mindset and Raising the Level of Knowledge <ul style="list-style-type: none">• Job improvement training for safety supervisors (SCP-S)• Job training for subcontractor safety supervisors	Twice/year	Completed a session each in June and October	100%	
		Twice/year	Completed a session each in July and October; The content is to reflect subcontractor safety supervisors' requirements, and its effectiveness will be monitored.	100%	
	Safety and Health Training Programs for Foreigners <ul style="list-style-type: none">• Conducting safety and health training programs for foreign instructors• Conducting safety and health training programs for foreign workers	Annual	First round of safety personnel recruitment (2 individuals): To provide translation and interpretation services and support site safety activities	100%	The second round of safety personnel recruitment is scheduled for 2022.
		Twice/year	Completed a session in September 2022	50%	To be continued twice a year following the plan to enhance foreign workers' safety management
	Improving the Mindset of Safety Rule Violators <ul style="list-style-type: none">• Conducting training programs in the Safety Academy	12 times/year	Provided as needed. The effectiveness of the revised training method is to be reviewed (and the level of the safety mindset is to be monitored after training)	100%	

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Plans
Upgrading Practice/Experiential Safety Training Programs	Operating Practice/Experiential Safety Training Programs • Providing practice/experiential safety training programs to high-risk workers • Collecting and reviewing feedback on training to reflect it in improvements	At all times At all times	In progress according to the curriculum; To be updated to a 2-season course The answers in the training questionnaires is to be reviewed and reflected; To be updated to a 2-season course	100% 100%	
	Upgrading Practice/Experiential Safety Training Programs • Producing new VR safety training programs	9 types/year	9 types to be produced by the end of this year (final editing in progress)	75%	The utilization plan, including new content, to be confirmed and implemented
	• Producing instructional materials for micro-learning safety training programs	1 type/month	More than 45 types have been developed through in-house producers and short-form contests; 2–3 content types per month to be continuously developed	100%	
Improving Safety and Health Training Programs	Improving the Safety Training Management System • Raising convenience for users and administrators by fully revising the safety training management system	-	Initial system design and item setting in progress	20%	Building a system that maximizes user convenience
	• Eliminating an omission from training by constantly checking individual training plans/performance	-		0%	To coincide with the Hi-SEs revision schedule, individual training completion is to be monitored, and an automatic management function is to be enabled
	Developing and Operating the Safe Career Path (SCP) System • Designing stage-specific training courses • Selecting and training instructors for each course	- -	Detailed learning materials for each subject (70 courses) completed The first-round of selecting instructors per course completed	100% 50%	The practicality and effectiveness of instructor development programs to be improved
	Improving Training in the Safety Academy • Increasing the frequency of training sessions	-	Review completed. The number of trainees, training durations, and methods to be further reviewed	100%	
Promoting a Safety Culture	• Improving training effectiveness	-	A feedback survey is to be added approximately one month after each training to review the survey's effectiveness (and check changes in the safety mindset)	100%	
	Improving Internal Qualification Training • Raising the effectiveness by fully improving training courses	-	Partial improvements have been made.	50%	The internal qualification programs' adequacy is to be reviewed and revised by the end of 1Q 2023
Promoting a Safety Culture	Examining the Level of Safety Culture • Online questionnaire survey	Annual	The survey was conducted at several departments in June; it will be conducted enterprise-wide in December.	10%	To be level-specific and customized to improve the effectiveness of diagnosis
	• Analysis of results and feedback	Annual	Each organization is to submit the analyzed survey results by mid-January after a survey in December	0%	Responsibilities of each officer to be improved based on the analysis of results
	Producing and Using Safety Mascots • Mascot production • Launch and use	At all times -	Mascots to be developed and named to help create a friendly safety culture The mascot is used in internal training and promotional materials, waiting for a formal launch; its various movements are under development.	100% 90%	To be applied to various content
Promoting a Safety Culture					

Operation of Statutory Safety and Health Training Programs

Statutory Safety and Health Training for New Recruits (Upon Employment)

The Safety Experience Training Center contributes to preventing safety accidents by providing basic and essential safety training to new employees of HD HHI and its subcontractors and transferred personnel. In 2022, 9,336 recruits completed statutory safety and health training, and based on this training, the foundation for safe work in the field was established.



Regular Safety and Health Training for Workers

We provide various training, including on-site, video, and monthly safety training for production workers. We are promoting high-quality safety training by operating various programs, such as media content (VR, short forms, etc.), including materials customized to each organization. Furthermore, we aim to increase effectiveness by additionally operating content, such as discussion-based learning and midterm quizzes so that workers can participate and learn independently.

For office workers, online safety and health training is provided on 12 topics that suit their characteristics, such as understanding the Occupational Safety and Health Act and industrial accident insurance system, preventing and managing VDT syndrome and cardio-cerebrovascular diseases. In addition, online examinations are conducted to review and remind them of what they have learned.



Statutory Safety and Health Training for Supervisors

We provide safety and health training to approximately 1,800 frontline supervisors (of contractors and subcontractors) to improve the level of required safety and health expertise and develop self-regulated safety capabilities by helping them accurately understand their safety role.

In addition, in-house and external instructors qualified under the planned SCP system help them acquire and learn the importance of communication and the attitude necessary for safety management, thereby improving safety management leadership.

We run a variety of educational curricula to improve supervisors' expertise and fulfill their roles and responsibilities in safety management to achieve corporate safety and health objectives and standards.



Statutory Safety and Health Training for Managers

Statutory safety and health training was provided to HD HHI and its affiliates' contractors'/subcontractors' managers in the first and second halves of the year. The training curriculum consisting of the tasks and roles given to managers, safety management, and leadership is to strengthen their capabilities to realize our safety and health management objectives and vision.



Reinforcing Non-statutory Safety and Health Training Programs

Safety and Health Training for New Supervisors

We provide safety and health training for new supervisors on basic issues to help them recognize their roles and responsibilities in safety, understand essential safety issues, and improve their safety mindset. In particular, the curriculum is structured with differentiated safety roles of each position so that essential safety competencies can be acquired.

Improving the safety mindset Roles and responsibilities, leadership	Information delivery Enterprise-wide safety objectives, activities, laws, issues, etc.	Emergency response Accident cases, responses by situation	Job competency Hi-SEs, SLIs, risk assessments, PTWs, etc.
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Safety Leadership Training

We provide safety leadership training to field workers to improve the expertise of safety supervisors who perform safety activities at the forefront site and secure a pool of experts. By providing systematic training comprising Levels 1 (basic course) and 2 (advanced course), we improve the safety leadership of field workers.

안전사고, 그냥 사고가 아닙니다.

Fact 최근 키워드로 본 "안전사고 프레임"

실제 사고는.. 불안전 행동 : 90%
불안전 상태 : 10%

중대재해

위험의 외주화
비정규직 문제로 바뀜
중대적 안전관리 부실
살안기업 낙관
중대재해 기업자멸 강화

개인 불안전 행동 등 실제 사고의 직접 원인으로 위험의 외주화 등 기업 자체의 구조적 문제로 접근하거나, 한-이점간의 문제로 확대하는 경향이 높음
→ '안전'이 기업 내부의 이슈에서 사회 전체의 이슈로 확대

안전 경영 리더십

□ '안전 최우선' 방침 및 안전경영 전담조직

2022년 경영방침
"제로로 50년, 제로로 도전"
1. 안전 제로화
2. 도약기 기술 확대
3. 위험과 성장
4. ESG 경영 확대

□ 안전경영실 신설 : 전사 안전활동 컨트롤타워 역할 수행 (現 안전통합경영실)
• 대표이사 직속 안전경영 컨트롤 타워 기능 수행 조직 운영
2021년 8월 10일 제1차 안전경영실 소속 → 안전경영실로 격상

경영지원본부 안전부문 → 격상 → 안전경영실 (장관 : 대표이사 부원)

SCENE MANAGEMENT (사고현장 관리)

Recording the Scene

카메라 CCTV 비디오 스케치

Check Point

Before & After

✓ 전기 전방 차단 여부 ✓ 가스 밸브 차단 여부
✓ 조립 차단 여부 ✓ 누출/유출 물질 제거
✓ 장비, 도구 이동 여부 ✓ 사고 현장 변경 등

위험요인 파악

사전예방 위험요인 파악 위험성 추정/평가 고위험성 위험성 관리

1. 작업 진행 전 위험성 평가
2. 작업 중 위험성 평가
3. 작업 후 위험성 평가

안전 관리팀 RCA/OPL 안전대응팀 안전대응팀

안전 RISK 관리

Safety and Health Training Programs for Foreigners

Special safety and health training is provided to raise the safety consciousness of foreign workers who are in the blind spot of regular safety and health training because of the language barrier. Safety guidebooks are available in five languages (English, Vietnamese, Thai, Uzbek, and Sri Lankan) for foreign workers. When educating new foreign workers, interpretation services are provided to teach basic and essential safety content practically and effectively, and textbooks translated into 6 languages (English, Chinese, Thai, Russian, Sri Lankan, and Vietnamese) are used.



Safety Guidebook for foreigners

In addition, interpreters (Vietnam, Thailand, Uzbekistan) are stationed site to help foreign workers adapt to fieldwork.

We will continue to improve the safety knowledge and capabilities of foreign workers by operating a safety training cycle reinforced with "training for new recruits – training in the 7th month – regular training – special safety training" and supporting safety signs and site safety management activities.



Safety and health training for foreigners



Training materials (translations)

Site interpreters

Special Training
for Subcontractors'
Representatives

We provided special lectures on safety for the in-house subcontractors' representatives to improve their safety consciousness and develop their ability to respond to recent safety issues.

In particular, this special lecture was given to around 150 representatives who hire foreign workers, which is recently increasing, on understanding foreign workers and safety management measures. We will continue providing various special safety lectures to improve our subcontractors' safety management capabilities.



Job Training for
Safety Supervisors
and Subcontractor
Safety Supervisors

We provided job training to site safety supervisors and subcontractor safety supervisors, who perform site safety activities, in the first and second halves of the year to improve their job competency and professionalism. The training provided an opportunity to understand recent safety issues, learn changed safety standards, and acquire know-how in face-to-face activities to strengthen site safety management activities. We will continue to provide regular high-quality training to secure safety capabilities.



Safety Academy

We operate a Safety Academy for those who have violated the golden safety rules to create a safety culture by observing the fundamentals and principles. Rule violators attend the Safety Academy, a 2-day course of various subjects, to analyze individual behavior, increase safety consciousness, and make safety behavior a way of life. The course reduces the possibility of safety accidents and prevents repeated violations of safety rules.



Safety Training for
Short-Term Work

The Integrated Safety Training Center operates the existing safety training for short-term work into a comprehensive training program. Through this, we provide systematic and effective safety training by professional instructors to all site visitors so that short-term workers not familiar with our site can start working more safely.



Upgrading Practice/Experiential Safety Training Programs

Practice/Experiential Safety Training for High-Risk Work

We provide direct and indirect practical and experiential training for high-risk workers to prevent major incidents effectively. The training consists of 6 practice/experiential courses for 8 high-risk work tasks: ▲welding, ▲special welding, ▲ piping/outfitting, ▲fitting/fit-up, ▲ spraying, ▲blasting, ▲cranes, and ▲scaffolding.

Going further than the existing theory delivery method, the training shows high satisfaction as the trainees naturally learn and understand safety by practicing and experiencing safety-related matters. We plan to improve training effectiveness through curriculum updates and revisions continuously.



Additional Production of VR Safety Training Content

Recently, new content has been additionally developed for various uses of VR safety training, which was introduced for the first time in the industry in 2017. Among the content that was not included in the existing 11 content types, 9 new contents were created based on scenarios with a relatively high possibility of occurrence of major incidents. In addition, by changing the previously inconvenient hardware to the latest version, trainees can easily experience VR safety training without restrictions in place.

- ① Argon-purging of pipes
- ② Truss assembly and disassembly
- ③ Being caught in power-operated doors
- ④ Operating winches (cable laying)
- ⑤ Working on and operating a cherry picker
- ⑥ Pressure testing
- ⑦ Transporting sub-materials
- ⑧ Operating cranes to assemble engines
- ⑨ Hydraulic work for HiMSEN Engines



Producing and Using Safety Short Form Videos

We have produced and utilized short and attention-grabbing “safety short forms” to improve learning effectiveness.

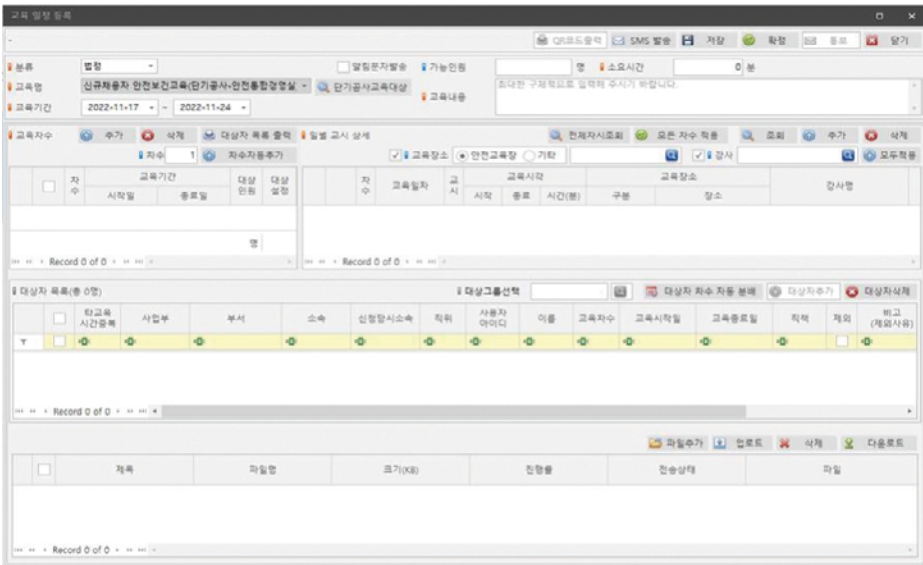
The short form is structured to make it easy and engaging to understand site safety standards, such as the importance of safety gear and safe movement on ladders. Through the contest, short-form videos containing novel ideas are secured and used as safety training materials.



Improving Safety and Health Training Programs

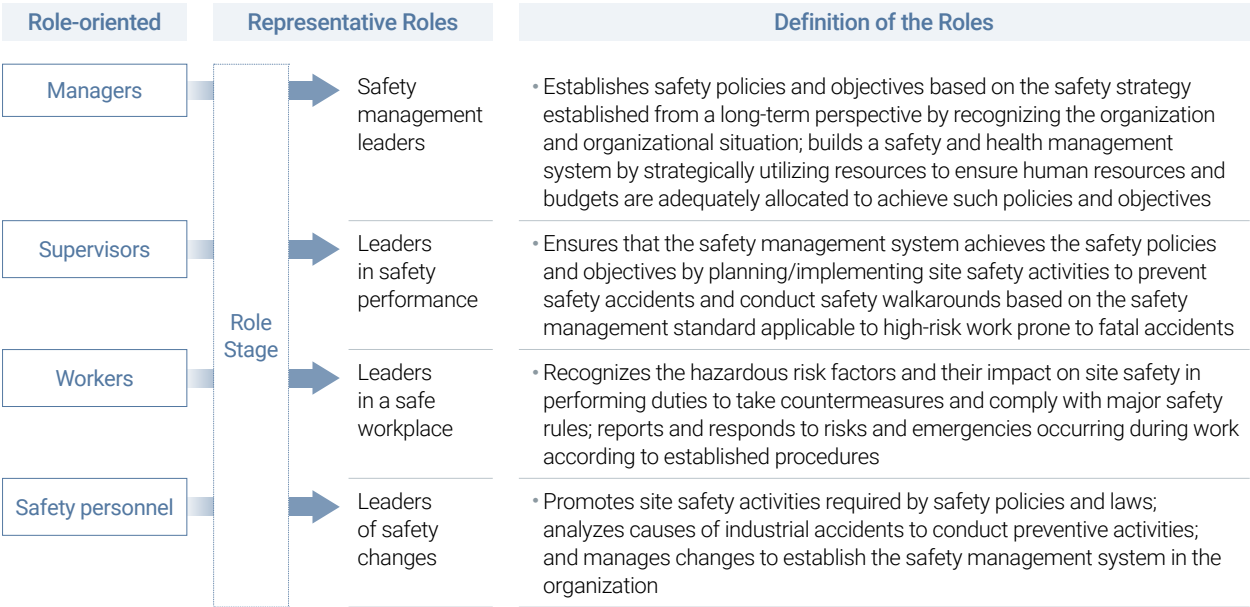
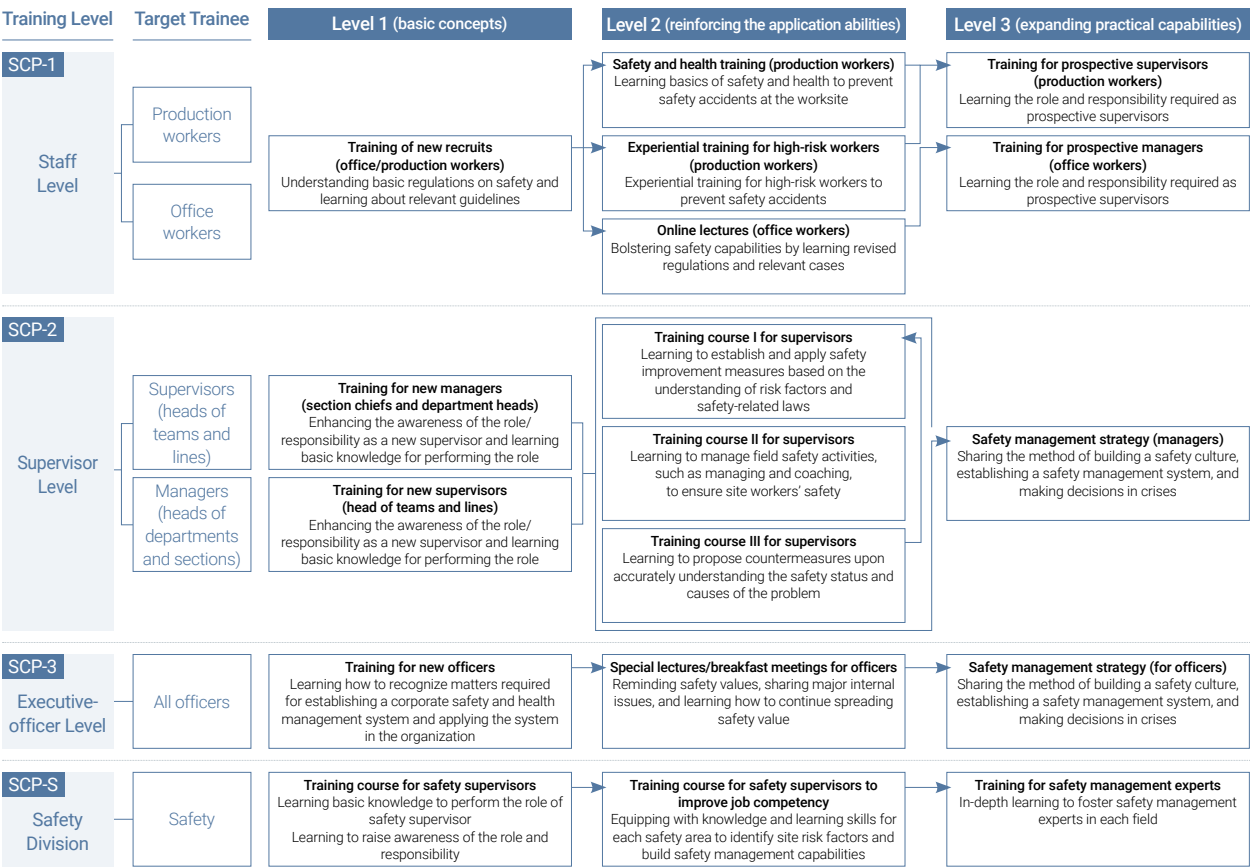
Improving the Safety Training Management System

We use the QR code attendance management system in all safety training to increase the efficiency of training result management. As a result, efficiency and accuracy were secured by drastically reducing unnecessary office work compared to the existing method of managing attendance books. In addition, by advancing Hi-SEs, we are developing the safety training data management system to be easy, quick, and effective for the users, which was hitherto somewhat inconvenient and complicated.



Developing and Operating the Safe Career Path (SCP) System

SCP is a step-by-step safety training program that enables standardized safety training according to a set system and aims to secure safety capabilities and awareness levels suitable for each trainee's responsibility and role. It will be operated for each trainee (general workers, supervisors, executive officers, and safety divisions) to understand their respective safety roles and develop their safety capabilities to fulfill such roles and improve through continuous monitoring.



Operating Safety Management Courses for Technical Trainees

We run the “Safety Management for Technical Trainees” course to help subcontractors secure safety supervisors. We opened a new safety management course in collaboration with the Technical Education Institute. Through a systematic education curriculum, such as utilizing the in-house safety training program and KOSHA’s professional program, we foster trainees to become excellent safety supervisors by increasing their level of achievement.

As a result, 23 technical trainees completed the course first implemented in 2022, and they commenced roles as safety supervisors at in-house subcontractors to conduct safety activities at the site.

We will provide technical trainees with higher-quality training by extending the training time and expanding field experience so that it can be of practical help in taking the first step as a safety supervisor.

Hosted by HD HHI	<ul style="list-style-type: none">• Understanding roles and responsibilities of safety management and safety and health-related laws• Safety management program/Site safety walkarounds tips• Safe work/safety improvement/health management by accident type• Emergency response/first aid/accident investigation tips• Work standards & Risk assessment/PTW program• Understanding safety training programs/Improving teaching competence• Safety Experience Training Center (SETC) and practical/experiential training	Lecture on safety and utilizing the Integrated Safety Training Center (ISTC) (130 hrs)
	<ul style="list-style-type: none">• Composed of safety management issues during technology training	Supported by the Technical Education Institute (16 hrs)
Hosted by the KOSHA	<ul style="list-style-type: none">• Selective support for special lectures and online/offline courses	Supported by the KOSHA (22 hrs)

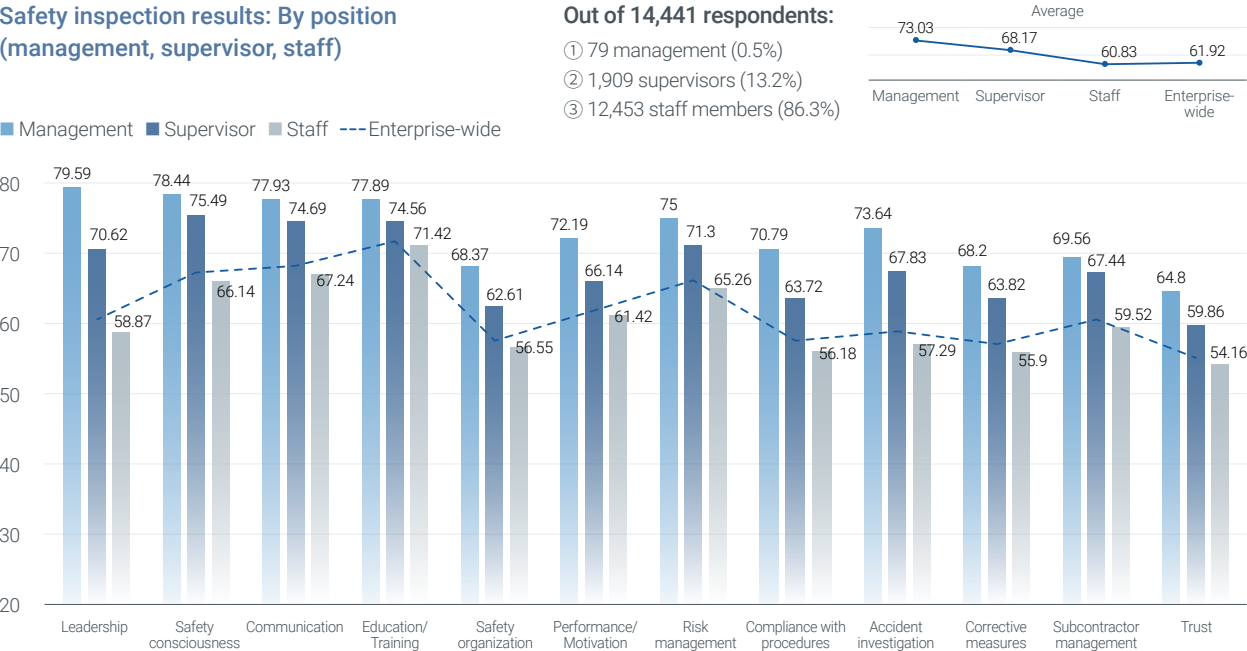


Promoting the Safety Culture

Safety Consciousness Survey, Psychological Safety Awareness Test (PSAT)

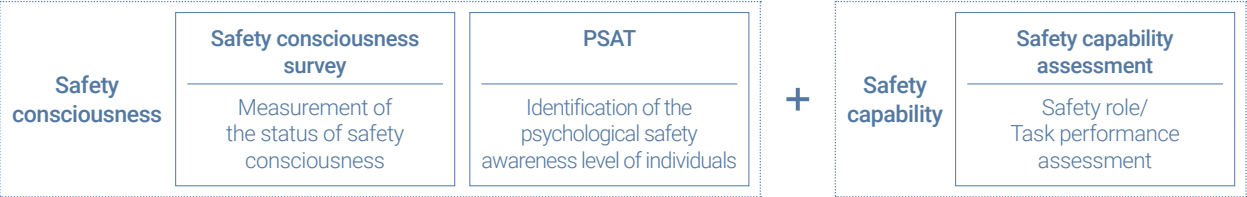
Safety consciousness surveys and the PSAT were conducted with some organizations to identify the level of safety consciousness, which will be expanded throughout the Group. In addition, “safety consciousness” surveys and “safety capability” assessments were conducted. We established and implemented customized improvement strategies based on the resulting indicators to promote an enterprise-wide safety culture.

Safety inspection results: By position (management, supervisor, staff)



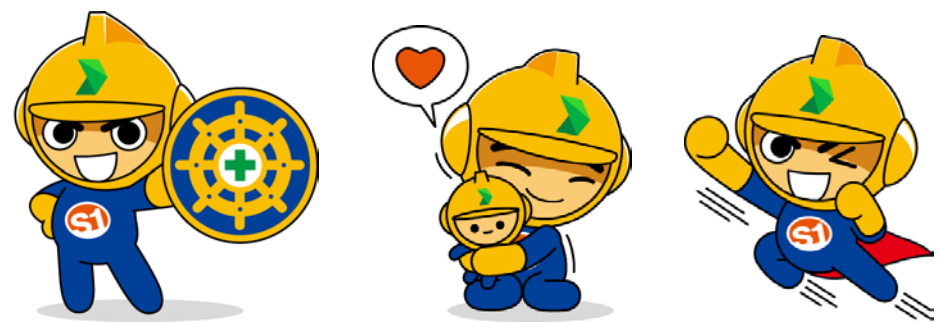
• The overall level of consciousness was high in the order of management, supervisors and staff (averages were 73.03, 68.17, and 60.83, respectively).

- Areas with a large gap in consciousness level between management/supervisors and staff: leadership, compliance with procedures, accident investigation, corrective measures, and safety consciousness
- Education/Training is recognized as a strength in all positions.
- Trust, Corrective measures, and Safety measures were recognized as weaknesses in all positions. Notably, Trust and Corrective measures were the lowest among the staff.



Development
and Utilization of
Safety Mascots

We have developed a safety mascot to raise a friendly and positive image of safety. In particular, the mascot, named “HIRO,” through an enterprise-wide contest, drew participation and interest from all staff members, and it is used in training and meeting materials.



Installation of
Safety Notices

Safety banners, signboards, and electric signboards with novel and sophisticated designs installed throughout the site will inspire safety consciousness by repeatedly showing safety messages to workers. They are gaining sympathy from workers through appropriate content, such as emotional safety messages and safety information tailored to each location.



Other Performance in Safety Training

Safety Training
for Construction
Machinery Operators

Holders of construction machinery operator's licenses (19 types) must complete safety training every 3 years under the new provision, Article 31 (Safety Training for Construction Machinery Operators) of the Construction Machinery Management Act. Although such training is provided only by an institution designated by the Ministry of Land, Infrastructure and Transport (MOLIT), we arranged training sessions with the Safety and Health Advancement Institute (SHAI) to provide convenience for workers of HD HHI and its affiliates, who frequently use construction equipment at sites. In October 2022, 10 training sessions were provided on related laws, safety in construction machinery operation, accident cases, and preventive measures.



Cargo Crane Safety
Training

As with safety training for construction machinery, cargo crane operators are required to attend external training individually. However, we replaced this with special, in-house, collective job training to resolve the inconvenience of attending external training. Operators received their qualifications after completing theoretical and practice sessions on safely operating mobile cranes and aerial work platforms. We will operate collective job training by securing a schedule for educational institutions to visit our company and provide training whenever there is need.



SAFETY

•

HEALTH

4-4

Management Performance of the Safety Risk Management (SRM) Section

The SRM Section concentrates its capabilities on smarter and more active safety management at sites by diagnosing the safety culture level to raise safety consciousness, inspecting whether causes of fatal accidents have been investigated and countermeasures have been taken, establishing a system to discover risk, and engaging in safety improvement activities.

Major Achievements of the Safety Risk Management (SRM) Section in 2022

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Risk Identification and Safety Improvement	Continuing Enterprise-Wide Hi-SAFE Improvement Activities				
	• All production and support departments select their self-improvement topics (registration of subjects).	Annual	Each department registered and presented their improvement topics (March).	100%	
	• Production/Support departments made interim presentations on the progress of their improvement tasks in the first half of the year.	Annual	Completed interim presentations (May)	100%	
	• Production/Support departments made presentations on the results of their improvement tasks in the second half of the year.	Annual	Presentations on results are scheduled for September.	100%	
	• Safety incentives to be awarded through the safety contest.	Annual	The safety contest is held, and the winning tasks are awarded in the second half of the year (completed on October 20, 2022).	100%	
	Risk Contest				
	• 2022 Safety Risk Contest was held.	Annual	The 2022 Safety Risk Contest was held (May 2–13).	100%	
	• Aggregated the 2022 Safety Risk Contest results for monitoring by relevant departments	At all times	Reporting on the contest results, sharing the results with the Production, Assets, and Safety divisions, and requesting improvement (through official letters and email)	100%	
	• Safety incentive for excellent informants at the 2022 Safety Risk Contest	Annual	Rewarding excellent informants (10 Grand Prize winners and 30 Excellence Prize winners)	100%	
	Safety Open Market				
	• Registering and managing improvement topics	At all times	Registering topics and assessing improvement ideas	100%	
	• Rewarding outstanding ideas	4 times every 6 months	Held 3 award ceremonies (March 10, August 10, and November 25)	75%	Award ceremonies were held on the third and fourth quarters
Big Data on Safety/Accident Prediction System	Implementation of TF to Upgrade Big Data on Safety and Accident Prediction Model				
	• Palantir Foundry Application	To be completed in July	Completed the application of AI Lounge raw data and Palantir Foundry	100%	
	• Improving accuracy through correlation analysis between process, design, and quality data	To be completed in July	Analyzed the correlation between process, design, and quality data (July 2022, Palantir TF issues)	100%	
	• Accident prediction system advancement	At all times	Sending alerts when specific departments detect anomalies, such as accidents, rule violations, and safety intervention data, developing rule editor * to be completed within the Palantir TF period (July 2022)/utilized Palantir Foundry	100%	
	Expansion of Accident Prediction Services				
	• Expanding the receiving method and recipients (supervisors → management, staff)	At all times	Expanded the information provision service (covering supervisors, management, and Production/Support Departments' office workers)	100%	
	• Utilizing mobile work instructions to expand the information service to operators	At all times	Third-round development is ongoing following the completion of the second-round mobile work instruction system's development * Budget supported	50%	Request for approval to advance the mobile work instruction system (3rd) is pending (in collaboration with the Shipbuilding Safety Department)
Digital Safety Improvement	Introduction of AI Cameras for Heavy Equipment				
	• Installed AI cameras on 13 excavators	Annual	Hardware for AI cameras installed and tested.	100%	
	• Installed AI cameras on forklifts (10 t or above), skid loaders, and wheel loaders	Annual	Validated AI camera test installed on forklift; devised initial installation plan	100%	
	• Installed AI cameras on forklifts (3–10 t)	Annual	Devised the second installation plan (for 186 forklifts ranging from 3 to 10 t)	75%	To be installed on 10 t+ forklifts and improved if necessary (2023)
	Vehicle Traffic Monitoring System				
	• Established an improvement plan through consultations with related departments (including Logistics and Industrial Security)	Annual	Reviewed the improvement plan (installed and tested cameras at the entrance)	100%	
	• Built a monitoring system for vehicles entering the Mipo/Ilisan Gates (linked to the Joint Support Information Team)	Annual	Joint Support Information Team requested approval	100%	
	• Linked to Hi-SEs' data and applied to the alarm system (Traffic Team)	Once/Annual	Work in Q4 completed (October), Testing and upgrades in progress	100%	

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
	Development of Drone Safety Monitoring System <ul style="list-style-type: none">• Registered a drone-applicable safety improvement task among digital TFs• Improved safety management using drones and conducted field tests* Collaborated on the national project in the KSOE DT sector	Once every fortnight	Implemented the digital safety TF KOM and selected TFs	100%	
		Annual	Technical review in progress to select a drone company; to be completed by the end of this year; requested for approval and selected a drone company (October 11, completed field test at the Unit Assembly Shop Plant 1)	100%	
	• Established a long-term safety management monitoring system using drones	Annual	Established an expanded application plan through site verification (4Q)	75%	Scheduled to secure dedicated drone personnel for the Corporate Safety and Health Office in 2023
	Application of the Jib Crane Collision Avoidance System <ul style="list-style-type: none">• Detailed review of the application of a collision avoidance system for each crane type (traveling part, boom, and weight)• First-round J/C application (16 units)	Annual	Detailed review of the application of a collision avoidance system for each crane type; selected the types for the initial and second-round applications	100%	
		Annual	Confirmed the number of units (27) to be applied with the system (first-round investment for 23 units)	80%	Subcontractor selection in progress after obtaining approval and POR completion
	• Second-round J/C application (19 units)	Annual	Selected the types for the second-round application (4 Naval & special ships in 2023)	30%	Requested for approval to be made in the second half of 2022 and further improvements for 2023
	Reinforcing the Safety of 3 Major Safety Facilities <ul style="list-style-type: none">• Held opening ceremony for the TF tasked to enhance the safety of 3 major safety facilities• TF participated by In-/Out-Shop Lighting, Scaffolding, and Ventilation• Derives improvement plans for TFs and follows up on improvements	Annual	In-shop and out-shop TFs formed after the TF opening ceremony (April)	100%	
		At all times	TF participated by In-/Out-Shop Lighting, Scaffolding, and Ventilation (weekly)	100%	
		At all times	Improvement agendas derived from each TF are applied through the Safety-Production Deliberation Committee (reflected in the agendas of the second, third, and fourth rounds of deliberations)	100%	
	Safety-Production Deliberation Committee <ul style="list-style-type: none">• Established and implemented a plan to operate a Safety-Production Deliberation Committee• Among high-risk improvement tasks, those that are expected to increase costs or delay processes are continuously identified and presented as agenda items for deliberation.• Items selected as deliberation agenda and the deliberated items undergo improvements (budget and MH supported by the relevant department)	Annual	Proposed the operation of a Safety-Production Deliberation Committee (February)	100%	
Site Safety Improvement		4 times/year	Held the first, second, third, and fourth Safety-Production Deliberation Committee (fourth in October)	100%	
		At all times	Budgetary support and follow-up on the site application of safety improvements in progress	80%	Budgetary support for deliberated items in progress
	Ship Design Improvement <ul style="list-style-type: none">• Improves the design to avoid falling from vertical ladders	Annual	Established design improvement plans (20 items); application of the improvements to ships in progress.	100%	
	• Examines and responds to requests for design safety review	At all times	Completed 43 out of 48 cases (4 cases per month)	90%	Design safety review to continue in 2023
	A System to Check the Performance of Countermeasures against Major Incidents <ul style="list-style-type: none">• Establishes a system to check whether countermeasures against major incidents have been implemented (Hi-SEs)	Once/Annual	Hi-SEs with a system to check whether countermeasures against major incidents have been established completely.	100%	
	• Inspects and assesses countermeasures against major incidents (first and second halves of the year)	Once/Biannual	Completed inspection of the performance for the first and second halves of the year	100%	
	Advancement of Hi-CAMS <ul style="list-style-type: none">• Developed fire/smoke detection systems	Biannual	Developed a fire/smoke detection system (detection rate to be continuously improved with a wider coverage)	100%	
	• Developed a road traffic control system for main roads at the main yard	Annual	Settings have been made to detect vehicles and danger zones, track vehicle routes, and measure speeds	80%	Detection rates to be continuously improved with a wider coverage
	• Developed portable imaging devices	Annual	Completed initial development of the Edge device	100%	
	• Develops Hi-CAMS, a risk event analysis platform	Annual	Holds meetings with an external developer	50%	UI to be improved upon consultation with the external developer (Hanwha) (after December 2022)
Image Processing Devices for Safety Improvement	Introducing Body Cams for Safety Supervisors <ul style="list-style-type: none">• Conducting field tests• Applied to enterprise-wide safety supervisors	Once/Quarterly	Field test completed (Hytera)	100%	
		Quarterly	Applied to enterprise-wide safety supervisors (200 units)	100%	
	CCTV Installation at the Gunsan Shipyard <ul style="list-style-type: none">• Inspects the field installation at Gunsan Shipyard• Reported the field installation at the Gunsan Shipyard• Requests for approval of CCTV purchases for the Gunsan Shipyard	Quarterly	Inspected the field installation at the Gunsan Shipyard	100%	
		Biannual	Reported the confirmed installation plan at the Gunsan Shipyard	100%	
		Annual	CCTVs (wired) arrived (179 wired units and 37 wireless units)	90%	Wireless type to arrive in March 2023 (delayed because of the semiconductor crisis)
	• Installs CCTVs at the Gunsan Shipyard	Annual	Installed wired CCTVs at the Gunsan Shipyard (October)	100%	23 wireless ones to be installed after their arrival in March 2023

Risk Identification and Safety Improvement

Enterprise-wide Safety Improvement Activities (Hi-SAFE)

We held an enterprise-wide safety improvement (Hi-SAFE) contest at the ISTC in November and awarded KRW 48 million in prize money to 13 teams that had carried out outstanding Hi-SAFE activities throughout the year.

Our enterprise-wide Hi-SAFE that focused on accident prevention was held for the 3rd time, where the relevant department (including Production, Design, and Technology Research) identified high-risk tasks that can lead to fatal accidents to develop and implement proactive improvement plans.

This year's Hi-SAFE Contest was attended by officers, such as CEO Lee Sang-kyun, CSO Noh Jin-yul, the Engine & Machinery Business Unit's President Ahn Kwang-heon, and external safety experts like the MOEL, KOSHA, and DNV officials as examiners.

After 72 departments selected 155 tasks in January, improvement activities were carried out for about 8 months. The Crank Production Department received the grand prize for promoting improvement plans for fall accidents that may occur during the crankshaft manufacturing process.

Award	Department	Improvement Task
Grand Prize	Crank Production Department	• Stopped the balance weight from falling out of a single shrink-fit product
Top Prize	Shipbuilding 2	• Reduced risk of fatal accidents in an enclosed/confined space
	HD HHI MOS) Heavy Machinery Support	• Reduced risk of hydro crane tripping
Excellence Prize	Hull Outfitting Design Department	• Reduced risk of falling through the diagnosis of neglected tasks, which may cause fatal accidents
	Cabin Production	• Improved the access/traffic design for safety passages
	Special) Ship Electric & Weapon Design Department	• Improved mast block work safety

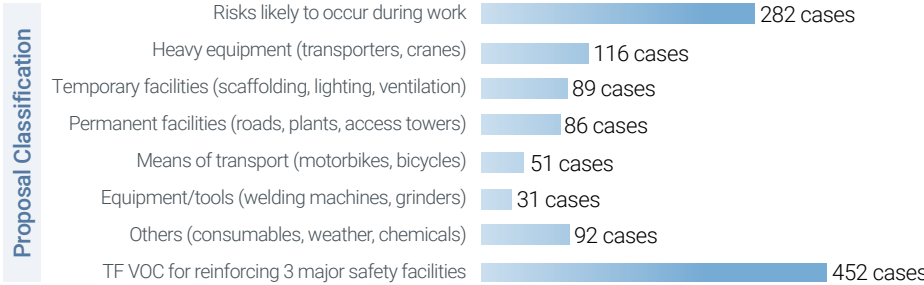


Enterprise-wide Safety Risk Contest

The enterprise-wide safety risk contest, which serves as the representative channel for safety communication with the site, was held for around 2 weeks in May. In 2022, about 1,200 various site risk factors were received, confirming the active participation and intention of employees to create a safe site.

We also held an award ceremony by selecting 30 people who made excellent or multiple proposals. Received proposals are reviewed and sorted by the Safety, Asset, and Production departments, and urgent and mid- to long-term improvement plans are set up according to urgency and risk level to promote improvements with investments and interdepartmental collaboration.

We plan to establish a dedicated platform to review and manage reported issues and advance Hi-SAFE by strengthening communication, such as sharing improvement progress with informants and promoting improvement cases.



Field Idea Contest
(Safety Open Market)

The Safety Open Market is operated to derive improvement measures by encouraging the interest and participation of all employees and inviting ideas by applying open innovation techniques to safety-related issues (risks) that are difficult to improve.

Risks that were difficult to solve for a long time because of various problems, such as a lack of ideas, technical limitations, and departmental interests, were classified into high/medium/low grades according to difficulty and risk level and registered in the Hi-SEs system. Up to KRW 100,000 is rewarded for the chosen idea for improvement.

In 2022, 94 proposals were made under 33 topics, and 20 were selected as excellent ideas and rewarded.



1st Best Idea Proposal Award






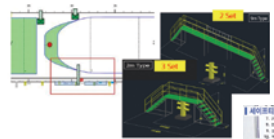





2nd Best Idea Proposal Award

Proposals made during the 2022 Safety Open Market/Awards

First award (March)	Second award (August)	Third award (November)
35 proposals 7 awards	45 proposals 8 awards	14 proposals 5 awards

Safety Open Market Process

Process	Description
Long-term unresolved safety risks	<ul style="list-style-type: none">• Safety risk review and task selection <p>Improvement of a passage that interferes with the Dock 8.9 G</p> <p>Crane traveling part</p> <p>Problem</p> <ul style="list-style-type: none">- There is no space for passage when the 8.9 Dock G/Crane stops.- Causes the worker to behave unsafely* Increases the risk of Caught-in/Fall accidents 
Task registration on Safety Open Market (by difficulty level)	<ul style="list-style-type: none">• Selected tasks registered on Hi-SEs   
Task promotion through Hi-SEs and Hi Square	<ul style="list-style-type: none">• Task promotion (through Hi-SEs, Hi Square, The Yard, HD HHI Family News) 
Received ideas and incentivized excellent ideas	<ul style="list-style-type: none">• Selected excellent ideas and incentivized Improvements <ul style="list-style-type: none">- Dock 8/9-exclusive passage development* Safe crossing facility development- Completed the site investigation of interferers (UT, transformer, bit) (December 2021)- Confirmed the concept and prepared a production plan/completed safety review- Scheduled for pilot application to Dock 8 Vessel 3286  
Risk reduction	<ul style="list-style-type: none">• Risk reduction through excellent ideas  <p>Improvement of the safe passage</p> 

Big Data on Safety/Accident Prediction System

Advancing the Accident Prediction System by Applying Palantir Foundry

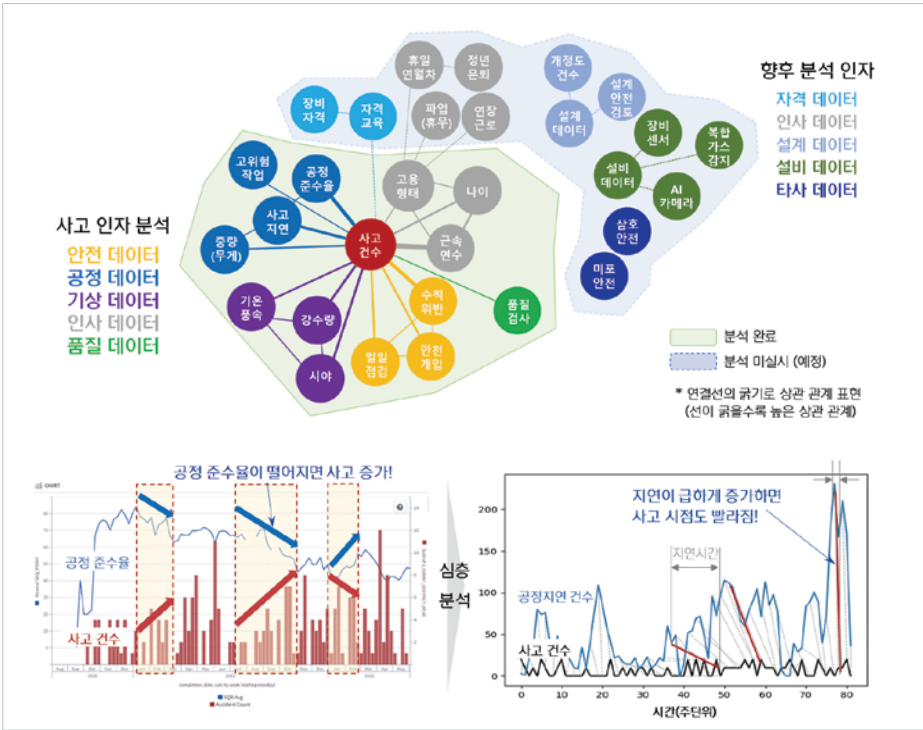
The big data AI-based safety accident prediction system, which is being developed and applied for the first time in the shipbuilding industry, was upgraded through a collaboration with Palantir, a big data company in the United States.

