Port of Ulsan, implementing a comprehensive safety network for port industry

- Based on safety augmentation cases of Ulsan Port
Ulsan Port Overview

Ulsan Port has developed into an industrial port that supports the automobile, shipbuilding, and petrochemical industries located in the national industrial complex. It has world-class petrochemical complexes, oil refining companies, and large-scale liquid cargo storage facilities.

This port processes 33.8% of the country’s liquid cargo and 41.05% of its crude oil in South Korea, making it the largest liquid cargo handling port in Northeast Asia. 1st in Korea and the 4th largest in the world.

World-class port
The Ulsan Port Authority manages the world-class liquid cargo handling port and the largest industrial support port in Korea, establishing a comprehensive safety network to ensure the safety of both port facilities and users.
Ulsan Port Authority implements specialized safety management plans with the vision of establishing a safe Ulsan Port.

"Vision for Safe Ulsan Port"

Maintain ZERO Major Accidents

**Strategy Goal**: Achieve Sustainable Management

**Task**: Establish the safest port

**Task Details**:

- Port Industry Safety Network
- Disaster response system

Strive for a goal of ZERO major disasters!

- Prepare for explosions of hazardous materials
- Prevent Safety Accidents in the pier
- Strengthen safety of ship navigation

UPA CEO KIM JAE GYUN
Ulsan Port annually hosts domestic and international harbor safety conferences to disseminate its excellent safety management plans and port safety culture around the world.

Ulsan Port Port-Safety Conference (International/Domestic)

Objectives and Progress Reports (2017-2022)

- Regularization of port safety conferences to enhance awareness of the importance of port safety
- Contribution to sharing domestic and international port safety management strategies and spreading safety culture.
Introducing the safety culture of Ulsan Port that embraces the safety of "port facility, workers, and vessel" to achieve ZERO major disaster port.
Contents
Establishing a comprehensive safety network of port industry

Chapter 01
Preparing for a chemical explosion
Enhance Information Management during Port Entry
Joint Response System for Chemical Accidents at sea
Ship Training Programs for firefighting personnel

Chapter 02
Preventing safety accidents
Eliminate blind areas
Identifying and improving safety factors
Develop Port Safety Measurement Tools

Chapter 03
Strengthening safety of ship navigation
World's first AI-based ship mooring monitoring system
Corner protection device (patented)
Real-time safety communication platform
Joint response system of “private-public” sectors for hazardous material explosion accidents

Ulsan Port’s ‘Marine Safety Belt’ Campaign

In case of an explosion

Previous: Individual response (organization, company)

Current: “private-public” sectors joint response

Systematic and prompt response

Standard dock entry information system of dangerous goods:

- Ulsan Port Authority
  - Send Stowage plan
- Pier operator
  - Provide information in advance

Inbound ships

Training land-based rescue personnel on ship structures and equipment

Training land-based rescue teams to enhance their ability to respond to incidents such as liquid cargo vessel fires and maritime chemical accidents.
Prepartion for hazardous materials explosion accidents

Organize and operate Ulsan Port “Marine Safety Belt”

“Marine Safety Belt,” an Ulsan Port Safety Community, led by UPA, led by Ulsan Port-related public institutions and the private sector,

<table>
<thead>
<tr>
<th>Year</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>UPA-led, 13 organizations participated in building “marine safety belts” and conducting joint training on accident</td>
</tr>
<tr>
<td>2015 - 2017</td>
<td>Production of tanker vessel safety guidelines, safety training for loading master, and establishment of a disaster response Collaboration system, etc.</td>
</tr>
<tr>
<td>2018 - 2019</td>
<td>Expansion of participating institutions (17 institutions) Reinscribing dangerous goods accident prevention training such as dangerous goods worker tour training</td>
</tr>
<tr>
<td>2020 - 2021</td>
<td>Expansion of alcohol-resistant fire extinguishing agent Advancement of Dangerous goods pier entry information</td>
</tr>
<tr>
<td>2022</td>
<td>Reinforcing a cooperative system for joint response to maritime chemical accidents, such as production of ship engine safety guides, etc</td>
</tr>
</tbody>
</table>

Establishment of a joint response system in preparation for an explosion of hazardous materials based on the Ulsan Port disaster safety collaboration system

Participating organization in marine safety belts

- A total of 18 organizations, businesses and organizations participated up until 2022
  - [Public] Ulsan Metropolitan City, Ulsan Regional Maritime Affairs and Fisheries Office, Ulsan Maritime Police Station, Ulsan Port Authority, Korea Maritime Environment Corporation, Ulsan Port and Maritime Traffic Control Center, Safety and Health Corporation,
  - Korea Maritime Transportation Safety Authority, Korean Register of Shipping, Maritime Dangerous Goods Inspector
  - Organization Ulsan Port Pilot Association, Korea Tugboat Cooperative, Ulsan Port Tank Terminal Association, Ulsan Port Labor Union, Korea Shipping Association,