Palantir's Foundry (big data processing/analysis platform) showed that key accident factors analyzed by using multiple data sets increase reliability in accident prediction. In addition, this system enables customized safety management by providing accident prediction alarms and safety inspection items that can be used on site.



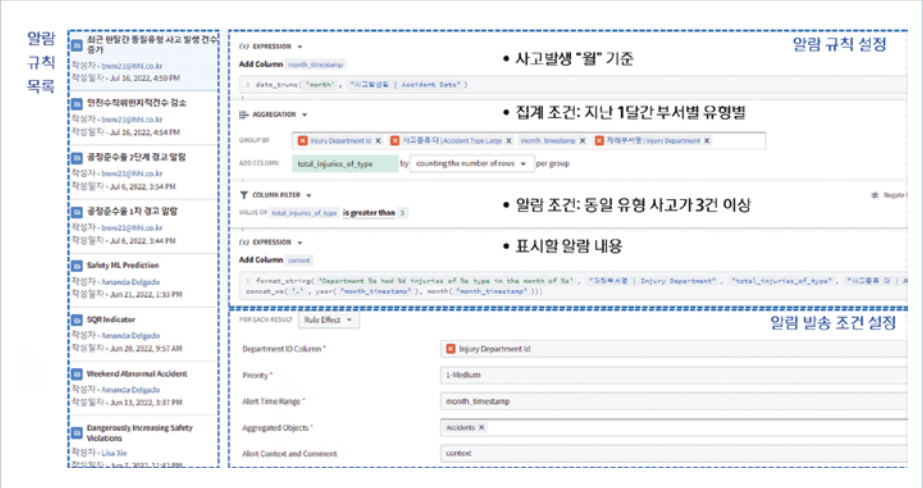
Accident Factor Analysis

Through the analysis of 14 data sets in 5 categories, including production process data, personnel data such as age, working periods, and weather data, the fundamental factors that cause safety accidents were identified.



Accident Risk Alarm Rule Setting and Dispatch System Development

Through the development of an accident risk alarm rule-setting system, employee-participating (Top Down/Bottom Up) safety management was induced.



Site-specific Safety Management Activities

Along with accident prediction alarms, and action lists, key inspection items were provided to induce site-specific safety management. In addition, through the alarm validation function, the site safety inspection items were checked, feedback was received, and accident prediction alarms were continuously updated.



Digital Safety Improvement

Establishment of Co-work Guidelines for Industrial Robots (Statutory Standards Relaxed)

As industrial robots were included in the legal safety inspection with the revision of the Occupational Safety and Health Act in October 2017, industrial robots like welding robots require barrier fences and are required to undergo safety inspections. However, because of the nature of the shipbuilding industry, which requires collaborative work, welding robots have limitations when complying with the obligation for safety barrier fence installations.



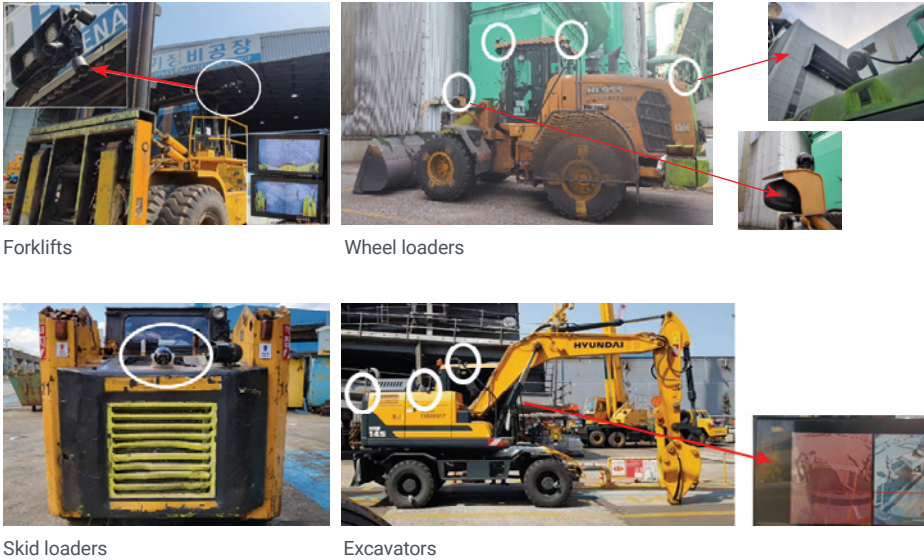
To solve this issue, the Corporate Safety and Health Office submitted a deregulation proposal to the MOEL in collaboration with Samsung Heavy Industries and Hanwha Ocean, both of which shared the same problem, and the Korea Enterprises Federation and the Korea Offshore & Shipbuilding Association (KOSHIPA) several times. In addition, improvement plans were derived through continuous consultations with the MOEL and the KOSHA for 2 years. After installing local barrier fences, speed control devices, and shock sensors, the safety guide for collaborative industrial robots was posted on the KOSHA website in September 2022. As a result, when introducing new robots in the shipbuilding industry in the future, complying with relevant laws and regulations with safety measures, such as local stockades and shock sensors without physical stockades under the safety guide, will be possible.



Posted on the KOSHA website (September 26, 2022)

Intelligent (AI) and Automatic Human Body Detection Systems (Cameras, Alarms) for Heavy Equipment

An intelligent (AI) and automatic human body detection system was applied to heavy equipment, such as forklifts and excavators, to prevent major incidents caused by human errors because of poor visibility, overlooked guardians, and nearby workers. In 2022, the system was installed on excavators, skid loaders, wheel loaders, and forklifts (10 t or more). In 2023, it will be installed on forklifts weighing 3–10 t.



AI cameras installed on heavy equipment

Classification	Number of Units	Current Status	'22.1Q	'22.2Q	'22.3Q	'22.4Q	2023	Remarks
Excavator	13	Completed						February 2022
Forklift (pilot installation)	1	Completed						Offshore 44 t
Skid loader	128	Completed						October 2022
Wheel loader	1	Completed						November 2022
Forklift, first-round	64	Completed						10 t or more
Forklift, second-round	189	Not installed						To be applied in 2023 (3–10 t)

Safety-Production Deliberation Committee

We have been operating the Safety-Production Deliberation Committee, a decision-making body for management, since February 2022 to reduce site safety hazards quickly.

The Safety-Production Deliberation Committee, presided over by the CSO and attended by the heads of the Safety-Production and Finance Divisions, makes the final decisions on high-risk safety issues requiring high cost such as changes in construction methods and standards, enhancement of safety facilities and maintenance of buildings and facilities.

Safety-Production Deliberation Committee operating procedure



The main agenda items deliberated by the Safety-Production Deliberation Committee in 2022

First agenda item (February 28, 2022)

- Improving passage of large truss structures on the Yard 1 steel stock area



Second agenda items (May 17, 2022)

- [Scaffolding TF] Operate the rapid response team/introduce safety nets
- [Lighting TF - Out-shop] Lighting to be expanded on the vessel, PE area, and facilities

Third agenda items (July 8, 2022)

- [Lighting TF - In-shop] Lighting to be expanded at the factory buildings and cranes
- [Ventilation TF - Out-shop] Dedicated ventilation team to be operated/additional jet fans to be provided on the vessel
- [Scaffolding TF] The height of handrails to be raised to 1,100 mm or above

Fourth agenda items (October 13, 2022)

- Adapted construction schedule for facility improvement investment
- [Scaffolding TF] Changed the installation method of the vertical ladder installed on the block/established the plan to secure manhours for the introduction of safety nets

Implementation Check for Countermeasures against Major Incidents

In accordance with the Serious Accidents Punishment Act, which took effect on January 27, 2022, we are establishing a system that regularly checks the implementation of measures to prevent recurrence in preparation for major incidents while recording and maintaining related results. We are contributing to the prevention of major accidents of the same/similar nature through field-oriented inspections to ensure that countermeasures are performed.

Implementation Check Flow



Registration of performance checks concerning major incident recurrence prevention for the last 3 years (2020-2022)

[illegible]

TF Formation to Reinforce 3 Major Safety Facilities

The TF inauguration ceremony to reinforce 3 major safety facilities (scaffolding/lighting/ventilation) was held at the Health Promotion Center in April 2022, which are closely related to the working environment in the shipyard and major incidents. For scaffoldings, arbitrary disassembly and restoration of the scaffold due to a lack of workforce, delays in taking safety measures, such as guard rails, and secondary fall accident prevention (safety nets) required improvements. Illumination problems were identified in factory buildings, arterial roads, under blocks, and confined spaces, and areas with chronic poor ventilation and insufficient ventilation equipment maintenance systems were reviewed (workers' opinions were reflected).

The TF analyzed the problems in the facilities in detail, prepared an improvement plan, and referred it to the Safety-Production Deliberation Committee, the safety-related decision-making body, for deliberation, enabling more rapid improvements.

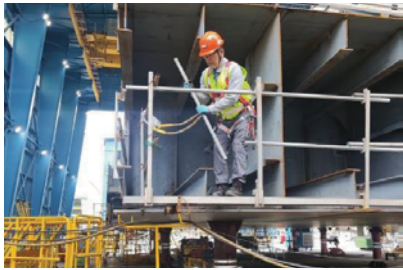


Inauguration ceremony of the 3 major safety facility reinforcement TF

Improvement
of 3 Major
Safety Facilities
(Scaffolding)

Scaffolding/Reducing Fall Accidents

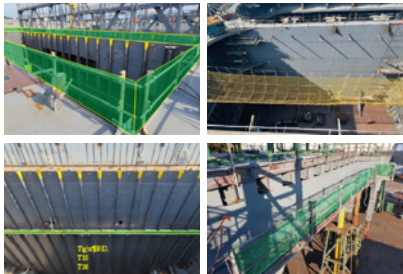
- Operation of an in-shop rapid response team to prevent delays in undertaking safety measures such as disassembly and restoration of the scaffolding structure by scaffolders (at Yards 1 and 2)



- Ladder access platforms to be introduced to prevent the risk of falling when boarding the top of the gondola at the block in the dock area (demonstration completed)

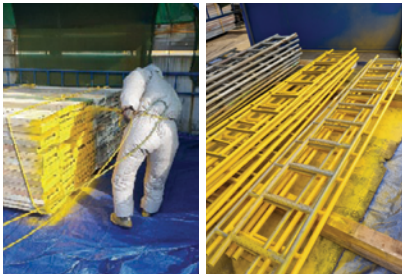


- Designation of an area where there is a risk of falling during aerial work on CNTR and VLCC and the installation of safety nets (2023)



[CNTR]

[VLCC]



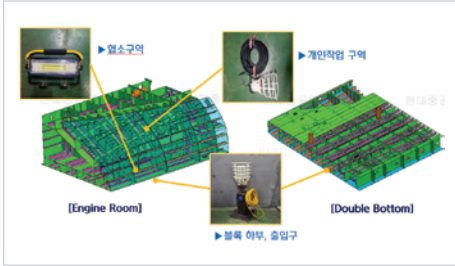
[Scaffolding]

[Ladders]

Improvement of
3 Major Safety
Facilities (Lighting)

Improvement of In-shop Lighting

Additional lights were installed in blind spots, such as under cranes and equipment (fabrication plants, pre-outfitting shelters), and portable and personal lights were installed to improve lighting in confined and narrow areas.



Improvement of Out-shop Lighting

LED straps were supplemented in enclosed areas, such as the W.B.TK, D/B, and PE blocks, and illumination was improved for trunk roads, access towers, and the lower blocks.



Development of non-ignition explosion-proof strap lighting in W.B.TK



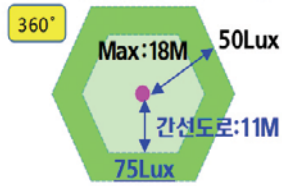
Installation of strap LED lighting on the dock floor



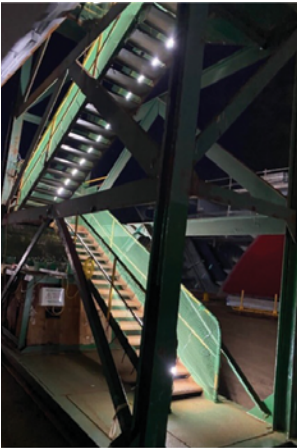
Improvement of TK illumination (L.F.O)



Improvement of TK illumination (H.F.O)



Improvement of side trunk road illumination in the dock area



Installation of LED straps and upper flood lights on the access tower stairs

Improvement of 3 Major Safety Facilities (Ventilation)

Improvement of In-shop Ventilation

Ventilation schemes were devised for each factory building through the due diligence with the Technical Consulting Center.

- (Fabrication 1 Dep't) Installed additional large jet fans (12 units)



- (Unit Assembly 2 Dep't) Improved airflow by removing walls in the factory



- (Outfitting Production Dep't) Installed additional vents, jet fans, and dust collectors



- (In-shop Block Ventilation) Installed additional ventilation fans, jet fans, and exhaust fans



Improvement of Out-shop Ventilation

Improvement plans were devised with external consultants, and the proprietary jigs/equipment were developed.

- Designated ventilation-vulnerable area (LNG Engine Room, CNTR Passage Way)
- Testified the improvement plan and drew the results through consulting
- Under review for application to more vessels



- Installed ventilation fans, opened a test shop, and pilot-operated dedicated personnel



- Produced supporting jigs for 30 hp fans in the upper part of the E/R
- Produced anti-bend jigs for 3 hp fans' portable flexible duct at the dock floor



Establishment
of Standards for
Lifting Cherry
Pickers

Accidents have been prevented by redefining the standard for preventing falling while lifting a cherry picker into the dock or inside the ship under construction.

Establishment of standards for lifting cherry pickers by their type



Safety rules for lifting cherry pickers

- Check the cherry picker's weight and crane SWL.
- Lift the cherry picker after the boom is in the correct position.
 - *never lift with the boom rotated.
- Fasten the shackle after checking the lifting lug (yellow).
- Use an extension wire that can compensate the height difference of lugs attached to the cherry picker.
- Install guide ropes in at least one location.
- Prohibit boarding/loading the basket when lifting the cherry picker.
- Control access to the operating range under the lifted cherry picker.

Establishment
of Safety
Standards for
Securing Winch
Stands

Safety standards have been established to prevent accidents when the winch stand used to move scaffolding materials is moved using a trailer.

Method of securing a winch stand to a trailer

- Secure the four directions using a lever puller or ratchet belts (2 in the forward direction, 2 in the backward direction)
- Use after checking the proper allowable load of the lever puller or ratchet belts
- The fixing angle of the lever puller or ratchet belts is kept above 45 degrees
- Allowable loads for lever pullers and ratchet belts: 15 t or more for air winches (3 t) or 3 t or more for electric winches (8 t)

Precautions when securing a winch stand to a trailer

- Secure within a section that does not exceed 1/3 of the total length from both ends of the substructure of the winch stand.
- When fastening the hook, ensure the securing bars are fastened (use a shackle if necessary).
- When fastening the shackle, use caution against fingers getting caught.

Introduction of Ladders Exclusively for Passage to the Sea Chest

We developed a dedicated passage facility to the *sea chest of ships being constructed in the dock and PE areas and applied it to the site.

We had discussions with the Construction Technology Planning and the Production Department to reduce the risk of existing unsafe temporary passage structures falling and secured safe passage and installation through long-term stages from the first and the second rounds of product improvement. The final product is currently in use.

*Sea chest: a seawater access facility at the lower part of the hull (below the water line)

Problem

Height: Maximum of 6 m

- Noncompliance with the statutory requirements for temporary passages (vertical ladders, scaffoldings) and risk of fall accidents (Occupational Safety and Health Committee agenda for 2Q 2020)
- Different sea chest heights for ship types and no standards for walkway installations

Improvements

Utilizing existing A-type ladders and introducing removable bridge walkways (adjustable height → enabling passage at all sea chest heights)

Improved install-ability with lightweight bridges (aluminum)

Expansion of applications after pilot application at the bridge's lower damper (prevents caught-in accidents at the lower bridge part and improves installability)

Securing Safety Passage in the Dock Area (Bridges)

A crossing bridge was introduced to ensure safety against caught-in accidents between the traveling parts of the Goliath crane on Docks 8 and 9's pedestrian passageways. This was a case where there were several improvement proposals at the Safety Risk Contest, and as the risk of accidents was high, urgent improvements were needed.

Currently, the engine room area on the west side of Dock 9 has been selected as the first pilot area, and passageways have been installed, receiving positive feedback from workers. Crossing bridges will be installed in all areas at Docks 8 and 9 by the first half of 2023.

Problem

"Caught-in Hazard"

- Safe passage unsecured because of the travel motor on the Goliath crane and obstacles in the passage

Improvements

Introduction of bridges → securing safe passage and an emergency evacuation route

Improvement of
the Anchorage
for Suspended
Scaffolding on
Exterior Building
Walls

The safety review and improvement of cleaning work on the building's outer wall, discovered through the high-risk site inspection, were conducted during the in-house subcontractor safety meeting.

The exterior wall cleaning and repairs were performed by descending from the building's roof through suspended scaffolding, and safety measures were urgently needed, as the suspended scaffolding rope-fixing facilities were aging, insufficiently fastened, and lacking in quantity.

The rooftops of all buildings were investigated, and fixed rings were newly installed or repaired in consideration of each building's roof conditions and environment to ensure the safety of the subcontractors' high-risk work.

Problem

Improvements

- The suspended scaffold-fixing facility (retaining ring) was newly installed on all buildings.

Safety
Improvement for
Airless Pump
Silencers

As countermeasures against breakage to the silencer cover during the use of the airless pump used for painting work, changing the material of the silencer cover, replacing the contaminated outlet (muffler), and the anti-contamination cover were applied, and as a result, the root cause of the accident was eliminated.

Problem

Damage incident on August 17, 2022

Damaged cover

- The silencer cover was damaged while using the airless pump
- Delayed air discharge and damage were caused by the silencer materials' durability problems and outlet contamination

Improvements

Cover

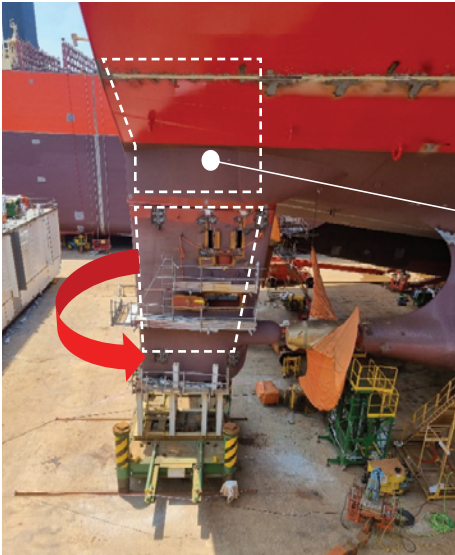
Muffler

Silencer body

- Changed the silencer materials: Upgraded impact resistance, ductility, and elongation
- Replaced the contaminated outlet (muffler) and applied an anti-contamination cover.

Reducing the
Risk of Machinery
Outfitters Being
Caught in the
Steering System

Outside the dock floor, welding and painting are performed by the Shipbuilding and Painting Departments, while machinery outfitting is performed in the interior (steering gear room). When the rudder is rotated for welding and painting work from the outside, the worker inside would be unaware, leading to a potential risk of fatal accidents by being caught in the tiller.

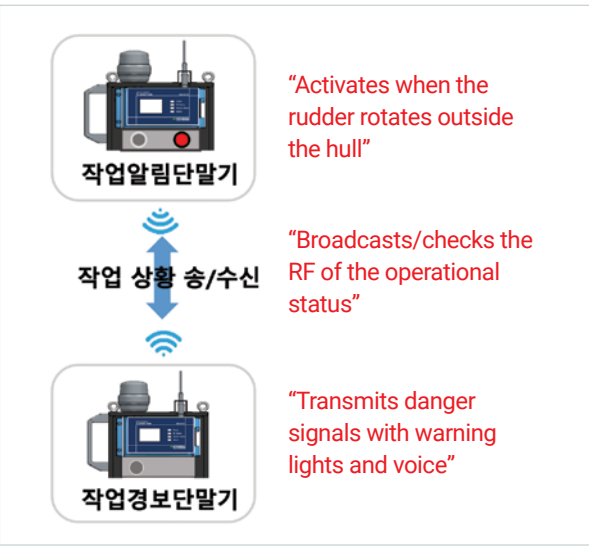


(Exterior) Rudder rotation



(Interior) Risk of being caught inside during machinery outfitting

We are preparations for internal and external workers to recognize rudder rotations and take safety measures by installing work notification terminals outside the hull and operation alarm terminals inside the hull. (To be tested and applied throughout the enterprise in February 2023)



Application of operation notice/alarm terminals



SAFETY

•

HEALTH

4-5

Management Performance of the Safety Supporting Section

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

Major Achievements of the Safety Supporting Section in 2022

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Plans
Strengthening Activities for Internal and External Safety Management	Management of MOEL/KOSHA-related affairs		Management of MOEL/KOSHA-related affairs		
	• Complying with an improvement order issued by the MOEL (safety and health supervision, various inspections, etc.)	At all times	• Implemented improvement orders related to the Occupational Safety and Health Act	100%	
	• Safety and health supervision: responding case-by-case and taking remedial measures	At all times	• Underwent 2 MOEL supervision; completed remedial measures for cases submitted to judicial proceedings	100%	
	• Collected fact-related data and responded to other actions	At all times	• Responded to the actions of related government agencies regarding the occurrence of 2 fatal accidents	100%	
	Management of Labor Union Affairs		Management of Labor Union Affairs		
	• Operated the Occupational Safety and Health Committee and implemented the agreement results	Quarterly	• Held the Occupational Safety and Health Committee (ordinary and extraordinary): Held 5 times in total	100%	
Prevention of Major Industrial Incidents Through Process Safety Management (PSM)	Elevating Grades (M+ → S) through the Improvement of PSM and Enhancing 12 Guidelines		Elevating grades (M+ → S) through the Improvement of PSM and Enhancing 12 Guidelines		
	• Evaluating the performance of PSM under the supervision of the MOEL: Annual (by the Major Industrial Incident Prevention Center)	Once every other year	• Completed the MOEL-hosted PSM assessment (February, September)	100%	
	• Conducting internal audits on the operational status of PSM in the workplace (annual)	Annual	• Conducting internal audits on the operational status of PSM in the workplace and implementing improvement measures: July 18–22 (documentary); August 29–September 2 (on-site) / completed improvement measures for 104 issues	100%	
	• Conducting internal inspections on the status of PSM operations in the workplace (quarterly)	Quarterly	• Conducting audits on the operational status of PSM in the workplace: Replaced with the MOEL's inspection on performance status	100%	
	• Conducting a special inspection of high-risk facilities in the workplace by management	Annual	• Conducting a special inspection on high-risk facilities in the workplace by management: completed on June 2	100%	
	• Holding meetings about PSM: After a performance assessment or special supervisory inspection by the MOEL, if necessary	Annual	• Held 2 meetings about PSM (March 25, November 29)	100%	
	• Conducted a training program for PSM practices: For PSM personnel and supervisors (annual)	At all times	• Provided practical PSM training: September 2, PSM personnel	100%	
	• Prepared and submitted a checklist for the PSM danger alert system (quarterly)	Quarterly	• Prepared and submitted a checklist for the PSM danger alert system	100%	
	Reinforcing Safety Inspection and Accident Prevention for Harmful and Hazardous Machinery/ Equipment		Reinforcing Safety Inspection and Accident Prevention for Harmful and Hazardous Machinery/ Equipment		
	• Conducting statutory safety inspections for each piece of harmful and hazardous machinery/equipment	At all times	• Completed safety inspections on all equipment subject to the 2022 safety inspection (639 units in the first half; 548 units in the second half of the year)	100%	
Improvement in Emergency Response through Proactive Safety Management	Improvement in Emergency Response		Improvement in Emergency Response		
	• Reviewing and improving the emergency response manual and standards: Annual	Annual	• Reviewed and improved the emergency response manual and standards (December 2022)	100%	
	• Advancing the enterprise-wide typhoon alert and monitoring system (linked with the response manual)	Upon occurrence	• Built enterprise-wide typhoon alert and monitoring system and completed drills (linked with the response manual, August 2022)	100%	
	• Enhancing firefighting and fire suppression capabilities: supporting drills on facilities subject to PSM, Business Unit Safety Management's firefighting drills, etc.	At all times	• Conducted firefighting and fire suppression drills: 29 times	100%	
	• Continuous management of firefighting and rescue equipment (air respirators, thermal imaging cameras, xenon searchlights, megaphones, waterproof materials, etc.)	Once/month	• Inspected firefighting and rescue equipment (air respirators, thermal imaging cameras, xenon searchlights, megaphones, waterproof materials, etc.)	100%	

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Plans
	Enhancing Accident Response Capability through the Stable Operation of the Integrated Control Center		Enhancing Accident Response Capability through the Stable Operation of the Integrated Control Center		
	• Monitoring safety intervention for high-risk work in real time and operating the Emergency Rescue Team	Upon occurrence	• The Emergency Rescue Team performed 314 rescue/relief operations.	100%	
	• Act as an overall control room in emergencies caused by disasters (typhoons, earthquakes, large-scale fires, etc.)	Upon occurrence	• Act as a situation control room: Twice (in response to 2022's typhoons)	100%	
	• Corporate Safety and Health Office operates as an in-house fire brigade and drills	Monthly	• The Corporate Safety and Health Office conducts monthly drills for the in-house fire brigade.	100%	
	• The Emergency Rescue Team conducts exercises on how to respond to emergency situations (water disasters, vertical rescue situations, etc.).	Monthly	• The Emergency Rescue Team conducts exercises on how to respond to emergency situations (water disasters, vertical rescue situations, etc.).	100%	
	• The Integrated Control Center performs nighttime safety management.	Daily	• Nighttime safety management conducted by the Integrated Control Center	100%	
Strengthening Practice-oriented Site Safety Management	Improving Firefighting and Safety Management of Hazardous Substances		Improving Firefighting and Safety Management of Hazardous Substances		
	• Maintenance of firefighting facilities in normal operational condition by conducting statutory inspections (comprehensive functionality inspections)	At all times	• Performed statutory inspections on enterprise-wide firefighting facilities (comprehensive functionality inspections); deployed the Rapid Response Team	100%	
	• Stabilizing firefighting facilities, including automated fire detection systems (153 locations) through an outsourced, on-site, 24-hour maintenance and repair service	At all times	• Maintenance (24-hour) of automated fire detection systems in progress	100%	
	• Enhancing job competency through the completion of statutory job training programs for safety managers in charge of firefighting/dangerous materials	Annual	• 152 safety managers in charge of firefighting/dangerous materials completed the statutory job training programs.	100%	
	• Legalizing in-house quayside hazardous substance handling facilities	At all times	• Obtained permits and licenses for paint shops	100%	
	• Stable operation by tightening up the internal inspections of facilities for storing/handling hazardous substances (76 locations) and improving firefighting equipment	Annual	• Conducted statutory inspections on 20 locations subject to regular inspections on hazardous substances; reviewed regulations on hazard prevention	100%	
	• Minimizing fire insurance expenses by inspecting fire insurance policies to determine the fire insurance premium rate (annual)	Annual	• Inspected fire insurance policies to determine the fire insurance premium rate: Completed from September 21~22	100%	
	Preventing traffic accidents by increasing in-house road traffic facilities and advising on compliance		Preventing traffic accidents by increasing in-house road traffic facilities and guiding on compliance		
	• Site guidance for compliance with traffic rules and patrols to prevent violations	At all times	• Providing guidance for compliance with traffic rules and patrolling to prevent violations	100%	
	• Strengthening traffic safety management for vehicles entering the premises for deliveries and other purposes	At all times	• Performed traffic safety management for vehicles entering the premises for deliveries and other purposes (education on in-house traffic rules, material securing, and observation of speed limits)	100%	
	• Maintaining the speeding prevention warning system on the premises' major areas	At all times	• Managed the speeding prevention warning system on the premises' major areas	100%	
	• Improving traffic facilities along the main roads on the premises (continuous management of road surfaces and lanes and various traffic safety facilities)	At all times	• Installed 60 anti-slip crosswalks, anti-skid road surfaces, and speed bumps on roads where large cargo vehicles mainly travel	100%	
	• Traffic control on the premises where traffic congestion and emergency occur	At all times	• Traffic control on the premises where traffic congestion and emergency occur	100%	

Promoting Labor-Management Joint Safety Activities

Operation of the Occupational Safety and Health Committee

Through the Occupational Safety and Health Committee, the Company and the labor union regularly hold quarterly meetings to create a safe working environment. The Occupational Safety and Health Committee discusses in-house safety and health matters, and the Company actively implements the results of the discussions, such as safety facility improvements and accident prevention activities.



Operation of the Occupational Safety and Health Committee in 2022

1Q	Discussed 16 issues, including the items added to the comprehensive health examination
2Q	Discussed 20 issues, including the provision of safety subsidiary materials and PPEs
3Q	Discussed 16 issues, including the prevention of cardiovascular diseases in cold weather
4Q	Discussed 19 issues, including PPE improvements
Ad-hoc (4 times)	Preparation of measures to prevent the recurrence of fatal accidents, among others



Stop Works Authority (SWA) of the Union

The Company guarantees the labor union's safety and health activities to create a safe and healthy workplace. The labor union utilizes the Stop Work Authority (SWA) to suspend work under the labor-management agreement when there is noncompliance with a request to improve safety facilities under the related law or if there is immediate danger. In 2022, improvement measures were taken in 124 SWA cases (50 related to accidents, 74 related to unsafe states).

Labor-Management Joint Inspection and Safety Inspection by Honorary Occupational Safety Inspectors

The Company and the labor union conduct labor-management joint inspections 16 days per month and joint safety inspections with honorary occupational safety inspectors 5 days per month to improve unsafe elements at sites and provide guidance during unsafe situations. Through these inspections, the Company and the union collaborate as win-win partners to create a safe working environment.

Findings	Number of Cases Inspected and Resolved
Prevention of falls/falling objects	136
Hazardous substances	0
Machines/equipment/facilities	5
Electrical safety	73
Safe passages/illumination	74
Prevention of fires/explosions	4
Confined spaces/ventilation	1
PPEs	1
Others	181
Total	475



Preventing Major Industrial Incidents through Process Safety Management (PSM)

Process Safety Management (PSM)

Performance Assessment of PSM in 2022

In February and September 2022, PSM performance was assessed according to the occasional and special supervision of the MOEL. We operate a total of 11 facilities subject to PSM, including paint shop VOC processing facilities, LNG supply facilities, ethylene storage, and fuel oil storage (filling stations). The assessment group consisting of labor inspectors from the MOEL and experts from the KOSHA assessed performance based on the process safety report, including document reviews for 12 PSM elements and site verification. Regarding the violations (subject to correction order) identified during the assessment, a report on the continuous improvement and remedial measures taken was submitted to the MOEL.

Raising PSM Grades

We established a plan to improve our grade in 2022 with the goal of acquiring an S grade by the first half of 2025. After improving the overall PSM system through the operation of an internal TF and working with external consultants, we set the goal of improving the level by strengthening the ability to execute the PSM on-site. Efforts to raise the PSM grade were carried out with the goal of improving the grade systematically in preparation for grading in 2025 based on four major tasks: improvement of management, reinforcement of monitoring, reinforcement of the competence of the person in charge of implementation, and improvement of culture.

PSM grade as of 2022 (assessed in 2021)	Target PSM grade in 2025
Grade M+ 78.27 points	Grade S 80 points

Internal Audits and Inspections on the Status of Operation of PSM in the Workplace

We conduct an internal audit yearly to examine and ensure that the PSM is performed in compliance with regulations. In September 2022, an internal audit team comprised of external PSM consultants and internal PSM officers inspected whether each department in charge of facilities subject to PSM appropriately implemented the PSM system,

whether the system meets the standards, and whether there were any issues in the system or procedure. We regard internal audit as part of the work to improve our PSM grade and plan to carry out practical tasks every year, such as improving the capabilities of auditors and conducting joint inspections with external consultants.



Special Inspections on High-risk Facilities Subject to PSM

In June 2022, we conducted a special inspection of high-risk facilities subject to PSM (including ethylene storage and FGSS facilities) to promote management's PSM implementation. Officers from the Corporate Safety and Health Office, technical advisers, and officers of the departments' operating facilities subject to PSM participated in the special inspection. They conducted practical checks to prevent major industrial incidents (fires/explosions and leakages). The Corporate Safety and Health Office and related departments continuously take measures to eliminate the risk of major industrial incidents, such as problems in operating explosive hazardous areas found during inspections.



Holding Meetings with PSM Personnel

PSM personnel had 2 meetings in March and November 2022 to discuss PSM issues. During this PSM meeting, they discussed the content of the PSM implementation status inspection hosted by the MOEL in 2022, the long-term enterprise-wide improvement of explosive hazardous locations, and plans for raising the PSM grade in 2023.

In addition, through business meetings, we continuously shared problems related to PSM, such as problems in facility operation, implementation of improvement measures, implementation of monitoring, and other improvements, and we strive to supplement them. In 2023, we plan to hold PSM meetings as part of a promotion to raise the PSM grade.



Practical and Professional Training for PSM Personnel

We provide specialized courses and practical training every year to nurture experts by strengthening the capabilities of PSM personnel. In 2022, we provided practical training on process safety reports, such as process safety data, process risk assessment, and the designation of explosive risk areas, through an external consultancy.

In addition, starting in 2023, we plan to provide various and practical training (such as in-depth training for PSM personnel and general and interview training) through workshops and collective job and external training, considering the level of competency of PSM personnel. We will do our best to continuously foster experts by securing budgets every year.



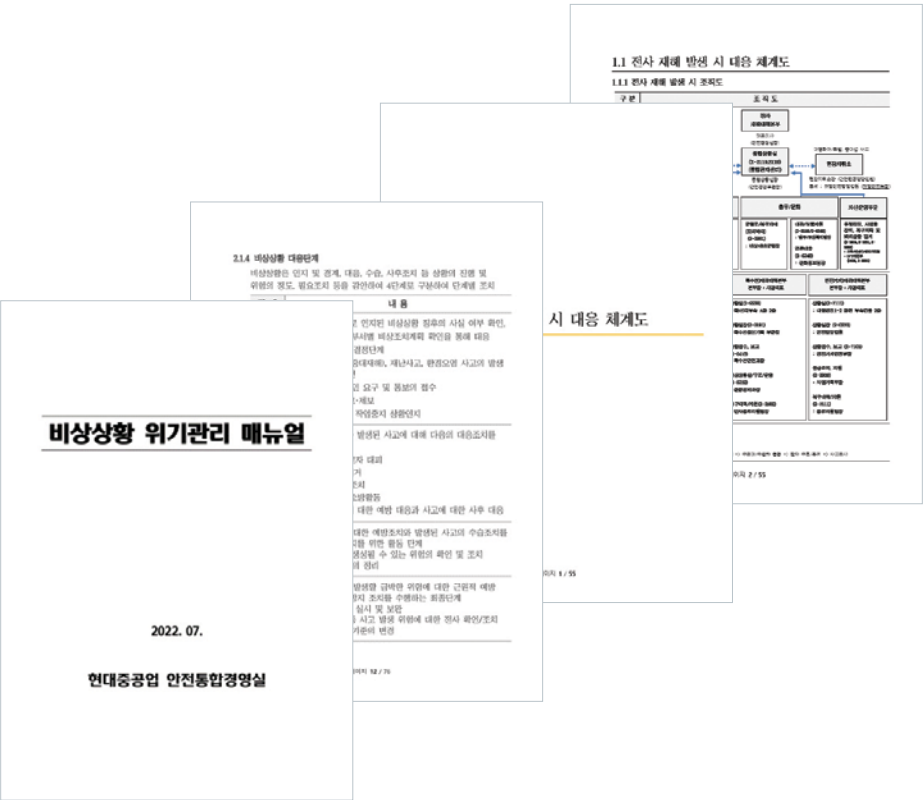
Improving Emergency Response through Preventive Safety Management

Improving
Emergency
Response
Capabilities

Revising the Enterprise-wide Emergency Crisis Management Manual

We revised an enterprise-wide emergency crisis management manual to protect corporate assets and limit damage to employees during enterprise-wide emergencies and against natural disasters (typhoons, earthquakes, heavy localized rains, heavy snow) and large in-house fires and explosions.

Following the enforcement of the Serious Accidents Punishment Act, the manual's content has been fully revised and reflected to systematically and promptly respond to emergency situations at different stages, such as defining fatal accidents, emergency response and management systems, and the establishment and operation of emergency action plans. In addition, based on the enterprise-wide manual, manuals for each business unit, division, and department were separately established to prepare for fatal accidents or imminent risks of occurrence, providing measures concerning work suspension, worker evacuation, removal of hazards, and other countermeasures and relief for the injured.



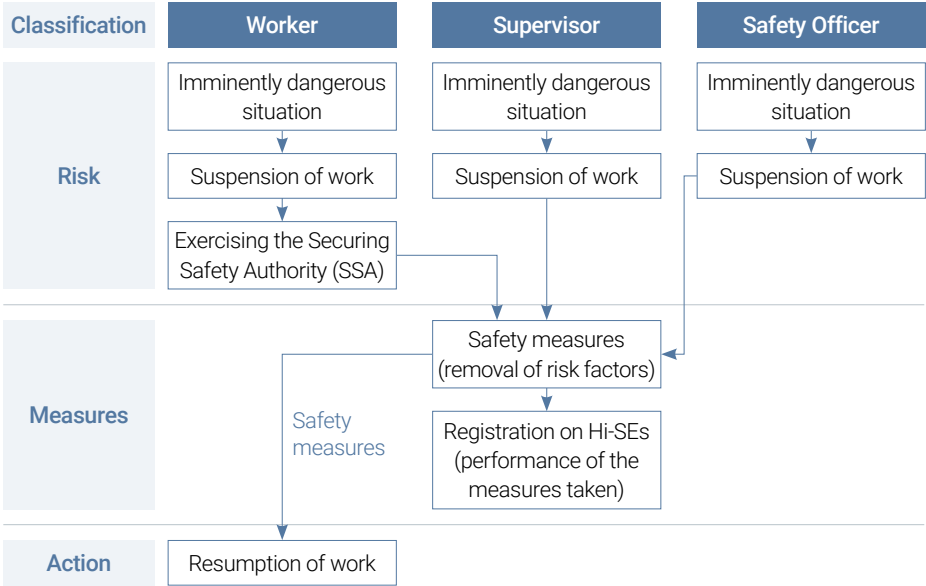
Defining the criteria for imminent risk situations where fatal accidents occur or are likely to occur

We specified any event scoring at least 15 as an imminently dangerous situation after conducting a risk assessment (intensity and frequency) on all internal work based on the Work Standards and Risk Assessment Management Procedure (HHIS-AE-1001). If there is a possibility of major accidents caused by insufficient safety measures while working in an imminently dangerous situation, work must be stopped immediately. It may be resumed after the supervisor has taken safety measures.

Classification		Severity (Intensity)			
		1 (Negligible injuries)	2 (Minor injuries)	3 (Major injuries)	4 (Fatality/disability)
Probability (Frequency)	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

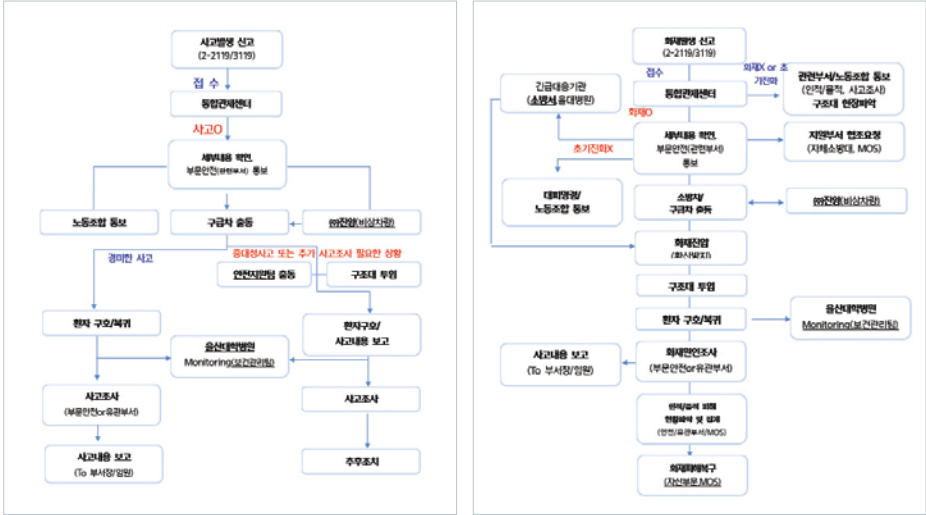
Risk Criteria	Measures	Assessment Points
Maintaining reasonably practicable reduction measures	Any additional measures or recording of the relevant grounds are unnecessary, but self-regulated improvement activities may be performed if deemed necessary	1–3 points
The current safety measures are insufficient.	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
	While the measures mentioned above are necessary, preventive measures, such as temporary safety measures, are also required, considering that the case is between danger and safety	7–8 points
The risk of accident occurrence exists.	An improvement plan to reduce the risk should be established; it is necessary to take preventive measures as quickly as possible during the regular repair period. If there is a possibility of major accidents, 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 major accident occurrence is very high.	Work must be stopped immediately to take remedial measures. Work should then be resumed after reassessing the safety of the remedial measures. Subsequent safety measures, such as the establishment and implementation of an improvement plan, should be taken after listing the types of work that pose a similar risk	15–20 points

Response Process by Class in Imminently Dangerous Situations



Procedure for responding to the occurrence of accidents

We utilize manuals that assist in forming a response system upon the occurrence of conventional accidents (fall to below and caught-ins) and fires, enabling systematic responses to emergencies and taking relevant measures.



Procedure for accident response

Procedure for fire response

Adoption of rescue/relief manual by type of accident

We use a response/action manual tailored to each accident type to respond quickly and accurately. We provide a quick response guide for each type of 7 accidents (such as those that occur in manholes and confined areas) and operate prompt rescue and relief according to the response guide for each emergency type for 21 situations (such as hanging from gondolas or cherry pickers and falling below).



Securing Safety Authority (SSA) System

We use the SSA system, which allows workers in the workplace to immediately exercise their right to request safety improvements to their supervisor in the event of imminently dangerous situations because of unsafe working environments. In addition, we are making every effort to prevent safety accidents by establishing a mobile system for rapid situation propagation and action and creating a culture of ensuring safety as the top priority.



Classification of major incident and fire/explosion accident control areas

We use a control area map in preparation for major incidents and fires/explosions. Additional secondary disasters are prevented by classifying access permits for each risk area, preserving sites for accurate accident investigations, and controlling the vicinity of accident sites.



General (major) incident control zone map

Fire/explosion accident control zone map

Personnel authorized to enter hazardous areas (common to general and fire/explosion accidents)

Classification	Details
Dangerous Zone	• Rescuers/investigators – Persons authorized by the head of the safety department among those permitted to enter a quasi-dangerous zone
Quasi-Dangerous Zone	• Personnel from the relevant safety section (controllers) • Supervisors of the department affected by the accident • Personnel from the Labor Safety and Health Office
Safe Zone	• Management • Government officials • Union executives • Personnel from the safety department aside from those from the relevant safety departments (prohibiting those not involved in the accident and photographing)

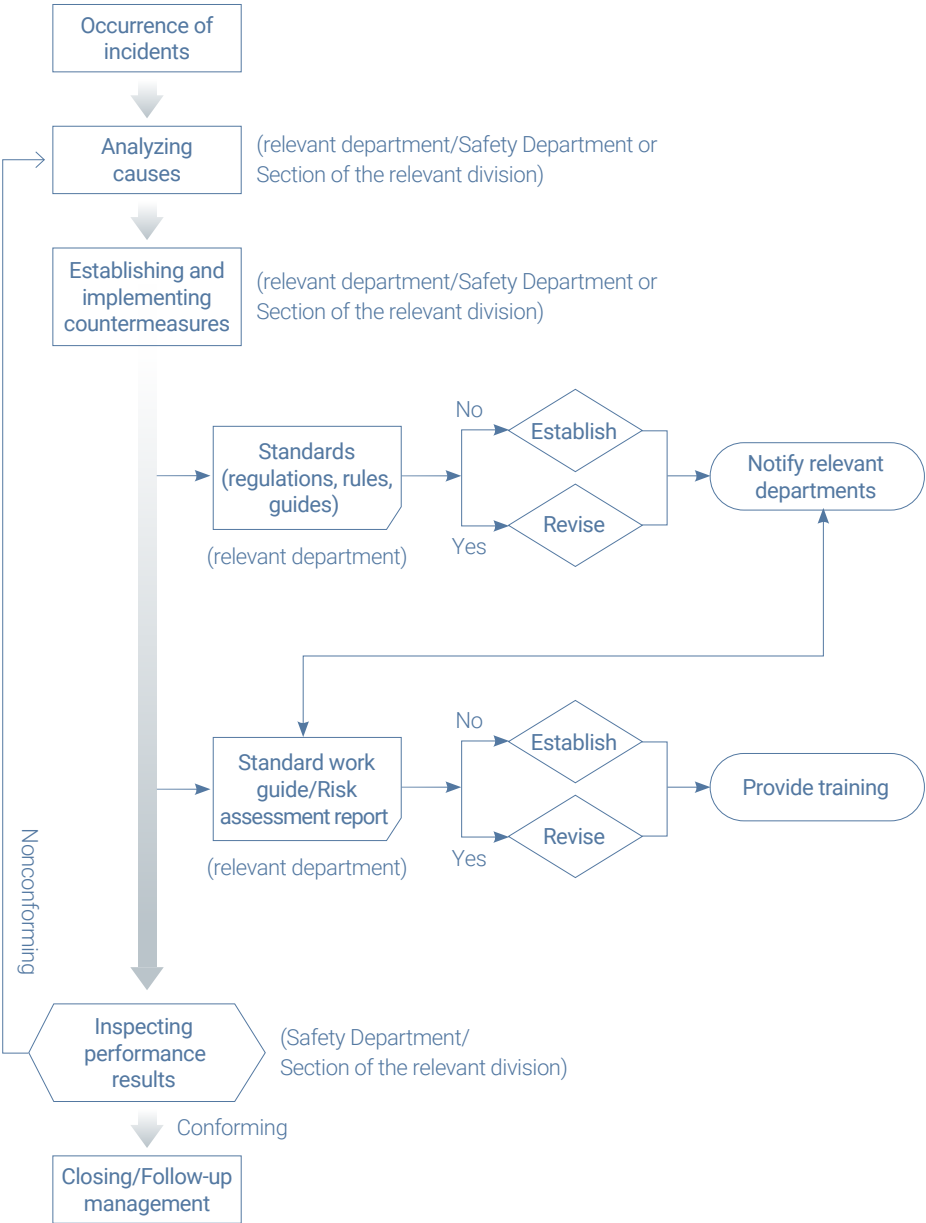
※ Once the firefighters arrive at the scene, firefighting and rescue are led by the head of firefighters.

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

In preparation for fatal accidents or imminent risks, we inspect the performance status at least once every 6 months to determine whether imminently dangerous situations were classified based on the risk criteria after assessing all work within the workplace, whether safety measures have been taken against unsafe conditions and work, and whether response exercises have been conducted according to the manual.

Measures to prevent further damage

After major incidents, we use root cause analysis (RCA) techniques to identify the root cause of disasters and establish countermeasures through risk reassessment to prevent additional damages, such as incidents of the same or similar type.



Establishing an
Enterprise-wide
Typhoon Status
Management
System and
Conducting Drills

The Corporate Safety and Health Office conducts drills and operates an enterprise-wide typhoon status management and monitoring system established in 2021 to reduce damages caused by typhoons every year. The system based on the enterprise-wide typhoon response manual enables us to manage typhoon information and preventive measures systematically, share typhoon statuses in real time, aggregate damage, and manage recovery performance. Notably, it enabled us to respond to typhoons (Himmamnor (#2211) and Nanmadol (#2214)) promptly.



Overview of the Enterprise-wide Typhoon Status Management System

Classification	Item	Description		Host
Common	Management of typhoon information	• Management of basic typhoon information	Operation of the response system according to the level of typhoon risk; issuing a warning; checking the typhoon response measures	Corporate Safety and Health Office
		• Typhoon risk assessment		
Before a typhoon's occurrence	Typhoon Forecasting	• Typhoon Forecasting System	Examination of similar typhoons based on big data	Whole departments (teams)
	Pre-inspection	• Management of the standard inspection sheet of each department (team)	Conducting typhoon prevention activities through pre-inspections for typhoon preparation	
		• Management of the pre-inspection results of each department (team)		
In the event of typhoons	Real-time typhoon status	• Registration of the typhoon preparation record		Whole departments (teams)
		• Real-time monitoring of typhoons	Systematic response to typhoons through real-time typhoon monitoring and informing of damage cases	
After typhoons	Follow-up measures for typhoons	• Status of GIS-based typhoon damage	Real-time propagation of typhoon status	Vessel Control Department
		• Real-time damage registration		
After typhoons	Follow-up measures for typhoons	• Hull movement plan		Whole departments (teams)
		• Registration of daily typhoon records		
		• Calculating recovery costs based on the registered typhoon recovery and proceeding with recovery work		
After typhoons	Follow-up measures for typhoons	• Registration of the restoration results		Whole departments (teams)
		• Registration of damage to facilities and restoration plan		
		• Aggregation of the results of preparation for and recovery from typhoons		

Establishing a System Based on the Enterprise-wide Typhoon Response Manual

Standards for grading and assessing the risk level of typhoons (classified into four stages based on 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)	
17-25m/s	15 points	[Heavy rain advisory] 70 mm/6 h or 110 mm/12 h	1 point	2m	1 point
25-33m/s	25 points	[Heavy rain warning] 110 mm/6 h or 180 mm/12 h	3 points	3m	3 points
33-44m/s	35 points	[Local torrential rainfall] 100 mm/h or above	6 points	5m	5 points
44 m/s or more	40 points	-	-	6m	7 points

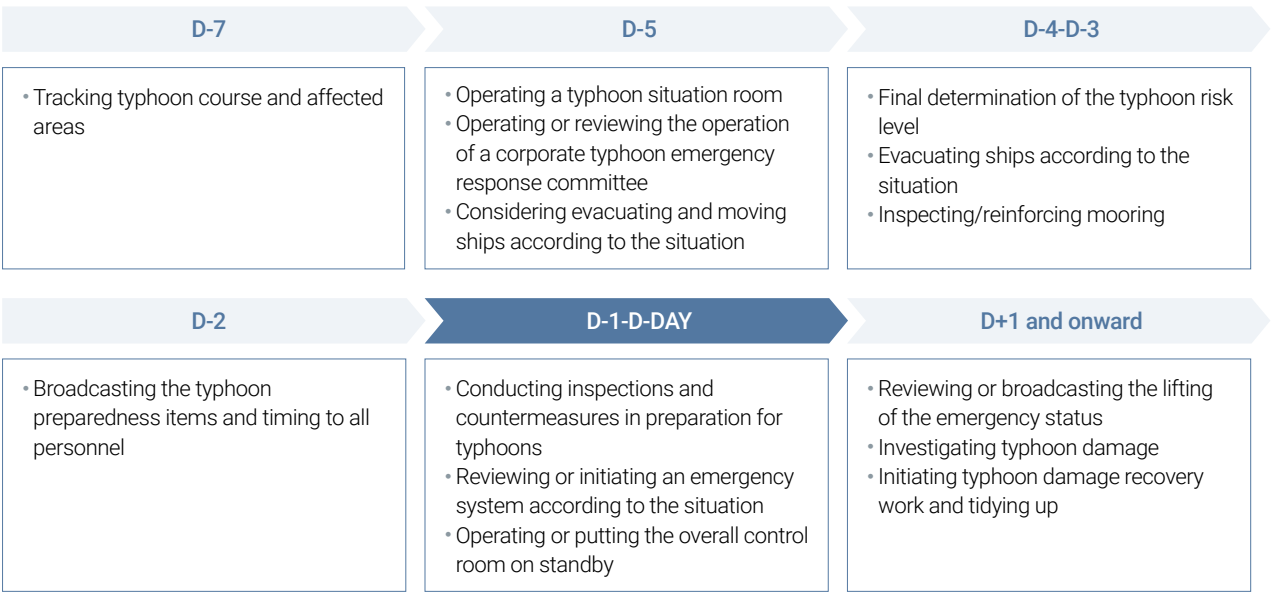
Typhoon risk level calculation (risk level = wind velocity + rainfall + wave height)

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

Typhoon preparedness

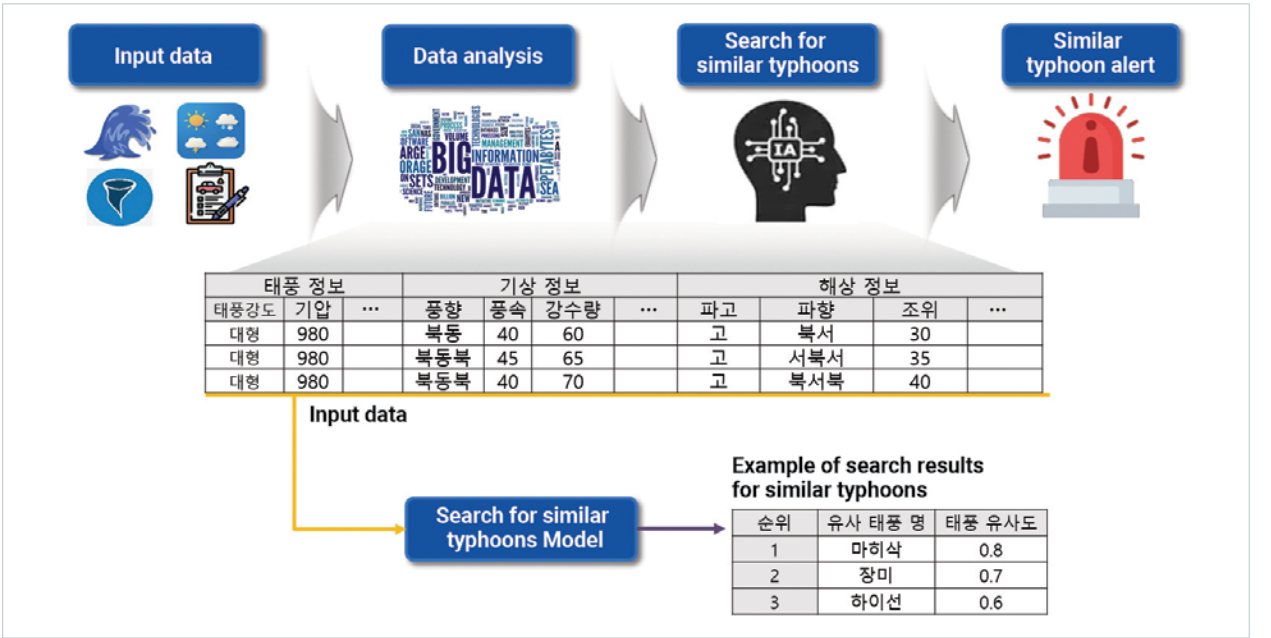
Risk Level	Led by the Emergency Response Committee	Major Tasks
Stage 1 (Concern)	-	• Monitoring the predicted typhoon path and risk
Stage 2 (Caution)	Head of the overall control room (chief/corporate safety officer)	• Including those from Stage 1
Stage 3 (Alert)		• Reviewing whether to convene the Corporate Typhoon Emergency Response Committee
Stage 4 (Serious)		• Operating the Corporate Typhoon Emergency Response Committee • Prioritize the prevention of accident-related industrial accidents and aim to prevent large-scale property damage • Take safety measures in preparation for floods and strong winds • Review whether to prohibit boarding/working on quayside ships • Review whether to prohibit outdoor work • Review whether to prohibit all work

Typhoon response measures



Typhoon Forecasting System

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



Drills in Preparation for Typhoons

Last August, we conducted drills by integrating corporate typhoon status management, the monitoring system, the typhoon response system, and typhoon response manuals. The relevant personnel from 24 departments, including departments representing each safety and business unit, participated in a tabletop exercise through a video conference with the typhoon scenario that recently caused extensive damage to the Company. Using this exercise and the typhoon response manuals (systems), the participants became familiar with the typhoon response system. We will continue to conduct drills to address deficiencies.

In addition, we plan to make every effort to prepare the Group for typhoons in 2023 by conducting virtual tabletop exercises at each point and stage of a typhoon by composing a period and stage scenario similar to real situations from the time of typhoon occurrence.



Conducting a typhoon preparedness and response videoconference / tabletop exercise using the Typhoon Situation Management System

Enhancing the Responsiveness to Accidents through the Stable Operation of the Integrated Control Center

Operating the Integrated Control Center and the Emergency Rescue Team

The Integrated Control Center within the Corporate Safety and Health Office is operated 24 hours a day throughout the year as the enterprise-wide overall control room when emergencies (or natural disasters) occur, broadcasting emergencies in real time and conducting rescue/relief operations to enable rapid response. In addition, 376 CCTVs are monitoring hazardous work in real time, including internal road accidents, sea and air pollution, and high-risk (such as aerial and quay-side) work.



Emergency Rescue Team mobilization status

Classification	Shipbuilding & Offshore	Naval & Special Ship	Engine & Machinery	Management/ Others	Monthly Total
January	22	3	2	4	31
February	14	4	1	2	21
March	17	4	3	1	25
April	13	6	1	3	23
May	22	1	-	11	34
June	15	5	5	5	30
July	21	5	4	5	35
August	13	1	1	3	18
September	9	-	2	9	20
October	13	6	2	6	27
November	16	7	2	4	29
December	15	7	-	4	26
Grand Total	190	49	23	57	319

Building and Reinforcing a System to Monitor the Premises to Aid the Integrated Control Center in Responding to Disasters

The Integrated Control Center is prepared to make rapid judgments and responses by grasping the situation through the real-time monitoring of essential areas (quayside, break-water, etc.), even during large-scale power outages caused by emergencies or natural disasters (such as typhoons).

- 15 locations (11 at the main yard and 4 in offshore fabrication yard; 5 more than the previous year)
- Composition: Installed emergency generators and a wireless communication network



Operation of the In-house Fire Brigade and Drills

We operate a non-statutory internal fire brigade (with 3 fire engines and 3 ambulances) to respond to large-scale fires or explosions more quickly. The members of the internal fire brigade participate in monthly drills to reinforce their responsiveness to various emergencies.



Nighttime Safety Management by the Integrated Control Center

The Corporate Safety and Health Office operates a nighttime safety team to manage nighttime safety and quickly respond to accidents or emergencies. The nighttime safety team, comprised of four people, is thoroughly prepared to prevent nighttime safety accidents and quickly respond to emergencies by managing safety and patrolling in all sites, monitoring, receiving accident reports, conducting rescue and relief operations, and broadcasting emergency situations.



Prevention of Maritime Accidents by Building an Active Port Control System at the Ship Navigation Management Center

We operate a Ship Navigation Management Center that prevents various accidents and saves logistics costs by monitoring and navigating all ships entering and leaving HD HHI's port. The Center is equipped with a state-of-the-art electronic chart-based ship control system, VHF communications equipment, an automatic identification system (AIS), and maritime radar. In particular, marine loudspeakers were installed at the entrances of Jeonha and Mipo Bay in February 2022, which contributed to the prevention of safety accidents for small vessels and fishing workers and securing safe routes for large vessels. We are conducting industry-academia research projects to build an active control system based on AI images. In the event of an emergency, such as typhoons or marine pollution accidents, it will act as an emergency situation room and is fully committed to maritime safety management.

Status of the ships' entries and departures

Classification	January	February	March	April	May	June	July	August	September	October	November	December
Daytime	112	91	121	104	127	105	117	101	108	114	127	146
Total : 1,373												
Classification	January	February	March	April	May	June	July	August	September	October	November	December
Nighttime	25	17	21	19	15	15	11	8	3	8	11	22
Total : 175												



Improving Practice-focused Field Safety Management

Improving Safety Management Concerning Firefighting and Hazardous Substances

Preventive Management through Firefighting Facility Inspections

We inspect firefighting facilities in 178 buildings twice a year. Immediate measures are taken and invested based on priorities, such as replacing 10-year-old fire extinguishers and malfunctioning visual alarms and exit lights. In addition, a 24-hour Rapid Response Team conducts walkarounds to ensure that all firefighting equipment operates properly and maintains them through immediate repairs.



Status of firefighting facilities subject to statutory inspections

Classification	Shipbuilding & Offshore	Naval & Special Ships	Engine & Machinery	Management	External Facilities	Total
Subject	93	7	21	32	25	178

Status of hazardous substances subject to regular inspections

Classification	Shipbuilding & Offshore	Naval & Special Ships	Engine & Machinery	Management	External Facilities	Total
Subject	9	1	4	6	-	20

Operation of the HD Hyundai Group Fire Safety Committee

In July 2022, the HD Hyundai Group Fire Safety Committee was convened. As a group-level general improvement measure concerning firefighting and hazardous substances, this Committee, composed of 19 personnel involved in firefighting and hazardous substances from group companies (HD HHI, HDKSOE, and Hyundai Genuine), shared information on the main fire safety managers' tasks and the division of fire-related laws and changes in major laws and regulations, aiming for efficient fire safety management through the smooth communication between group companies.



Operation of an Integrated Paint Warehouse

Since September 2022, an integrated paint warehouse has been in operation. Hazardous substances, such as paints and thinners, that were stored and released in various places, are handled in a new integrated paint warehouse with a computer system for efficient management. In addition, safety is ensured by incorporating the latest fire safety technology.

Status of facilities handling hazardous substances

Classification	Shipbuilding & Offshore	Naval & Special Ships	Engine & Machinery	Management	External Facilities	Total
Subject	24	3	37	8	1	73

Integrated fire detection and management system

- Automatic fire detection at the Integrated Control Center
- Broadcasting the situation to mobile devices and taking immediate action

Gas discharge and lightning protection systems

- Forced discharge system for hazardous gases in a warehouse
- Installation of a Type 1 lightning protection system

Gas-type fire extinguishers

- Halogen compounds
- Combustion suppression facility with reduced risk of suffocation compared to CO₂ facilities



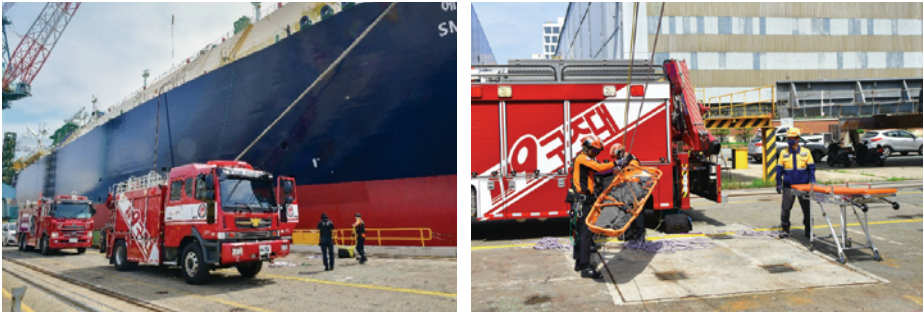
Fire Evacuation Drill at the Main Management Building in 2022

In November 2022, we conducted a fire evacuation drill at the main management building. The main management building is where the largest number of employees occupy, and the drill was conducted to minimize casualties and property damage through rapid evacuation and initial response in case of disasters, such as fires. Based on a hypothetical fire scenario, we strengthened our ability to respond to emergencies through the overall fire drill, which included initial firefighting, first aid and evacuation, evacuation safety rules, and familiarization with evacuation routes and sites.



Ship Rescue Training Exercise in 2022

In July 2022, we conducted a special rescue drill with the Ulsan Nambu Fire Station on a quayside vessel. We strengthened our responsiveness in emergencies by training on establishing an emergency escape system using rope rescue techniques to quickly rescue people from ship facilities and structures in the event of an emergency.



Firefighting/Fire Suppression and Emergency Rescue Team Drills

Classification	January	February	March	April	May	June
Times	2	2	3	2	2	4
July	August	September	October	November	December	Total
4	2	2	3	3	4	33

Job Training for Firefighting/Hazardous Substance Safety Managers

HD HHI's A total of 152 safety managers designated for firefighting and hazardous substance safety completed job training provided by the Korea Fire Safety Institute. The training program that is conducted every 2 years, focuses on maintaining and managing firefighting facilities to ensure their proper function when fires occur. In addition, it builds our capacity to manage evacuation facilities so that we can respond quickly and accurately when a situation arises.

Classification	Shipbuilding & Offshore	Naval & Special Ships	Engine & Machinery	Management	Total
Firefighting safety managers	7	-	-	3	10
Fire prevention sub-managers	74	3	25	8	110
Firefighting engineers	-	-	-	4	4
Hazardous substance safety managers	12	1	6	3	22
Hazardous substance transporters	2	-	-	4	6
Total	95	4	31	22	152

Reviewing Fire Insurance Policies to Determine Fire Insurance Premium Rates

HD HHI is designated as a defense contractor under Article 35 of the Defense Acquisition Program Act. Accordingly, it maintains an annual insurance package with the Korea Fire Protection Association, a public institution. In September, the insurer conducted a regular survey for 2 days, assessing our fire prevention activities through a field inspection and an inspection of our firefighting plans and drills.

Preventing Traffic
Accidents by
Improving Internal
Road Traffic
Facilities and
through Guidance
and Regulations

Status of Internal Road Traffic Safety Management

The Corporate Safety and Health Office operates a Traffic Safety Team to prevent internal traffic accidents and maintain smooth traffic and logistics flow on the main roads. A team of 6-people provides traffic guidance on crossings during rush hours; exercises control over traffic rule violators; inspects damaged roads and requests repairs; maintains road safety facilities; guides visitors' (VIP) vehicles; and performs other accident-prevention activities.



Number of traffic accidents (past 5 years)

Classification	2018	2019	2020	2021	2022	Total
No. of Cases	32	48	56	50	49	235

Status of traffic safety facilities

Classification	Traffic speed measurement system	LED signboard (30km/h)	Psychedelic warning light	Breath analyzer	Motorcycle	Camcorder	Speedometer	Total
Quantity	10	8	18	3	6	6	2	53

Improving and Repairing Road Safety Facilities

In November 2022, new speed bumps were installed to prevent major traffic accidents in the Mipo Gate area, where the traffic volume of large delivery vehicles is the highest. In addition, we continuously incorporate improvements to strengthen internal traffic safety, such as the reconstruction/reinforcement of deteriorated anti-slips (non-slip) installed on major in-house ramp areas.



Continuous Inspection and Improvement of Internal Traffic Safety Risk Zones

The Corporate Safety and Health Office continues to discover and mitigate potential risks in internal traffic safety risk sections (curves, etc.) through daily site inspections. In October, road safety facilities (warning lights) were newly installed to alert drivers to 2 additional curve sections in advance, and a total of 18 are in operation. We are fully committed to the safety of our employees by preventing road accidents by mitigating potential risks through continuous site inspections.



Conducting Statutory Safety Inspections

Safety performance is ensured by inspecting the protective devices of dangerous machinery and equipment and taking supplementary measures by complying with the statutory safety inspection system for hazardous and dangerous machinery operated in-house. In addition, if safety inspections are necessary, we ensure the safe performance of hazardous and dangerous machinery at all times by placing requests for inspections and measures to the statutory safety inspection agency from time to time.

Statutory safety inspection for dangerous machinery and equipment in 2022

Classification	Crane	Pressure vessel	Lift	Conveyor	Industrial robot	Shearing machine	Total
First Half	444	186	3	5	-	1	639
Second Half	271	161	10	104	2	-	548

Self-safety Inspection for In-house Mobile Cranes

In November 2022, the Corporate Safety and Health Office conducted internal safety inspections for 98 mobile cranes in collaboration with an external safety inspection agency. In addition to the annual self-inspection under the internal standard, we commissioned an external safety inspection agency to conduct an in-depth identification and analysis of safety performance levels to take measures and supplements.



Safety and Health Supervision by the Ministry
of Employment and Labor (MOEL)

Supervisory
Safety and Health
Inspections by the
MOEL

We complied with the MOEL's 2 safety and health supervisory inspections this year. The safety and health supervisory inspections gave us an opportunity to understand our safety and health management system and site problems. The matters pointed out by the inspectors were corrected, and corrective measures were reported to the MOEL.



Conducting Safety
Inspections

We completed the safety inspection in accordance with the MOEL by forming a consortium with four organizations. Through the one-month safety inspection, unsafe acts/conditions, the need for improvement, and comments made at the site were carefully diagnosed, with particular emphasis on diagnosing field operability. We have completed the corrective measures for all issues found to build a safer workplace. Beyond the momentary diagnosis, we are promoting safety inspection follow-up management by 2023 with the goal of ensuring a safe working environment by continuously managing and improving discovered problems.

Safety and Health Seen through the Movie “Don’t Look Up (2021)”

Insensitivity to Safety

An Everest-sized comet orbiting within the solar system will collide with Earth in 6 months. If that happens, a huge tsunami with a height of over 1 km will sweep the Earth, and the plant will be destroyed by an earthquake.

In response to the warnings of Dr. Randall Mindy (Leonardo DiCaprio) and a graduate student from the Department of Astronomy (Jennifer Lawrence), US President Orlean (Meryl Streep) responded that “almost all life on Earth will become extinct with force measuring one billion times greater than that of the atomic bomb in Hiroshima.” As time passes, the President, realizing that the situation is urgent, gives up halfway while trying to launch a missile to destroy the comet.

As proposed by Peter Isherwell (Mark Rylance), the CEO of a giant IT company, the comet is not to be blown up all at once but to be used in pieces. It is because the comet contains USD 140 trillion worth of minerals.

However, this plan fails, and Orlean and the other leaders board a sleeper spaceship and escape to a world 20,000 years away. Upon arriving in the future world, Orlean is caught and eaten by a dinosaur.

Humanity perishes with only one survivor left on Earth.

This film shows the height of “insensitivity to safety,” just like the proverb “Never say never.”

Insensitivity to safety refers to “reacting unsafely to safety accidents without any awareness of the problem despite the need to pay attention to them.” There is also a story about flying humans in “Myth.”

Icarus escaped by making wings made up of bird feathers and wax. However, he was so fascinated by flying that he forgot his father’s warning. He flew too high, and the heat of the sun melted the wax, causing him to fall to the sea and die.

Many Western painters liked to paint this story about Icarus.

The only way out of insensitivity to safety is to maintain the basics and principles before the law.

Because of the fall of Icarus (a careless accident), safety accidents have been repeated endlessly.

As the film warns, “Look up at the sky to see if a comet falls.”



SAFETY

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HEALTH

4-6

Management Performance of the Health Management Section

The Health Management Section creates a healthier workplace and focuses on prevention by conducting safety and health activities, such as providing enterprise-wide health planning and employee health checkups, managing work-related illness and statutory PPEs, and operating chemical management systems to examine and manage the working environment.

Major Achievements of the Health Management Section in 2022

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Expanding Prevention-focused Health Promotion Activities	Upgrading the Heath Examination Follow-up System and Improving the Quality of Health Promotion Activities				
	• Expanding and improving Total Health Promotion (THP) programs (health management tailored to each employee)	At all times	Improving management programs for THP targets (linked with health promotion programs) - Priority is given to THP targets for obesity/job stress control programs	100%	
	• Operating health promotion programs, such as obesity and smoking-cessation programs	Annual	Obesity control programs for employees - Provided O/T (education) to 98 employees subject to obesity control programs; counseling and body composition analyses in progress * 38 first-round success cases out of 98 recipients of obesity control programs/28 final-round success cases (9 out of 20 with high risks of cerebrovascular diseases were improved)	70%	smoking-cessation programs halted because of COVID-19 (to be resumed in 2023)
	• Supplemented instructional materials for follow-up management of medical examinations	Annual	Preparing educational materials on health management (Hi-SEs – Health Risk Management Guide)	80%	To be supplemented in the first half of 2023
	• Strengthened the monitoring of follow-up management (strengthening management of vulnerable departments, increasing health counseling rate, etc.)	At all times	Health counseling in progress for employees requiring post-management in 2022 (1,048 people as of November 26); counseling rate: 85%; counseling improvement rate: 89%	89%	
	Conducting Medical Examinations More Efficiently				
	• Conducting medical examinations adequately: General (annually), special (once or twice a year), comprehensive (once every other year), pre-employment medical examinations, etc.	At all times	Conducted medical examinations in 2022 - First half of the year: 12,103 eligible employees/Implementation rate 99% - Second half of the year: 3,137 eligible employees/Implementation rate 97%	98%	Employees on leave - 66 in the first half of the year/95 in the second half of the year
	• Improving the corporate medical examination system (Hi-SEs)	At all times	Developed the health management system	90%	System back test and reliability analysis in progress: until January 2023
	• Improving the medical examination cycle management system	At all times	Scheduling individual medical examination cycles considering individual medical examination cycles	100%	Monitoring the appropriate implementation of the examination cycle
	• Introducing a mobile general/special medical examination report	At all times	Providing a mobile medical examination record only to the applicants (pilot operation with a few applicants)	100%	
	Setting Standards for Those Requiring Enhanced Job Stress Management and Operating Related Programs				
	• Devising and running job stress management programs	At all times	Operation of job stress management programs - Participatory stress relief programs; public health center–linked mental health promotion programs; provision of relevant education	100%	
	• Operation of job stress management training programs	Biannual	Operated job stress management programs as part of regular safety training (online) for office workers: May 2022; Operation of job stress management programs as part of video safety training: November 2022	100%	
	• Advancing ways to utilize job stress assessment results	At all times	Developed ways to utilize job stress assessment results - Calculated department-specific stress level indicators based on job stress assessment scores - To be used when selecting departments for participatory stress relief programs	100%	
	Operation of an Internal Health Promotion Center				
	• Operating and managing an in-plant hospital, local medical office, physiotherapy center, rehabilitation therapy center, and oriental medicine clinic	At all times	A total of 61,201 users as of September 2022 (101% compared to the previous year/60,547 users in the same month of the previous year)	100%	
	• Operation of an offshore in-plant hospital	Annual	Resumed the operation of the offshore in-plant hospital (May 2022)	100%	
Enhancing Support for Subcontractors' Health Management Affairs	Enhancing Subcontractors' Health Management				
	• Strengthening tasks linked to health management service providers (sharing information on health measures and measures determined as substandard or those that require supplementation)	Biannual	Held meetings with health management service providers in the first and the second halves of the year (May 31, October 28)	100%	
	• Monitoring subcontractors' work-related illnesses and suspected cases	Once every other month	Completed discussion concerning the monitoring of subcontractors' work-related illnesses and suspected cases (service providers) - Completed collecting status data and developing a health management system for subcontractors	100%	Planned a briefing session for subcontractors on the health management system in the first half of 2023
	• Providing technical guidance to subcontractors with substandard health management	Biannual	Twice a year (in the first and second halves) Providing technical guidance to subcontractors with substandard health management	100%	
	• Reinforcing monitoring and technical guidance for small-scale subcontractors	Biannual	Twice a year (first and second halves) Providing technical guidance for small-scale subcontractors	100%	

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Strengthening a System for Field-Oriented Chemical Management	Management for Persons with Health Care Risks				
	• Improving health management for persons with healthcare risks (Target: subcontractors’ new recruits)	At all times	Improved the health management system for persons with healthcare risks - Additional review process for inadequate essential personnel; assessment of job competencies	100%	
	• Strengthening the management and monitoring of the follow-up health management plan for persons with healthcare risks	Monthly	Registration rate for the follow-up health management plan for persons with healthcare risks: 100% (1,281 persons); suitability rate upon reassessment (274 out of 1,176 persons reassessed (23%))	100%	
	Setting Standards for Managing Stocked Chemical Products				
	• Establishing the R&R of each department based on the guidelines for managing stocked chemicals and their standards (procedure for chemical management)	At all times	Revised detailed rules - Set the R&R of each department - Revised or added provisions on handling chemicals (provisions on chemical imports and handling of hazardous substances subject to control)	100%	
	• Strengthening the management of subcontractors supplying the chemicals	Annual	Sent official notices to chemical suppliers regarding the MSDS system and compliance requirements	100%	
	• Operating and monitoring the special inspection period on compliance with the standards for the appropriate management of chemicals	Biannual	Inspected 14 departments and subcontractors in the first half of the year; set the inspection plan for the second-half	100%	
	• Establishing and implementing a procedure to manage products provided by subcontractors	At all times	Established a plan to survey the status of chemical products purchased by subcontractors and completed the report - Scheduled a status survey in January 2023 and reviewed/established a management plan	50%	Scheduled a status survey in 2023 and reviewed/ established a management plan
	Minimizing the Risk of Keeping Highly Hazardous Chemicals				
	• Promoting the substitution of highly hazardous chemicals handled internally (specially controlled substances and substances subject to permissible exposure limits)	At all times	Substituted 3 highly hazardous chemicals; 3 other cases in progress (halted their use/substitutes under review)	100%	
	• Strengthened the monitoring and guidance for the status management of the working environment of departments that handle highly hazardous chemicals	Biannual	Conducted self-inspection for the departments using cleaning agents in preparation for the MOEL’s unannounced inspection of cleaning processes	100%	
	• Distributed guidance materials (One Point Lesson (OPL) for the safe handling of highly hazardous chemicals	Annual	Completed distribution	100%	
	Supplementing the Chemical Management Process				
	• Upgraded a procedure for examining the hazards of new chemicals (paints) in advance	At all times	Applied a procedure for examining the hazards of low-solvent paints - Stocking after reviewing MSDS adequacy, component, and skin hazard (irritation/hypersensitivity) data	100%	
	• Operation of a labor-management consultative body for discussing proper paint handling	At all times	Non-operation of a consultative body following the self-imposed restriction of solvent-free paints	100%	
	• Operation of a chemical management system and conducting risk assessments	Annual	The chemical management system is always in operation; risk assessments for chemicals are to be conducted in the second half of the year - Identified 6,320 cases as of November/Hazards assessed in 2,555 cases/Submitted MSDS for 2 imported substances	100%	
Enhancing Working Environment and Health Management Capabilities	Appropriate Operation of Working Environment Measurements				
	• Regular measurement: once every 6 months; measurement in a shortened cycle: quarterly	At all times	Measured the working environment in the first half of 2022; measured the working environment in the second half of 2022 (in 63 of 63 departments)	100%	
	• Monitoring and managing hazardous factors that exceeded the exposure limits in the working environment measurements	At all times	655 of 18,290 samples (3.5%) exceeded limits in the first half of 2022	50%	The aggregated results of 2022 will be monitored once the second-half measurement is completed.
	• Improving the management system for the measurement of the internal working environment	At all times	Developed a management system – codes for the upload processes of measurement data (2018–2022) to be compiled - A presentation on a manual for the preliminary inspection of the working environment measurement will be given to responsible persons of the relevant departments.	100%	
	• Strengthening site management for the measurement of the working environment (occasional inspections on the conditions of wearing samples, working position, etc.)	At all times	Site inspections of major nonconforming departments (inspected 15 and 10 departments in the first and the second half of the year, respectively)	100%	
	Strengthening Health and Hygiene Management				
	• Implementation of a plan to prevent hazards and dangers in ventilation systems	At any time	Submitted eight 2022 harm and hazard prevention plans - Dust collectors at Offshore Paint Blasting Shops 1 and 2, pre-treatment equipment (RTO1), dust collectors at No. 1 pre-treatment equipment, casting and fit-up/shot booths, welding booths at Munsan Factory, plasma cutters at Yards 1 and 2 (completed documentation and site inspections)	100%	
	• Conducting and managing safety inspections for the interior and exterior of local exhaust ventilation (Target: All; Cycle: Annually)	At all times	Inspected 3 units in the first half of the year (passed); inspected 70 units in the second half of the year (passed); certificates to be displayed at sites after receiving the completion reports from the safety inspection agency	100%	
	• Anti-epidemic disinfection: Regular (year-round), special (May–August), and additional (anytime) disinfection and hygiene inspections of catering facilities	At all times	Conducting regular (canteens and buildings) and special (restaurant buildings and drains) disinfections in the summer (May–October)	100%	
	• Improving the management of local exhaust ventilation (maintenance and update for the status/list)	At any time	Updating the status of safety inspections of local exhaust ventilation	100%	
	• Strengthening site healthcare in extreme summer/winter weather	At all times	Sent an official notice on heat illness prevention in hot weather (June 3) - Reported response to heatstroke in preparation for the Serious Accidents Punishment Act Sent an official notice on the prevention of health problems during cold weather (November 30) - Prepared a manual on text messaging following the issuance of a special cold wave report and updated for vulnerable persons (high-risk group and the elderly)	100%	

Main Activities	Implementation Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Reinforcing Activities to Prevent Work-related Illness	Reinforcing Activities to Prevent MSDs				
	• Conducting regular investigations on the harmful factors of MSDs	Annual	Conducted regular investigations on the harmful factors of MSDs in 2022 and reported the results	100%	
	• Conducting occasional investigations on the harmful factors of MSDs	At all times	Sent an official notice on the occasional monthly investigation on harmful factors and conducted the investigation at each department - Completed 172 out of 202 cases subject to occasional investigations on harmful factors	85%	Pending cases to be followed up
	• Operating and upgrading MSD prevention and management programs (improving educational content and sites)	At all times	Revised the standard for MSD prevention and management programs - Added provisions on occupational safety and health standards - Improved the teaching plan concerning the computerized input method for the occasional investigations of harmful factors	100%	
	• Improving the operation of internal and external rehabilitation programs	At all times	Under review for relaunch	50%	To be resumed in January 2023 after devising an improved plan
	Prevention and Control of Work-related Illnesses				
	• Conducting site surveys/epidemiological surveys on work-related illnesses	At any time	Assisted in site surveys/epidemiological surveys on work-related illnesses - Completed with 57 out of 57 targeted persons (100%)	100%	
	• Conducting earplug suitability tests to prevent noise-induced hearing loss	Annual	Reviewed the testing of earplug suitability for noise-exposed workers requiring medical observations	50%	Tests to be conducted in 2023 depending on medical examination results this year
	• Improving the management system for preventing lung diseases and testing the suitability of protective equipment for breathing	Annual	Conducted a respiratory fit test (December 7–8): 32 people	100%	
	• Establishing a plan to vitalize the hearing conservation program and respiratory protection program	At all times	Under review for program improvement	25%	program improvement review postponed; educational materials on respirators/hearing programs to be distributed
	• Strengthening the pre-management of people requiring medical observations for work-related illnesses (to prevent the contraction of occupational diseases)	At all times	Implementation of follow-up measures for people classified as C1 in the medical examinations in 2022 - Implemented follow-up measures for 60 out of 60 persons classified as C1 (requiring close observation)	100%	
	Systems for Responding to Infectious Diseases				
	• Operating an emergency situation room to respond to COVID-19	At all times	Continuously operated the overall control room to respond to COVID-19 (8,971 confirmed in-house cases as of September 30, 2022)	100%	
	• Established a system to respond to infectious diseases promptly and upgraded the procedure for such a purpose	Annual	Revised the infectious disease prevention and response manual for the third time and notified the relevant departments - Adjusted each department’s R&R based on experiences responding to COVID-19 - Added a response system for confirmed cases by infectious disease and management methods for confirmed cases/contacts of major infectious diseases - Reflected in reorganization	100%	
Improving PPE Management to Prevent Accidents/ Diseases	Improving the PPE and Safety Consumable Management System				
	• Stabilizing and monitoring the newly established operation plan for PPE and safety consumables	At all times	Improved the PPE/safety consumable management system in compliance with the Serious Accidents Punishment Act (for safety and health management costs) - Implemented measures, such as the separation of target items, establishment of management standards, and supplementation of the management system	100%	
	• Establishing guidelines for wearing PPEs/safety consumables	At all times	Established guidelines for wearing safety harnesses and hardhats (safety guidelines)	100%	
	• Operating the pre-approval procedure when registering new safety consumables	At all times	Continuously reviewing specifications of PPEs/safety consumables before their registration	100%	
	• Improving the system related to PPEs (periodic distribution of safety boots, etc.)	At all times	Reviewed the safety boots distribution standard and reported the distribution plan: First-round distribution in June 2022 (4,600 pairs) Distributed cool T-shirts to prevent heat-related illnesses in the summer (to 1,300 workers) Improved the A/S procedure for old, heated vests	100%	
	PPE/Safety Consumables Quality Management				
	• Improving the quality of PPEs/safety consumables	At any time	Improved 12 PPEs/safety consumables, such as painting gloves, cooling pants, and polarized safety glasses	100%	
	• Monitoring the performance/quality/conditions of the usage/safety, etc., of PPEs/safety consumables	At any time	Quality testing of 6 kinds of grinder gloves in progress - Identified items requiring improvements; testing of the improved products’ suitability/economics in progress	90%	Testing of safety shoes (8-inch shoes and loafers) in progress in 2023
	• Providing major PPEs adequately (safety shoes, prescription safety goggles)	Biannual	Completed the regular distribution of safety shoes and prescription safety glasses in the first half of 2022: 20,681 pairs of safety shoes, 831 safety shoes coupons/5,715 pairs of prescription safety glasses Completed the regular distribution of safety shoes and prescription safety glasses in the second half of 2022: 19,535 pairs of safety shoes, 762 safety shoe welfare points/1,433 pairs of prescription safety glasses	100%	

Expanding Prevention-focused Health Promotion Activities

Conducting Medical Examinations More Efficiently

Regular Medical Examinations

Regular medical examinations are performed for employees to monitor their health conditions. In addition, special examinations are available for those who work with noise, hazardous rays, and organic compounds. Furthermore, long-term employees are provided with comprehensive medical examinations, and customized preventive care is available for each job category.

Medical examinations conducted in 2022

Classification	General	Special Medical Examination		Comprehensive Medical Examination	Others
		First Half	Second Half		
Schedule	2022.3.28-12.30				
Target	Office workers	Production workers	Persons with excess exposure to measurement factors	40 years of age or older with 5 years of continuous service ※ Additional optional tests (once every 6 years)	<ul style="list-style-type: none">• Pre-placement examination• Overseas examination• Recruitment health screening• Additional thorough examination
Cycle	Once a year	Once a year	-	Once every other year	
Number of people examined	3,918	8,185 715 (nighttime)	3,137	3,622 1,386 (underwent additional optional examinations)	

* Optional examinations: ①Colonoscopy ②Low-dose lung CT/Cyfra 21-1 ③Ultrasound for prostate/thyroid ④Ultrasound for breast/thyroid ⑤OCT angiography/thyroid ultrasound

Introduction of a Mobile General/Special Medical Examination Report

Receiving examination reports from the hospital system via mobile phones (Kakao Service) is now available instead of papers through the mail. It is available upon request for the corresponding year only, with increased convenience, as people can receive results more easily and conveniently than papers through the mail.



Mobile examination reports

Advancing Medical Examination Follow-up Management Systems and Internalizing Health Promotion Activities

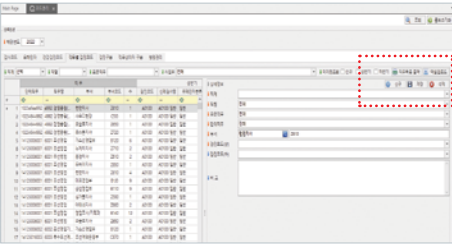
Improving the System to Operate Medical Examinations

By upgrading and improving the integrated HSE management system, we established a system that can manage persons eligible for medical examinations and strengthened basic health data management functions, such as follow-up management and statistics.

Major improvements in medical examinations

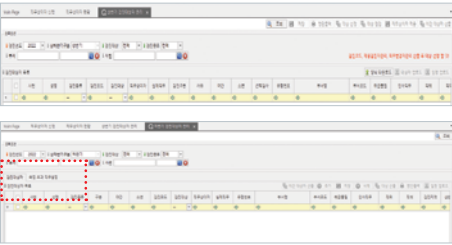
- Built a system to identify and manage eligible persons for medical examinations, types of examinations, and examination codes based on personnel information
- Built a follow-up management and monitoring system based on examination results
- Monitored the overall implementation status and examination rate of each department
 - Enabling personalized scheduling and monitoring considering individual examination cycles

Improving convenience for calculating examination codes



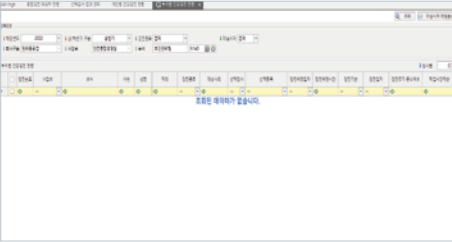
Linking with job DB

Comprehensive management screen for health checkups



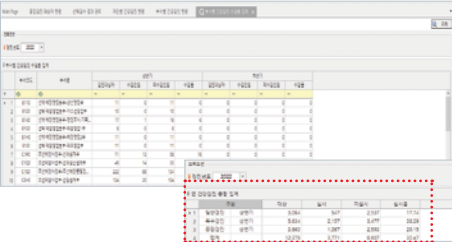
Developing a function to set jobs exceeding the measurement criteria

Improving the menu to manage the medical examination status of each department



Enabling the viewing of statuses, such as the type and date of examination and compliance with the cycle

Developing a medical examination statistics menu



Aggregation of implementation statuses

Expanding and Improving THP¹⁾ Programs

We devised a plan to link the obesity and job stress control programs, which were halted by COVID-19, for those with underlying diseases²⁾ with a relatively high possibility of cerebrovascular diseases based on the examination results of the year, with priority given to THP targets for participation.

1) THP: Total Health Promotion (cerebral cardiovascular disease prevention and management program)
2) Underlying diseases: hypertension, hyperlipidemia, diabetes, etc.

Operating an Obesity Control Program

As part of employee health promotion and THP program improvement, and for personalized health management, an obesity program consisting of body composition analysis, health counseling, the provision of weight scales and low-sugar diets are available for applicants among workers whose examination results indicate obesity. Congratulatory money is paid to those who achieve their target. The program started in 2017, and in 2022, 38 out of 100 participants succeeded.

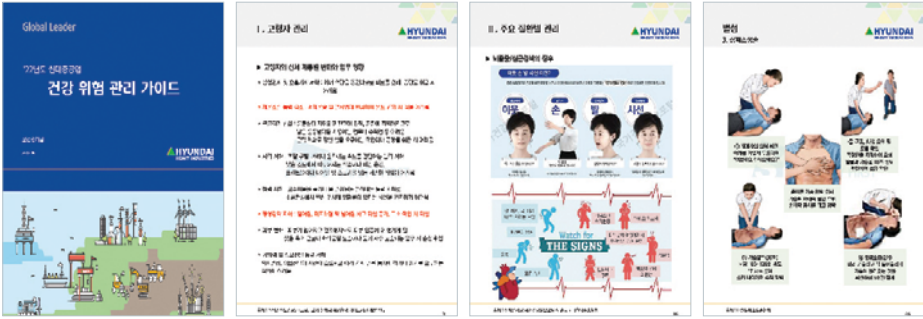
- Conducted health and nutrition counseling by professional medical personnel and nutritionists
- Provided low-sugar diets
- Provided body fat scales and healthy snacks
- Conducted selective assessment for yo-yo prevention (after 10 weeks)

Classification	Result	Success Rate
2022	38 out of 100 participants succeeded	38%
2021	Halted by COVID-19	
2020	Halted by COVID-19	
2019	71 out of 100 participants succeeded	71%
2018	67 out of 100 participants succeeded	67%



Supplementing Educational Materials for Medical Examination Follow-up Management

We produced healthcare guidelines that focus on major diseases identified in medical examinations. The healthcare guidelines distributed to prevent and manage diseases define diseases and describe ways to diagnose and treat diseases, workplace management plans, and measure required when engaged in fieldwork.