Main activities

- Preparation of safety measures related to Ulsan Port
- Conducted joint drills to respond to maritime chemical accidents
- Production and distribution of safety training materials

Establishment of private + public collaboration system and activities to strengthen joint disaster response capabilities

Reinforcement of Ulsan Port-related organizations and companies accident response capabilities and systematic and prompt response in case of an accident
Prepartion for hazardous materials explosion accidents

Marine Safety Belt activities | Completion of private, public, and public communities in preparation for maritime chemical accidents and expansion of response equipment

Reinforcement of joint disaster response system and expansion of disaster response equipment through joint education with maritime safety belt participating organizations

<table>
<thead>
<tr>
<th>April 2021</th>
<th>May 2021</th>
<th>July 2021</th>
<th>November 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation of target vessels for business participation And on-site meeting</td>
<td>Establishment of plan to expand alcohol-type foam fire extinguishing agent and response equipment</td>
<td>Production of training materials for seafarers related to the operation of foam fire extinguishing systems for harbor tugboats</td>
<td>Alcohol-resistant fire extinguishing agent (48 tons) loading of tugboats (11 vessels) and operation training of fire extinguishing equipment</td>
</tr>
<tr>
<td>Joint training in response to complex disasters due to chemical product carrier explosion and fire</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Start of 2019</th>
<th>2020 (1st project)</th>
<th>2021 (2nd project)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Resource</td>
<td>Budget support</td>
</tr>
<tr>
<td>Fire extinguishing agent</td>
<td>39.7 tons</td>
<td>69.7 tons</td>
<td>UPA</td>
</tr>
<tr>
<td>Mobilizable ship (coast police)</td>
<td>14 ships</td>
<td>KRW 180 million</td>
<td>25 ships (+20 ships/spare ships)</td>
</tr>
</tbody>
</table>

Reinforcement of community systems such as private, public, and public joint training

Expansion of disaster response equipment (Fire extinguishing agent, fire suppression vessel, budget, etc.)

Reinforcement of first responding ability to maritime chemical accident

Simultaneous initial response for up to 3 fire-stricken vessels
Prepartion for hazardous materials explosion accidents

Advancement of dangerous goods entry information

Establishment of a standard system for exchanging safety information such as pier information and loaded cargo information between pier ↔ ship when dangerous goods enter the pier

- **July 2021**: Dangerous goods entry into port information advancement research service commenced
- **August 2021**: Organize a TF and hold a workshop to advance dangerous goods entry into port information
- **December 2021**: Production and distribution of arrival information guide for Ulsan Port dangerous goods terminal by company (16 companies)

Improving the level of safety management of dangerous goods in the port through advanced dangerous goods entry into port information

- **Establishment of standard system for dangerous goods pier entry information**
  - Advancement of dangerous goods handling terminal arrival information (16 companies)
    - Including terminal-specific safety management plans, emergency response procedures, and safe navigation information
  - Changes to the cargo information reporting system for vessels entering port
    - (Previous) Report only unloading cargo information → (Change) Report all cargo

- **Production and distribution of the latest safety checklist between ships and terminals**
  - Provide step-by-step checklist for unloading ship/terminal
    - Latest international guide (ISGOTT 6th) such as detailed procedures and preventive measures for each task reflected
  - #ISGOTT: International Safety Guide for Oil Tankers and Terminals

Improvement of internal safety standards by establishing a standard system for port entry information and creating a safety checklist

- Rapid cause analysis and response is possible while preventing accidents, in the event of an accident.
Prepartion for hazardous materials explosion accidents

Ship rescue/equipment familiarization training for onshore rescuers

Conduct ship rescue and equipment familiarization training to strengthen the ability of land rescuers to respond to maritime ship accidents

- July 2021
  Provide self-produced training materials for emergency rescue personnel (coast police, firefighting)

- August 2021
  Ulsan main port local adaptation joint training for new firefighters

- August 2021
  Joint training in response to complex disasters caused by chemical product carrier explosions and fires

- December 2021
  Customized training for firefighting and coast guard rescuers (ship structure and fire extinguishing equipment, etc.)

Ship familiarization training activities for emergency rescue agencies (coast police, firefighting) → Enhancement of ship disaster response capabilities

- Support for local adaptation training for firefighters in preparation for disasters
  - Inspection of firefighting access roads, high-performance equipment utilization plan, firefighting facilities, etc.
  - Support for waterproof work training in preparation for large ship fire (1 session/26 people)
    - Fire extinguishing procedure proficiency training according to the response procedure manual

- Customized ship structure/facility familiarization training support
  - Conduct specialized training on ship rescue and firefighting equipment (3 times/74 people)
    - Joint training to maintain land and sea (firefighting/coast guard) cooperation system
  - Preparation of educational materials to enhance understanding of ship rescue/firefighting equipment
    - Ship/firefighting drawings, ship firefighting equipment (movable/fixed), etc.