Healthcare guidelines

Setting Standards for Those Requiring Enhanced Job Stress Management and Operating Related Programs

Reinforcing Post-Medical Examination Management and Monitoring

Counseling, medication administration, and health education are available through dedicated medical personnel to the high-risk group whose medical examination results for the year show a relatively high possibility of cerebral cardiovascular diseases, such as hypertension, dyslipidemia, and diabetes, as well as those who require medical attention.

- Period: March 28 (first session) – January 31 (15th session)
- Method: Notice and counseling for the relevant department by session
- Counseling: In-plant hospital and local clinics
- * Implementing measures, such as limiting work hours, if necessary, after examination by an occupational medicine physician



Conducting a Job Stress Control Program

We operate a job stress control program to provide employees with psychological stability, improved stress awareness, and support for recharging. The job stress control program consists of job stress assessment, stress-related education and campaigns, and a participatory stress relief program.

Operation of a Mind-Safe Bus in conjunction with a mental health welfare center and implementation of the Love Life Campaign

In addition to our internal management program, we are implementing activities that promote mental health with a local mental health welfare center. The Mind-Safe Bus is regularly run every month to measure stress, and mental medical examinations and counseling services are provided through professional personnel. Furthermore, we conduct the Love Life Campaign every 6 months, which consists of various participatory activities, including writing Hope postcards, Love Life crossword puzzles, and mental health OX quizzes, to raise interest and awareness of mental health.



Stress assessment and counseling onboard a Mind-Safe Bus Love Life Campaign

Operation of In-house Training Programs Concerning Job Stress

Operation of stress relief programs

We operate a monthly participatory stress relief program to help employees relieve stress and recharge through empathy and consolation. The program consists of meditation, stretching, stress diagnosis, and happiness experiences and provides time to recharge, enabling participants to learn how to understand and relieve stress correctly. The Human Resources Development Team operates the Hope for Empathy (a course for position holders) and Rest for Healing (a course for staff) programs at the Human Resources Development Institute once a month.

Classification	Rest for Healing	Hope for Empathy
Target	Persons nominated by each department	Position holders nominated by each department
Number of participants	12	12
Schedule	Monthly, 08:00–17:00 (8 hrs)	
Venue	Human Resources Development Institute	

Stress management training programs

The first step in stress control is understanding stress. We need to know what problems stress can cause, how to recognize it, and how to relieve it. We operate the training curriculum, as shown on the right, to improve the employees' awareness of stress.

Classification	Time	Topic and Content
Online safety and health training	Second quarter	Job stress and safety
Video safety and health training	Second session in November	Understanding stress

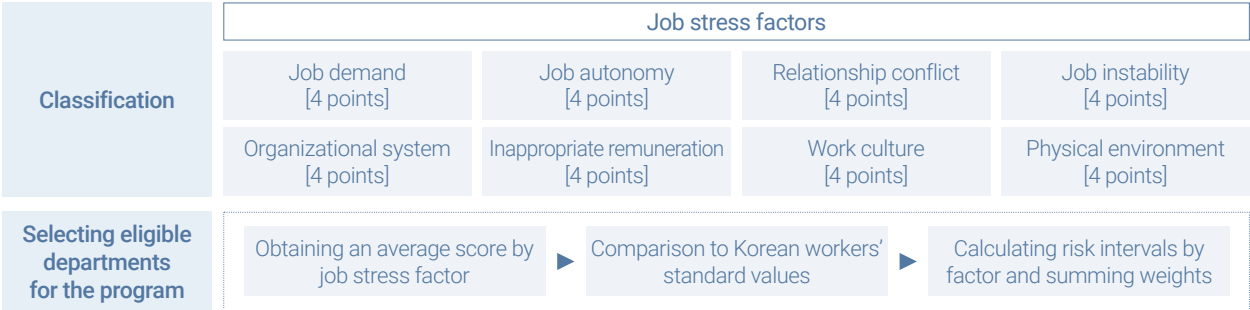


Advancing Ways to Utilize Job Stress Assessment Results

Establishing job stress assessment and risk estimation standards

Every year, during the medical examination, a questionnaire survey for job stress assessment is utilized according to the KOSHA's job stress factor measurement guidelines. The survey covers 8 areas: physical environment, job demand, job autonomy, relationship conflict, job instability, organizational system, inappropriate remuneration, and work culture. The calculated results are indexed to check the risk level of each department and used when selecting departments for participatory stress relief programs.

Indexing job stress assessment results



Risk Classification	Very low (lower 25%)	Low (lower 50%)	High (upper 50%)	Very high (upper 25%)
Weight	1	2	3	4

- Weighing each risk interval according to each job stress score (8 factors, 4 points each)
- * Weighing criteria: Calculated by comparing with the average distribution of stress factors for Korean workers
- Checking the risk level of each department by summing the weights of each factor

Operation of an Internal Health Promotion Center

Operating and Managing the In-plant Hospital, Physiotherapy Center, Rehabilitation Therapy Center, and Oriental Medicine Clinic

These facilities aim to contribute to employee health protection and welfare promotion by performing health management tasks, such as health consultations and medical treatments. In 2022, 87,114 people visited these facilities, where various medical services for health promotion are offered.

In-plant hospital performance

Classification	Year-on-Year Rate			2022		2021
Target	Aggregated	Individual	Total	Individual	Total	Individual
In-plant hospital		113%		53,816		47,732
Physiotherapy/ Rehabilitation therapy centers	104%	92%	87,114	16,958	83,779	18,370
Oriental medicine clinic		92%		16,340		17,677



Reoperating the Offshore in-plant hospital

The Offshore Clinic was raised to the status of an in-plant hospital in line with the increased number of workers at the offshore fabrication yard and reopened in May 2022, contributing to the health promotion of employees by providing medical treatments, prescriptions, and physiotherapy.

Enhancing Support for Subcontractors' Health Management Affairs

Enhancing Subcontractors' Health Management

Reinforcing Affairs Linked to Health Management Service Providers

Holding meetings with health management service providers

We hold regular (twice a year) meetings with health management service providers (Occupational Healthcare Center of Ulsan University Hospital, Ulsan Healthcare Center of Korea Industrial Health Association) to improve subcontractor healthcare.

Meeting Dates

- First half: May 31, 2022 (Tue)
- Second half: October 28, 2022 (Fri)

Agenda

- Status of the occurrence of work-related illnesses and persons requiring medical attention for subcontractors
- Plans for medical examinations, follow-up management, and technical guidance for subcontractors
- Plans for updating MSDS, training, and guidance for subcontractors
- Distribution and management of PPEs and safety consumables



Providing Technical Guidance to Subcontractors with Substandard Health Management

For small-scale subcontractors with less than 50 employees who have not appointed an agency, we are making efforts to strengthen their healthcare by visiting them for technical healthcare support, pre-inspection on areas where health-related vulnerabilities may occur, and providing guidance.

Meeting Dates

- First half: June 2022 (7 locations)
- Second half: October–December 2022 (11 locations)

Agenda

- 7 fields: Safety and health management regulations/Chemical substances/Medical examination / Musculoskeletal Disorders (MSDs)/Working environment measurement/PPE / Job stress control



Management for Persons with Health Care Risks

Improving the Management System for Persons with Health-Related Risks

Due to an increase in the age of subcontractors' new recruits, we reviewed the standards and access conditions for those with health-related risks. Based on the review results, additional measures were taken to allow entry for older employees with noise-induced hearing loss.

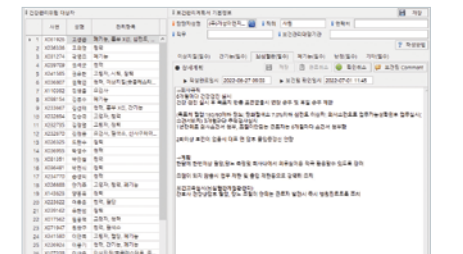
In addition, as the Gunsan Shipyard reopened, older employees' entry to the technology transfer's vicinity will only be limited to technical guidance for new recruits.

Classification	Before		Now	
	Hearing (hearing loss)	Exceeding other criteria	Hearing (hearing loss)	Exceeding other criteria
	Restriction on the issuance of passes	Restriction on the issuance of passes	Access allowed	Restriction on the issuance of passes

Reinforcing the Management and Monitoring of Follow-Up Management Plans for Persons with Health-Related Risks

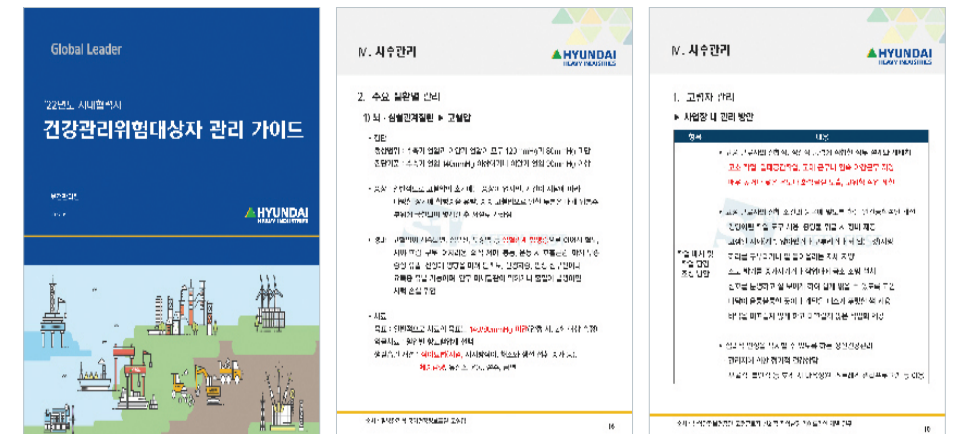
For follow-up management for persons with health-related risks, we create a customized health management plan for in-house subcontractors biannually through the integrated HSE management system and continuously monitor and provide feedback to increase the number of suitable cases when reexamined.

- Adequacy rate at reexamination: 23%
(274 out of 1,176 individuals/Target: 20%)



Hi-SEs System

In addition, we distributed a set of management guidelines for persons with health-related risks to subcontractors for reference in their follow-up management.



Management guidelines for persons with health-related risks

Strengthening a System for Field-Oriented Chemical Management

Setting Standards for Managing Stocked Chemical Products

Operating and Monitoring a Special Inspection Period to Ensure Compliance with Management Standards for Chemical Products

Self-inspection of chemical handling

Due to the nature of the industry, we handle various types of chemicals at the workplace. Accordingly, special inspections were conducted at departments and subcontractors to prevent accidents caused by the use of chemical substances by ensuring that they were properly managed. Self-inspections were conducted twice, once in the first half and once in the second half, and measures were taken to improve any nonconformities found.

Content of self-Inspection

Classification	First Half	Second Half
Target	14 departments and subcontractors	7 departments and subcontractors
Period	2022.6.29-7.14	2022.12.9-12.15
Inspection Items	<ul style="list-style-type: none"> • Placing and posting MSDS • MSDS education • Attaching MSDS label • Posting management tips for each work process • Complying with standards for handling special management materials (SMM) • Wearing PPE 	
Improvements made	38 cases	27 cases

Improvements

화학물질 적정 취급 자체 점검 개선사항		
부서명(과명) : 환경안전부		
점검 시간 : 적정관리팀 준수관리 과시 전도		
개선 사항	적정관리팀 준수관리 과시 전도	
구분	개선 전	개선 후
조리 장비 (4대)		
장소 내용	<ul style="list-style-type: none"> 화학 안전정보시스템 사용 및 위험 현상에 대한정보 준수관리팀에 전달 	<ul style="list-style-type: none"> 화학안전법 제21조 제2항 준수관리팀 과시 전도


화학물질 적정 취급 자체 점검 개선사항-1		
부서명(과명) : 환경안전부		
점검 시간 : 화학물질 보관장소 정기점검 및 적정관리팀 과시 전도		
개선 사항	화학물질 보관장소 정기점검 및 적정관리팀 과시 전도	
구분	개선 전	개선 후
조리 장비 (4대)		
장소 내용	<ul style="list-style-type: none"> 기준 준수사항이 없는 보관장소 점검 	<ul style="list-style-type: none"> 정비사항이 있는 보관장소 점검

Distribution of chemical handling and management guides

We distributed chemical handling management guides covering the basic matters to be understood when handling chemicals, such as posting MSDS and education and attaching MSDS labels.


1. 물질안전보건자료(MSDS)

- ✓ **물질안전보건자료(MSDS) 게시 요령**
 - 최초 게시 이후 **지속적으로** 최신화 하여 관리
 - GHS 기준에 적합한 MSDS 게시
 - 반드시 국문 MSDS 배치·게시
 - 작업 장소 및 보관 장소에 비치·게시
 - 고정형 작업 장소가 아닌 경우 **안전 장소에 게시하고 작업자가 이를 인지**하도록 관리
- ※MSDS 검색 방법 : HSES - 보안 - 화학물질관리 - MSDS DB
- ✓ **GHS 기준 적용 MSDS 판별 방법**

	국문	GHS 적용 확인	GHS 적용 이유
그림자화	노란 사각형 내 검정 그림		발생에 따라 화학물질에 대응하도록 내림
MSDS 항목 순서	구분별 2번, 유해 위험성이 2번 기재	1. 위험성(위험도)에 따라 2. 유해 위험성이 2번 3. 유해 위험성 3번 4. 유해 위험성 4번	유해 위험성에 대응하도록 구분

2. 경고표지


- ✓ **경고표지 부착이 필요한 경우**
 - 화학물질이 담겨있는 모든 용기·물건 반드시 부착
 - 물질들 들어있는 용기·물건 반드시 부착
 - 기존 경고표지가 훼손·오염되었을 경우에도 재부착
 - 영문 경고표지가 부착 시 국문 경고표지도 교체
- ✓ **경고표지 구성 요소**
- ✓ **경고표지 색상 및 크기**
 - 경고표지 바탕 색은 **흰색**이어야 하며, 글자·문양은 **검정색**이어야 한다.
 - 경고표지는 GHS·국제 기준에 따라야 하며 **태두**는 **평평**이며, **바탕색**은 **흰색**이어야 한다.



① AHA 조작성
② 위험성
③ 유해성
④ GHS 표시
⑤ 내용
⑥ 제조/수입
⑦ 경고표지 방법


① 내용
② 제조
③ GHS 표시
④ 위험성
⑤ 경고표지 방법

MSDS 항목 순서

구분	국문	GHS 적용 확인	GHS 적용 이유
그림자화	노란 사각형 내 검정 그림		발생에 따라 화학물질에 대응하도록 내림
MSDS 항목 순서	구분별 2번, 유해 위험성이 2번 기재	1. 위험성(위험도)에 따라 2. 유해 위험성이 2번 3. 유해 위험성 3번 4. 유해 위험성 4번	유해 위험성에 대응하도록 구분

경고표지

- ✓ 경고표지 부착이 필요한 경우
 - 화학물질이 담겨있는 모든 용기·물건 반드시 부착
 - 물질들 들어있는 용기·물건 반드시 부착
 - 기존 경고표지가 훼손·오염되었을 경우에도 재부착
 - 영문 경고표지가 부착 시 국문 경고표지도 교체
- ✓ 경고표지 구성 요소
- ✓ 경고표지 색상 및 크기
 - 경고표지 바탕 색은 흰색이어야 하며, 글자·문양은 검정색이어야 한다.
 - 경고표지는 GHS·국제 기준에 따라야 하며 태두는 평평이며, 바탕색은 흰색이어야 한다.



① AHA 조작성
② 위험성
③ 유해성
④ GHS 표시
⑤ 내용
⑥ 제조/수입
⑦ 경고표지 방법

① 내용
② 제조
③ GHS 표시
④ 위험성
⑤ 경고표지 방법

Reinforcing Management of Chemical Suppliers

The importance of chemical management is being emphasized further with the continuous strengthening of chemical-related laws and enforcement of the Serious Accidents Punishment Act. Beyond in-plant management, we have produced and distributed guides on MSDS that meet legal standards and information on strengthened legal compliance to subcontractors who supply chemical products to minimize risks from the time of receiving chemical products.

Main contents of the guides provided to chemical suppliers

- Operational status of the chemical management system
- Requirements when drafting and submitting MSDS
- Label making and attaching
- HiPRO user guide

[illegible]

Establishing and Reflecting Departmental R/R concerning Management Guidelines for Arrived Chemicals

We clarified R&R for each department and detailed the handling-related provisions to preemptively minimize the legal and health risks in handling in-house chemicals.

R&R by department

Classification	R&R	Revisions
Requesting departments	<ul style="list-style-type: none"> • To cooperate in operating the chemical management system when requesting chemicals • To avoid bringing in restricted materials 	<ul style="list-style-type: none"> • To avoid requesting restricted materials/a provision is added to propose alternatives
Purchasing departments	<ul style="list-style-type: none"> • To cooperate in operating the chemical management system when purchasing chemicals • To manage chemical supplies 	-
Handling departments	<ul style="list-style-type: none"> • To use only the chemicals that underwent as evaluation by the managing department • To post information at worksites, as necessary for chemical handling • To manage PPE and ventilation • To provide training on chemical handling • To comply with relevant management standards under chemical-related regulations 	<ul style="list-style-type: none"> • To add local exhaust ventilation-related provisions • To add supervisors' duty-related provisions • To revise or add provisions of MSDS/special education • To revise or add PPE-related provisions
Managing departments	<ul style="list-style-type: none"> • To operate the chemical management system • To support chemical requesting, purchasing, and handling departments 	<ul style="list-style-type: none"> • To add import procedure-related provisions

Minimizing the Risk of Keeping Highly Hazardous Chemicals

Reinforcing Working Environment Management Status Monitoring and Guidance for the Highly Hazardous Chemical Handling Department

Following a mass poisoning accident at a manufacturing company caused by cleaning agents containing harmful and toxic substances during the cleaning process, we inspected all departments that handle cleaning agents to prevent similar cases. Although no products or processes were at risk of causing a similar accident, we conducted additional fact-finding inspections on the departments that needed site inspections to minimize risks, confirm proper handling, and take action for the items needing improvements.

Classification	Fact Finding	Site Inspection
Target	52 departments	2 departments
Period	2022.4.25-4.29	2022.5.9-5.13
Inspection Items	Department's Self-Inspection	Health Management Section's Site Inspection
	• MSDS posting • MSDS education • Posting management tips • PPE • Ventilation	
Improvement Performance	10 cases	Improvement completed at 2 departments



Distribution of One Point Lesson (OPL) Materials on Chemical Handling

Safe use of chemicals requires a clear understanding of their hazards and risks. Accordingly, we registered OPL on the integrated HSE management system and distributed it to related departments to make known the risk of highly harmful chemicals (paints and welding materials) we handle.

Listing the main types of chemicals and the summary of the PPE-wearing requirements during chemical handling

Major chemical substances	Main products containing such substances	Mandatory PPE during handling
Insoluble nickel, hexavalent chromium	SUS welding rod	Wear a Class 1+ dust mask and welding clothes and face shield
Sulfuric acid	Some acid cleaners	Gas masks with acid filter/Wear acid-resistant protective clothing and gloves
Styrene	Paint	Gas mask or air-supplied mask (if necessary)/Wear PPE and safety glasses
Toluene	Paint and thinner	Gas mask or air-supplied mask (if necessary)/Wear PPE and safety glasses
:	:	:
Manganese	Welding rod	Class 1+ dust mask/Wear welding clothes and face shield

Distribution of OPL materials

[illegible]

Summary of the Chemical Management System Operation

Since introducing the chemical management system in 2019 to verify the safety of chemical products brought in, about 10,000 materials have been registered and are under management. Through this, we check the adequacy of the contents of the MSDS for chemicals brought in, the harmfulness of the product, and whether or not it contains restricted substances and purchase approved products after review.

Operational performance of the chemical management system

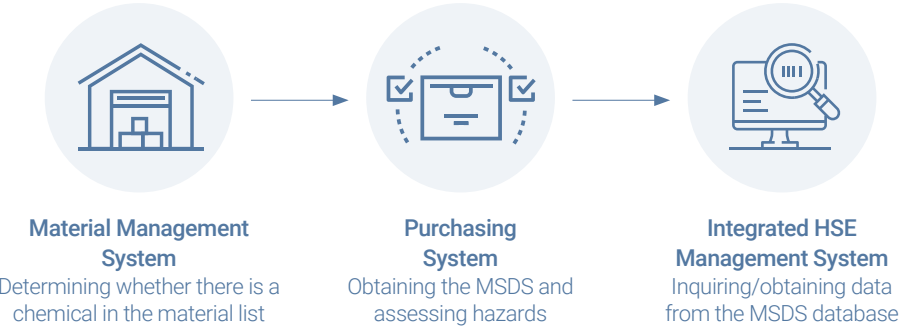
Classification	Chemical hazard assessment				MSDS submission for imported chemicals
	Approval	Conditional approval		Disapproval (including non-MSDS submission)	
		Product substitution	Receipt of evidence		
2019	932	6	0	3	-
2020	3,337	7	5	13	
2021	1,924	0	1	14	21
2022	2,466	11	4	250	10

Note 1) Chemical substances brought into the company are managed by classifying them into prohibited, restricted, and observation groups according to their harmfulness. The prohibited group consists of products that contain prohibited substances or substances requiring permission, which must not be brought in under any circumstances. The restricted group refers to products prohibited from being brought in but containing specially managed and toxic substances that may be brought in after review with the Health Management Section and the Environmental Management Section.

Note 2) Suppliers must submit an MSDS that meets the Occupational Safety and Health Act to proceed with the hazard assessment procedure. If the MSDS is not registered or an MSDS that does not meet the standards is submitted, re-registration is requested, and if action is not taken, it will be regarded as "Disapproval."

Note 3) One type of cleaning agent (containing chlorinated solvent) was replaced, purchasing of 2 types of welding material (nickel, 99%) was canceled, 2 types of polishing blades (diamond pad), one type of paint, and one type of water treatment agent were purchased against the evidence.

Workflow of the Chemical Management System



Expanded Application of the Chemical Management System

At the time of the initial application of the chemical management system, the target materials were limited to sub-materials managed by the resource management system (RMS) and materials registered through the material management system of each business unit. Since its introduction, the stable operation has greatly blocked the introduction of highly hazardous chemicals and resolved legal risks. In June 2022, it was expanded to include construction, transportation, and tool management materials.

Initial Application (January 2019)	First expansion (December 2019)	Second expansion (June 2022)
<ul style="list-style-type: none">• (Former) Shipbuilding Business Unit• Naval & Special Ship Business Unit• Engine & Machinery Business Unit• Resource management system (RMS)- sub-materials	<ul style="list-style-type: none">• (Former) Offshore Plant Business Unit	<ul style="list-style-type: none">• Resource management system (RMS)- Construction materials- Transportation materials- Tool management materials

Advancing the Hazard Review Process for New Chemical Products (Paints)

When new chemical products are purchased, an MSDS is obtained at the purchasing stage through the chemical management system, and hazards and whether or not they contain regulated substances are reviewed. If a new product to be introduced has significantly different components or hazard/risk information compared to existing products because of a change in generation, etc., the hazards are closely reviewed as follows.

Major hazard review items

Chemical handling information 	<ul style="list-style-type: none">• Expected amount of product handling• Product handling method (keeping and storage, transport, handling, and disposal)• Working environment information during product handling (whether indoor/outdoor or equipment is used)• Information on the number of expected handlers (job type, major tasks, and headcount)
MSDS 	<ul style="list-style-type: none">• Review of the MSDS adequacy<ul style="list-style-type: none">- Whether the MSDS preparation standards have been met- Whether hazard risks have been adequately classified- Whether component labeling is adequate• Whether the product contains highly hazardous or regulated substances
Hazard review 	<ul style="list-style-type: none">• Checking product hazard and toxicity information• Cross-verification of hazard information in an overseas database (DB) (such as ECHA) for each single component• Checking test results related to major hazards
Appropriate management plans 	<ul style="list-style-type: none">• Checking methods of safe product handling<ul style="list-style-type: none">- Precautions for storage, handling, and disposal- Measure to reduce exposure during handling (isolation, ventilation, prevention of scattering)• Appropriate PPE during handling

Enhancing Working Environment and Health Management Capabilities

Appropriate Operation of Working Environment Measurements

Working Environment Measurement

We measure the working environment (the term “working environment measurement” means collecting, analyzing, and evaluating samples after a business owner formulates a plan to measure hazardous factors regarding their employees or worksite to ascertain the actual status of the working environment) twice a year under Article 125 of the Occupational Safety and Health Act.

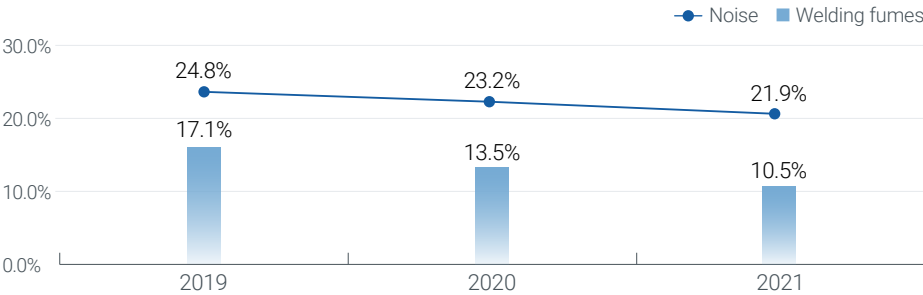
- Measurement cycle: 2021 (2H), 2022 (1H)
- Measurement institution: Working Environment Measurement Team of Ulsan University Hospital

Classification	2021 (2H)	2022 (1H)
Measurement period	2021.7.15.-12.29 (85 days)	2022.1.17.-7.21 (88 days)
Target departments (including subcontractors)	57 departments	63 departments
Target personnel (including subcontractors)	2,215 persons	2,663 persons
Measurement cases (including subcontractors)	14,581 cases	18,945 cases
1) Dust and fume	7,559 cases	11,182 cases
2) Noise/heat	2,174 cases	2,657 cases
3) Organic compounds	2,846 cases	2,674 cases
4) Other factors	2,002 cases	2,432 cases

Monitoring Harmful Factors that Exceed Exposure Limits and Reinforcing Site Management while Measuring Working Environments

Changes in the annual rate of harmful factors exceeding exposure limits

- Noise and welding fumes account for over 90% of all harmful factors exceeding exposure limits.
- * The excess rates have been lowered every year (noise by 6%; welding fumes by 20%–22%)



Reinforcing site management while measuring working environments

- Reinforcing site management while measuring the working environment of the department with excessive harmful factors
- * Target: 15 sites/6 months (achieved the target in 2022 with 30 sites)

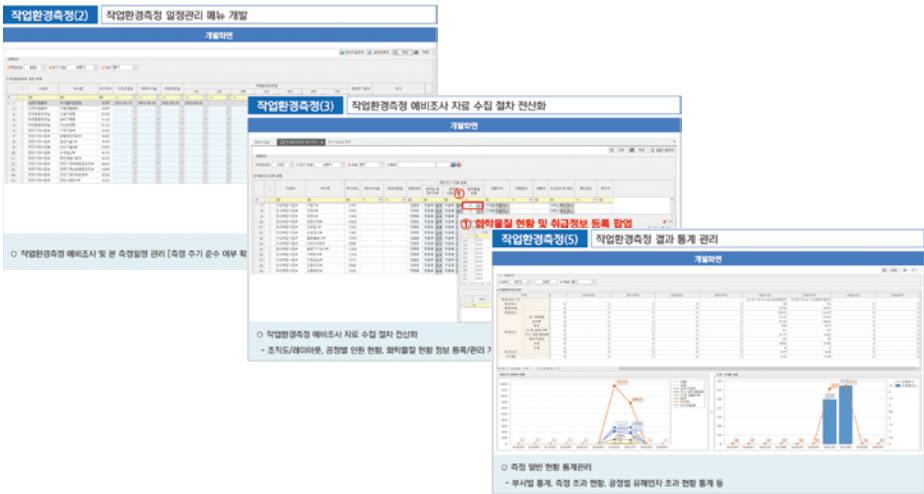


Improving the Internal Working Environment Measurement System

The working environment measurement operating system has been computerized as part of upgrading the integrated HSE management system. Through computerization, we plan to reflect the history management of health measures and the statistical data of measurement results to site improvement activities.

Key contents of the computerization of the working environment measurement system

- Building preliminary survey data / schedule management for working environment measurement
- Establishing and improving an action history management system according to working environment measurement results
- Calculating excessive harmful substances and statistical monitoring by each department, process, and harm factor



Strengthening
Health and Hygiene
Management

Hazard Prevention Planning for Ventilation Facilities

Hazard prevention plans were reviewed for approval according to Article 42 of the Occupational Safety and Health Act for ventilation facilities newly established or changed every year (local and general ventilation and airtight facilities).

Hazard prevention plans (ventilation equipment related to harmful substances and dust work subject to permission and management)

- Number of submitted and reviewed cases in 2022: 8 cases

Facilities subject to hazard prevention planning



Safety Inspections of Local Exhaust Ventilation and Status Update

Under Article 93 (Safety Inspections) of the Occupational Safety and Health Act and Article 124 (Application for Safety Inspections) of the Enforcement Rules of the same Act, we conduct safety inspections on local exhaust ventilation every year. Changes, such as the new installation, abolition, or suspension of local exhaust ventilation, are frequently checked and reflected in the inspection targets.

Status of local exhaust ventilation safety inspections in 2022

- Number of units inspected: 72
- Inspection institution: Korea Industrial Safety Association Ulsan Office
- Inspection period: April–November 2022 (5 days)

Measuring control velocity at hood, identifying duct damage, checking for filter/canvas damage, checking exhaust airflow



Disease Control, Disinfection, and Hygiene Inspections of Meal Service Facilities

We conduct hygiene inspections and disinfect corporate buildings and meal service facilities every summer season to manage hygiene and workers' health and control diseases at worksites.

Hygiene inspection of meal service facilities

- Target facilities: 38 facilities (35 cafeterias, 3 external caterers)
- Meal service providers: Hyundai Green Food (33 sites), CJ Freshway (2 sites), Other external caterers
- Inspection period: May 24–July 19, 2022 (9 days)
- Scope of inspection: Examining the bacterial growth rate of samples collected from tableware, cutting boards, knives, and dishcloths
- Inspection results: Bacteria were detected in 3 out of 144 samples, additional follow-up measures completed

Tableware samples were collected for bacteria testing, and other hygiene checks were made.



In-house disease control (regular, special, and COVID-19 control)

- Areas subject to disease control: 69 buildings, 27 cafeterias, and drains
- Control period: Regular disease control (Buildings: once every other month; Cafeterias: monthly), special disease control (buildings including cafeterias and drains: additional monthly control from May to October)

Disease control against harmful insects and coronavirus at each cafeteria, building, and drain

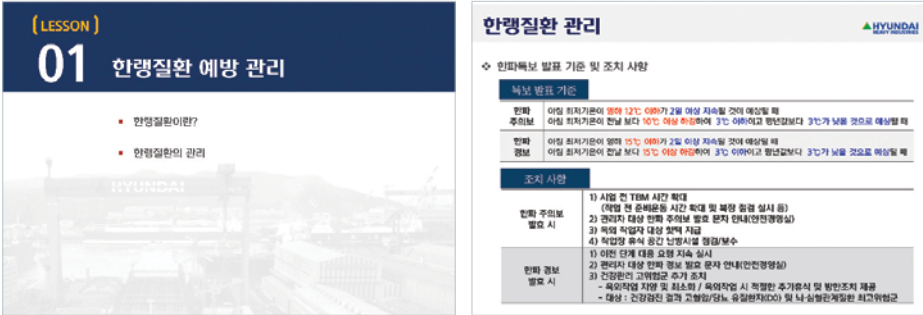


Reinforcing Health Management during Hot/Cold Seasons

For field workers, we are operating various measures to prevent health problems caused by heat or cold waves. In particular, in the summer, saline dextrose tablets are provided to prevent dehydration caused by excessive sweating during outdoor work. In addition, a text guidance manual is prepared and operated to provide text messages when a heat wave alert is issued to prevent heat-related illnesses for older people and those with underlying medical conditions.



In order to prevent health problems in the cold season, we provide guidance to take preventive measures, such as providing hot packs and winter goods and training to prevent cold diseases. When a special cold wave warning is issued, an information message is sent to managers to check the health status of outdoor workers and take appropriate rest and winterization measures.



Reinforcing Activities to Prevent Occupational Diseases

Strengthening MSD Prevention

Conducted Regular Investigations of Harmful Factors of MSDs in 2022

Under Article 657 of the Rules on Occupational Safety and Health Standard, regular investigations of harmful factors are conducted every 3 years, and preliminary investigations, pre-specialization training, harmful factor investigations, and working environment improvement measures have been carried out.

- Period: July–December 2022 (6 months)
- Target departments: 45 departments (Production and Production Support)
- Target individuals: Departmental secretaries, promotion committee members, delegates, and others
- Investigation method: Use of the KOSHA GUIDE questionnaires

Classification		Schedule	Content
Preliminary investigation (2 weeks)		3rd–4th week of July	<ul style="list-style-type: none">• Registering organizations on HEMP• Classifying musculoskeletal system–related work• Classifying heavy materials handled
Specialization training (1 week)		August 22–26 (excluding the 24th)	<ul style="list-style-type: none">• In progress
Investigating harmful factors	Supplementing the preliminary investigation (1 week)	August 29 – September 2	<ul style="list-style-type: none">• Sending preliminary investigation reports after editing omissions and deficiencies- Recipients: Sang-hyun Lee, Health Management Team
	Conducting investigations (5 weeks)	September 5 – October 7	<ul style="list-style-type: none">• Basic survey on harmful factors by department + survey on symptoms
	Registering survey results (2 weeks)	October 10–21	<ul style="list-style-type: none">• Registering survey results on the Hi-SEs computer system and setting plans to improve hazard processes
Improving the working environment (5 weeks)		October 24 – November 25	<ul style="list-style-type: none">• Improving departmental working environment based on survey results
Result reporting		3rd week of December	<ul style="list-style-type: none">• Reporting survey and improvement results

Provided specialization training on regular investigations of harmful factors



Occasional Investigations of Harmful Factors of Musculoskeletal System-Related Work in 2022

- Number of investigated cases: 202
- Targets: Departments where an MSD-related non-accidental industrial accident occurred during the specified period
- Measures taken: Improved the working environment in which musculoskeletal system–related work is performed

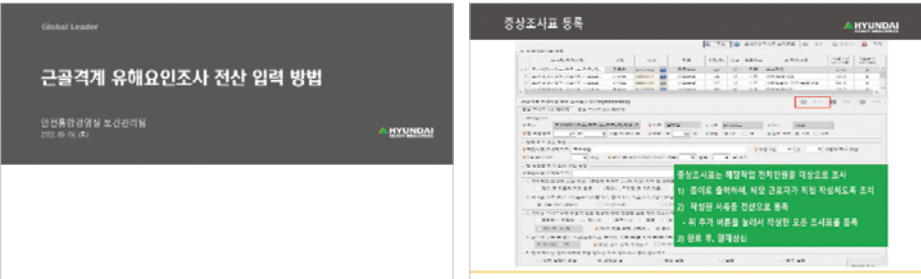
Classification	2018	2019	2020	2021	2022
Number of approved persons	32	74	68	95	100

Operating and Upgrading MSD Prevention and Management Programs

The standard concerning MSD (recognized as work-related illness) prevention and management programs was revised to conform to Article 657 of the Occupational Safety and Health Standard. Data on the method of computer entry of occasional investigations of harmful factors were added and distributed after being registered in the integrated HSE management system.

Additional revision to the occasional investigation of harmful factors

- Before revision: When an incident is approved as an industrial accident
- After revision
 - When introducing new equipment corresponding to musculoskeletal system–related work
 - When the working environment, such as the amount of work and work process corresponding to musculoskeletal system–related work, is changed



Prevention and Control of Work-related Illnesses

Conducting Field and Epidemiological Investigations Associated with Work-Related Illness

In the event of an industrial accident claim arising from a work-related illness, we conduct field investigations to reveal the causal relationship between the illness and the work performed.

- If claiming that the MSD is caused by repetitive physical work
- When it is necessary to conduct a field investigation whether the alleged cerebrovascular, heart, or mental disease is due to overwork or stress
- Other cases where field investigation of a disease caused by genetic factors or chemicals is required

The Health Management Section coordinates the schedule with the Korean Workers' Compensation & Welfare Service and the relevant department for cases deemed necessary for additional field investigations and conducts a prior review, location selection, and site response tasks for the smooth progress of the investigation. In 2022, a total of 61 field investigations were conducted.



Classification	Total	MSD	Lung disease	Noise-induced hearing loss
Number of individuals involved in the investigation	61	54	5	2



Reinforcing Ex Ante Management of Workers Requiring Observation for Occupational Diseases

We take the following preventive measures to strengthen ex ante management of those who need observation for occupational diseases¹⁾.

- 1) Workers requiring observation (C-graded): Those who require medical observation
- Cases where measures, such as wearing of PPE and having follow-ups, are necessary based on medical opinion

Preventive measures

- Providing health-care counseling and interview to C1 graders (requiring observation) to prevent D1 morbidity rate
- Testing earplug adequacy to prevent noise-induced hearing loss
- Improving the management system for preventing lung diseases and testing the adequacy of PPE for breathing

Improving the Management System for Preventing Lung Diseases and Testing the Adequacy of PPE for Breathing

A respirator fit test was conducted for the high-risk group among the workers who were determined to require observation (C1) for respiratory diseases at the medical examination. We checked whether they were wearing respirators properly and provided guidance on how to wear it properly.

Conducting respirator fit test

- Targets: The high-risk group among the workers who were determined to require observation (C1) for respiratory diseases at the medical examination
- Test period: December 7–8, 2022, 10:00–16:00
- Venue: 4th Fl., Seminar Room, Health Promotion Center
- Test items: Respirator fit test





Vitalizing Hearing Conservation and Respiratory Organ Protective Programs with Improved Administration

Updating and distributing educational materials on hearing conservation and respiratory organ protective programs

- Distributing educational materials on hearing conservation and respiratory organ protective programs to the relevant departments (exposed to excessive noise and dust)
- Uploading content to Education Data Room on Hi-SEs

Sharing best field improvements of 2022 with production departments

- Distributing best departmental practices of 2022, which have over-achieved the process improvement target

Hearing / Respiratory Program	<ul style="list-style-type: none">• Distributing supplemented educational materials• Sharing Hi-SEs educational materials 
Distributing information on excellent improvement cases	<ul style="list-style-type: none">• Expanding investment in ventilation• Utilizing and introducing low-noise tools and equipment 

Infectious Disease Response System

Operating an Overall Control Room in Response to COVID-19


Due to the continuous occurrence and influx of the COVID-19 mutant virus, the epidemic is repeated, and the COVID-19 situation is prolonged. We effectively respond to the prolonged COVID-19 situation by operating a COVID-19 overall control room ("Situation Room") under the internal infectious disease prevention and response management manual. We are blocking the inflow and spread of COVID-19 in our premises through close collaboration with relevant departments in the following activities: aggregating confirmed cases, monitoring trends in nationwide confirmed cases and public disease control policies, establishing and revising internal disease control guidelines, promoting disease control rules, managing cafeterias and convenience facilities, and managing work systems.

Major responses and countermeasures taken

COVID-19 Situation Room	<ul style="list-style-type: none">• Monitoring trends in nationwide confirmed cases and public disease control policies• Establishing, revising, and promoting internal disease control guidelines• Aggregating internal confirmed cases• Providing and managing self-test kits for contacts of confirmed cases
Management of work systems and business trips	<ul style="list-style-type: none">• Initiating work-from-home (WFH) and flexitime work systems (adjusting the rate according to trends and departmental circumstances)• Initiating WFH for pregnant women• Adjusting domestic/overseas business trip guidelines (approval regulations, restriction on transport modes)
Meeting/ Training/ Event	<ul style="list-style-type: none">• Reviewing to limit the number of participants to meetings, training, and events• Reviewing to restrict eating during meetings, training, and events* The number of participants is adjusted or deregulated according to trends
Access and welfare facility management	<ul style="list-style-type: none">• Reviewing to limit visitors' access• Installing partitions in cafeterias and expanding the provision of prepared meals• Reviewing to limit the operation of amenities (gym, reading room, and the like)• Reviewing to limit the operation of recreational facilities
Overseas entrant management	<ul style="list-style-type: none">• Complying with the government's pre/post-entry inspection standards for overseas entrants• Adjusting internal access standards for overseas entrants

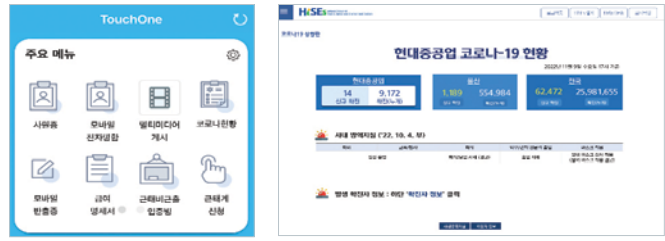
COVID-19 information disclosure and public relations

The daily occurrence status and disease control guidelines are disclosed through the COVID-19 Bulletin on our Hi Office, and they are linked with the mobile Touch One App for easy checking. In addition, we continuously provide information on internal and daily disease control rules through posters, signage, and in-house mobile notification services.



Touch One
(on mobile phones)

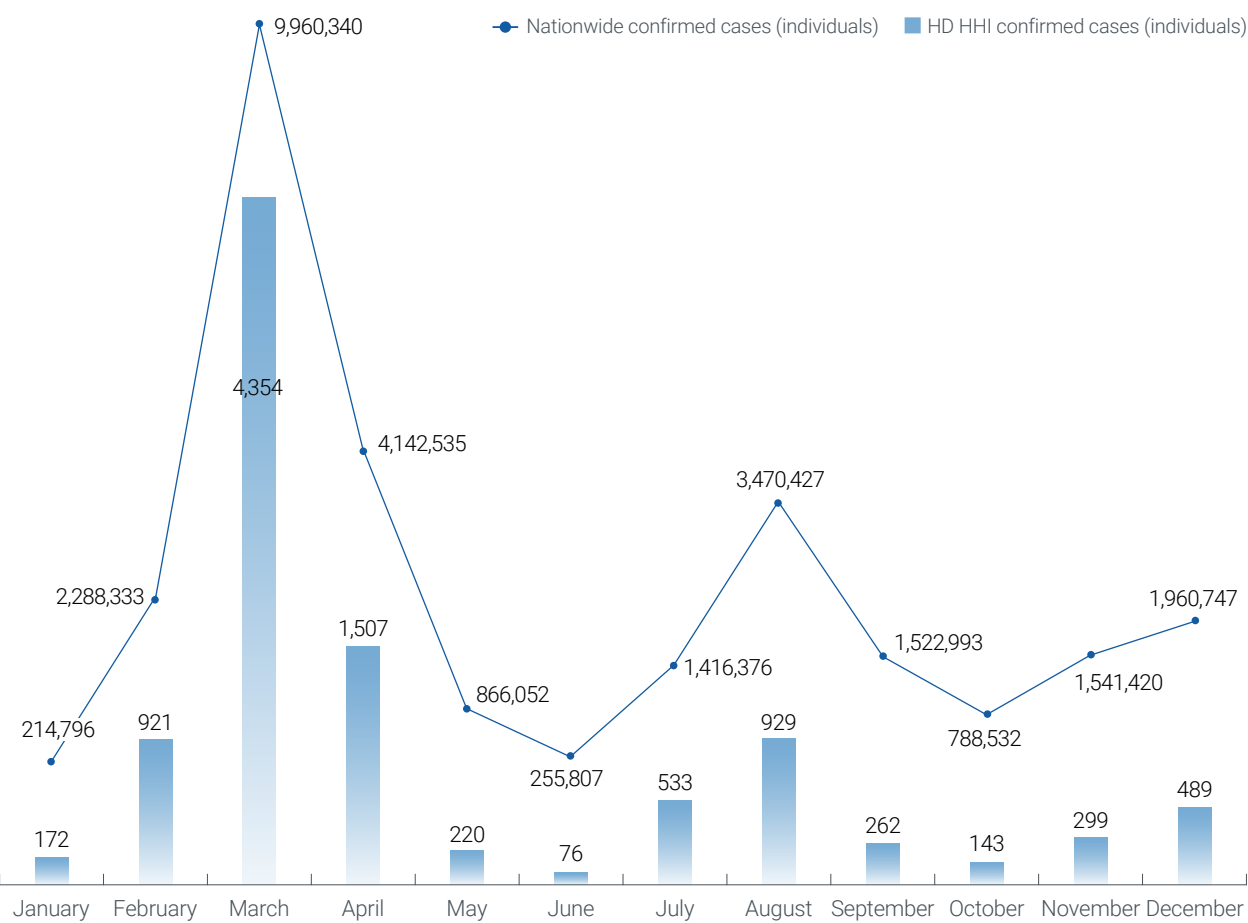
Quick link to Hi Office



COVID-19 Bulletin



Trends in confirmed cases (National/HD HHI)



Establishing a System for Prompt Response to Infectious Diseases and Upgrading the Procedure for Such Purpose

In order to strengthen the prevention and preparation system for infectious diseases and reduce the risk of infectious diseases through a rapid response system, the infectious disease response and prevention manual (“Manual”) was established in 2017 and is in continuous operation. Even when the COVID-19 virus entered Korea in 2020, we opened a Situation Room under the Manual. We are responding to the prolonged epidemic situation under our disease control guidelines.

In order to strengthen the response system for new infectious diseases that may become prevalent in the future as well as currently prevalent infectious diseases, we revised the Manual for the third time. In this revision, based on the experience accumulated through the COVID-19 response over the past 3 years, the role of each organization was reestablished in the event of an infectious disease outbreak, and a new common response procedure was established in the event of a confirmed case of an infectious disease in consideration of the basic principles of responding to infectious diseases.

In addition, by adding information on the management of confirmed cases by major infectious diseases (incubation period, quarantine period information, etc.) and contact management information (criteria for classification of contacts, quarantine period, etc.), the Manual’s effectiveness has been improved.

Infectious Disease Response and Prevention Manual

Infectious disease definition and description	Tips on responding to infectious disease outbreaks	Infectious disease prevention and management	Essential infectious disease information
Infectious disease definition	Tips on step-by-step response to crisis alert	Corporate measures and tips on personal behavior	Infectious disease definition, symptoms, pathway, diagnosis and treatment, vaccination, and daily practices
Definitions	Situation Room composition	Action tips when symptoms appear	
Infectious disease alert levels	Response system in case of a confirmed case	Personal hygiene management tips	
	Response to major infectious diseases		
	Contact network, information on laws		

Improving Personal Protective Equipment (PPE) Management to Prevent Accidents/Diseases

Improving the Management System for PPE and Safety Consumables

Improving the Management System for PPE and Safety Consumables

According to the need to supplement the safety and health cost management system and efficiently manage PPE/consumables, we improved the safety materials operation system for each department and subcontractor.

Improvements

- Safety consumables' material codes (510) newly established: for 500 items
- Before registering a safety consumable item as a safety material, it must be reviewed by the Corporate Safety and Health Office.
 - The registration of a safety material is subject to prior review of its safety/suitability.
- Computerizing safety material management for subcontractors by the related department
- Execute "Hi-SEs," go to "Health Care," and select "PPE/Safety Consumable Cost" to check the cost.

[illegible]

* Upgraded the screen to check and manage PPE and consumables costs by department/subcontractor on the Hi-SEs system

Setting Standards for Wearing PPE and Safety Consumables

We set the use period and replacement criteria for PPE and safety consumables that must be worn depending on the working conditions of each job. Currently, criteria for replacing hardhats and safety harnesses have been established, and standards for personalized provision considering duties, places, and environments are under review.

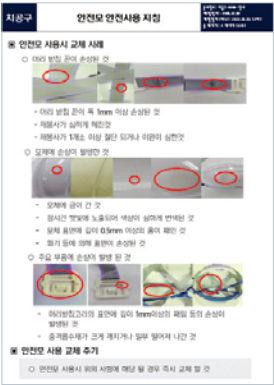
Use period and replacement cycles for safety harness and hardhat

Safety harness

- Damaged lanyard
- Loosened webbing or one or more cut/worn threads
- Damaged buckle/carabiner with a depth of at least 1 mm
- Heavily contaminated or deformed hooks
- Dislodged or loosened rivets
- Malfunctioning anti-disengagement lever

Hardhat

- Damaged headband
 - Damaged headband in 1 mm width
- Damaged shell
 - Cracked shell
 - Severe discoloration due to extensive sunlight exposure
- Damaged parts
 - Broken or missing lining that absorbs impact



Improving PPE-Related Systems

We established a plan to improve safety boots distribution and regular distribution standards after collecting opinions from workers and conducting field surveys. We also improved the procedure for prompt repair of worn-out winter heating vests.

Safety boots provision

Following the improvement of the standard and system for providing safety boots, we provided the first batch of safety boots.

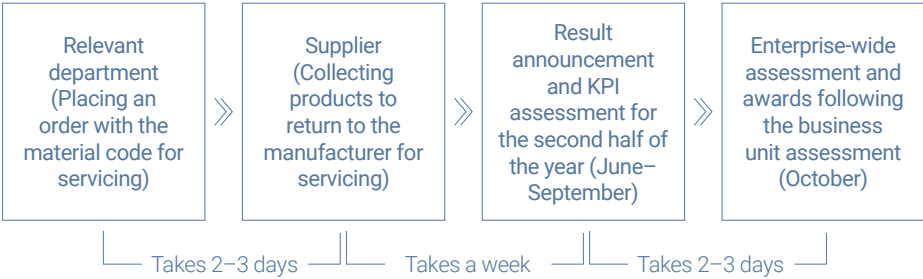
In the future, we plan to revise the standards for providing safety boots through surveys on field departments' usage.

- Provision targets: Those who are provided with raincoats and perform painting (washing) work
- Supply quantity: 4,614 pairs

Classification	New arrivals (Manufacturer: Dae Shin Industry)			
Photo				
Product name	Rubber safety boots (short, yarding)	Rubber safety boots (short, general)	Rubber safety boots (long, yarding)	Rubber safety boots (long, general)
Product features	<ul style="list-style-type: none">Fully waterproof by injection method of productionExcellent anti-slip effectLightweight (15% weight reduction compared to the previous version)			





Improving repair procedures for old heating vests

In order to maintain the body temperature and manage the health of workers during the cold season, we have provided a guide on the repair procedure for old heating vests.









Improving PPE/Consumables

We are carrying out activities to prevent health problems and safety accidents by continuously improving the PPE we use in-house. In 2022, we reviewed and improved the performance of 21 items, including special dust/gas masks, light-shielding safety glasses, safety harnesses, knee supports, and safety harness protectors. We are committed to continuous improvement to provide PPE with improved usability for field workers.

Item name	Image	Major improvements
Knee supports		<ul style="list-style-type: none">Reinforced belt (band) hook durabilityIncreased convenience with adjustable belt (band) widthEnhanced durability with heavy-duty-treated materials
Automatic welding face shield (headband) for narrow spaces		<ul style="list-style-type: none">Improved headband (not fixed to the hardhat) for pipe welding (tig), considering the nature of the work being carried out in a narrow spaceCompatible with auto-light-shielding welding face shield (Chameleon 7)
Safety harness (for scaffolders)		<ul style="list-style-type: none">Weight reduction with double lanyard considering the nature of scaffolders' workEasy and convenient to wear and work
Light-shielding safety glasses (polarized glasses)		<ul style="list-style-type: none">Eye protection from sunlight and ultraviolet rays at seaEnhanced impact and heat resistanceLightweight for less fatigue
Special dust/gas mask		<ul style="list-style-type: none">Outstanding durability with high-strength plastic bodyDust collection efficiency: 99.95%Low inhalation resistanceCompatible with conventional Class 1 dust/gas masks
Grinder gloves (cut-resistant)		<ul style="list-style-type: none">Cut resistance to protect hands from grinder operation and grinder wheels (coated with high-hardness silicon composite)NonslipExcellent wearer-mobility, lightweight, and breathability

Quality Inspection for PPE and Consumables

To improve PPE and safety consumables, we regularly inspect their quality, and based on inspection results, safety, and field opinions, we improved 16 items, including welding aprons and protective lenses for air-supplied masks.

Item name	Image	Major improvements
Protective lens for air-supplied mask		<ul style="list-style-type: none">• Changed the air-supplied mask's protective lens material, as it breaks when working with a grinder (acrylic to PC)
Welding and fitting gloves (for winter)		<ul style="list-style-type: none">• Added the thermal function for hands during welding and fitting work in winter• Excellent wearability with brushed lining
Work gloves (liner gloves for winter)		<ul style="list-style-type: none">• Added the thermal function for hands during outdoor work in winter• Suitable as liner gloves as they come with brushed lining and spandex material• Excellent wearer-mobility and lightweight
Sunshade		<ul style="list-style-type: none">• For signalmen in the summer• Existing visors were less durable against the wind; durability is enhanced by changing the visor part's material.
Clothes for paper/metal grinding (one-piece type)		<ul style="list-style-type: none">• Improved the existing two-piece suit (for painting and metal grinding), in which foreign substances enter the inside into a one-piece type• Increased efficiency with the overall type
Welding Apron		<ul style="list-style-type: none">• Changed the welding apron strap material (cross-belt type and leather material)• Changed the neck/waist strap tightening method (buckling to one-touch clip type)

Appropriate PPE Provision (Safety Shoes, Prescription Safety Glasses)

We regularly provide safety shoes to production workers (including subcontractors) twice a year in May and November, and we also provide them to new recruits at all times. In addition, we provide prescription safety glasses after eyesight testing twice a year in February and October. We will continue to improve to provide PPE that improves the usability for field workers.

Classification	Target	Cycle	Provision Date	Provision Quantity
Safety shoes	Production and technical workers (including subcontractors)	Once a year per individual	May, November	42,216 units
Prescription safety glasses			February, October	7,634 individuals

* If the product cannot be used because of damage or destruction, it is replaced immediately.



The Crash of Helios Airways Flight 522 that Killed Everyone Onboard

What drove them to death?

On August 14, 2005, Cyprus Helios Airways Flight 522 from Larnaca Airport, Cyprus, at 9:00 a.m. to Prague, Czech Republic, crashed in Athens, Greece, 3 hours later at around 12:00 p.m., killing all 121 passengers on board.

In general, airplanes start flying at an altitude of 7–8 km for domestic flights and 10–12 km for international flights to reduce air resistance after takeoff. Aircraft can go higher, but if they do, the air required for engine combustion becomes thinner, which causes problems with engine efficiency.

Flight 522 began to gain altitude immediately after takeoff and reached an altitude of 3.6 km after a few minutes.

After takeoff, the aircraft contacted the Helios operations center about a problem with the aircraft, but the contact was lost 30 minutes later.

After 11:00 a.m., the aircraft reached the sky above Athens. However, it had been hovering over the airport for 30 minutes without responding to the call from the control tower. At that point, the Greek aviation authorities determined that the aircraft had been hijacked and had launched 2 F-16 fighter aircraft of the Hellenic Air Force. They looked closely at the aircraft and looked into the cabin. They observed that the oxygen masks were dangling down, and all passengers wearing masks were unconscious. They also observed that the first officer was slumped motionless at the controls, and the captain's seat was empty. Shortly after, the plane started to descend and crashed on Grammatiko Hill around 12:00 p.m. What investigators pointed out after the accident was the cabin pressurization control switch.

Normally, this switch should be set to "Auto," but it was set to "Manual." The switch was set to Manual because the mechanic servicing the aircraft in the morning forgot to turn the switch back to Auto after setting it manually to test the pressurization and confirm there was nothing wrong with it. It was an accident that could have been avoided if only the mechanic had made sure that the pressurization system was set to automatic, but a minor mistake had far-reaching consequences. In the case of a car, if the vehicle breaks down, it is enough to park it on the roadside, but the story is different with an aircraft. Poor maintenance and failure to respond to emergencies are critical issues that are directly related to safety.



SAFETY

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HEALTH

4-7

Management Performance of Business Units

In order to proactively prevent accidents, the Business Units analyze the causes of past accidents and establish efficient measures to prevent similar accidents from occurring. In addition, for a safe workplace, they strive to prepare fundamental safety measures by further advancing the accident prevention system through active communication and exchange among employees.

SHIPBUILDING & OFFSHORE BUSINESS UNIT

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 its inception in 1972, HD 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 set the world's first record of achieving shipbuilding of 100 million GT in 2012 and 2,000 ships in 2015. In addition, it constructs various facilities on a turnkey basis, from the design, purchasing, construction, transport, and installation to the commissioning for the development of offshore oil and gas fields. It has successfully delivered more than 170 projects from more than 30 clients worldwide.



Major Achievements of the Shipbuilding & Offshore Business Unit (Shipbuilding Division) in 2022

Main Activities	Management Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Select and Concentrate in Safety Management	Intensive Management of Working with Risks of a Fatal accident				
	• 100% feed management of major accident prevention measures and prevention measures for reoccurrence of major accident	At all times	Documenting weekly site unsafe cases by each section		
	• Operating a triple (supervisors/Safe Clover/safety supervisors) safety management system for high-risk work	At all times	Monitoring activities of responsible departments by each section; summed up third-quarter performance results; scheduled to sum up the second-half performance	100%	
	• Select and Concentrate safety management prioritizing PTW-applicable high-risk work	At all times	Total management of site and face-to-face permission and priority inspection		
	• Continuous PTW system upgrades and reinforcing site and face-to-face PTW inspections	At all times	Total management of site and face-to-face permission and priority inspection		
	Upgrading and Standardizing Safety Standards for High-Risk Work			100%	
Reinforcing Safety Management for Subcontractors	• Establishing/executing multiple (double, triple) safety measures for high-risk work	At all times	One safety improvement case per month (20 cases by November)	100%	
	• Establishing double/triple safety measures for high-risk work relying on PPE	Continuous		100%	
	Operating Support Programs for Subcontractors’ Safety Management				
	• Improving in-house and outside subcontractors’ safety management capability through support and technical guidance	Quarterly	Executing quarterly (20 times in April for the 1Q; 20 times in July for the 2Q; 20 times in October)	100%	
	• Assessing the level of in-house subcontractors’ safety management and rewarding excellent performers	Quarterly	Executing quarterly (5 times in April for the 1Q; 5 times in July for the 2Q; 5 times in October)	100%	
	• Improving safety and health based on the subcontractors’ opinions heard at monthly subcontractor safety and health committee meetings	Monthly	Executed monthly by each production director (January – November: 110 times; 10 officers * 9 months)	100%	
Safety Activities Based on Risk Prediction	Strengthening the Competency of Subcontractor Safety Supervisors				
	• Strengthening safety supervisors’ competency by focusing on major incidents prevention	Biannual	Targeting subcontractor safety supervisors	100%	
	• Mentoring new safety supervisors; monthly meetings held by the safety section chief with subcontractor safety supervisors	Monthly	- Assessment: Executed biannually (127 individuals in July; 5 individuals) - Mentoring system: 59 individuals (18 in January; 17 in July; 24 in October; 10 in November) - Meetings (held monthly)	100%	
	Strengthening DT-based Safety Management				
	• Enhancing work-specific risk management by introducing a mobile safe work instruction system	At all times	Applied continuously following the second update	70%	To be upgraded and its users to be expanded in 2023
Spreading Safety-First Culture	Building a System to Comply with the Serious Accidents Punishment Act				
	• Operating safety improvement and strategy meetings (safety management activities led by management)	Monthly	Improvement and strategy meetings were held monthly.	100%	
	Establishing a Safety Culture of Autonomy and Discipline based on Safety Communication				
	• Establishing a safety culture of “reward and punishment” in compliance with fundamentals and principles	Quarterly, at all times	- Outstanding production teams were incentivized. (16 teams in April for the 1Q; 16 teams in July for the 2Q; 16 teams in October for the 3Q; 16 teams in December for the 4Q) - Deliberation Committee: 2 cases (Assembly 1 “Being hit” on March 4; Unit Assembly 1 “TT car crash” on July 21)	100%	
	• Reinforcing compliance with basic order within the worksite/Strict enforcement of safety regulations against unsafe work based on fairness	At all times	353 golden safety rules–related cases	100%	

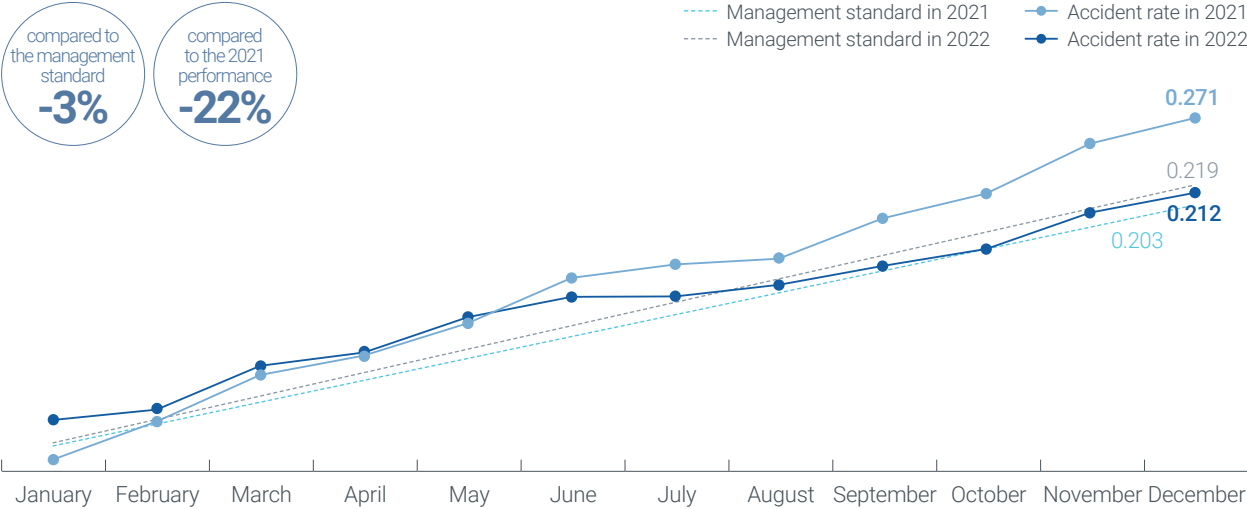
Major Achievements of the Shipbuilding & Offshore Business Unit (Offshore Division) in 2022

Main Activities	Management Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Select and Concentrate in Safety Management	Intensive Management of Working with Risks of a Fatal Accident				
	• 100% feed management of major accident prevention measures and prevention measures for reoccurrence of major accident	At all times	Daily/weekly documentation of unsafe site cases	100%	
	• Operating a triple (supervisors/Safe Clover/safety supervisors) safety management system for high-risk work	At all times	Production/Support departments monitored high-risk work inspections.	100%	
	• "Select and Concentrate" safety management prioritizing PTW-applicable high-risk work	At all times	Total management of site and face-to-face permission and priority inspection	100%	
	• Continuous PTW system upgrades and reinforcing site and face-to-face PTW inspections	At all times	Total management of on-site and face-to-face permission and priority inspection	100%	
Reinforcing the Safety of Subcontractors	Operating Support Programs for Subcontractors' Safety Management				
	• Improving in-house and outside subcontractors' safety management capability through support and technical guidance	Quarterly	Assessing the level of subcontractors' safety management quarterly	100%	
	• Assessing the level of in-house subcontractors' safety management and rewarding excellent performers	Quarterly	Executing quarterly	100%	
	• Improving safety and health based on the subcontractors' opinions heard at monthly subcontractor safety and health committee meetings	Monthly	Subcontractor safety and health meeting (held monthly by the responsible officer)	100%	
	Strengthening the Competency of Subcontractor Safety Supervisors				
	• Strengthening safety supervisors' competency by focusing on major incidents prevention	Biannual	Assessing competency of subcontractor safety supervisors (biannual): Executed in June and December	100%	Few meetings with safety supervisors were omitted (To be held in May).
	• Mentoring new safety supervisors; monthly meetings held by the safety section chief with subcontractor safety supervisors	Monthly	Meetings with subcontractor safety supervisors (monthly): Held in May, June, August, September, October, and November	75%	
Spreading Safety-First Culture	Establishing a Safety Culture of Autonomy and Discipline based on Safety Communication				
	• Establishing a safety culture of "reward and punishment" in compliance with basics and principles	Quarterly, At all times	Subcontractors Safety Accident Deliberation Committee: 1 case (In-Shop Production Department, August 10 (Wed), "trip accident")	100%	
	• Reinforcing compliance with basic order within the worksite/Strict enforcement of safety regulations against unsafe fieldwork based on fairness	At all times	28 golden safety rules-related cases 6 major safety rules-related cases	100%	

Safety Management Achievements of the Shipbuilding & Offshore Business Unit in 2022

The Shipbuilding & Offshore Business Unit conducts various safety activities such as intensive safety management through major accident prevention measures, active safety intervention, and a digital technology-based safety system to prevent safety accidents. In 2022, it recorded 44 industrial accidents, representing a 0.212 accident rate, down 22% from the previous year. Despite its effort to create a safe workplace, 9 major incidents, including 2 fatal accidents, occurred in 2022.

The Shipbuilding & Offshore Business Unit plans to carry out further safety activities, focusing on daily safety work and improvement of safety capabilities of individual workers in the safety activities of the organizational unit, to make 2023 the first year without fatal accidents.



Classification	2020	2021	2022
Fatal accidents	3	3	2
Accident-related industrial accident	52	54	44
Accident rate	0.252	0.271	0.212
Frequency (per 1 million)	1.199	1.284	1.020

Intensifying High-Risk Work Management

100% feed management of major accident prevention measures and prevention measures for reoccurrence of major accident

The Shipbuilding & Offshore Business Unit is concentrating all its capabilities on major accident prevention activities, such as major accident prevention measures and operation of the triple safety management system, to create a safe working environment.

Establishing Major Accident Prevention Measures

The production and support divisions of the Shipbuilding & Offshore Business Unit strive to prevent fatal accidents by discovering and analyzing fatal and major incidents and high-risk work with a high possibility of major accidents, establishing preventive measures, and preparing a standardized checklist for accident prevention.

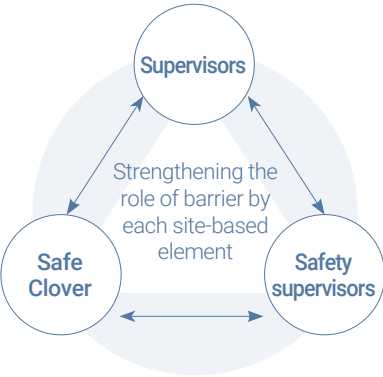
Major accident prevention measures established by the division

Total	In-shop	Out-shop	Offshore & H Dock	
	Fabrication	7 Hull	22 Platform Construction	6
	Panel Assembly	9 Outfitting	40 System Construction	5
	Unit Assembly	35 Painting	8 H Dock Hull/Outfitting	12
	Pre-Outfitting/ Outfitting Production	8 Scaffolding	10 H Dock Painting	4
	Chemical and Power Plant Equipment/ ITER	7 LNG/CHS	12 H Dock Support	8
	UNIT	3 Deck House	17	
	Others (Material Operations, etc.)	7 Commissioning	7	
		Others	10	
237cases	76cases	126cases	35cases	



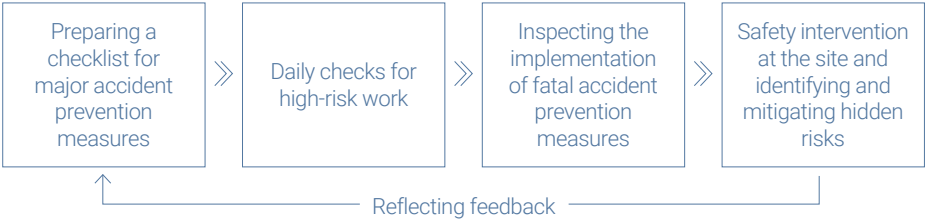
Operating a Triple-Safety Management System

The Shipbuilding & Offshore Business Unit implements a triple safety management system in which supervisors, Safe Clover, and safety supervisors conduct cross-checks on work subject to major accident prevention measures, thereby implementing thorough safety management for high-risk work.



The purpose of the Safe Clover system is to select and operate work experts in the production departments as safety management personnel so that high-risk work can be inspected under the direction of production. Safe Clover inspects the implementation of major accident prevention measures and high-risk work within the department, attends toolbox talks, and inspects work standards and risk assessment, among others. Notably, with a view that balances work and safety, it reduces the gap between work standards and actual work. At the same time, it discovers potential risks that have not been recognized before, playing a major role in advancing major accident prevention measures.

Safe Clover's work process



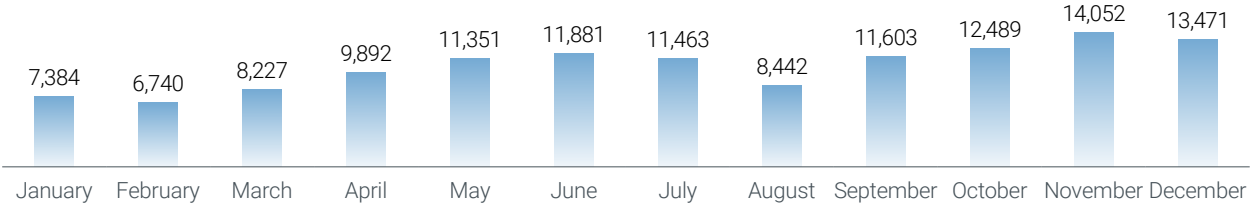
Safety Intervention

All employees, including supervisors, participate in safety interventions and daily safety inspections to prevent safety accidents and improve unsafe behaviors and working environment. In 2022, a total of 126,995 daily safety inspections and 74,039 safety interventions were conducted. Records are registered and managed in the integrated HSE management system.

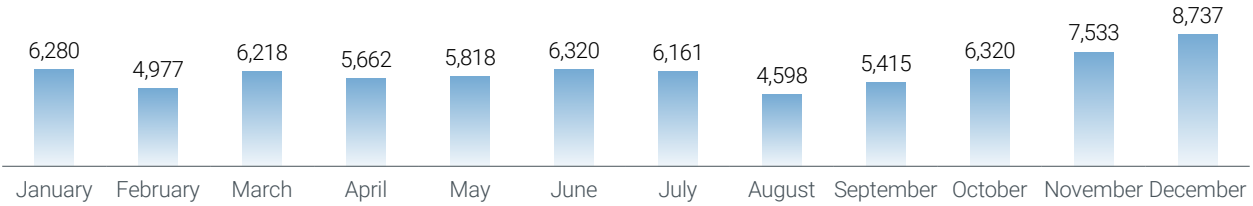
Supervisors' safety inspections and interventions



Number of daily safety inspections



Number of safety intervention activities



“Select and Concentrate” Safety Management Prioritizing PTW-applicable High-Risk Work

Depending on the risk level of the work subject to permission, the Shipbuilding & Offshore Business Unit categorizes permits into 3 categories—electrical, face-to-face, and on-site—in intensive management of risk work following the risk level.

Continuous Improvement of the PTW System

The Shipbuilding & offshore safety organizations re-evaluated and re-selected the risks of the work subject to permission following the continuously changing working environment. Works subject to permission are displayed on the computer system and checked and managed without omission through the triple safety management system (supervisors, Safe Clover, safety supervisors). In particular, the PTW system applied to offshore projects has strengthened safety inspections for high-risk work by dividing the collective management of face-to-face permits into face-to-face and on-site permits.

Shipbuilding

- In-Shop: New implementation of the PTW system
- Out-Shop

Site permits	All works are done by rope access technicians (Dock)/All works occur inside the hold after the side opening is closed [LNG/ETH carriers] (Quayside)
Face-to-face permits	Resin work at the upper side of DF tanks [Applicable to DF CNTR vessels only] (Dock)/Dismantling work for pipe/level sensors/valves/strainers (Quayside)

* All works inside elevators/vent trunks: Adjusted to electrical permits

Offshore

Classification	Works subject to permission	
	Face-to-face permits	Site permits
Past	34	-
First-round improvement	21	13
Second-round improvement	25(▲4)	23(▲10)

In offshore projects, we conduct joint safety programs with the client based on the English procedure submitted to the client in addition to the activities to preemptively prevent and block safety accidents.

Joint Safety Inspections with the Client

We jointly conduct safety inspections with clients weekly to identify safety issues that do not conform to our safety standards or client’s safety requirements and actively take ac-

Implementing Offshore Project Safety Programs and Preemptive Safety Accident Prevention Activities

tion. We are promoting the prevention of safety accidents by sharing the results of safety measures we take, building a cooperative relationship with our clients, and keeping our worksites safe.



Safety Meetings with the Client

We hold weekly safety meetings with clients, share KPIs, and discuss major HSE issues concerning offshore projects. In particular, we present reasonable solutions for major safety issues based on our safety standards, keeping a cooperative relationship based on mutual trust.



Offshore Project Safety Training

All personnel involved in offshore project is required to complete HSE induction, which is basic safety training, before starting work. In addition, safety training for confined spaces and gas measurers (confined-space monitors) is provided to prevent safety accidents in confined spaces and perform the role of a manager, operator, and watcher. Stickers, which are attached to the hardhat, are issued at the end of the training for a visual check of their training completion status.



We determine the rationality of safety activities requested by clients and their contribution to safety accident prevention and actively accept and implement them.

P78 Project / IOGP Requirement Audit

In the case of the P78 Project, it is specified in the contract to comply with the requirements of the IOGP Report issued by the International Association of Oil and Gas Producers (IOGP), and the client periodically monitors compliance.

In response to the client’s requirements, we are actively conducting audits after establishing an audit schedule under IOGP Reports 577 and 597, which describe safety practices at manufacturing sites.


Not only the national oil companies (NOCs), such as Petrobras, the client of the P78 Project, but also the international oil companies (IOCs) are demanding manufacturers comply with the IOGP requirements. Considering this, we are preparing a separate checklist for IOGP Reports 577 and 597, preparing related answers in Korean and English, and planning for effective responsiveness, for offshore projects, from the marketing to the execution stages.



SHWE, P78, Shenandoah Projects / Safety Observation and Intervention Program

We also operate safety intervention and the SSA systems within the Hi-SEs. However, for all offshore projects currently underway, we implement a separate safety observation and intervention (SOI) according to client requirements.

We are receiving observations and intervention results from clients. In addition, the HSE manager of the project checks for areas that require additional action, actively responds to them, and returns action results to the client.

EOE 

BOE Observation Card

Observer Name: Heon Gyu Park BOE Approver: Paul Smith

Observer Company: BOE

Document Number: SHN-FPS-HSS-BBS-0.D.0.1.9-00

Date: 16 Nov Time: 10:30 Location: 0-Young 4-1H1 Sub

Observation Type:

Positive: ☐ Unsafe Act ☐ Unsafe Condition ☐

HPO: ☐ N.Miss: ☐ PPE: ☒

Env: ☐ PTW: ☐ House Keep: ☐

Description:

We observed the grinding work without a face shield.

WHO (was observed)					
Operator	<input type="checkbox"/>	Engineering	<input type="checkbox"/>		
Mechanical	<input type="checkbox"/>	Electrical	<input type="checkbox"/>		
Technical	<input type="checkbox"/>	Other	<input checked="" type="checkbox"/>		
WHERE (was observation made)					
Main Deck	<input type="checkbox"/>	Shop	<input checked="" type="checkbox"/>		
Machinery Space/Hull	<input type="checkbox"/>	Subcontractor	<input type="checkbox"/>		
Accommodation	<input type="checkbox"/>	Other	<input type="checkbox"/>		
What (was observed)					
Housekeeping - workarea maintained safely	Safe	At Risk	PPE - using required PPE	Safe	At Risk
Trash/Scrap picked up	<input type="checkbox"/>	<input type="checkbox"/>	Eye Protection	<input type="checkbox"/>	<input type="checkbox"/>
Walkways Clear	<input type="checkbox"/>	<input type="checkbox"/>	Hand Protection	<input type="checkbox"/>	<input type="checkbox"/>
Materials & Tools Organized	<input type="checkbox"/>	<input type="checkbox"/>	Face shield	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Adequate lighting	<input type="checkbox"/>	<input type="checkbox"/>	Safety Harness	<input type="checkbox"/>	<input type="checkbox"/>
Tools & Equipment - using safely	Safe	At Risk	Body Positioning / Protecting	Safe	At Risk
Guards are in place	<input type="checkbox"/>	<input type="checkbox"/>	Proper hand positioning	<input type="checkbox"/>	<input type="checkbox"/>
In safe working order	<input type="checkbox"/>	<input type="checkbox"/>	Proper working posture	<input type="checkbox"/>	<input type="checkbox"/>
Right tool for the task	<input type="checkbox"/>	<input type="checkbox"/>	Proper lifting technique	<input type="checkbox"/>	<input type="checkbox"/>
General					
Proper use of handrails	<input type="checkbox"/>	<input type="checkbox"/>	Combustible materials	<input type="checkbox"/>	<input type="checkbox"/>
Escape routes identified	<input type="checkbox"/>	<input type="checkbox"/>	Proper ventilation	<input type="checkbox"/>	<input type="checkbox"/>
Rigging / Lifting	<input type="checkbox"/>	<input type="checkbox"/>	Surrounding are secured	<input type="checkbox"/>	<input type="checkbox"/>

HHI Offshore & Shipbuilding Checklist Schedule														
Checklist	Fonte	May				June				July				
		2	9	16	23	30	6	13	20	27	4	11	18	25
LV BF Reboque	Petrobras													
LV BF Loadout e Peação	Petrobras													
LV BF Amarração no Cais	Petrobras													
LV BF Lifting	IOGP													
LV BF Working with Electricity	IOGP													
LV BF System Test	IOGP													
LV BF SIMOPS	IOGP													
LV BF Emergency Plan	Petrobras													
LV BF Housekeeping	IOGP													
LV BF General	IOGP													
LV BF CFE	IOGP													
LV BF Scaffolding	IOGP													
LV Traffic	IOGP													
LV Dropps	IOGP													
LV Loto	IOGP													
LV JSA	IOGP													
LV PPE	IOGP													
LV WAH	IOGP													
Total Checklist Schedule + performed		4	0	1	1	2	2	2	1	2	1	1	0	0
Rev. 0 - 12-May-2022														

Shenandoah Project / Implementing the 6-Week Look-Ahead Plan and Special toolbox talks

We check major risk work 6 weeks ahead, visit the place where the major dangerous work is performed every Monday, and conduct a special toolbox talk to inform the workers about risk factors and precautions. In addition, weekly/monthly/quarterly safety incentives are provided to teams or workers to encourage safe work continuously.



Reinforcing Safety Management Standards for High-Risk Work

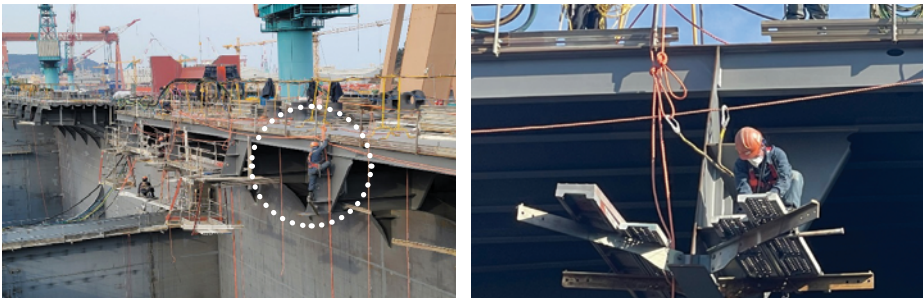
Establishing and Implementing Multiple (Double, Triple) Safety Measures for High-Risk Work

The Shipbuilding & Offshore Safety organizations discover hidden risk factors through intensive inspection of high-risk work and continuously promote safety improvement.

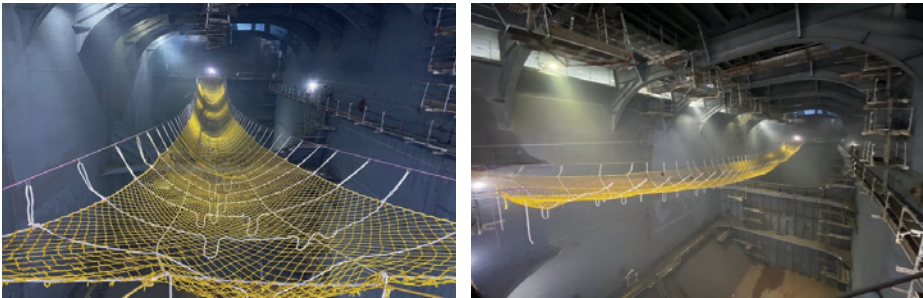
Installing Safety Nets under the Scaffolding for VLCC S*D Joints

Because the S*D joints of the VLCC vessel are about 30 m high, the scaffolding installers must work with the psychological burden of the risk of falling. Accordingly, a safety net was installed underneath the work position to give them a sense of psychological stability and eliminate the risk of a fatal fall accident.

Before



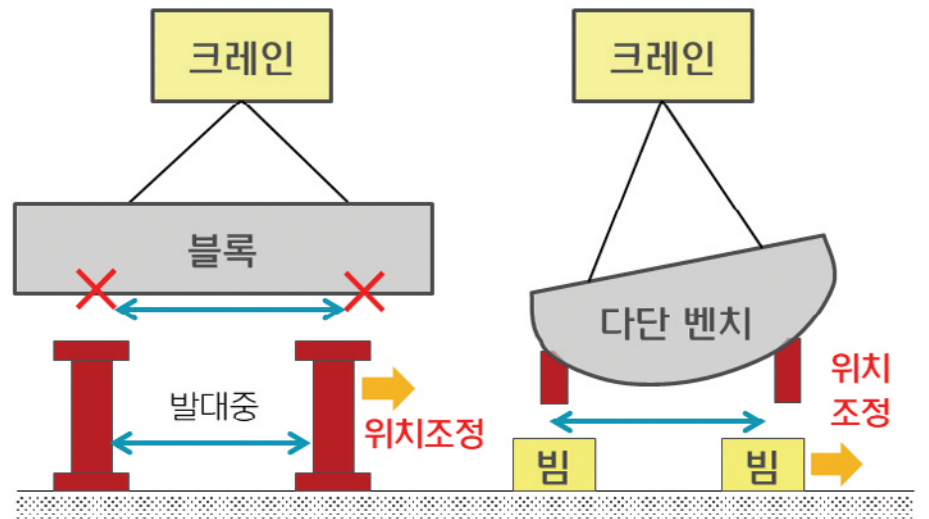
After improvement (safety net installation)



Improving the Block Support Work through the Floor Marking of the Transport Site

In the past, when setting supports for transporting blocks, the work depended on the signalman's sense of distance, and the positions of supports and beams were frequently re-adjusted, exposing workers to the risk of being caught under. Accordingly, it was possible to reduce readjustment work, which has a high risk of being caught under, by providing a clear reference point by marking the floor at 2 m intervals.

Before



After improvement (marking the floor of the transport site)



Preventing Accidents Caused by Falling Objects and the Worker Being Caught In/
Between through Improving Construction Methods

Deformation occurred during hoisting and mounting curved outer hull plates, and there was a risk of the plate falling and the worker being caught in/between. We improved the construction method by using a lifting beam when hoisting a curved plate of a certain length to remove the risk caused by the plate falling.



Worker Behavior Analysis through Stop-Stay-See-Say (4S) Safety Intervention

As a way to improve the effectiveness of safety intervention, we are implementing 4S. Recently, this activity has expanded from Stop, Stay, See, and Say to a technique that analyzes and guides workers' unsafe behavior. 4S is gradually developing into a series of activities to discover and mitigate potential risks (risk assessment, work standards revision, reinforcement of training, etc.).



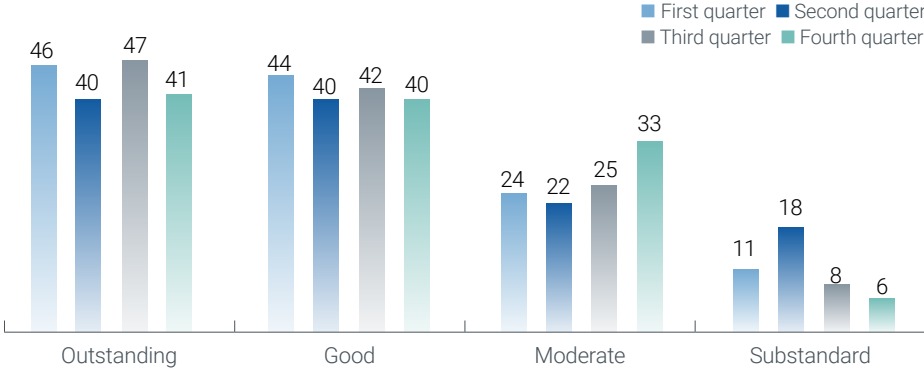
Operating Support Programs for Subcontractors' Safety Management

Operating Support Programs for Subcontractors' Safety Management

Reinforcing Safety Management Capacity through Support and Technical Guidance for In-House Subcontractors and Project Partners

Shipbuilding & Offshore safety organizations provide technical guidance on safety and health to in-house subcontractors and project partners. First, we assess safety-related documents and systems. Second, we assess the level of safety management centered on site safety activities such as safety intervention, SSA performance, and toolbox talks.

Results of Technical Guidance to Subcontractors



In addition, we directly visit subcontractors with substandard technical guidance results, conduct sampling inspections, provide guidance, and strive to improve the safety management level of our subcontractors.



Subcontractor Safety and Health Committee

We hold monthly safety and health meetings attended by subcontractors' representatives to share safety activities and performance, listen to safety-related problems and difficulties experienced by subcontractors' employees, and work together to solve problems.



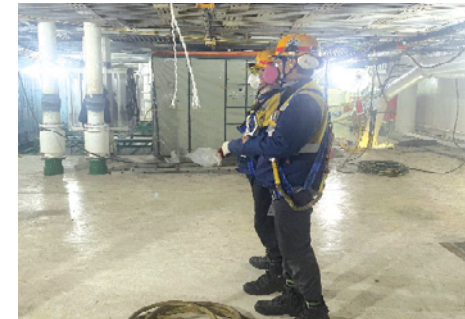
Incentivizing Outstanding Subcontractors in Safety

Based on the quarterly technical guidance results, 5 excellent subcontractors are incentivized every quarter. The assessment criteria consist of 10 items: disaster indicators, regulatory compliance, safety activities, and system management. The selected subcontractors are awarded a plaque and an incentive of KRW 10 million. In 2022, a total of 20 subcontractors were rewarded.



Mentoring New Subcontractor Safety Supervisors

To help new safety supervisors of subcontractors adapt to the field early, we are implementing an education and mentoring system. Directly controlled safety supervisors serve as mentors to pass site safety walkarounds tips and inspire the role, sense of duty, and mindset of safety supervisors. In 2022, Shipbuilding & Offshore safety organizations provided mentoring for 60 new safety supervisors.

[illegible]

Holding Monthly Meetings with Subcontractor Safety Supervisors

We pursue direct communication by holding monthly meetings with subcontractor safety supervisors hosted by the safety section chief. Through regular meetings, we have opportunities to remind ourselves of the roles and responsibilities of subcontractor safety supervisors while sharing and discussing grievances from them in performing their roles.



Rewarding Subcontractor Safety Supervisors for Outstanding Performance

Based on the biannual safety management competency assessment results, we incentivize our subcontractor safety supervisors. The assessment criteria include disaster indicators, safety inspection activities, safety communication, job assessment, improvement activities, and personal development, and each winner receives a plaque and KRW 500,000. In 2022, a total of 10 safety supervisors received their rewards.



Strengthening DT-based Safety Management

Reinforcing Risk Management for Each Work by Introducing a Mobile Safe Work Instruction System

Developing a Mobile Safety Work Instruction System

In issuing work instructions through paper, it is difficult to store and utilize data, there are limitations to one-way information transmission, and it is difficult to provide sufficient safety information. Therefore, we developed a mobile-based work instruction system to overcome such difficulties.

When supervisors send work instructions and safety information (work standards, checklist by risk type, etc.) using a PC or mobile device, workers can easily check the contents on their personal mobile phones. In addition, workers can perform self-safety checks by utilizing the self-safety check function in the system, which can help them work more safely.

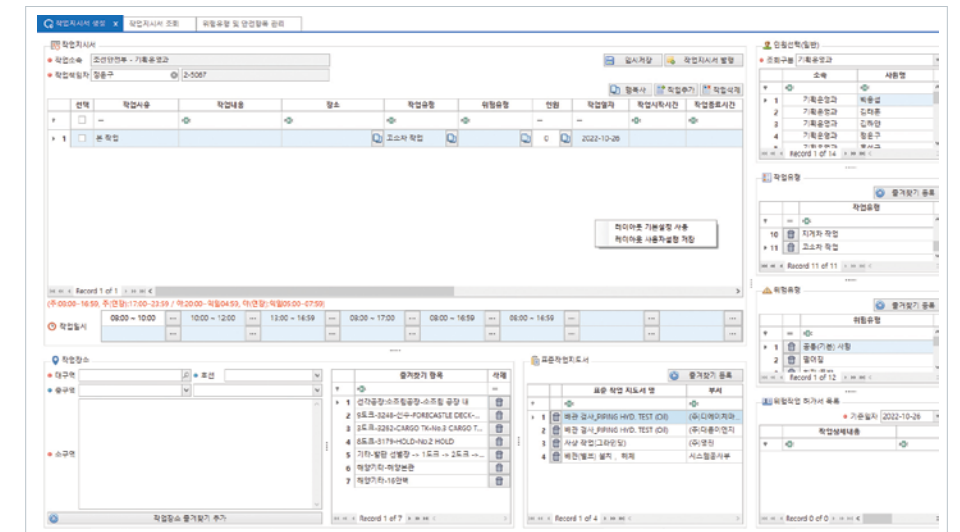
Mobile work instruction process



Change in the way we work

Convenience	<ul style="list-style-type: none"> Easier to secure operability as it is more convenient than the existing method (paper) Applied the frequently used instruction units (or work standard items) selection method rather than predefined act-based selection
Data accumulation	<ul style="list-style-type: none"> Accumulation of work instruction units, contents, and dangerous work situation data according to the time of ship construction Possible to have a detailed schedule for following ships based on performance by securing instruction data at the standard work level
Scalability	<ul style="list-style-type: none"> Various information, such as work standards, work permits, and accident history related to the instructed work, can be delivered to the work unit or can be viewed by themselves Linkage with other work-related systems (Hi-SEs, Hi-Standard, etc.)
Two-way communication channel	<ul style="list-style-type: none"> Two-way feedback on the instructions given
Safety inspection by workers themselves	<ul style="list-style-type: none"> Before starting work, it is possible to establish a procedure for checking the wearing status of PPE, tidying up the surroundings, and checking whether it is being implemented.

Menu for supervisors



Menu for workers



Building a System to Comply with the Serious Accidents Punishment Act

From the management level, the Shipbuilding & Offshore Business Unit actively participates in safety activities to create a safe workplace and prevent safety accidents.

Safety Improvement Meetings

The safety improvement meeting is held monthly under the supervision of the CEO, and the CSO, heads of each business unit, and officers (Safety, Design, In-Shop, Construction, Design, Painting, LNG Construction, Offshore, H Dock, naval &special ship production, HD HHI MOS) attend and contribute to the establishment of a production-led safety culture by discussing and identifying division-specific risks and sharing problems.



Safety Strategy Meetings

The Shipbuilding & Offshore Business Unit conducts monthly safety strategy meetings supervised by the head of the safety production division to reach a consensus on the direction of safety policy promotion of the business unit and establish specific action plans. At the meeting, free discussions are held among production officers on the safety policies presented, and the benchmarking effect is significant by sharing safety activities and thoughts with each other.



Meetings for Safety Communication

Shipbuilding & Offshore safety organizations hold monthly safety communication meetings with the production and support division's operations section chiefs. Through meetings, we publicize major issues related to safety, listen to ideas, difficulties, and requests from production organizations, and seek solutions together. We are promoting a safety culture of HD HHI's "building together" through free discussions on better site safety management plans rather than one-way communication.



Details of major improvements

Sequence	Description
1	Improvement of gas blocking standards for CO ₂ welding equipment
2	Unification of color marking after inspecting gas cutter, sling belt, etc.
3	Suggestions for additional functions to activate the mobile safety work instruction system
4	Suggestions for using Hi short-form video in safety education
5	Suggestions for updating the Hi-SEs MSDS data system

Establishing an Autonomous and Disciplined Safety Culture based on Safety Communication

Management of Golden Safety Rules / Major Safety Rules

Shipbuilding & Offshore safety organizations apply a zero-tolerance principle to violations of golden safety rules and major safety rules (priority risk management tasks) to prevent fatal accidents and major incidents. In addition, they carry out crackdown activities to prevent accidents that may occur due to the unsafe behavior of workers.

Golden safety rules (based on Shipbuilding)



Do not use smartphones/earphones (while moving/working).



No smoking (while moving/working)



Comply with the internally regulated maximum speed limit of 30 km/h on the premises (8 km/h for forklifts)



Wear a safety harness when working at height.



Do not pass underneath any hoisted material.



Refrain from the arbitrary removal /disassembly of safety devices from machinery/apparatus.



Comply with lockout tagout (LOTO) regulations in electrical work (locking/marking devices).



Refrain from Simultaneous Operations (SIMOPS) of painting / hot work.



Refrain from the arbitrary installation/removal of fall protection facilities.



Do not skip welding the rear side of a lug.

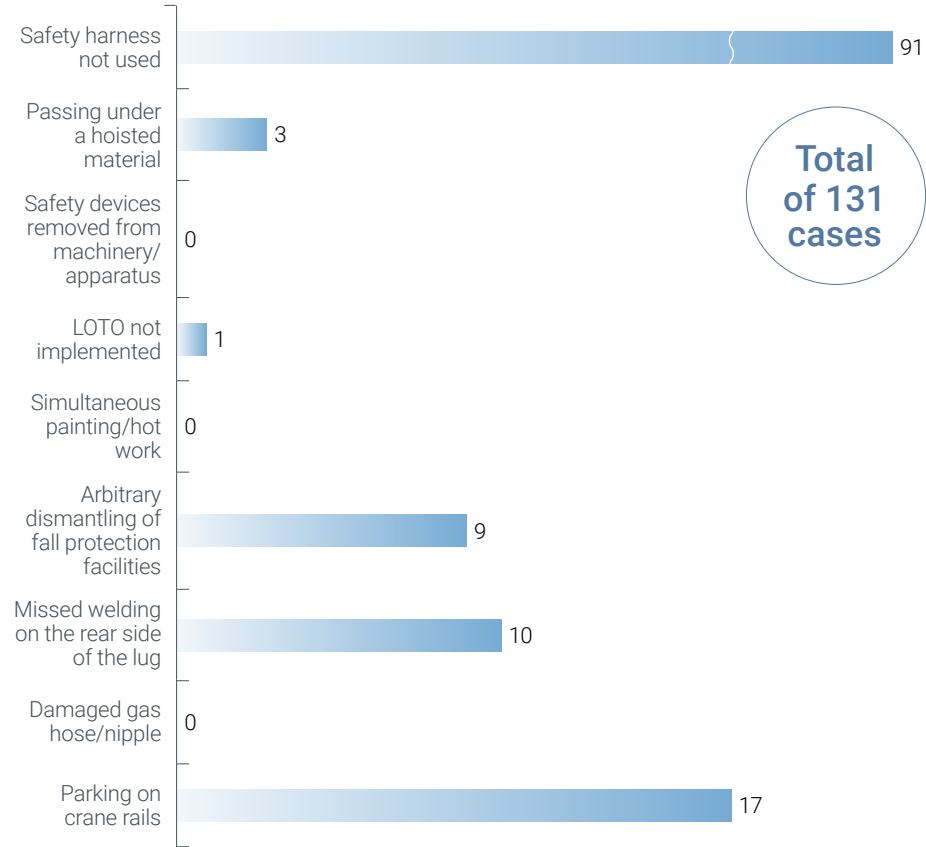


Refrain from damaging a gas hose or altering a nipple.

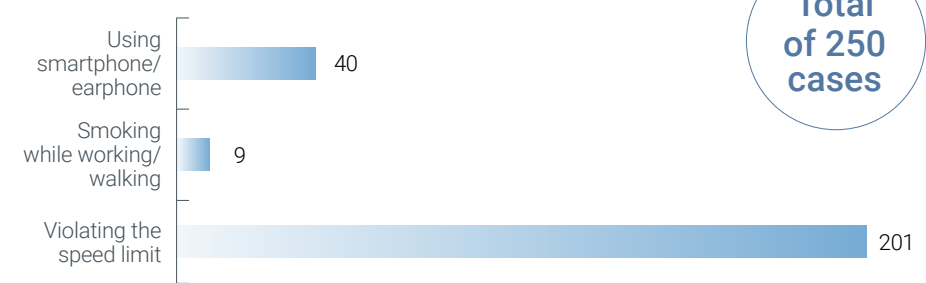


Refrain from unauthorized parking on a crane rail.

Status of the golden safety rules: 9 work-related items



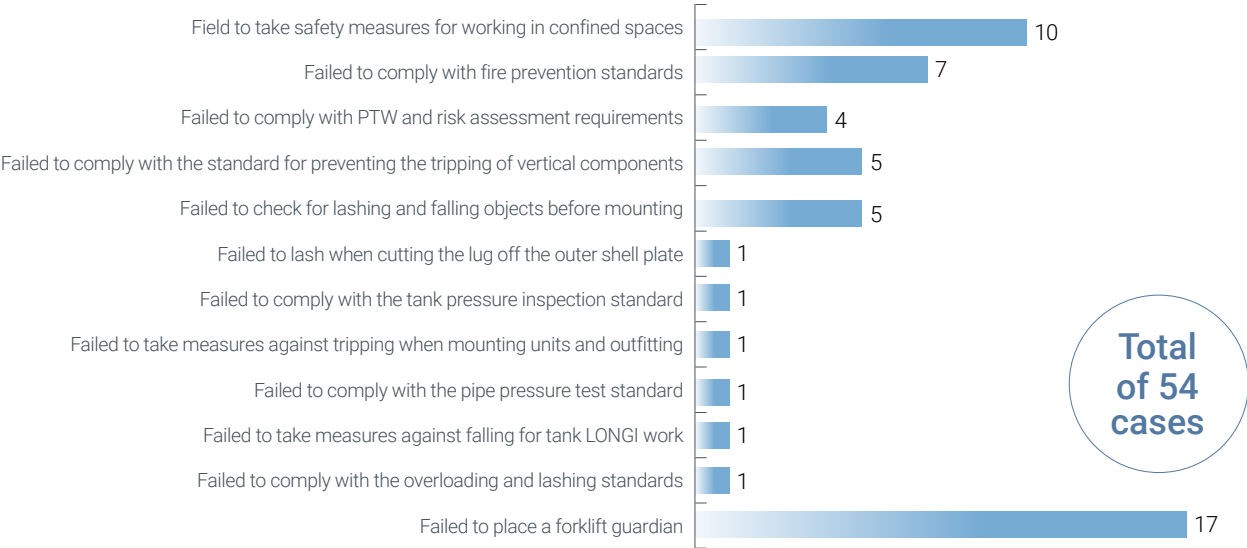
Status of the golden safety rules: 3 items related to basic order



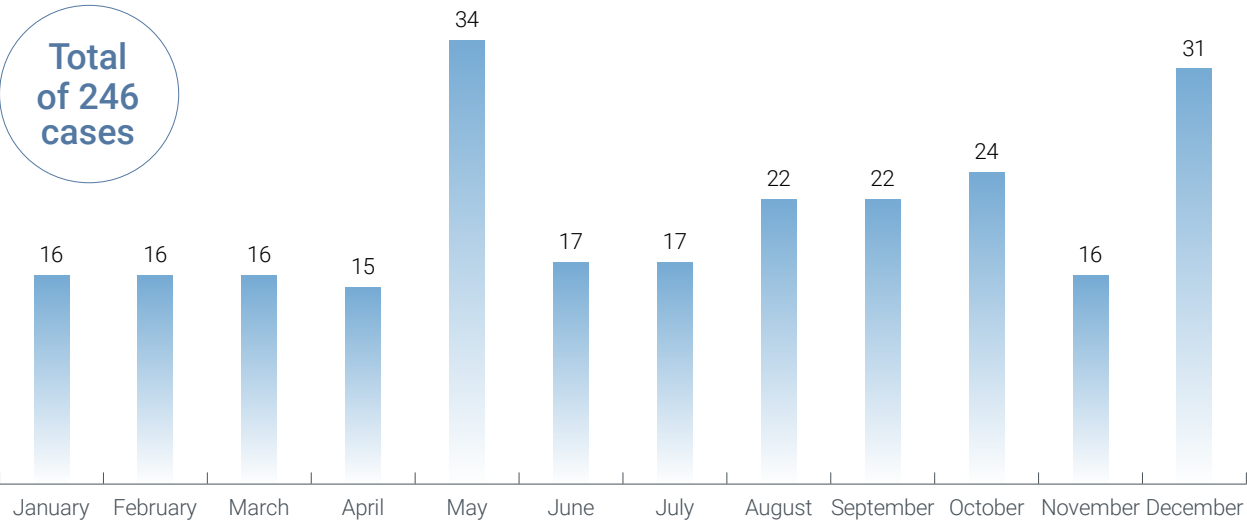
Major safety rules / priority risk management tasks (based on Shipbuilding)

Classification	priority risk management tasks	Classification	priority risk management tasks
Common	1. Implementation of safety measures when working in a confined space - Ventilation/lighting, gas concentration measurement, PTW, removal of flammable materials	Painting	1. Implementation of fall prevention measures for tank LONGI work
	2. Compliance with fire prevention standards - Removal of flammable materials from the rear/lower part, use of a fire blanket, placement of a watcher		2. Compliance with the use of explosion-proof lights/lanterns in enclosed areas
In-Shop	3. Compliance with PTW regulations and the conduct of a risk assessment - Including improvement in construction methods and rush/non-routine work	Commissioning/ Operation/ Mechanical Outfitting	3. Removal of organic solvents (paint, thinner) from enclosed areas
	1. Compliance with standards for tripping prevention of vertical components		1. Guardian placement and access control for excavator operation
Shipbuilding	2. Compliance with the prohibition of leaving cutters inside (or underneath) a block	Transportation	2. Compliance with the work standard when using round sling belts
	3. Compliance with standards for using vertical/horizontal clamps		3. Attaching danger signs around oil tanks and removing inflammable materials
Outfitting	1. Checking for mis-securing or falling objects before mounting	7 construction types/20 items	1. No overloading. Compliance with the lashing standard.
	2. Compliance with lashing requirements when cutting the shell plate lug		2. Guardian placement for forklift operation
	3. Implementation of standard tank pressure inspection procedures		
	1. Unit mounting and implementation of measures to prevent tripping of iron fittings		
	2. Implementation of standard pipe pressure inspection procedures		
	3. Compliance with argon gas suffocation prevention measures		

Status of Violations of Priority Risk Management Tasks



Status of work suspension



Sequence	Reason for Suspension
1	Failed to take safety measures, such as ventilation and bulletin display, before working in a confined space
2	Failed to place a guardian or signalman when handling heavy objects
3	Working without installing safety devices
4	Risk of being hit due to single-sided or insufficient welding when using a jack ram
5	Failed to place a fire watcher on the opposite side, take fire prevention measures, or remove inflammable materials during hot work
6	Working with poor lighting inside a block
7	Failed to take suffocation prevention measures for argon purging work

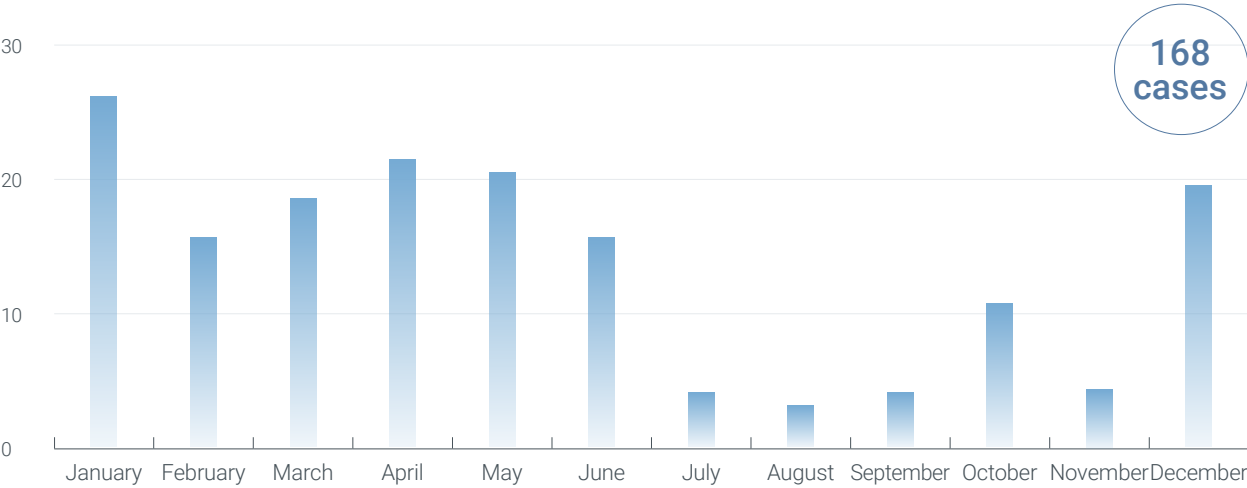
Other Safety Activities

Safety Design

Shipbuilding & Offshore safety organizations have handled more than 100 design feed-backs as of 2022 to fundamentally improve the risks identified in the field from the design stage.

They systematized the work so that improvements were fed back to the end by notifying related design departments after registering design-related site safety problems through computerized ERP. The Shipbuilding & Offshore Business Unit will continuously conduct safety design feedback to ensure safety by fundamentally eliminating risks.

Design Feedbacks in 2022



Number of cases of feedback by type of accident

fall to below	obstructed passages	slip, trip and fall	struck by	falling/flying object
55	25	27	20	10
tripping/collapsing	improper behavior	caught-in or caught by a heavy object	interfered mounting	others
15	2	9	3	2

Exemplary Improvements

Struck by

Before change

After change

A risk of being struck during non-routine work due to a poor ladder installation

Revised and applied the drawing on site

Fall to below

A risk of falling from an elevated platform when working on cell guides

Working from an elevated platform is abolished as the in-shop completes work.

Slip, trip and fall

A risk of stumbling on steep steps

Steps and handrails were added.

Interfered mounting

A risk of interference by the seam during mounting

Changed the seam to apply to subsequent ships

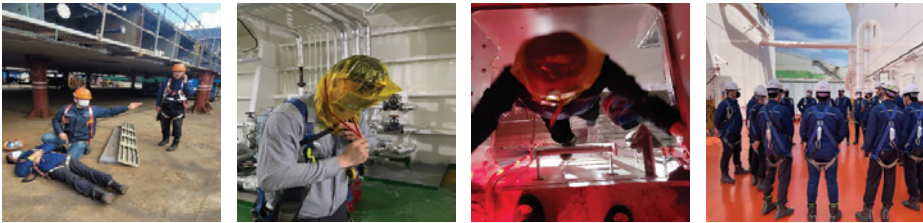
Emergency Response Activities

Emergency Evacuation Drill

Main Shipyard

We conduct periodic firefighting and emergency evacuation drills to improve early and safe firefighting and evacuation capabilities. Considering the uniqueness of each place, we improved the quality of training and response capabilities by organizing various scenarios such as buildings, factories, PE areas, and ships in each training session. The Shipbuilding & Offshore Business Unit conducted a total of 20 emergency evacuation drills in 2022, gradually expanding the number of drills as COVID-19 social distancing measures were eased.

No.	Date	Location	Drill Type
1	January 28 (Fri), 2022	Paint warehouse	Emergency evacuation
2	February 21 (Mon), 2022	Near the Unit Assembly Shop at Yard 2	Fire extinguisher training
3	April 11 (Mon), 2022	Stockyard of the Scaffolding Department	Emergency evacuation and rescue
4	April 11 (Mon), 2022	Onboard #3283, #8223	Emergency evacuation
5	April 11 (Mon), 2022	Plant Shop 12	Emergency evacuation
6	April 11 (Mon), 2022	UNIT Shops 1, 2, and 3	Emergency evacuation
7	April 11 (Mon), 2022	Onboard #3186 at Quay 1	Emergency evacuation
8	November 28 (Mon), 2022	Onboard #3137 at Quay 1	Emergency evacuation
9	June 7 (Tue), 2022	An office on the 3rd floor, Production Technology Center 2	Fire suppression and emergency evacuation
10	July 1 (Fri), 2022	Pretreatment shop at Yard 2	Rescue from an enclosed space



Rescue and emergency evacuation

Offshore Fabrication Yard

Fire drills are regularly conducted yearly under relevant laws and regulations at specific firefighting targets. In preparation for possible emergencies during offshore projects, we conduct various emergency drills, such as rescue, firefighting, and evacuation.

No.	Date	Location	Drill Type
1	April 8 (Fri), 2022	Offshore Main Building	Emergency evacuation
2	April 11 (Mon), 2022	LNG Comp. Room erection site	Firefighting and emergency evacuation
3	April 11 (Mon), 2022	Offshore PE area	Fire suppression and evacuation
4	April 11 (Mon), 2022	Offshore Unit Assembly Shop	Firefighting and emergency evacuation
5	September 29 (Thu), 2022	P78 FPSO Hull Block A14C1	Rescue from an enclosed space
6	November 16 (Wed), 2022	Offshore Paint Shop 1	Emergency evacuation
7	November 28 (Mon), 2022	EPC Center	Emergency evacuation
8	November 30 (Wed), 2022	Offshore Technology Center	Emergency evacuation

In particular, in the case of the P78 Project, rescue training was conducted in September to develop the ability to respond to safety accidents in confined spaces.



Firefighting and evacuation



Rescue and evacuation

NAVAL & SPECIAL SHIP BUSINESS UNIT

The Naval & Special Ship Business Unit, which has been playing a pioneering role in the independence of Korea's shipbuilding industry, starting with the development of the first Korean-built frigate "ROKS Ulsan" in 1975, has developed the Aegis-class destroyer "King Sejong the Great" and various state-of-the-art naval ships with its technology. It is also actively advancing into the world market and is being recognized for its technological prowess. The Naval & Special Ship Business Unit, positioned as another pride of HD HHI, will continue expanding its world-leading technological capabilities by partnering with domestic and foreign research institutes and combat system developers based on its professional workforce and state-of-the-art technology.



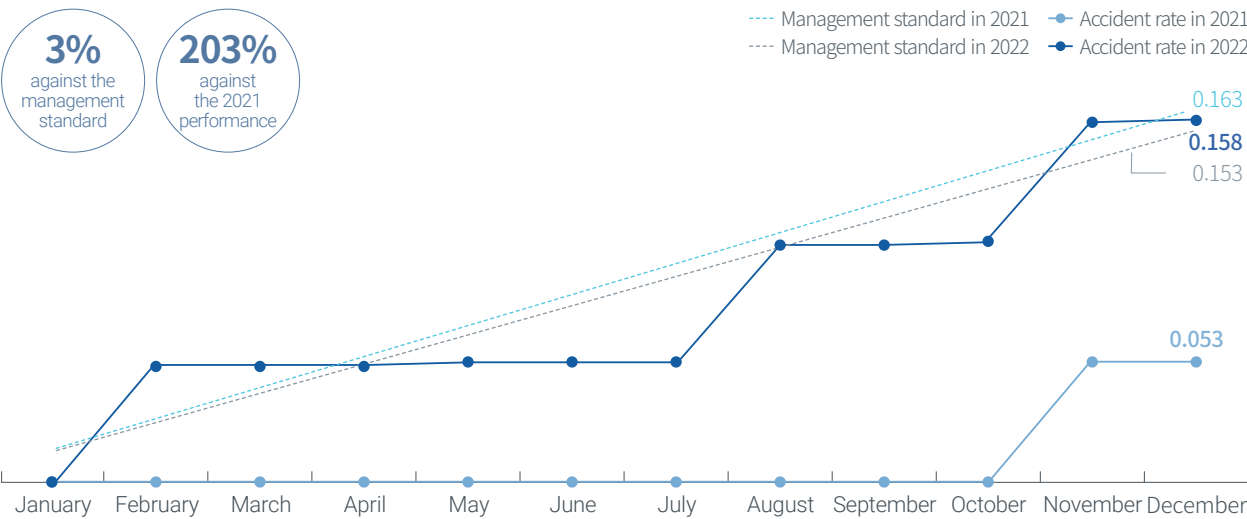
Major Achievements of the Naval & Special Ship Business Unit in 2022

Main Activities	Management Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Advancing Safety Management Systems	Safety Management Focusing on Fatal Accident Prevention				
	• Continuing to implement the safety management system for preventing fatal accidents	Annual	Reviewing detailed safety action plans for 2022 of the naval & special ship and establishing departmental major accident prevention measures	100%	
	• Monitoring the naval & special ship's safety management system	Annual	Completed monitoring and result reporting	100%	
	Establishing Work Standards Systems				
	• Reviewing work standards & risk assessment adequacy according to the naval & special ship's new work standard system	Annual	Production work standards & risk assessment (completed in October) under review (4,472 out of a total of 5,174 items were reviewed)	86%	Review/approval has been in progress since October when the work standard system construction was completed.
	• Conducting regular risk assessments in the naval and special ship	Annual	1,400 out of 1,400 items (including support departments of the Naval & Special Ship) were assessed.	100%	
Improving Subcontractors' Safety and Health Levels	Developing Safe Design Work; Discovering and Improving High-Risk Factors				
	• Developing safe design work (Design Feedback)	At all times	Handled 9 design feedback items, including the prevention of falling from vertical ladders onboard P168 due to large gaps	100%	
	• Identifying and improving high-risk factors in worksites	One case per quarter	1. Improved the clamp repair standard (reducing the risk of falling objects due to the thin steel plates at the naval & special ship) 2. Mitigated the risk of falling from the ship ladders at the upper part of the funnel (by installing safety blocks and posting user guides) 3. Established a standard to prevent purchased module units from tipping over (by applying fit-up and welding of 50 mm or above at 4 locations in all directions)	100%	
	Providing Support for Enhancing Subcontractors' Safety Management Capabilities				
	• Raising safety supervisors' roles and competencies, focusing on major incident prevention	Biannual	Assessed competencies of the subcontractor safety supervisors in the first and second halves of the year (June, December)	100%	
	• Sharing information on changes in safety regulations and systems and promoting the power of execution	Monthly	Promoted site safety management by sharing the latest regulations and accidents at the monthly subcontractors' safety and health meeting	100%	
Compliance with the Serious Accidents Punishment Act	Evaluating and Incentivizing Subcontractors' Safety Management Capabilities				
	• Feedback management through regular technical guidance and assessments	Quarterly	Provided technical guidance on safety management and assessed subcontractors quarterly	100%	
	• Selecting and incentivizing outstanding subcontractors (safety supervisors)	Biannual	Selected and incentivized Heung Shin as the outstanding safety performer among the Naval & Special Ship's subcontractors in the 1H Selected and incentivized Sein ENG as the outstanding safety performer among the Naval & Special Ship's subcontractors in the 2H	100%	
	Gathering Opinions on Improving Subcontractors' Safety and Health and Providing Feedback	Monthly			
	Inspecting Harmful and Hazardous Factors				
	• Conducting ex ante risk assessments for work, including new processes and non-routine work	At all times	Checked whether risk assessment was conducted against PTW for non-routine work (including short-term work and new processes)	100%	
	• High-risk work inspection and recording for each entity (Production/Safe Clover/Safety)	At all times	Shared the results of high-risk work inspection of Production and Safety through group chatting on Kakaotalk; the status is under monitoring.	100%	
	Implementing Accident Recurrence Prevention Measures				
	• Checking the implementation by major/general incident	At all times	Checked the implementation for 34 out of 36 accidents	94%	The implementation to be checked in January 2023 for the accidents that occurred in December
	Emergency Response				
	• Establishing an emergency response manual	Once	An emergency action plan was established for the naval & special ship.	100%	
	• Devising disaster scenarios and conducting drills per disaster scenario	Once	Conducted departmental drills per disaster scenario (April 11) and evacuation drills onboard a ship (June 3)	100%	

Safety Management Achievements of the Naval & Special Ship Business Unit in 2022

In 2022, the number of accident-related industrial accidents in the Naval & Special Ship Business Unit was 3, recording an accident rate of 0.158%.

In 2022, safety activities were carried out to advance the safety management system centered on major accident prevention by continuously discovering high-risk work for each worksite and operating the triple safety management system. Since 2020, the Unit has achieved zero fatal accidents. In 2023, we will strengthen the executive power of the current safety management system and strive to establish safer, accident-free workplaces through a routine risk assessment.



Classification	2020	2021	2022
Fatal accidents	1	0	0
Accident-related industrial accident	4	1	3
Accident rate	0.200	0.053	0.158
Frequency (per 1 million)	0.953	0.300	0.755

Advancing Safety Management Systems

Implementing Safety Management centered on Fatal Accident Prevention

Continuing and Monitoring Safety Management centered on Fatal Accident Prevention

In 2021, we designated high-risk work that requires fatal accident prevention and multiple safety measures. In 2022, the focus was on checking whether safety measures against high-risk work are being implemented on-site with the triple safety management system. In addition, the designated high-risk work (including multiple safety measures) was reviewed by referring to past major accident cases.

Result of the high-risk work (and multiple safety measures) review

• Designated 29 as high-risk work from 6 worksites and established multiple safety measures

Worksite	High-Risk Jobs	Notes
Cutting and Forming Shop and Submarine Plant	• Joining of curved block pin jigs (for shell plates) and 4 other jobs	
Dry Dock/Quay	• Welding/cutting or hot work associated with revision drawing, and 6 other jobs	Surface vessels
Lifting Dock/Quay	• Conducting operational tests on machinery/equipment in a narrow space and 7 other jobs	Submarines
Pre-outfitting Shelter/PE area/Others	• Argon gas handling and 2 other jobs	
Logistics	• Loading and unloading of containers	
Common	• Work at height in a zone without safety facilities and 4 other jobs	

- Consolidate seven workplaces into six in 2021.
- Integrate common items for each workplace (heavy load loading/moving, forklift transport operations).
- Select new high-risk tasks (block transport, bulwark mounting, air leak test).

Triple safety management for high-risk work

Status check

Daily status check on high-risk work

Identifying the daily status of high-risk work one day ahead and sharing the information with supervisors

구분	순서	작업시간	조작	안전	책임자	책임자 연락처	오전	관소		작업		비고	확인	확인	확인	
								기본	현재	내용	분류					
PTW (작업 허가)	1	16:00~18:00	관능	4	최광현	010-3659-9498	P165	해당작업	부상실, 기동정밀	SPRAY	C 정세 책임자					
	2	08:00~16:59	도장1팀	3	이영민	010-8543-0561	P165	해당작업	O-1 선수 대고	GIR & SPRAY	도장세 책임자					
작업 허가	1	08:00~12:00	중조1팀	4	최부승	010-7777-4745	P167	중조관장	복합	H23P 수리부재 작업	수리부재 책임자					O
	2	08:00~16:59	중조3팀	4	이정민	010-9448-7237	P167	중조관장	복합	H23S 소부재 입재	중입물 입재					O

Site inspection

Site inspection using a checklist on high-risk work

Inspecting the site with the triple safety management system based on the status of high-risk work

[선각공정]외판곡물복 탐재,이동 점검 체크리스트					
항공사	항공사	항공사	항공사	항공사	항공사
작업구분	작업구분	작업구분	작업구분	작업구분	작업구분
순	점검항목	점검결과	특이사항	조치결과	비고
1	고장상태 점검한 후 안전 구역 설정 여부				
2	해당구역의 안전상태를 확인 여부				
3	고장상태 하부 안전통계 및 안전거리 확보 상태				
4	안전통계 사용 여부				
5	안전통계/안전 통계를 위해 필요한 시 인공물 교정/교정 배치 여부				
6	고장상태 하부 시 3mm 이내의 위험/안전 여부				

※ 안전통계 : "안전통계", "안전통계", "안전통계" 등 기입
※ 안전통계 : "안전통계"의 경우 안전통계로 안전통계로 기입

특.선제생산부 일일 위험작업 확인/점검 활동					
항공사	항공사	항공사	항공사	항공사	항공사
작업구분	작업구분	작업구분	작업구분	작업구분	작업구분
순	점검항목	점검결과	특이사항	조치결과	비고
1	고장상태 점검한 후 안전 구역 설정 여부				
2	해당구역의 안전상태를 확인 여부				
3	고장상태 하부 안전통계 및 안전거리 확보 상태				
4	안전통계 사용 여부				
5	안전통계/안전 통계를 위해 필요한 시 인공물 교정/교정 배치 여부				
6	고장상태 하부 시 3mm 이내의 위험/안전 여부				

Monitoring the inspection status with the triple safety management system

- Date: October 25–28, 2022; November 8–11, 2022 (2 sessions)
- Monitoring the inspection status per location for the high-risk work observed during the corresponding period
- Results of the high-risk work inspection with the triple safety management system

Classification		Hull	Outfitting 1	Outfitting 2	Commissioning
Status of high-risk work registration		90 cases	147 cases	97 cases	22 cases
Production	Supervisors	55 cases	133 cases	75 cases	19 cases
	Safe Clover	130 cases	166 cases	51 cases	15 cases
Safety		64 cases	79 cases	22 cases	11 cases
Inspection rate against the registered cases		277%	257%	153%	205%

- Overall inspections on high-risk work with the triple safety management system in progress e.g.) Hot work associated with revision drawing according to the standard (whether flammables have been removed; a watcher is placed; 3D drawings are used as an additional safety measure)
- Daily high-risk listing in progress, even for non-high-risk work → To be settled after reviewing the high-risk work adequacy in 2023



Establishing Work Standards Systems

We identified all worker-centered standard unit operations and conducted a risk assessment of work standards based on past work-related accidents. In addition, we have established a standard management system, encompassing process management plans and the risk work notification system for workers.

Work standards & risk assessment adequacy review according to the new work standard system

From October 2022, supervisors and the Safety Department are reviewing whether the risk assessment has been properly conducted for the work standards established by the new system.

We plan to create a work standard system that tracks and manages risk assessment even for the work standards that have not yet undergone risk assessment so that no single work standard is used without it.

Department	Work Standard	Risk Assessment	
		Completion	Implementation Rate
N&S) Hull Production	639	633	99.1%
N&S) Outfitting Production 1	1,327	1,326	99.9%
N&S) Outfitting Production 2	2,113	1,461	69.1%
N&S) Commissioning	984	941	95.6%
N&S) Materials Operation	111	111	100.0%

Results of regular risk assessment

In 2022, we conducted regular risk assessments for 1,400 job standard procedures; accordingly, we established or revised 549 cases and discarded 3 unnecessary work standards. In addition, from 2023, regular risk assessments will target job standard procedures established under the new work standards system.

Department	No. of job standard procedures in Operation	Regular Assessment	job standard procedure/Risk Assessment		
			Established or Revised	Unchanged	Abolished
N&S) Hull Production	178	178	98	80	-
N&S) Outfitting Production 1	368	368	147	218	3
N&S) Outfitting Production 2	306	306	136	170	-
N&S) Commissioning	504	504	125	379	-
N&S) Quality Management	31	31	31	0	-
N&S) Materials Operation	13	13	12	1	-
Total	1,400	1,400	549	848	3

Developing Safe Design Work; Identifying and Improving High Risk Factors

Customized safety accident-preventing design information for each process is provided, and safety design feedback activities are carried out to determine safety risk factors at the drawing stage before fieldwork. Hence, the exposure to fatal accidents was reduced by eliminating site speculative repetitive work and performing work to a clear standard. In addition, as part of preemptive safety management activities, potential high-risk factors are discovered and prevented in addition to the high-risk work designated for each worksite.

Results of the provision of customized and process-specific design information

Vessel	P142	P161	P164	P165	P166	P167	P168
Revisions (provision of safety information)	4	5	2	42	47	692	328

[illegible]

5 cases
requiring a
safety check

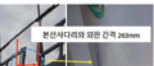



**This revision
drawing is
attached with a
safety CHK.LIST.
Please check
before revising it.**

BANKING SERVICE CARD				
NO	DATE	CNA	REMARKS NO	REMARKS
1	10.01.2019	100		
2	10.01.2019	100		
3	10.01.2019	100		
4	10.01.2019	100		
5	10.01.2019	100		
6	10.01.2019	100		
7	10.01.2019	100		
8	10.01.2019	100		
9	10.01.2019	100		
10	10.01.2019	100		
11	10.01.2019	100		
12	10.01.2019	100		
13	10.01.2019	100		
14	10.01.2019	100		
15	10.01.2019	100		
16	10.01.2019	100		
17	10.01.2019	100		
18	10.01.2019	100		
19	10.01.2019	100		
20	10.01.2019	100		
21	10.01.2019	100		
22	10.01.2019	100		
23	10.01.2019	100		
24	10.01.2019	100		
25	10.01.2019	100		
26	10.01.2019	100		
27	10.01.2019	100		
28	10.01.2019	100		
29	10.01.2019	100		
30	10.01.2019	100		
31	10.01.2019	100		
32	10.01.2019	100		
33	10.01.2019	100		
34	10.01.2019	100		
35	10.01.2019	100		
36	10.01.2019	100		
37	10.01.2019	100		
38	10.01.2019	100		
39	10.01.2019	100		
40	10.01.2019	100		
41	10.01.20			

TOTAL		50	50
TOTAL		50	50

Design feedback activities

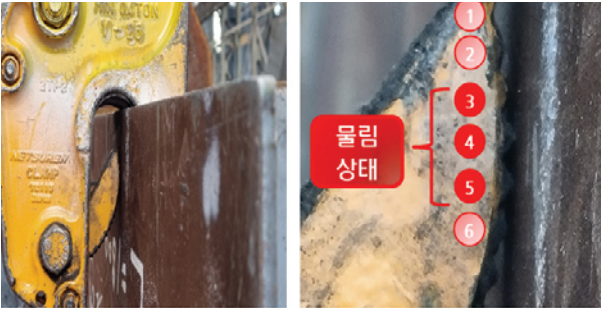
Date	Vessel	Problem
1/7	P167	A risk of being struck by the interfering electrical tray at the upper part of the inclined ladders
1/12	P167	Inconsistent height for the vertical ladder installation inside the tank
1/12	P167	No handrail at the upper part of the tank manhole
2/4	P167	A risk of falling when transferring the H32 block because TB1 is omitted
2/28	P167	A risk of being struck and deformation while moving because of the interfering copper pipe at the upper part of the inclined ladders.
4/9	P167	A potential risk of stumbling while moving because the height of the coaming seat at the entrance of the inclined ladders is high
4/22	P167	A risk of being stuck while moving by the interfering lighting seat at the upper part of the inclined ladders.
9/30	P168	A risk of falling while moving due to the gap (263 mm) between the ship ladders for the M12 block and the shell plate.
11/3	P168	A risk of being struck by the upper cable tray while climbing the ship ladders
11/15	P167	A risk of getting caught due to failure to install RCS protection fences
11/15	P167	A risk of getting caught due to a lack of protection fences on the wire rope rotating part in the elevator machine room
11/15	P167	A risk of falling due to improper RCS junction box installation location
11/15	P167	A risk of falling due to a lack of safety railings in the trunk of the 2nd and 3rd GTG intake/exhaust

자료출력 (변환)	활어장	제 목	본선사교장 및 원관 간격 검토를 위한 활어장 개편
본 선장	<div>[사 전]</div> 	<div>내 용</div> <p>본선사교장 및 원관 간격(253mm)로 작업 이 되어서 활어로 하역이 되어 본선사교 간 격을 수 있도록 현장에서는 설계 검토가 불 가능하다.</p>	
본 선장	<div>[사 전]</div> 	<div>내 용</div> <p>본선사교장 및 원관 간격(253mm)로 작업 이 되어서 활어로 하역이 되어 본선사교 간 격을 수 있도록 현장에서는 설계 검토가 불 가능하다.</p>	
개 선 (변)	<div>[사 전]</div> 	<div>내 용</div> <p>수직사교장 형상 변경 계획(표시)</p>	
개 선 (변)	<div>[사 전]</div> 	<div>내 용</div> <p>수직사교장 형상 변경 계획(표시)</p>	

Cases of worksite high-risk factor discovery and improvement

Improving the standard for repairing vertical/horizontal clamps

Problem




Improvement direction

- Improving the clamp repair standard considering the thin steel plates on naval & special ships (U/T Support Department)
 - To be repaired when the average wear rate is 50% for cams #3, #4, and #5 of the vertical clamp
 - To be repaired when the average wear rate is 50% for cams #4, #5, #6, and #7 of the horizontal clamp
- Conducting total inspection on the clamp and requesting repairs during the monthly inspection period (Hull Production Department)

- The area where the thin plate clamp cam is engaged on naval & special ships

Mitigating the risk of falling while climbing the ship ladders

Problem



Improvement direction


- Identifying inherent sections vulnerable to falls for each naval ship; installing safety blocks; and posting user guide

Place/ Vessel	Escape Trunk	Engine Cashing	Mast	Others
P165	4	1	-	2
P166	4	1	-	1
P167	8	2	6	3
P168	8	2	3	1

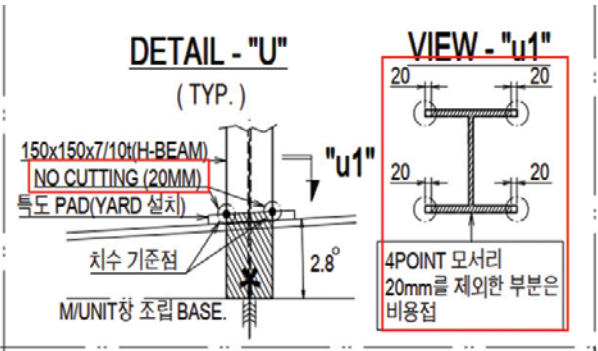
* Recovered items after ship delivery to be reused on subsequent ships

Establishing a standard to prevent purchased module units from tipping over

Problem



Improvement direction



- A risk of tipping over due to excessive cutting and poor fitting of temporary supports on module units supplied by external suppliers
- Establishing a cutting/welding standard for unit supports

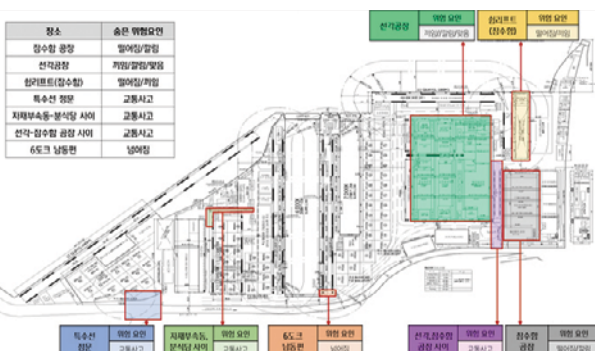
* Fit-up and welding standards for temporary supports

- Products weighing less than 400 kg: To be welded 50 mm or above
- Products weighing 400 kg or above: To be welded 100 mm or above

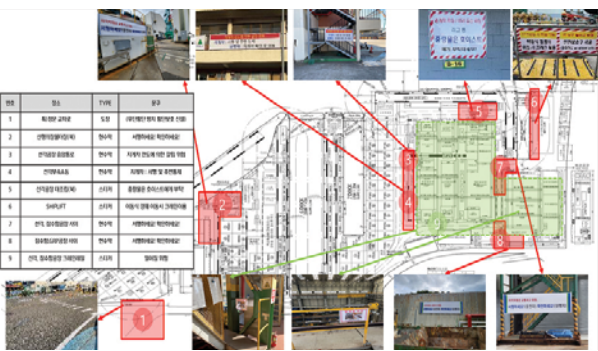
* There is a cutting standard for sections other than four-sided 50 mm sections of pipe supports.

Mitigating risks centered on human behavior

Problem



Improvement direction



- Discovering and improving areas where worker-centered risk assessment is insufficient concerning moving to the worksite and preparing for work
- Identifying worker-centered risk factors while moving to the worksite and preparing for work onboard naval & special ships: 9 places

* Producing and utilizing safety phrases, banners, standing signs, etc., for worker safety behavior

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Improving Subcontractors' Safety and Health Levels

Enhancing Subcontractors' Safety Management Capabilities

We apply the same triple safety management system to our subcontractors to encourage safety management activities centered on major incident prevention. We also share safety regulations and system changes by holding safety and health committee meetings and informal meetings to strengthen their safety management capabilities. In addition, through regular technical guidance, assessment, and incentives for outstanding subcontractors and their safety supervisors, we actively support them in raising their level of autonomous safety management.

Subcontractor Safety and Health Committees and Safety Supervisors Meetings

We support improving our subcontractors' safety management capabilities by sharing current safety and health policies and issues through monthly safety and health committee meetings with subcontractors and informal meetings with their safety supervisors. We also share safety improvement ideas with them so that they can be applied equally.



Subcontractor safety supervisors' meetings

Assessing and Incentivizing Subcontractors' Safety Management Capabilities

We visit our in-house subcontractors every quarter to provide technical guidance on system and site safety management and, at the same time, assess their competency to select and incentivize them and their safety supervisors who have shown outstanding safety performance.



Incentivizing subcontractors with outstanding safety performance



Incentivizing subcontractor safety supervisors with outstanding safety performance

Gathering Opinions on Improving Subcontractors' Safety and Health and Providing Feedback

By utilizing the Subcontractor Safety and Health Committee operated by the Business Units, we listen to the opinions of subcontractors on safety and health, which are submitted for deliberation, review, taking action, and providing feedback.

No. of Opinions Heard	No. of Cases Handled and Closed	No. of Cases Dealt with/Reviewed	No. of Cases Requiring No Action
22	21	0	1

협력사 종사자 의견청취 현황								
부문: 특수선 생산부문 / 연도: 2022 년								
순	일자	업체	내용	구분	내용	조치부서	완료예정일	완료일
16	5/27	인형	P167 매스터부 크레인 없어 발판 설치용 플랫폼 설치 불가하여 사다리꼴 지지대로 사용하여 발판 설치함. 고소작 사용에 따른 안전사고 위험이 있어 추후 호안에서는 코팅 반경 검토 (기존 P165, 166호선은 코팅 존재함)	조치완료	- 설계 검토 결과 현상과 유지 의견 (6/10) * 설계 검토: 설치할 사용Master Wing 배수 관련 문제, 코팅 반경시 배수구 등 추가로 인한 협소구역 작업 등 고려하여 현상과 유지 - Master Wing Deck에 옥상 설치용 피스 적용 검토 요청 (6/28) 및 선체설계에서 추가 검토 중 - 코팅 설계 반영 확정 및 추가 상세 정보 주류 송부	선체생산 (선체설계)		9/29
17	6/27	인형	6도크 서면(분식당) 착수대 설치 건의	조치발의	- 6도크 서면 1층 구조 개편설 설치시 내부 냉난방기 비지 추진 --> 2층 유계실 이동으로 계획 변경 - 6도크 서면은 작업자 이동감소로 공간은 분식당 남쪽 착수대 사용하고 2도크 착수대 추가 설치 추진 (설치 위치 인사통무 자문될 통보 필요)	의장 2부		종결 (23년도 추진)
18	6/27	금봉	현장 여차 회차실 개선 필요 (건물내 설치 등)	조치중	- 분식당 앞 여차 회차실 위치 이동 검토 또는 가림막 설치 추진 - 여차 회차실 분식당 남쪽 코너쪽으로 이동 추진 - 이동 예정 장소 주변 적치물 이동 후 회차실 이동 완료	의장 1부		9/27
19	6/27	세인	TIM시 (07:50분 경) 오토바이 및 차량특히 식당 차량으로 인한 안전사고 위험 개선 필요	조치완료	- 6/7도크 07:40 ~ 08:10 차량오토바이 통행 금지 표지판 설치 및 공지 완료	안전과		7/8
20	8/26	흥신	상자지 P1장 입구 볼트 컨테이너서 창고 부근 유전시 배수 연도어 물고임시 막히 발생	조치완료	- 고안물 제거 완료	의장 1부		9/16
21	10/28	금봉	6-7도크 사이 소형 침수함 비트 보강 콘크리트 구역 통행시 단차로 인한 안전사고 위험 (단차 약 400mm)	검토중	- 단차 해소 계단 설치 추진	시운전부		

Compliance with the Serious Accidents Punishment Act

Inspecting Harmful and Hazardous Factors

In response to the Serious Accidents Punishment Act, we supplement matters that do not meet the Serious Accidents Punishment Act and document matters that meet the Serious Accidents Punishment Act to prove our compliance with the statutory safety and health obligations.

Results of the 2022 high-risk work inspection

Classification	Hull	Outfitting 1	Outfitting 2	Commissioning	Others	Total
Production	1,954 cases	3,299 cases	1,584 cases	422 cases	0	7,259 cases
Safety	1,200 cases	753 cases	396 cases	149 cases	318 cases	2,816 cases

Inspecting the Implementation of Accident Recurrence Prevention Measures

By analyzing past fatal accidents in HD HHI, we selected hazardous work and risk factors related to the Naval & Special Ship Business Unit and set weekly inspection plans. We are conducting intensive inspections on 6 hazardous jobs and risk factors. In addition, we are striving to prevent similar accidents by checking the results of the inspections on the implementation of the accident recurrence prevention measures.

Results of the 2022 inspections on the implementation of the major incident recurrence prevention measures

Item	Inspection Status	
	Inspection	Substandard
Work requiring a guardian or signaler	117 cases	8 cases
Mounting heavy objects (crane)	181 cases	1 cases
Mounting curved shall block/Preventing tripping of vertical components	82 cases	1 cases
Fire/Explosion	193 cases	2 cases
Machinery operational test	16 cases	0
Jacky ram/Lug welding	154 cases	1 cases

Results of the 2022 inspections on the implementation of the accident recurrence prevention measures

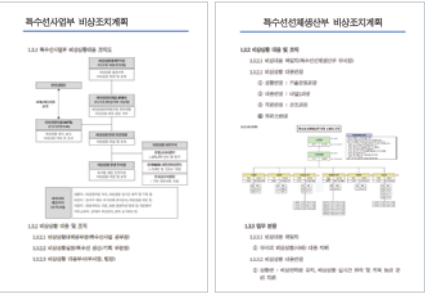
•Results of the inspections on the implementation of the accident recurrence prevention measures: 34 out of a total of 36 inspected (The inspections on the implementation of the accident recurrence prevention measures for the latest accidents to follow)

Emergency Response

We have established a detailed action plan to respond to emergencies, such as industrial accidents from facilities, equipment, and hazardous substances in production and operation.

Establishing emergency response manuals

•Establishing enterprise-wide, BU-specific, and departmental emergency response plans (1 enterprise-wide, 1 for the Naval & Special Ship Business Unit, and 6 departmental)



Devising disaster scenarios and conducting drills per disaster scenario

Date	Type of Drill and Training	Remarks
2022.4.11	Training on the emergency response manual; drills by virtual scenario	
2022.6.3	Participatory evacuation drill with a fire scenario onboard P167	

P167호선 비상대피훈련 시나리오					
1. 일시 : 2022년 6월 3일(금) 11:30 ~ 12:00 2. 장소 : 6도크 P167호선					
항목	시간	시나리오	담당	Action Plan	비고
화재발생	11:30	P167 호선 제1기문실에서 의자를 용접작업 중 이면부 화재 발생	생산	훈련 내용 사전 메일 공지 및 당일 시작 전 개회 공유	
화재확산신고	11:30	1. 화재 목격자가 호루라기 또는 육성을 통해 화재발생을 주변 작업자에게 알림 2. 비상대피작동 3. 비상대피로 긴급신고(002-2002-2119) * 신고 내용 "P167호선 제1기문실에서 화재가 발생했습니다. 전용 비상 대피용기구 → 화재 신고는 특수안전팀 김진영 팀장으로 신고 (010-2547-4153)	생산	특,의장생산1부 인원 1명 선정	
비상대피	11:31	호선 내 전 인원 비상대피로 통용하여 호선 밖으로 비상대피 → 비상대피 간 비상실용 작동 및 주변 알람 실시 (사노코 방송, 전지, 선주 각 1개소 작동 - 전원)	생산/안전	비상대피 유도 인원 선정 및 유도 위치 지정(생산)	
집결 & 광명	11:40	1. 비상집결지로 이동 및 각 부서별 대피인원 파악 2. 호선 내 잔류인원 확인(안전: 광명 호선 전체 확인) 3. 급할 상황 상황 및 인명 교육	생산/안전	부서별 집결지 알람한 준비 집결지에 영프 설치	부서별 인원 파악 후 이상유무 보고 (선기공사 업체 포함)
소화기 사용	11:45	소화기 사용법 교육 및 소화기 사용 훈련 → 안전과 소화기 사용 방법 설명 (소화기는 CO2 소화기용 시간)	안전	소화기 준비	광명 진행결과에 따라 시행여부 재판단

ENGINE & MACHINERY BUSINESS UNIT

The HD HHI Engine & Machinery Business Unit, which occupies 35% of the global two-stroke engine market, achieved the world's first 200 million brake horsepower (BHP) in 2023, becoming the world's largest engine maker. In particular, we are playing a leading role not only in the shipbuilding industry but also in the general industry by supplying onshore engine power generation facilities (EPP), including portable power generation facilities (PPS), to domestic and overseas markets. In addition, we batch-produce marine products, including large and medium-sized engines, gas fuel supply systems, gas re-gasification/re-liquefaction systems, nitrogen reduction devices, ballast water treatment devices, propellers, and ship propulsion systems, for our domestic and overseas clients, positioning ourselves as a supplier of strategic items that drive future growth. Furthermore, we create a safety culture by solidifying our commitment to safety technology and Safety First.



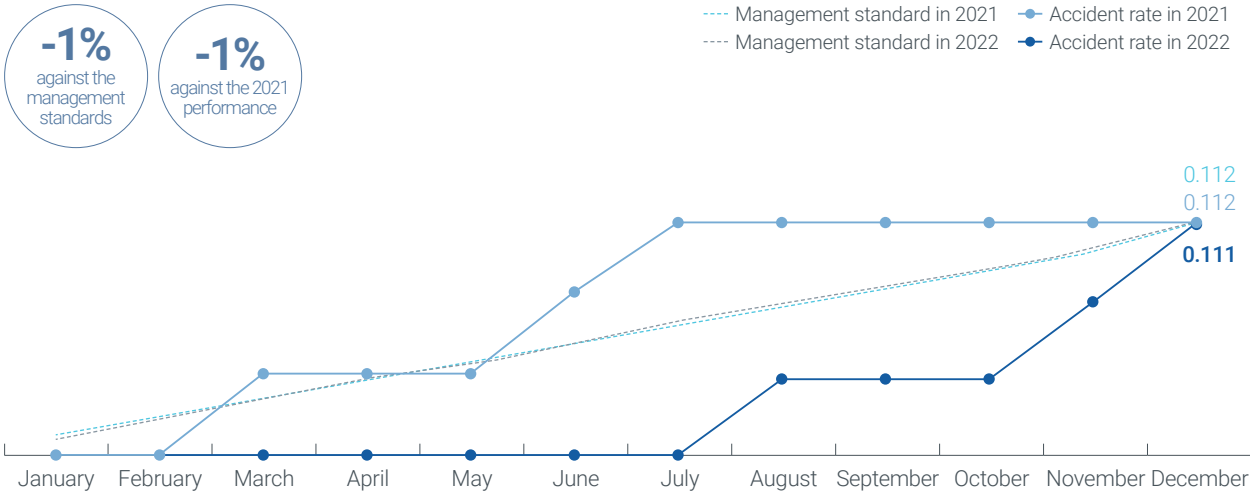
Major Achievements of the Engine & Machinery Business Unit in 2022

Main Activities	Management Plan	Implementation Cycle	Performance	Achievement Rate	Reasons for Nonachievement and Plans
Intensive Gas Safety Management	Rigorous compliance with job standard procedures for gas facilities				
	• Reviewing job standard procedures per unit work (operation/repair of gas facilities)	At any time	Performance in regular assessment of job standard procedures and risks related to the gas facility management departments	100%	
	• Thorough implementation of the risk assessment on the revised gas facility operation manuals and repair work	At any time	Performance in regular assessment of job standard procedures and risks related to the gas facility management departments	100%	
	Thorough management of the performance of ventilation and detection facilities (safety control)				
	• Periodic, thorough inspection of the performance of ventilation and detection facilities	Biannual	Performance in the gas facility safety inspection (biannual)	100%	
	• Testing and calibrating gas leak detection equipment	Annual	Entire leak detection equipment was calibrated in the 1H 2022.	100%	
	Rigorous utilization of the specified PPE and explosion-proof devices				
	• Rigorous utilization of antistatic uniforms and explosion-proof tools and instruments.	At any time	Provided antistatic uniforms to gas facility handlers	100%	
Maintaining the Balance between Strictness and Caring in Safety	• Strictly carrying a detector when entering a hazardous gas zone/Strict access control	At any time	A manager and a submanager are designated to each gas facility for rigorous management.	100%	
	Equipping with eco-friendly facilities and a fire response system for underground auxiliary engine shop pits				
	• Establishing a fire/emergency response manual	Annual	All departments within the Engine & Machinery Business Unit (and gas facility handling departments) to establish an emergency response manual	100%	
	• Regularly inspecting firefighting facilities and conducting emergency drills	Annual	Conducted emergency drills (gas, fire, explosion) at all departments within the Engine & Machinery Business Unit	100%	
	Strict compliance with regulations to prevent major incidents				
	• Intensive management of 4H risks [High (work at height), Heavy (caught by a heavy object), Hidden (fire and explosion), and Hot work (molten metal)]	At any time	Sharing improvement measures against 4H in the safety meetings and punishing major safety rules violators	100%	
	• Thoroughly inspecting the implementation of job standard procedures for high-risk work; strictly complying with major safety rules; strictly managing items vulnerable to major accidents	At any time	No. of inspections on the implementation of major incident recurrence prevention measures (inspected 44 cases)	100%	
	Enhancing supervisors' site safety activities				
Strict Compliance with the Serious Accidents Punishment Act	• Constantly conducting safety interventions centered on high-risk work	At any time	No. of daily inspections and safety intervention against the number of departmental supervisors and work days (Total of 21,728)	100%	
	• Sharing safety activity results and thorough performance management; communication and successive attendance to team-specific toolbox talks by officers and department heads	At any time	No. of safety inspections and safety intervention against the number of work days of each officer (Total of 900)	100%	
	Invigorating Safe Clover activities				
	• Identifying high-risk work in advance by department and process	Annual	No. of major accident prevention measures established by the Production and Support departments (A total of 8 departments established the measures)	100%	
	• Each department to thoroughly check the utilization of the Safe Clover high-risk checklist	At any time	Performance of daily dangerous work inspections by Safe Clover (9 persons) of each production department	100%	
	Reinforcing workers' behavior toward safety through emotional activities				
	• Enhancing feedback activities through "meetings about safety" between Safety/Production departments	At any time	Held 44 meetings about safety in the production divisions (4 divisions, monthly from January to November)	100%	
	Implementation of the safety compliance system				
Improving Subcontractors' Safety Management Systems	• Intensive management by the Plan (P) Do (D) Check (C) Act (A) cycle	Annual	All departments submitted a safety action plan (10 by 10 departments)	100%	
	• Rigorous review, maintenance, and management of Hi-STANDARD	Biannual	Status of risk assessment by department in the second half (completed on 928 items; 100% performance rate)	100%	
	• Inspections and feedback on compulsory activities (compliance) of relevant departments	At any time	No. of field inspections by safety supervisors from January to November/Inspection of the implementation of measures to prevent the recurrence of accidents (one case per week)	100%	
	Continuous addressing and solving of flaws/problems				
	• Listening to opinions (questionnaires) to address flaws and improve systems according to the system monitoring	Annual	Conducted a survey during the special promotion period for safety quality in the first half (May 4~10; 837 people participated)/Another survey to be conducted in the fourth quarter	100%	
	Elimination of safety blind spots				
	• Strict compliance with the PTW for vulnerable work (out-of-flow work, equipment maintenance, etc.)	At any time	Assessed 108 risk factors related to out-of-flow work	100%	
	• Periodically inspecting and monitoring vulnerable areas (auxiliary engine shop, underground pit); eliminating management gaps during vulnerable hours (nighttime, holidays)	Monthly	Safety supervisors conducted weekly and monthly inspections (41 cases as of November)	100%	
	Strengthening subcontractors' representatives' roles and responsibilities in safety management				
	• Establishing a safety management plan with the subcontractor safety and health committee and announcing the implementation results of the plan	Monthly	Held 12 subcontractor safety and health committee meetings in which 18 subcontractors gave presentations (2 subcontractors per month)	100%	
	Strengthening standards recording/management				
	• Rigorous review, maintenance, and management of Hi-STANDARD	Monthly	Held 12 subcontractor safety and health committee meetings in which 18 subcontractors gave presentations (2 subcontractors per month)	100%	
	• Assessing subcontractors' job standard procedures and confirming feedback activities	Monthly	Held 12 subcontractor safety and health committee meetings in which 18 subcontractors gave presentations (2 subcontractors per month)	100%	
	Strengthening the competency of subcontractor safety supervisors				
	• Holding meetings between subcontractor safety supervisors and Safety departments; sharing and spreading improvements	Monthly	Held 12 meetings with subcontractor safety supervisors	100%	

Safety Management Achievements of the Engine & Machinery Business Unit in 2022

In 2022, the Engine & Machinery Business Unit set intensive gas safety management, balancing strictness and caring in safety and strict compliance with the Serious Accidents Punishment Act, as key initiatives. With 3 accidents (with an accident rate of 0.111), the accident-related industrial accident rate decreased by about 1% against the management standards in 2022.

Intensive gas safety management, prevention of major incidents, establishing a safety communication culture, and site-specific safety management were selected as priority risk management tasks for 2023. With these, the unit will strengthen the safety management system for gas facilities and actively carry out specific tasks, such as intensive safety management for high-risk work, thereby creating an accident-free workplace.



Classification	2020	2021	2022
Fatal accidents	0	0	0
Accident-related industrial accident	1	3	3
Accident rate	0.038	0.112	0.111
Frequency (per 1 million)	0.180	0.630	0.560

Intensifying Gas Safety Management

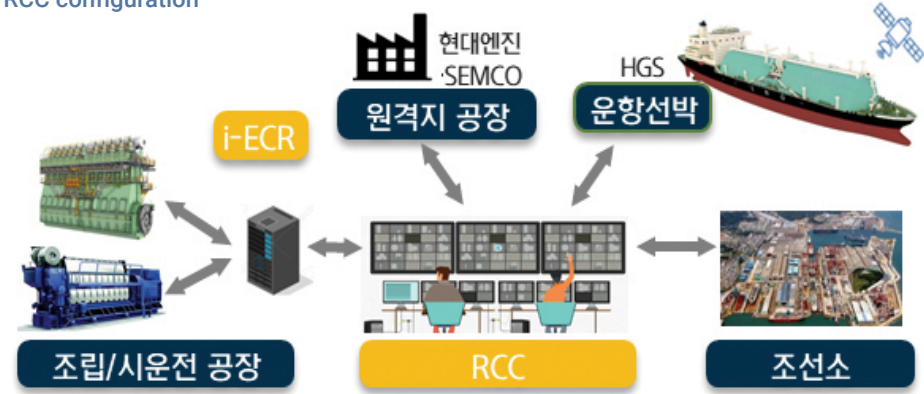
Integrated Gas Safety Management with a Remote Safety Control System

Establishing a remote safety control system

We have established a Remote Control Center (RCC) to remotely monitor engines in major hazardous facility areas, such as FGSS and auxiliary engine shops. The new system enables data-based prompt response to problems that occur during assembly/commissioning and contributes to the prevention of accidents by remotely detecting and monitoring problems. The Engine & Machinery Business Unit plans to expand the range of remote support by continuously advancing the integrated remote system for large HiMSEN engine commissioning and building an optimal commissioning platform.



RCC configuration



Complying with job standard procedures in operating gas facilities

Job standard procedures (JSP) are clearly defined in line with gas facility operating procedures and manuals, and a safety maintenance manual appropriate for each facility is established to manage safety work under the JSP. In addition, meticulous on-site pre-inspections are conducted before work using a checklist, and regular inspections are performed according to the gas facility grade to confirm compliance with JSPs.



Rigorous management of ventilation and detection performance

We have established a system with ventilation and detection facilities to prevent accidents caused by gas leaks and analyze and respond to risks in case of an emergency. We respond to emergencies by identifying fire- and explosion-risk situations in advance through fire monitoring sensors and video-based fire detection systems (Hi-CAMS) and quickly disseminating them through SNS, broadcasting, and radio.

In addition, gas detector maintenance standards have been established to keep gas commissioning facilities and gas detectors in good working conditions. Furthermore, self-inspections are conducted yearly according to the standard, and regular inspections are conducted by specialized institutions. In addition to regular inspections by the department in charge, special inspections are conducted under the supervision of organizations specializing in safety to ensure thorough management of ventilation and detection facilities.



Gas Facility Ventilation Fan

Gas Leak Detector

Special inspections and safety inspections of gas storage facility/dangerous goods handling facility

The Engine & Machinery Business Unit operated a special inspection team consisting of safety advisors and internal/external process safety experts to conduct special inspections on fire/explosion accident prevention in hazardous substance handling facilities, such as FGSS, 3 times. The Unit took improvement measures for the issues identified during the inspection.

In addition to regular safety inspections by production departments that directly handle and use gas facilities, we are fully committed to gas safety management through precise safety inspection and PSM audits by internal and external experts. In 2022, we inspected 10 in-house gas facilities in the engine plant shops 1, 2, and 3 in 2 sessions with an external Consulting agency to confirm whether each PSM-related department faithfully complied with the PSM regulations.

Internal audit period	Audit items	No. of items	Main contents
First round : 2022.7.19-7.22 Second round : 2022.8.29-9.2	PSM implementation status	12	11 cases, including the adequate management of process safety data
	Interviews	7	6 cases, including site supervisor interviews
	Site-safety inspections	4	3 cases, including safety inspection of facilities subject to PSM

Establishing a gas leak emergency response system

We have established a response manual and continuously inspect the emergency response system through regular drills. Gas facility operation and management personnel are fully committed to preemptive safety management by making their emergency-related roles and actions a way of life.



Gas leak response training

Special gas facility inspection

Strict use of regulatory PPE/explosion-proof equipment

Access to dangerous gas areas is strictly controlled. Entrants to facilities subject to gas safety management must wear antistatic clothing, use explosion-proof tools, and carry gas detectors.



Antistatic clothing for gas handlers



Explosion-proof tool

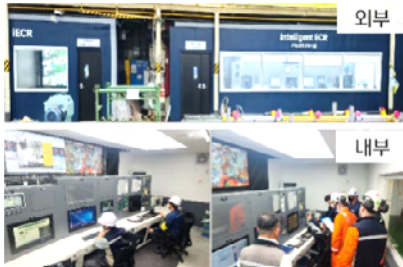


Gas detector

Enhanced safety for diverse engine fuel

In line with the trend of diversifying marine fuels, the Engine & Machinery Business Unit is additionally building methanol engine production facilities and preemptively managing issues related to safety required for engine operation and inspection.

Classification	Safety Measures
During engine running	Operators wear antistatic clothing (at all times); keep the operation unmanned (installation of CCTVs in major inspection areas)
During engine inspection	Operators wear gas masks and goggle-type safety glasses and use explosion-proof tools.
When responding to an accident	Operators wear chemical-resistant clothing/gloves/air-supplied full-face masks and place absorbent materials and cloths.



Unmanned operation with CCTVs



Hi-GAS antistatic clothing

Balancing between Strictness and Caring in Safety

Strict Compliance with Work Standards to Prevent Major Incidents and Reinforcement of Supervisors' Safety Activities

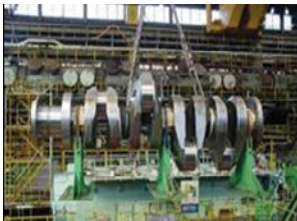
Triple safety inspections for high-risk work

As part of the safety management strategy of “select and concentrate,” the Engine & Machinery Business Unit selected high-risk work for each department and process. It designated 25 as high-risk work requiring intensive safety management, including molten metal work and 2 other items, for the Materials Production Department, and established safety management measures to prevent major incidents for each work item. In addition, experts from each department are designated as safe clovers to monitor the implementation of safety management measures on-site. For work at a high risk of major accidents, we established a multiple safety management system where secondary and tertiary inspections are made by relevant supervisors, safe clovers, and safety supervisors. In this way, we ensure that the regulations preventing major accidents are strictly observed on-site.

Department	High-risk work	priority risk management tasks
Materials	• Molten metal work (pouring, handling, and transport) and 2 other items	3
Propeller	• Heavy materials handling (flask turnover, runner) and 3 other items	4
Crank	• Crank shaft laying-down and 2 other items	3
Mechanical work	• Hydraulic tightening and 1 other item	2
Engine assembly	• Block mounting (bedplate T/O, bed mounting) and 5 other items	6
Engine commissioning	• Gas commissioning (initial start) and 3 other items	4
Materials Operation	• HiMSEN engine/propeller shaft unloading and 2 other items	3



Lifeline check inside the chamber



Restricted stay under heavy objects



Molten metal work management

Application of QR Code-based Smart Safety Inspection System

As part of our effort to prevent major accidents, we designate items at risk of major incidents as priority risk management tasks for each department, establish major accident prevention measures, and carry out self-preventive inspections. However, printing out checklists in paper form, coating them, and posting them on-site had a limit, as they are often contaminated, making it difficult to deliver information. Moreover, it was difficult to manage records of inspection results, making it hard for supervisors, safe clovers, and safety supervisors to conduct cross-checks.

Therefore, a QR code-based “smart safety inspection system” was introduced to strengthen the triple safety management system and monitor inspections for major incident prevention. As a result, eliminating manual data writing improved the efficiency of safety inspections. As a result of operating a triple safety management system for high-risk work with QR code-based smart safety inspections, it was possible for all safe clovers, supervisors, and safety supervisors to monitor inspection results in real-time, and data accumulation/statistics became easy through the verification of site inspections and computerized management.



The QR code displayed on-site

Management of golden safety rules / priority risk management tasks

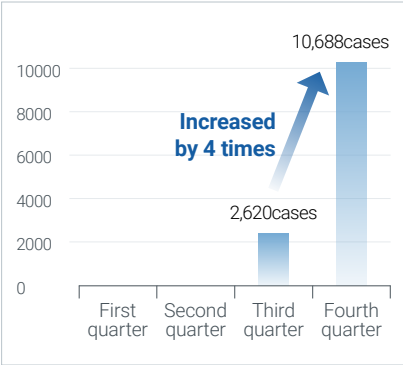
To prevent fatal and major incidents, we apply a zero-tolerance principle to violations of golden safety rules and major safety rules and actively conduct safety inspections to prevent accident-causing unsafe behaviors.



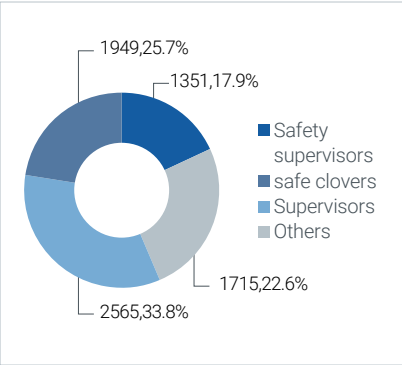
Golden safety rule items, Engine & Machinery



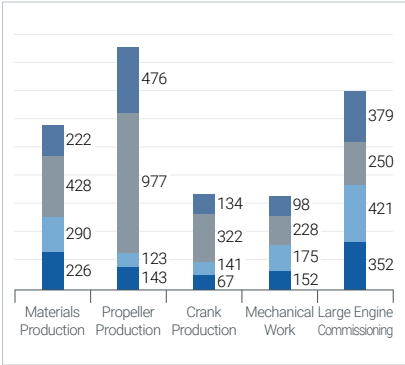
Major safety rules/Priority risk management tasks, Engine & Machinery



Increase in quarterly inspection cases



Inspection status check by entity



Inspection status check by department

Status of safety rule violations in 2022

Violation Type	Details of Violation	No. of Cases
Golden safety rules	Not wearing a safety harness when working at height and others	62
Major safety rules	Checking slinging tools and complying with the specified method	10
Suspension of work	Hydraulic jack released during the main chain disassembly and others	18
General rules	Not wearing PPE (protective glasses, hardhat)	37
Violation of traffic rules	Not wearing a designated helmet and safety device while riding a bicycle	32

Raising consciousness on safety by designating a special safety period

The Engine & Machinery Business Unit operated a special safety period to prevent accidents in the first half of 2022 and promoted risk mitigation activities related to 4 high-risk engine work (4H: High, Heavy, Hidden, Hot-work). During the period, 32 serious latent high-risk factors were discovered. As such, improvement details were announced, best practices were shared, and the Corporate Safety Production Officer incentivized excellent departments and subcontractors who reduced risks with fundamental safety measures.

Department	Major Safety Activities	Activity Cycle
Activities during the special safety period (2022.4.12-6.30)	Special safety period campaigns	Monthly
	Intensive inspection and improvement in 3 major high-risk work items (working at high places, handling heavy objects, working in confined spaces)	Weekly
	Inspection of the implementation of work standards for high-risk work	Weekly



Safety campaign



Presentation of improvements on 3 major high-risk work items

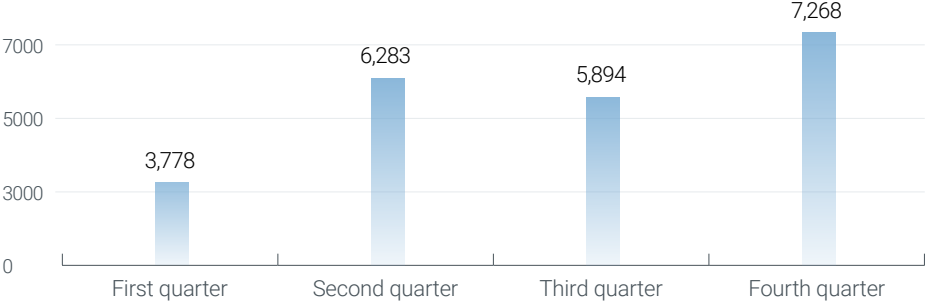


Spot incentives for outstanding organizations

Supervisors' daily safety inspection

Site supervisors maintain and manage records by registering at least one inspection result per day on Hi-SEs after daily site safety activities to prevent major incidents. Based on the 2022 performance, about 2,000 inspections were carried out monthly, and the status of inspections is monitored weekly to provide feedback to facilitate inspections.

Supervisors' daily inspections (cases)



Active promotion of "Individual Pointing and Calling"

The Safety Department of the Engine & Machinery Business Unit conducted special training on "individual pointing and calling" to promote individuals' mindset regarding safety and maintain a cautious behavior and ran an individual pointing and calling campaign period. To establish a safe culture within the Business Unit, both office and field workers were encouraged to participate in "pointing and calling" before starting their job. Incentivizing personnel with outstanding performance in "pointing and calling" provided positive feedback on activities related to safety. We are continuously working to establish a culture of "individual pointing and calling" in which individuals voluntarily identify risk factors within the workplace.



Holding the "Safety Golden Bell Challenge"

We held a "Safety Golden Bell Challenge" to increase our employees' knowledge about safety. The challenge provided fun opportunities for employees to learn things about safety that they must know in the field. It covered various topics, from basic safety rules and on-site first aid to industrial safety, health, and environmental management. A total of 100 employees participated in the Safety Golden Bell Challenge held for the fourth time this year, and a prize of KRW 1 million, 500,000, and 300,000 was awarded to the Top, Excellence, and Participation Prize winners, respectively.



Promoting “Eye Contact” safety activities

We have developed “Eye Contact” safety activities to encourage communication between colleagues and check surrounding dangers. The “Eye Contact” safety activities aim to check dangerous objects, such as moving equipment/vehicles and heavy objects, and communicate with fellow workers through eye contact during dangerous work. Eye Contact is a conscious safety management activity in which workers stop, look around, and remind themselves of workplace dangers. Eye Contact stickers were attached to the rear of major equipment, and safety lines were marked on the floor of collision risk areas to improve the ability to stop and check the surroundings.



Implementing Strict Response to the Serious Accidents Punishment Act

Rigorous
Implementation of
Risk Assessment
and Feedback on
Workers’ Opinions

Hi-STANDARD for risk assessment

The Engine & Machinery Business Unit prepared 491 Hi-STANDARDS, including 101 on materials, 49 on processing, and 318 on commissioning, and conducted regular/ad-hoc risk assessments to ensure that standard work is implemented in the field. In addition, for the initial engine and short-term work, the unit assessed risk factors concerning (out-of-flow work to ensure that safety measures have been sufficiently taken before work to prevent safety accidents. User training on the revised Hi-STANDARD system was also given so that field managers could manage risk assessments on their own more easily, which contributed to the rapid settlement of the system in the field.



Conducting risk assessment/Field test

Training on Hi-STANDARD

Meetings regarding safety between the Safety and Production Departments

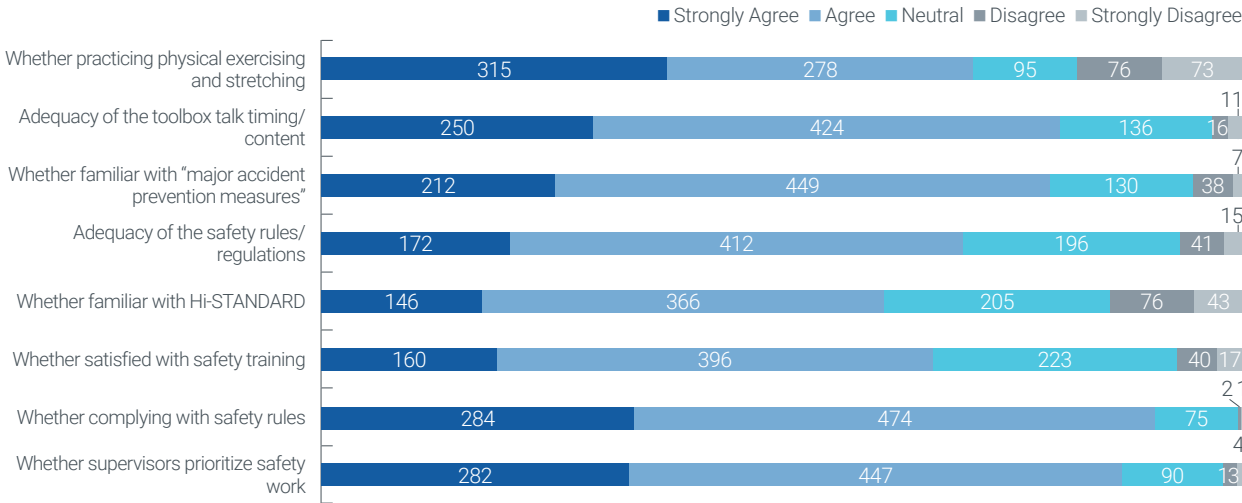
Under the supervision of the Corporate Safety Production Officer, major agenda items from the production departments are extracted monthly, and opinions on safety work are shared between the Production and Safety Departments. The contents of each agenda item are discussed in a brainstorming method, and the contents of the discussion are circulated and shared with the relevant departments.

We make and manage a list of agendas raised by the Safety and Production Departments and contribute to creating an accident-free workplace by giving rigorous feedback on the actions taken.



Conducting surveys on safety

We surveyed the workers to identify their satisfaction with our systems and address problems identified in the survey. A total of 837 employees, accounting for 30% of the Business Unit, participated in the survey, and it was confirmed that the level of satisfaction with the current safety system was high at about 92%. Improvement plans for substandard items were reviewed and reflected, and we plan to implement a system that can be shared and felt on-site through continuous communication.



Safety Improvement and
Emergency Response Activities

Safety
Improvement
Activities in
Design/Production

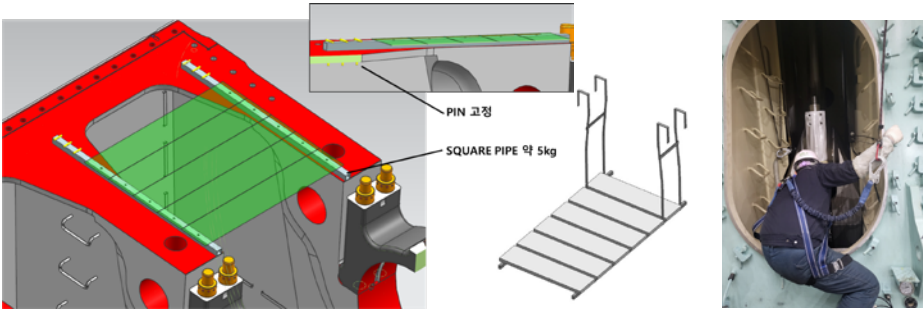
We improved 32 items concerning chronic and latent high-risk factors and construction methods to fundamentally prevent risks that could lead to major accidents.

Division	Department	High-risk work
Technology	Large Engine	Improving large engine assembly/coupling at high places and 2 other cases
	Eco-Friendly System	Adding open/close signals to gas turbine fire dampers and 2 other cases
	Engine Control Technology	Improving risk work involving electrical outfitting parts at M/E Top Sie and 2 other cases
	Engine Technology Development	Safety equipment for methanol supply pipes and 1 other case
	Engine Development Testing	Improving safety harness hook for the upper-side engine work and 3 other cases
	HiMSEN Engine Technology	Improving operability of the H32VP engine's turning gear
	Materials Production	Installing blocking walls to prevent molten metal leak and 1 other case
Safe Production	Propeller Production	Applying a safety jig to the propeller boss assembly and 1 other case
	Crank Production	Building a balance weight workbench for single shrink-fit products
	Mechanical Work	Improving the enclosed chip pit for 516/109 equipment at Mechanical Work Shop 1-1 and 1 other case
	Large Commissioning 1	Improving piston lifting safety for ultra-large engines and 1 other case
	Large Commissioning 2	Improving the scaffolding for the upper B/P part of ultra-large engines and 2 other cases
	Large Commissioning 3	Standardizing the crane operation for large engine assembly shops
	HiMSEN Engine Commissioning	Building an emergency response system for engine commissioning
	Materials Operation	Improving vertical ladders for loading large engines and one other case



The Safety Production division's proposal of "preventing falling risk inside/outside the product by using a workbench dedicated to fastening the balance weight for shrink-fit products" was selected as the best case (grand prize) and awarded.

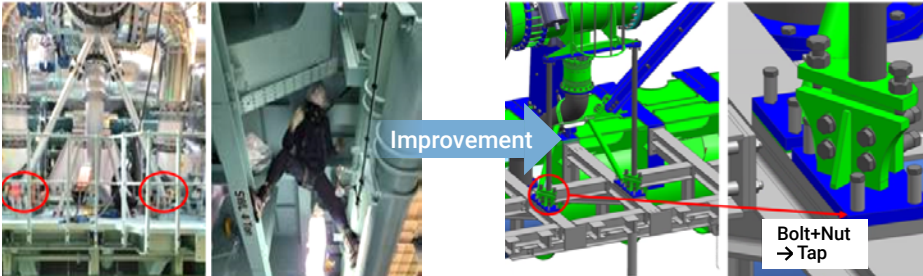
The Technology division reflected the working platform inside the engine chamber in the design, considering its light weightiness and assembly convenience/safety based on field workers' opinions. In addition, the division reviews the risk of falling during engine fasten- ing/assembly work at height in advance to reflect it as early as in the preliminary design stage to minimize the risk, contributing to safety.



Improving work inside the engine chamber










Seq.	Classification	Improvements (reflected in designs)
1	Minimizing the scope of work at height	Improving the lifting lug position for G60 EGR structures
2		Providing G70ME-GA pipeline supports
3		Improving access to 7X92-B fuel leakage facility lines
4		Optimizing the specification of bedplates/frame box lifting lugs
5		Adjusting the step height inside the bedplate
6		Easing assembly of the G80ME-C SCR support
7		Drilling holes for pipe assembly on the frame box sides before warehousing
8	Fall prevention	Improving the height and drooping of gallery handrail chains
9		Extending handrails around the G50ME-C top gallery
10		Adding handrails to the X72DF cylinder cover platform

Improving the SCR support construction method; pre-coupling



Business Unit's emergency response drills

We regularly conduct drills with realistic fire and disaster scenarios to improve our emer- gency response capabilities in various situations. In the fourth quarter of 2022, fire evacu- ation drills were conducted in 3 major buildings, including the Main Engine Building within the Business Unit. In addition, we regularly conduct drills customized to each factory build- ing with probable emergency scenarios. Furthermore, specialized training is continuously provided to improve the emergency response capabilities of the Engine and Machinery's safety supervisors.

Classification	Emergency Drill	Training Cycle
Buildings	<ul style="list-style-type: none">• Target: Engine Unit's main and annex buildings, Production Technology Center, annex building in Area 3• Content: Emergency evacuation and initial fire suppression drills	Annual
Featuring the drill	  	
Factory buildings	<ul style="list-style-type: none">• Target: Entire production and support departments of the Engine & Machinery Business Unit• Content: Drills according to the emergency (including fire) response manuals	Twice a year
Featuring the drill	  	
Safety supervisors	<ul style="list-style-type: none">• Target: Engine & Machinery Business Unit's safety supervisors• Content: Fire suppression drills and CPR training	Twice a year
Featuring the drill	  	

Improving Subcontractors' Safety Management Systems

Supporting Subcontractors' Capacity-building in Safety Management

Operating Subcontractor Safety and Health Committee Meeting

Each Business Unit holds monthly Subcontractor Safety and Health Committee meetings, attended by in-house subcontractors' representatives, the head of the unit, the Corporate Safety Production Officer, and relevant officers of the unit. Subcontractors present their safety management status and site safety improvement cases, while the unit shares safety systems, site risks, and excellent improvement cases. These council meetings improve the in-house subcontractors' safety management system and contribute to safety communication.



Description by Type

Division	No. of Cases	Measures Taken
Facility/Equipment	54	Proposed safety inspections of the bolts on the overhead crane girder
Work Method	42	Pointed out the falling risk because of a narrow assembly space
System	32	Proposed ideas to improve Hi-Standard/Hi-SEs
Health/Environment	5	Proposed to improve low-quality PPE
Total	135	-



Holding Monthly Meetings with Subcontractor Safety Supervisors

Monthly subcontractor safety supervisors' meetings are held to discuss safety management. In the meetings, subcontractors' safety work improvement cases are shared, and difficulties in implementing improvement measures or horizontal deployment plans are also shared.

In addition, to strengthen the capabilities of safety supervisors, current safety-related policies and issues are shared, and support is provided to close gaps in safety and improve safety management capabilities.



Incentivizing Outstanding Subcontractors and Safety Supervisors

We provide technical guidance on safety management to in-house subcontractors, assess their safety management level quarterly, and incentivize outstanding safety management. A total of 18 in-house subcontractors are assessed

Quarter	Outstanding Subcontractors
First quarter	Yuha CNP
Second quarter	Myoungshin ENG
Third quarter	Sehwa ENG
Fourth quarter	Seonghoon CS

on disaster indicators, job competencies, safety activities, site management, safety communication, and safety improvement, and one subcontractor is incentivized every quarter according to the safety management level. In 2022, 4 subcontractors were selected as excellent in safety management, and a plaque and a reward of KRW 10 million were awarded quarterly to encourage their continual safety activities. In addition, excellent safety supervisors are selected biannually and rewarded with KRW 500,000 each.



Safety and Health Seen through the Movie “Exit (2019)”

Survive the sudden chemical attack in the city!

The movie “Exit,” which was released in 2019, is a hit that recorded 9.5 million audiences through word of mouth.

A young unemployed Yongnam happens to meet Uiju, a junior in college, who was working as a deputy manager at the banquet hall at the banquet of Yongnam’s mother’s 70th birthday. At that time, a terrorist sprayed toxic gas on the streets, which quickly turned into hell.

The gas spreads to the banquet hall where Yongnam and Uiju are located, so Yongnam’s family, together with Uiju, head to the rooftop, thinking that such a high place is ideal for survival. To overcome the unprecedented chemical terror attack, Yongnam and Uiju use the various survival skills they learned in a mountaineering club in college.

In the film, chemical substances in the city were expressed as “smoke.” However, in reality, many compounds threaten humanity, and more than 120,000 chemical substances have already been developed and used worldwide, and new substances are constantly developed every year.

On the other hand, not all chemicals are bad. Certainly, there are beneficial compounds for the human body, such as toothpaste that cleans the teeth and shampoo that cleans the scalp. However, no matter how good a drug is, it becomes poison if misused.

In fact, in 2002, the worst chemical accident in Korea’s history called the humidifier disinfectant incident occurred, and it resulted in 239 deaths and 1,528 lung disease patients.

In 2022, even though Doosung Industrial, a manufacturer of air conditioner parts in Changwon City, used a cleaning agent containing trichloromethane, a toxic substance, it did not install local exhaust ventilation, which is a statutory safety device that must be installed. As a result, 16 workers developed toxic hepatitis, an occupational disease, and the manufacturer’s representative was brought to trial as the first prosecution case of the Serious Accidents Punishment Act. The most important method of managing chemical substances in daily life is thorough ventilation. Containers of insecticides, detergents, and sprays must be sealed and used in recommended amounts, and regular and periodic cleaning is also important.

The most important method of managing chemical substances at our worksites is the use of MSDS.

Safe management of chemicals starts with the availability of the right chemical information.





PART. 5

Safety and Health Management Plan

SAFETY

•

HEALTH

5-1

Management Plan of the Corporate Safety
Department/Corporate Safety and Health
Support Department for 2023

In 2022, the Corporate Safety/Corporate Safety and Health Support Departments carried out a reorganization to practice more reliable and meticulous HSE management. The Corporate Safety Department, which has been reorganized only for “safety” with a new mindset and commitment, will continue to focus its capabilities on establishing a safe workplace with zero fatal accidents.

Objectives of the Corporate Safety Department/Corporate Safety and Health Support Department for 2023

Safety and Health Objectives

Objective 1

Safety

Zero fatal accidents and an accident rate of 0.175 or below

Objective 2

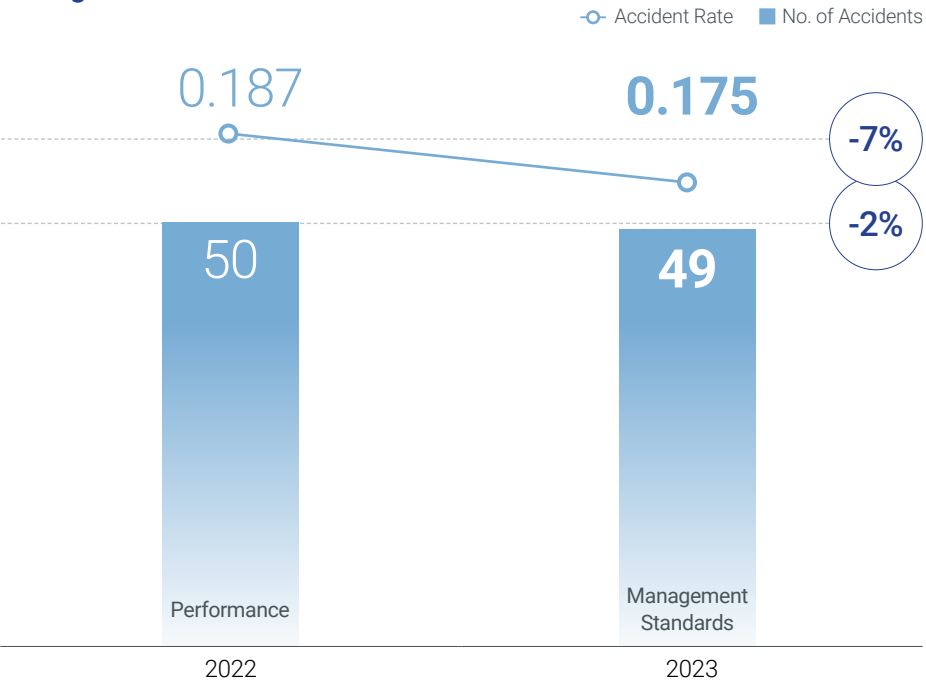
Health

Implementation of employee health promotion through prevention-oriented health management

Key Initiatives

- Making field-oriented risk assessment a part of life
- Reinforcing safety capabilities through safety culture level diagnosis and customized safety training
- Advancing accident prevention systems using DT
- Strengthening safety and health support for subcontractors for shared growth
- Reinforcing prevention-oriented health management systems
- Advancing management systems by improving chemical operating systems

Management Indicators



Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Safety Planning Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Establishing an Operability Oriented, Site Self-regulated Safety System	Operating enterprise-wide safety incentive program																		
	• Improving the enterprise-wide safety incentive program aimed at enhancing safety activities through efficient safety incentives	Whether improvements (proposals) are being implemented	10	Annual	Improvements (proposals) reviewed (33%), deduced (67%), implemented (100%)		○												
	• Safety incentives for outstanding organizations (teams and subcontractors) and individuals (supervisors, safety supervisors, and subcontractor safety supervisors)	Rewarding	5	At all times	Actual/Target	○													
	Improving the SLIs																		
	• Review of the indexation of leading safety activities (risk assessment, toolbox talks, safety improvement proposals)	Whether improvements (proposals) are being implemented	10	Annual	Improvements (proposals) reviewed (33%), deduced (67%), and implemented (100%)		○												
	Improving accident management and the usability of statistical data																		
	• Computerizing accident management processes (to be reflected in the new Hi-SEs)	Whether improvements (proposals) are being implemented	10	Annual	Improvements (proposals) reviewed (33%), deduced (67%), and implemented (100%)		○												
	• Realizing a safety statistics dashboard using real-time accident data and utilizing predictive data	Whether improvements (proposals) are being implemented	10	Annual	Improvements (proposals) reviewed (33%), deduced (67%), and implemented (100%)														
	Managing safety and health guidelines																		
	• Managing the establishment and revisions of safety and health guidelines	All established/revised versions to be notified	5	At all times	Whether registered on the computer system	○													
	• Lecturing on the status of safety guidelines	Whether training provided (twice a year)	5	Twice a year	Actual/Target	○													
	Maintaining the safety and health management certification (ISO 45001) and establishing a system for reinforcing site operability																		
	• Performance management against quantitative objectives stated in the Corporate Safety and Health Office's management plan	Documenting performance (biannually)	5	Biannual	Actual/Target	○													
	• Key performance management by department	Registering performance records (quarterly)	5	Quarterly	Whether registered on the computer system		○												
Systematizing the Risk Assessment	• F/U on requirements per major items: Assessing risk/opportunity, regulation management/ compliance, and the like	Assessing (Annual)	5	Annual	Actual/Target	○													
	• Auditing (internal and external) safety and health management systems; remedying nonconformities	Rate of remedial action taken (100%)	5	Annual	Actual (%) / Target (%)	○													
	• Training HSE promoters	Whether training provided (annual)	5	Annual	Actual/Target	○													
	Following up on whether the safety and health management plan is published and implemented																		
	• Prepared the Safety and Health Management Report and posted it on the website in line with the Serious Accidents Punishment Act and the ESG management strategy	Published, circulated, and posted on the website	5	Completed in January	No. of copies distributed / No. of copies published	○													
	• Posted the English version of the Safety and Health Management Report on the English website	Completed the translation and web-posting	5	Completed in May	Completed the translation and web-posting	○													
	• Reporting to the Board of Directors (BOD) on the safety and health management plan following Article 14 of the Occupational Safety and Health Act	Reported to the BOD	5	In February	Approved by the BOD	○													
	Operating a safety consultative body for the 3 main shipbuilders																		
	• Operating a safety consultative body for the 3 main shipbuilders (a strategic/working consultative body)	Whether operated the consultative body	5	4 times a year	Actual/Target	○													
			100																
	Improving the ad-hoc and site risk assessment system																		
	• Developing an ad-hoc risk assessment platform (templates) facilitating field application	Developing a simplified risk assessment template	10	At all times	A new template		○												
	• Establishing elaborate operating standards and procedures (reflecting to the procedure) for the site risk assessment system	Establishing standards and procedures	10	At all times	The operation plan reviewed (33%), deduced (67%), and implemented (100%)		○												
	• Conducting ad-hoc and site risk assessments and monitoring assessment results	Conducting site risk assessments	10	At all times	The operation plan reviewed (33%), deduced (67%), and implemented (100%)		○												

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Safety Culture Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Providing Statutory Safety and Health Training (Improving the Effectiveness)	Statutory safety and health training for new recruits																		
	• Providing statutory safety and health training for new recruits (SCP-1, Step-1)	Meeting the training hour requirements based on the Occupational Safety and Health Act	15	5 times a week	Actual/Target	○													
	• Providing special safety training (including training on changed jobs)	Meeting the training hour requirements based on the Occupational Safety and Health Act	15	Once whenever recruited	Training hour requirements to be met	○													
	Regular safety and health training for workers																		
	• Revising and providing statutory safety and health training for office workers (non-production departments, SCP-1, Step-2)	Rate of content revision/training completion	10	3 hours per quarter	Whether the content is revised and training is completed	○	○												
	• Improving statutory safety and health training for employees – customizing curricula and improving lecturing competency	Whether improvements implemented	10	At all times	Improvements (proposals) reviewed (33%), reported (67%), and implemented (100%)		○												
	• Providing statutory safety and health training for employees (production/support departments, SCP-1, Step-2)	Meeting the training hour requirements based on the Occupational Safety and Health Act	10	6 hours per quarter	Actual/Target	○													
	Statutory safety and health training for supervisors																		
	• Providing statutory safety and health training for supervisors (SCP-2, Step-2)	Meeting the training hour requirements based on the Occupational Safety and Health Act	20	16 hours per ear	Actual/Target	○													
	Statutory safety and health training for managers and designees																		
Operating In-house Safety and Health Training (Improving the Effectiveness)	• Providing statutory safety and health training for managers (SCP-2, Step-3)	Meeting the training hour requirements based on the Occupational Safety and Health Act	10	6 hours per year	Actual/Target	○													
	• Providing statutory safety and health training for new statutory assignees	Meeting the training hour requirements based on the Occupational Safety and Health Act	5	34 hours whenever designated	Training hour requirements to be met	○													
	• Providing statutory refresher training for statutory assignees	Meeting the training hour requirements based on the Occupational Safety and Health Act	5	24 hours per 2 years	Training hour requirements to be met	○													
			100																
	Improving the management’s safety mindset																		
	• Training to raise new directors’ safety consciousness (SCP-3, Step-1)	Annual (in the first half)	10	Annual	Actual/Target	○													
	• Special lectures for officers on safety (SCP-3, Step-2)	Twice a year (once each in the first and second halves)	10	Twice a year	Actual/Target	○													
	• Workshops on safety management strategy in the production division (SCP-2/3, Step-3)	Twice a year (once each in the first and second halves)	10	Twice a year	Actual/Target	○													
	Building supervisors’ safety capabilities																		
	• Training to raise new supervisors’ safety consciousness (SCP-2, Step-1)	Quarterly	10	4 times a year	Actual/Target	○													
	Building capabilities of safety managers																		
	• Job improvement training for safety divisions (SCP-S)	Twice a year (once each in the first and second halves)	10	Twice a year	Actual/Target	○													
	• Job improvement training for subcontractor safety supervisors	Twice a year (once each in the first and second halves)	10	Twice a year	Actual/Target	○													
	Safety and health training programs for foreigners																		
	• Providing the 7th-month training	Monthly	10	12 times a year	Actual/Target	○													
	• Providing special safety training	Twice a year (once each in the first and second halves)	10	Twice a year	Actual/Target	○													
	Practice/experiential training																		
	• Providing practice/experiential training for 8 high-risk jobs (2nd Stage / second-year)	Once a year for each target	10	Annual	Once a year for each target	○													

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Safety Risk Management (SRM) Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Risk Identification and Safety Improvement	Enterprise-wide Safety Improvement Activities (Hi-SAFE) • All Production and Support departments to select their improvement tasks (topics to be registered and presented) • Production/Support departments made interim presentations on the progress of their improvement tasks in the first half of the year. • Production/Support departments made presentations on the results of their improvement tasks in the second half of the year. • Safety incentives for outstanding tasks during the safety contest.	Topic Registration	5	Annual	Whether topics are registered (including the level of risk and difficulty, economic feasibility)	○		→											
		Improvement planning and improvement progress rate	5	Annual	Improvement rate of 50% at the time of improvement planning and interim presentation	○				→									
		Safety improvement progress rate	5	Annual	Improvement rate of 90% or above at the time of presenting the results	○								→					
		Announcement of results and evaluation	10	Annual	Examination results of the proposals presented at the safety contest and the final evaluation	○											→		
	Risk Contest • 2023 Safety Risk Contest • Aggregated the 2023 Safety Risk Contest results for monitoring by relevant departments • Safety incentives for the 2023 Safety Risk Contest winners	Holding a risk contest	5	Annual	Whether the contest was held (once)	○					→								
		Analyzing the contest results and making improvements	5	At all times	Whether the contest result reports/request for improvement have been made	○					→								
		Awarding safety incentives (once)	5	Annual	Whether safety incentives awarded (40 in total: 10 Grand Prize winners, 30 Excellence Prize winners)		○				→								
	Safety Open Market • Registering and managing improvement topics • Incentivizing good ideas	Registering improvement tasks and managing the status	10	Monthly	No. of improvement tasks published on The Yard (monthly)	○		→											
		Incentivizing biannually	5	Biannual	No. of awards ceremonies held	○					→							→	
	Safety-Production Deliberation Committee • Continuously identifying and submitting improvement items for deliberation, which are likely to incur costs or delay processes if improvement measures are taken • Items selected as deliberation agenda and the deliberated items undergo improvements (budget and MH supported by the relevant department) • Reporting to the management on the status of safety improvement by deliberated item	Identifying improvement items by the Deliberation Committee	10	At all times	Whether identified	○		→											
		Holding Deliberation Committee meetings	10	Quarterly	Held once (25%), twice (50%), thrice (75%), or four times or above (100%)	○				→		→		→		→			
		Confirmation of the implementation of the deliberated items and reporting to the management	5	Biannual	Reported once (50%) or twice (100%)	○		→					→	→					
	HD HHI Safety Open Innovation Contest *linked with Ulsan Center for Creative Economy & Innovation • Preparing for the Contest • Assessing submitted ideas • Conducting site POC(Proof of Concept) on the winning ideas	MOU signing and drafting an on-demand task statement	5	Annual	Whether an MOU is signed and a demand for safety technology is identified		○	→											
		Conducting technical review/assessment on the ideas submitted to the Contest	5	Annual	Whether submitted ideas were assessed		○			→									
		Conducting site POC concerning a technology demand	10	At all times	No. of POCs conducted: 1 case (33%), 2 cases (66%), 3 cases (100%)	○							→						
			100																
Digital Safety Improvement	Advancing big data on safety/ accident prediction system • Expanding the number of Palantir Foundry users	Expanding the number of Palantir Foundry users	5	At all times	Promoting at least 50% of the team members to use Palantir Foundry	○		→											
	• Linkage to the mobile work instruction system: Providing a safety checklist to field workers	Linking the mobile work instruction system with the prediction service	5	At all times	Whether the mobile work instruction system is linked		○	→											
	• Improving the dashboard: Improving the Safety screen on Twin FOS	Improving the visualization of major safety information	5	At all times	Whether the visualization is applied to Twin FOS and Hi-SEs Web		○	→											

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
	Improving heavy equipment safety • Installing AI cameras on 3–10 t forklifts	Enterprise-wide application of AI cameras on all forklifts of 3 t and above	10	At all times	Whether AI cameras were installed on all forklifts of 3 t and above	○													
	• Installing auxiliary devices (LED lamps) on forklifts	Full application to forklifts in factory buildings and materials storage	5	At all times	Whether applied to all forklifts in factory buildings and materials storage		○												
	• Improving communication methods for heavy equipment operators/signalmen *Developing an intercom communication device	Expanding the use of intercom throughout the enterprise	5	At all times	Whether a customized intercom communication device is developed and applied on-site		○												
	An Integrated heavy equipment monitoring system • Establishing an improvement plan: transporter, cherry picker, forklift (expansion), and the like • TF organization and devising improvement plans	Establishing and reviewing improvement plans Progressing TF activities	5 10	Annual At all times	Whether improvement plans were established Whether a TF organization is formed and improvement plans are devised		○ ○												
	• Developing and applying systems	Building an integrated monitoring system	5	At all times	Whether a system is built		○												
	Drone safety management • Establishing a drone-applied safety management plan	Applying drone-applied management on-site	5	Annual	Improvements (proposals) reviewed/established (50%), reported to the management (100%)	○													
	• Running a TF for drone safety management *Participated by experts, purchasing devices, providing drone training, establishing detailed operation plans, and others	Forming a drone-operation organization/preparing for compliance with relevant laws, including communication, security, and aviation	5	At all times	Whether a TF is running		○												
	• Drone operation and monitoring	Practical use of the drone monitoring system	5	At all times	Whether the system is used in practice and applied on-site		○												
	Advancing Hi-CAMS • Developing and advancing new algorithms: Applying to PPE, work at height, and digital fence • Develops Hi-CAMS, a risk event analysis platform	Advancing integrated features through deep learning Establishing Hi-CAMS risk event scenarios	10 10	At all times At all times	Whether the features are advanced Whether scenarios are established		○ ○												
	A smart safety system to prevent the collision of vehicles and forklifts in the factory • Establishing a detection sensor-applied safety management improvement plan	Selecting detection methods	5	At all times	Whether improvements (proposals) are documented and reviewed														
	• Reviewing the expanded pilot application of the system	Reviewing a pilot application of the equipment	5	At all times	Selecting a pilot test place and expanding the application		○												
			100																
Site Safety Improvement	Reinforcing the safety of 3 major safety facilities • Forming a TF for Out-Shop ventilation and expanding the jet fan application	Running a TF for Out-Shop ventilation	10	Annual	Whether a TF is formed and the jet fan application is expanded		○												
	• Forming a TF for In-Shop ventilation and improving ventilation for Unit Assembly Shops 1 and 2	Improving ventilation at Unit Assembly Shop 1 and Calcination Plant 1	10	At all times	Whether additional improvement plans are established/implemented		○												
	• Improving site safety by the lighting TF (an item deliberated by the Safety/Production Deliberation Committee in 2022)	Improving site safety by the lighting TF	5	At all times	Whether implemented on site		○												
	• Expanding the application of safety nets by vessel by the Scaffolding TF	Expanding the application of safety nets on vessels	5	At all times	Whether implemented on site		○												
	Improving safety facilities • Expanding the application of overhead ladders at Docks 8 and 9 • Improving narrow spaces at concave quay walls	Conducting inspections and assessing major incidents Building a system to inspect implementation	5 10	At all times At all times	Whether implemented on site Whether implemented on site		○ ○												
	• Improving safety facilities in the Shipbuilding's in-shop factory buildings	Conducting inspections and assessing major incidents	10	At all times	Whether implemented on site		○												
	Building the Risk Gate System (Design – Safety) • Establishing Risk Gate processes	Systemizing the Risk Gate	10	Annual	Establishing improvement plans and reporting to the management	○													
	• Checking and responding to requests for review of design safety	Examining requests for the review of design safety	10	At all times	10 or more cases reviewed per quarter	○													
	• Collecting and monitoring Design – Safety feedback data	Building a monitoring system	5	At all times	Whether a system is built	○													
	A system to inspect the implementation of measures against major incidents • Inspecting for and assessing major incidents (first half of the year) * Major incidents in 2022	Inspecting for and assessing major incidents	10	Biannual	Assessment and inspection rate of 100%	○													
	• Inspecting for and assessing major incidents (first half of the year) * Major incidents in 2022–2023	Inspecting for and assessing major incidents	10	Biannual	Assessment and inspection rate of 100%	○													
			100																

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Safety Inspection Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter			
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12	
Intensive Inspection of High Risks	Inspection of accident risk prediction • Special inspection of SLI-warned departments • Inspections during vulnerable hours (before and after a break, lunchtime, closing hour, and on or before and after a holiday) • Inspection of accident risk prevention during sudden weather changes (gusts, storms, cold waves, torrential rain, abnormally high temperatures) • Conducting site inspections when the SSA is exercised	Reducing the recurrence rate at risky/warned departments	10	At all times	Inspection rate (%) = No. of inspected department/ No. of target departments × 100	○														
		To be inspected more than 90% against the plan	20	At all times	Inspection rate (%) = No. of inspected department/ No. of target departments × 100 [≥ 90%]	○														
		To draft a checklist for each case of sudden climate changes (5 cases)	10	At all times	No. of checklists drafted (3 in the first half and 2 in the second half)	○		→						→						
		Fatal accident prevention	10	At all times	Inspection rate (%) = No. of inspections/ No. of SSA issued × 100	○														
	Inspecting the implementation of major accident prevention measures against recurring fatal accidents • Assessing fatal accident risk and determining the effectiveness of the measures against recurring major accidents (for 20 years) • Performing strategic inspections on the potential risk that scored 4 or higher in the risk assessment (checking whether deployed horizontally) • Validating the recurrence prevention measures and reporting the established measures	Drafting fatal accident risk assessment reports	10	Twice a year	Whether fatal accident risk assessment reports have been prepared		○	→								→				
		Inspected 50% or more of the risks subject to strategic inspection	30	Twice a year	Actual (%) = No. of cured cases/ No. of requests for cure × 100 [≥ 90%]	○		→			→			→			→			
		Report-writing	10	Twice a year	Report-writing (twice a year)		○												→	
Inspection of Safety and Health-related Laws and Regulations	Compliance inspection of safety and health-related laws and regulations • Preparing annual inspection plans • Conducting inspections; requesting for corrective action; receiving corrective action results; validating the measures • Preparing inspection result analysis reports	Documenting a plan	10	Annual	Whether a plan is documented		○	→												
		Reducing the number of law violations and charges	80	Twice a year	Actual (%) = No. of cured cases/ No. of requests for cure × 100 [≥ 90%]	○		→			→			→						
		Preparing inspection result analysis reports	10	Twice a year	Whether reports have been prepared		○												→	
External Subcontractors' Safety Management	Providing technical guidance and support for external subcontractors' safety management • Inspecting safety and health management systems • Inspecting the status of site safety management • Supporting the improvement of cases identified as deficiencies	Advising on the fatal accident prevention system	30	Twice a year	Reporting the inspection plans/ results of five companies that signed the MOU		○	→			→			→						
		Providing technical guidance on site fatal accident prevention	40	Twice a year	Reporting the inspection plans/ results of five companies that signed the MOU		○	→			→			→						
		90% or more of the requests to be supported	30	Twice a year	Support rate (%) = No. of supported cases/ No. of requests × 100 [≥ 90%]	○		→			→			→						
				100																

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Safety Supporting Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Reinforcing Safety Management Execution Capabilities through Ex-ante Legal Risk Management	Conducting government-related (including the MOEL and the KOSHA) affairs	Fulfilling improvement orders	15	At all times	No. of improved cases/No. of improvement orders	○													
		Analyzing major violations and establishing a response plan	10	At all times	Whether major violations have been analyzed and whether a response plan has been established		○												
		Collecting facts and responding	5	At all times	No. of investigated cases/No. of charges		○												
		Follow-up management (once every other month)	5	Once every other month	Actual/Target	○		→			→			→			→		
		Preparing standards/guidance for ambiguous provisions	10	At all times	Whether standards/guidance for ambiguous provisions have been established		○												
	Labor union–related affairs	Holding the Committee meetings	15	Quarterly	Actual/Target	○				→			→			→			→
		Reporting the implementation results (biannual)	15	Biannual	Actual/Target		○												
		Conducting labor-management joint inspections (every month)	5	16 times a month	Actual/Target		○												
	Advancing the management system for hazardous machinery and equipment	Periodic: Twice a year (in the first and second halves)	10	Twice a year	No. of inspection targets/No. of devices inspected	○				→						→			
		Inspecting all target equipment	5	Once every other year	No. of inspection targets/No. of devices inspected		○						→					→	
		Establishing internal standards/procedures for safety inspection	5	until 2023	Whether safety inspection management manuals have been established and whether they are linked to the computer system		○												
			100																
Systemizing Firefighting/Hazardous Substance Management	Fire/explosion risk management	Producing an enterprise-wide explosion hazard classification map and devising improvement measures	15	until 2023	Whether an explosion hazard classification map has been produced and whether improvement measures have been devised	○													
		Devising improvement plans for explosion hazard zones in painting shops	10	until 2023	Whether improvement plans for explosion hazard zones in painting shops have been devised		○												
	Advancing inspection/management systems for firefighting/hazardous substances	Building a system to record and manage fire risk inspections	5	until 2023	Whether the system is built		○												
		Improving the hazardous substance supervisor/fire prevention sub-manager management system	5	until 2023	Whether the system has been improved		○									→			
		Operation of additional persons to take charge of fire safety management/hazardous substances by region	10	until 2023	Whether additional persons to take charge of fire safety management/hazardous substances have been appointed		○												
	Improving safety management concerning firefighting and hazardous substances	Obtaining installation permission from the competent authority	10	At all times	Whether permission is obtained		○												
		Statutory training for fire/hazardous substance safety	1	Twice a year	Target/Person who completed the training	○							→					→	

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Health Management Section

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Internalizing the Prevention-oriented Health Management System	Establishing management system with health data indicators	Building a system for health data indicators	15	Annual	Improvements (proposals) reviewed (33%), deduced (67%), and implemented (100%)		○												
		Setting objectives and managing performance	10	Annual	Objectives set (50%), performance managed (100%)		○												
	Internalizing post-management system of medical examination and health promotion activities	Internalizing and improving the program	10	At all times	The plan reviewed and the implementation inspected (25%), improvements (proposals) identified (50%), implemented (75%), and monitored (100%)		○												
		Health promotion program operation and participant success rate to be 70%	5	Annual	Whether implemented and whether the participants succeeded (70%)	○													
		Counseling/improvement rate to be 80% or above	5	At all times	No. of counselors against the number of persons requiring follow-up management	○													
	Conducting medical examinations more efficiently	The rate of medical examinations conducted to be 100%	10	At all times	No. of persons examined against the number of eligible persons	○													
		Implementation and monitoring	5	Biannual	The frequency reviewed (50%), implemented (50%), and monitored (100%)		○												
		Reviewing to improve the programs	5	Annual	Improvements (proposals) reviewed (50%), deduced (50%), and implemented (100%)		○												
	Expanding the operation of stress management programs and strengthening awareness-raising activities	Introducing equipment and operating programs	10	Annual	Equipment introduced (33%), operation plans devised (67%), and implemented (100%)		○												
		Operating the program	10	Annual	Operation plan reviewed (33%), deduced (67%), and implemented (100%)		○												
		Regular running of the Mind-Safe Bus; running campaigns	5	Quarterly	Actual/Target	○													
	Operation of an internal health promotion center	Utilization rate and the number of users	5	At all times	in-plant hospital operation performance and the number of users compared to the previous year	○													
		Inspection and improvement	5	Annual	Inspecting and replacing medical facilities and first aid and rescue equipment		○												
			100																
Improving Subcontractors' Health Management System	Improving subcontractors' health management	Building and operating a platform	20	Quarterly	Whether the operation status is monitored		○												
		Holding meetings and providing feedback	15	Biannual	Actual/Target	○													
		Status monitoring and devising additional management measures	10	Biannual	Status monitored (70%), management measures taken (30%)		○												
		Providing biannual technical guidance	20	Biannual	Actual/Target	○													

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Reinforcing the Operation of the Chemical Management System	Enhancing the management of persons at risk of health-care issues <ul style="list-style-type: none">Monitoring post-placement medical examinations to persons at risk of health-care issues and reassessment requestsIntensifying the monitoring of whether a health-care plan has been established for persons at risk of health-care issues	The rate of subcontractors that met the reassessment cycle to be 70%	20	Quarterly	Subcontractors that complied with the reassessment cycle/all subcontracts	○				→			→			→			→
		The rate of on-time registration of health-care plans to be maintained at 90% or above	15	Biannual	The rate of on-time registration of health-care plans	○		→						→					
			100																
	Establishing a safe chemical handling plan for foreigners <ul style="list-style-type: none">Distributing chemical safety information to foreigners (safe handling methods, tips on chemical management by work process)Collecting and reviewing feedback on chemical information to reflect it in improvement measures	Producing translated versions	10	Annual	Plans reviewed (33%), training materials prepared (67%) and distributed (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Whether feedback collected and improvements reviewed	10	Annual	Feedback collected (50%), improvements reviewed and supplemented (100%)		○												→
	Reinforcing operating standards for chemical management systems <ul style="list-style-type: none">Continuously operating chemical management systems (identification of chemical substances, hazard assessment, submission of MSDS for imported chemicals)Substituting highly hazardous chemicals (such as special management materials and substances with permissible exposure limits)Applying a validity period to the chemical hazard assessment results (HiPRO)Introducing a feature that manages MSDS revisions (HiPRO)Developing a self-chemical assessment function (for departments requesting chemicals, Hi-SEs Web)Communicating information concerning the chemical management system operation and matters requiring cooperation (Design, Purchasing, and Production departments)	System operation and reporting	10	At all times	No. of monthly performance reports	○		→	→	→	→	→	→	→	→	→	→	→	→
		Whether highly hazardous chemicals have been substituted	10	At all times	Under review (50%), substituted (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Adding a feature that sets a validity period to the chemical hazard assessment results	10	Annual	Standards and plans established (50%), applied (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Introducing a feature that manages MSDS revisions	10	Annual	Plans established (50%) and applied (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Developing a self-hazard pre-assessment function	10	Annual	Plans established (33%), applied (67%), and implemented (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Circulating official letters	10	Annual	Information compiled (50%), notified and circulated (100%)		○							→	→	→	→	→	→
	Intensive monitoring and management of chemical handling departments <ul style="list-style-type: none">Conducting regular site inspections in chemical handling departments (departments handling highly hazardous substances and exceeding exposure limits)Conducting regular chemical hazard assessments and managing improvement measures	Conducting site inspections	10	Biannual	Actual/Target	○		→	→	→	→	→	→	→	→	→	→	→	→
		Conducting assessments and compiling improvement measures	10	Annual	Plans reviewed (33%), assessment results notified (67%), improvement measures compiled (100%)		○												→
			100																
Strengthening Working Environment / Field Health Management	Reinforcing the operation of working environment measurements <ul style="list-style-type: none">Regular measurements: Biannual; measurements in a shortened cycle: Once in 3 monthsMonitoring and managing hazardous factors that exceeded the exposure limits in the working environment measurementsComputerizing preliminary investigation data for working environment measurements	Working environment measurement rate to be 100%	10	At all times	No. of completed measurements/No. of planned cases	○		→	→	→	→	→	→	→	→	→	→	→	→
		The excess rate in working environment measurements to be kept at 4.2% or below	5	At all times	No. of exceeding cases/No. of measurements	○		→	→	→	→	→	→	→	→	→	→	→	→
		The preliminary investigation system to be applied to all relevant departments	5	At all times	The departments registering preliminary investigation data/The departments subject to working environment measurements (registration rate)	○		→	→	→	→	→	→	→	→	→	→	→	→
	Supplementing site inspections of working environment measurements (checking whether improvements are implemented)	The full number of site inspections to be conducted	5	Biannual	No. of inspections/No. of planned cases (15 cases)	○		→	→	→	→	→	→	→	→	→	→	→	→
		Distributing a casebook	5	Annual	Whether a casebook has been distributed		○												→
	Applying enhanced management standards for confined spaces <ul style="list-style-type: none">Establishing management standards for confined spaces and managing site investigations (cataloging)Applying and operating work programs in confined spaces	Establishing and cataloging standards	15	At all times	Standards established (33%), site inspections conducted (67%), and cataloged (100%)		○	→	→	→	→	→	→	→	→	→	→	→	→
		Improving, distributing, and operating manuals	15	At all times	Reviewed whether the programs have been improved (33%), improvements (proposals) deduced (66%), and implemented (100%)		○				→	→	→	→	→	→	→	→	→

SAFETY

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HEALTH

5-2

Business Units’ Management Plans
for 2023

This year, each Business Unit plans to spare no support for preemptive site safety management and reinforce subcontractors’ self-regulated safety management capabilities through safety leadership at the management level based on the operability-centered self-regulated field safety systems. In addition, we will take the lead in creating a safe workplace by internalizing the risk assessment for routinizing a safety culture.



Management Objectives of the Shipbuilding & Offshore Business Unit for 2023

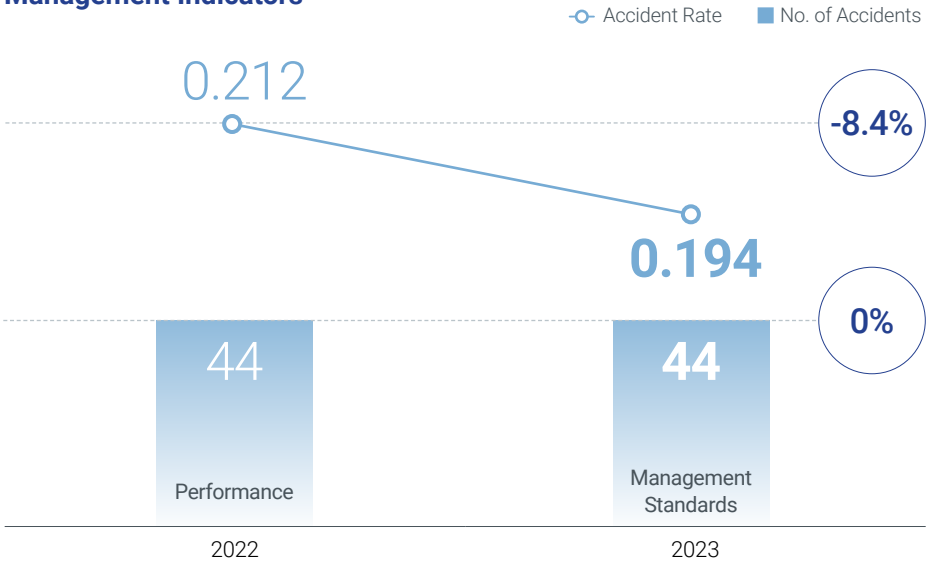
Safety and Health Objectives

Objective 1	Objective 2
Zero fatal accidents	Achieve an accident rate of 0.194 or below

Key Initiatives

- Establishing a safety management support system to strengthen on-site execution of “select and concentrate”
- Establishing overall systems for enterprise-wide participation and routinization of risk assessment
- Reinforcing enterprise-wide risk management according to environmental changes

Management Indicators



Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Shipbuilding & Offshore Business Unit
(Shipbuilding)

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Establishment of a Safety Management Support System	Improving SLIs to enable the intensive management of vulnerable risk factors by department <ul style="list-style-type: none">Establishing an intensive management system against repeated violations by newly establishing target management items for each department	Building a system with target management items	30	At all times	Adding target management items to Hi-SEs Web and building a management system		○												
	Collection and provision of integrated safety information based on the mobile safe work instruction system <ul style="list-style-type: none">Building and utilizing Safety-Work big data by integrating information from multiple systems	Building safety big data and expanding its use	30	At all times	Integrating work data of Hi-SEs/Mobile/NexFrame		○												
	Improving the executive capability of major accident prevention measures <ul style="list-style-type: none">One-stop and automatization (issuing mobile work instruction → identifying dangerous work → entering inspection results on mobile devices → automatic compilation by the system)	Establishing a systematic triple safety management system	40	At all times	Building a one-stop, automated system		○												
			100																
Activation of Field Worker-centered Risk Assessment	Establishing standard procedures for regular/ad-hoc/on-site risk assessments <ul style="list-style-type: none">Developing a guide tool to meticulously discover potential risks and worker behaviors	The rate of regular risk assessments performed to be 100%	30	At all times	Developing a guide tool for regular risk assessments within Hi-STANDARD		○												
	Establishing an ad-hoc risk assessment implementation system for all divisions (Design, Purchasing, Research, Shared) by expanding the concept of ad-hoc risk assessment	The rate of ad-hoc risk assessments performed to be 100%	30	At all times	Aggregating risk assessments conducted by each division		○												
	Activating the individual-level risk assessment based on the mobile safe work instruction system <ul style="list-style-type: none">Routinizing risk assessments by loading thought-provoking risk prediction questions on the mobile safe work instruction system	Routinizing risk assessments	40	At all times	Aggregating the number of site risk assessment cases on the mobile safe work instruction system		○												
			100																
Reinforcing the Management of Risks of Fluctuation according to Environmental Changes	Production of safety operation manuals for LNG and CNTR ships <ul style="list-style-type: none">Including ship type-specific risks (by space; violation cases) and work-specific safety standards/Providing information on mobile devices and in booklet form	Production of safety work manuals for major ship types	30	Annual	Developing a system to provide work manuals about safety/Publishing booklets		○												
	Development and operation of safety capability programs for foreigners <ul style="list-style-type: none">Providing site collective job training by nationality for effective training	Improving training effect	35	At all times	No. of site training cases per quarter		○												
	Conducting site safety coaching with subcontractor safety supervisors and safety supervisors	Improving foreigners' safety capabilities	35	At all times	Aggregating the number of foreigners' risk assessment cases in the mobile safe work instruction system		○												
			100																

Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Shipbuilding & Offshore Business Unit (Offshore)

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Customized Safety Management according to Fluctuations in Offshore-Shipbuilding Work Volume and Workforce	Reinforcing safety capabilities required for offshore projects and proactive accident prevention activities <ul style="list-style-type: none">Operating regular activity programs with clients for each offshore projectHolding integrated HSE meetings between Production Department and Safety Department (monthly)	At all times	10	At all times	Whether regular activity programs have been implemented		○												
		Monthly	20	Once a month	Whether monthly HSE meetings have been held	○													
	Conducting non-routine work risk assessments and improving work standards <ul style="list-style-type: none">In case of unplanned work, such as design changes, conduct a safety review in advance through risk assessment.Management of change (MOC) in response to fluctuations in Offshore-Shipbuilding work volume and workforce"	Confirmation of implementation in case of occurrence	20	-	Whether risk assessment has been conducted in case of emergency work		○												
		Confirmation of implementation in case of occurrence	20	-	Whether MOC has been implemented in case of changes in work volume or workforce		○												
	Activation of Production-Safety communication / Establishment of standards for improvement cases and using them as guidelines <ul style="list-style-type: none">Weekly safety performance (best practices and improvements) distribution and utilizing it as training materials for production departmentsEstablishing standards for improvement cases that can be applied horizontally and using them as guidelines	Weekly (50 times)	10	Weekly	Whether weekly safety announcements have been distributed and whether the Production departments provided training		○												
		Confirmation of implementation in case of occurrence	20	-	Whether standards have been established and made into guidelines		○												
			100																
Safety Inspections Based on Fundamentals and Standards and Enforcement of the Regulation	Taking safety measures before work as a safety practice <ul style="list-style-type: none">Intensive inspection in advance (as specified in the basic/work standards and PTW) before the start of work)	At all times	50	At all times	Whether inspections of safety measures before the start of work have been implemented		○												
	Fair and strict enforcement of regulations <ul style="list-style-type: none">Sustaining and improving safety execution capability through fair and strict regulation enforcementReview of golden safety rules for offshore yard; Revise the specialized golden safety rules for offshore project	Confirmation of implementation in case of occurrence	30	-	Whether golden safety rule violations have been inspected		○												
		Twice	20	-	Biannual		○												
			100																
Continuously Implementing Major Accident Prevention Measures	Reviewing the adequacy of the established major accident prevention measures and supplementing them by reflecting the characteristics of offshore projects <ul style="list-style-type: none">Allocating into high-risk work in the relevant department when a major incident occurs; establishing major accident prevention measures by reflecting the recurrence prevention measures	The rate of revision in the event of occurrence to be 100%	100	-	Whether major accident prevention measures have been established in the event of a major incident		○												
			100																



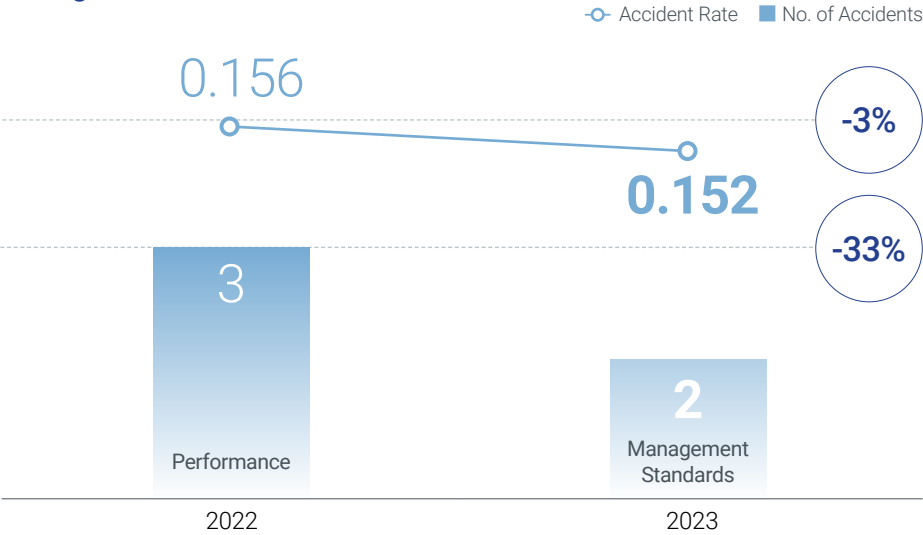
Safety and Health Objectives

Objective 1	Objective 2
Zero fatal accidents	Achieve an accident rate of 0.152 (2 cases) or below

Key Initiatives

- Advancing the safety management system centered on the prevention of fatal accidents
- Participation and routinization of risk assessments by all departments
- Improvement of subcontractors' safety and health management level

Management Indicators



Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Naval & Special Ship Business Unit

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Continuous Operation of the Safety Management System Centered on the Prevention of Fatal Accidents	Safety management for high-risk work																		
	• Reviewing and supplementing the adequacy of high-risk work by workplace and major accident prevention measures by department	Updating safety management plans for high-risk work	20	First quarter	Results of the adequacy review	○													
	• Safety golden rules/Applying the zero-tolerance policy against the violation of the Business Unit's priority risk management tasks	Whether a notice of rule violation has been issued	20	At all times	Performance in the issuance of rule violation notices		○												
	Work standards & Risk assessment																		
	• Conducting risk assessments based on the new work standards system	Conducting risk assessments	20	At all times	Operational status monitoring results (once every 6 months)	○													
Retaining Subcontractors' Safety and Health Level	• Making risk assessments for high-risk work mandatory (conducting ad-hoc/on-site risk assessments according to work and circumstances)	Conducting risk assessments for high-risk work (ad-hoc/on-site)	20	At all times	Whether risk assessments for high-risk work have been conducted (performance of the safety supervisors' journals)		○												
	Safety management for short-term work																		
	• Making PTW and preliminary risk assessments for high-risk work mandatory	Conducting risk assessments for short-term work	20	At all times	Status of the work journals and safety training for subcontractors		○												
			100																
	Safety and health management system																		
	• The safety management system for fatal accident prevention to be applied equally	-	-	-	-	○													
	- Conducting triple safety management for high-risk work and implementing the same work standards applied to the directly-controlled teams	Implementing the work standards system	15	To be completed by the end of the first half	No. of subcontractors' registrations made on the work standards system														
	• Intensive safety management for changed workforce according to the work circumstance of the Business Unit	-	-	-	-														
	- Safety management monitoring for the changed workforce (safety training, site safety management levels)	Implementing safety management for the changed workforce	15	At all times	Status of the work journals and safety training for subcontractors		○												
	Providing support for enhancing subcontractors' safety management capabilities																		
Establishment of Self-regulated Safety by Improving the Level of Safety Culture	• Providing visiting safety training	Providing training for new recruits and changed workforce	15	At all times	Whether on-site safety training has been provided (performance of the journals of safety supervisors)		○												
	• Holding regular meetings for safety supervisors and sharing safety information	Holding meetings	15	Monthly	Whether meetings have been held (monthly)	○													
	Evaluating and Incentivizing subcontractors' safety management capabilities																		
	• Feedback management through regular technical guidance and assessments	Providing technical guidance	15	Quarterly	Whether technical guidance has been provided (biannual)		○												
	• Selecting and rewarding outstanding subcontractors/safety supervisors	Capacity assessment and incentivizing	15	At all times	Subcontractors (quarterly), safety supervisors (biannual)	○													
	Safety communication																		
	• Hearing subcontractors' safety and health improvement proposals and providing feedback	Hearing subcontractors' opinions and managing improvements	10	At all times	Status of the opinion hearing from the Naval & Special Ship's subcontractors		○												
			100																
	Building a system to improve safety culture																		
	• Assessing the level of Business Units' safety culture	-	-	-	-	○													
	- Conducting surveys on safety consciousness and behavioral changes by position	Conducting surveys	20	First quarter	Survey results														
	• Developing safety activities by level of safety culture	-	-	-	-														
	- Conducting safety activities in the promotion, participation, and incentivization stages	Conducting safety activities by stage	30	At all times	Promoted (33%), participated (67%), incentivized (100%)														
	Vitalizing the discovery and mitigation of hidden high risks																		
	• Providing worker-centered guidance to identify hidden high risks and incentivizing best practices	Identifying hidden risks and incentivizing best practices	30	At all times	Results of the best practice selection and incentivization														
	• Implementing fundamental improvement activities through design feedback	Implementing design feedback	20	At all times	Whether implemented														
			100																



Management Objectives of the Engine & Machinery Business Unit for 2023

Safety and Health Objectives

Objective 1	Objective 2	Objective 3
"World's best safe engine maker" achieved by everyone together	Sustain the fatal accident-free workplace	Achieve an accident rate of 0.106 or below

Management Indicators



* The Engine & Machinery Business Unit achieved 0.111 (3 cases) against its disaster management standards (3 cases, 0.112) in 2022. It set the same objectives for 2023.



Detailed Action Plans to Achieve 2023 Safety and Health Management Objectives

Engine & Machinery Business Unit

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Intensive Gas Safety Management	Strict compliance with the job standard procedure when operating gas facilities <ul style="list-style-type: none">• Reviewing job standard procedures per unit work (operation/repair of gas facilities)• Strictly implementing risk assessments for gas facility maintenance	Establishing job standard procedures and managing revisions	20	Biannual	Performance of job standard procedure inspections and risk assessment (periodic) for gas facility operations		○				→						→		
		Review of the adequacy of manuals/ Conducting ad-hoc risk assessments	10	At any time	Performance of the adequacy review of manuals and risk assessments for out-of-flow work		○	→											
	Strict management of PSM operability <ul style="list-style-type: none">• Realizing unified management by forming an organization dedicated to PSM facility management• Fostering professional staff through specialized training courses	Establishing a plan to form a dedicated organization	10	Annual	Performance in forming an organization and establishing an organization management plan		○	→											
		Staff completing specialized training courses	10	Annual	Whether trainees have completed training courses		○	→											
	Thoroughly inspecting gas facilities' safety devices/detectors <ul style="list-style-type: none">• Establishing an early notification system in preparation for safety device/detector failure• Thorough inspection according to the gas facility safety rating	Completion of the establishment of an early notification system	10	Biannual	Whether an early notification system is established		○				→						→		
		Establishing a safety check system according to the gas facility safety rating	10	At all times	Whether a safety rating system is established and inspections conducted		○	→											
	Thoroughly inspecting firefighting facilities and conducting emergency drills <ul style="list-style-type: none">• Thoroughly inspecting firefighting facilities in gas-operating areas• Rigorous emergency preparedness training	Checking and keeping firefighting equipment in good working condition	20	Monthly	Firefighting equipment inspection performance against the plan by department	○						→							→
		Strengthening emergency preparedness and response capabilities	10	Biannual	Implementation against the emergency response training plan	○					→						→		
			100																
Rigorous Management of High-risk Work	Inspection of compliance with job standard procedures for major accidents <ul style="list-style-type: none">• Rigorously checking whether standard work is implemented on site• Rigorously checking whether changes in standard work have been reflected in Hi-STANDARD	Managing the implementation of preventive and recurrence prevention measures against major incidents	10	Weekly	Performance of site inspections on the implementation of standard work according to the list of past major accidents (or plans)	○		→											
		Conducting safety work according to the job standard procedure	10	Weekly	No. of inspections on whether Hi-STANDARD has been reflected in work at risk of major incidents and whether the procedures have been observed	○		→											
	Conducting special and priority control over 4H work <ul style="list-style-type: none">• Intensive inspections of 4 major high-risk works (high, heavy, hidden (fire/explosion), and hot (molten metal))• Strictly managing the performance of high-risk work according to the standard and executing high-risk management tasks	Intensive inspection and management of 4H work	20	Quarterly	Intensive inspection of 4H work; managing violators of Engine Unit's 10 safety rules		○			→			→			→			→
		Managing the implementation of prevention/ recurrence prevention measures against fatal accidents by each department	20	At all times	No. of inspections on the implementation of major accident recurrence prevention measures by department	○		→											
	Rigorous implementation of the QR-based triple safety inspection for high-risk work <ul style="list-style-type: none">• Checking whether QR-based triple safety inspections have been conducted for high-risk work• Expanding the application of QR-based safety inspections to equipment operations and hazardous substance management	Establishing a QR-based mobile triple safety inspection system	10	At any time	Performance in the QR-based system establishment and registration	○		→											
		Expanding the application of the QR system to high-risk work	10	At any time	Performance in the QR system establishment and registration of high-risk work in the system	○		→											
	Rigorous implementation of the identification of potential high risk <ul style="list-style-type: none">• Supporting ideas to eliminate potential risks• Supporting the Production Departments' safety improvement in their Hi-SAFE activities	Rigorous identification of potential risks	10	Monthly	No. of potential risks identified	○		→											
		Cooperating in the removal of high-risk factors through safety improvement support	10	Biannual	Performance in the registration of safety improvements in the Hi-SAFE system and implementation by department	○						→							→
			100																

Main Activities	Implementation Plan	Objectives	Weight	Implementation Cycle	Assessment Indicators and Criteria	Classification		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
						Qualitative	Quantitative	1	2	3	4	5	6	7	8	9	10	11	12
Establishing a Safety Culture through Communication and Training	Rigorous safety improvement activities by reflecting employees' opinions <ul style="list-style-type: none">Rigorously holding meetings by production divisionsReviewing the safety management satisfaction level through safety surveys	Communicating and improving site safety by reflecting employees' opinions	40	Monthly	Performance in the number of monthly safety meetings held	○													
		Supplementing and improving flaws in the safety management system	10	Biannual	No. of safety surveys conducted and the participation rate (50%)	○													
	Rigorous expansion of safety training facilities <ul style="list-style-type: none">Expanding VR safety experience facilitiesDeveloping instructional materials and rigorously providing training in line with an increase in the number of foreign workers	Raising risk sensitivities through VR training	10	Annual	Performance in the VR experiential training facility establishment and provision of training to target employees		○												
		Preventing safety accidents for vulnerable groups	10	At all times	No. of instructional materials produced and training provided for foreign workers	○													
	Rigorous feedback on employees' opinions <ul style="list-style-type: none">Rigorous feedback on meeting/survey resultsIncentivizing those who proposed excellent high-risk/safety improvement ideas	Rigorous feedback on employees' opinions heard	20	Monthly, Biannual	Performance in action taken for the opinions heard	○													
		Discovering excellent improvement ideas	10	At any time	Reward performance for excellent improvement cases by department	○													
			100																

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