Reinforcement of capacity to respond to maritime chemical accidents through customized ship structure/facility training for onshore rescuers who are not familiar with ship rescue
Prepartion for hazardous materials explosion accidents

Representative case of Joint Response Training for Marine Chemical Accident

Performed joint response training for marine chemical accident with participation of global liquid freight shipping company (STOLT TANKERS)

- Training to enhance joint response training for marine chemical accident based on accidents in the past

**Accident cases**
- 2019, Ulsan Port
  - An accident leading to a massive fire starting from ship tank coming into port
    - Extinguished fire within only 18 hours quickly thanks to cooperation system at the Ulsan port

**Accident overview**
- Need to improve response capacity to marine chemical accident
  - Quick corresponding measures shall be established by improving accuracy of reporting information of hazard materials
  - Initial response abilities to accidents through operation trainings shall be enhanced

**Matters to be improved**

**Training Situation**

- Video is accompanied separately

- Ship(Vessel)
  - Response training inside of the ship
    - Training to cope with fire and injured & isolated persons in the ship

<table>
<thead>
<tr>
<th>Initial response</th>
<th>Control of spillage oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving lives and Putting out fire</td>
<td>Prevent hazardous materials from leaking into sea</td>
</tr>
</tbody>
</table>

**Major achievement: Enhanced joint response ability for hazard material explosion accident**

- Enhance response capacity by conducting training specialized for explosion accident of hazardous materials after reflecting characteristics of the Ulsan Port with heavy quantity of goods transported
- Improve manual by conducting simulation by identifying possible problems in real situations in advance
Prepartion for hazardous materials explosion accidents

Representative case of Joint Response Training for Marine Chemical Accident

Pictures taken at the joint response training for marine chemical accident with the global liquid freight (STOLT TANKERS)

- Fire extinguishment inside of ship
- Response to marine accidents by fire-fighting teams or resources
- Lifesaving
- Fire extinguishment at sea
- Composition of response headquarters at on-site accidents
- Fence establishment for preventing and combating marine accidents
Preliminary discovery and improvement of port safety hazards

Ulsan Port “Industrial Safety Guidance Team” Activity

Consultation with professional safety instructors
Voluntary safety management activities

Prevention of safety accidents in advance

Establishment of an inclusive safety net without safety vulnerable groups

Ulsan Port “Industrial Safety Guidance Team” Activity

Continuous education through production of education and operation of training center for the underprivileged in training (racing, rowing, temporary port entrants, etc.)

Building an inclusive safety net without blind spots

Development of unloading safety measurement index “Unloading safety index”

Ulsan Port “Industrial Safety Guidance Team” Activity

Safety measurement | Safety quantification | Safety reflux

Reinforcing safety management of loading and unloading at Ulsan Port
Evolution of port industrial accident prevention and safety management system, “Industrial Safety Guidance Team”

Ulsan Port Safety accident prevention collaboration system between professional safety instructors and voluntarily participating port companies “Industrial Safety Guidance Team”

June 2016

- Industrial accident prevention patrol
  - Collaboration with related organizations to prevent industrial accidents in the port loading and unloading industry Deploy patrol
  - Conduct safety improvement activities through creating and checking checklists such as safety and health management systems, and notification of actions to be taken

Establishment of safety measures according to checklist-based inspection and notification of actions taken by an external professional organization (Occupational Safety and Health Agency)

- Professionalism is high, but port community spontaneity is low

July 2018

- Introduction and operation of ‘3R and 5S’
  - 3R (Right Location, Right Product, Right quantity), 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke)
  - Port safety, environment, and security hazard management through port area environment maintenance, etc.

*Japanese word for Organization, Tidying, Cleaning, Cleanliness, habituation

- Establishment of stevedores, port labor union, and UPA collaboration system
- Based voluntary program activities promotion
- Advancement of improvement activities through expert advice such as external consulting
- Establish and proceed with expert consulting plan separately Requires constant professional consulting

2020~

- Operation of Industrial Safety Guidance Group
  - Appointment of external experts, development of safety support activities
  - Establishment of a comprehensive safety consultative body for the port industry, including port hinterland complexes other than quay operators (39 tenant companies, 30 terminal operators, etc.)
  - Port safety management through voluntary discovery and improvement of safety risk factors by the port community

- with direct, constant safety support through the appointment of an external expert safety instructor

Occupational safety expertise enhancement

Preliminary inspection and improvement of hazards through improvement of voluntary safety such as expansion of participation in the port community, etc.
## Occupational Safety Guidance Group activities

**Safety hazard discovery results and representative cases of improvement**

**Improvement of port safety through constant identification of safety risk factors and practical improvement of the port-based industrial safety guidance team**

<table>
<thead>
<tr>
<th>Improvement factor discovery</th>
<th>Risk assessment</th>
<th>Safety training</th>
<th>Basic · Safety</th>
<th>Machine · Equipment</th>
<th>Electricity · Device</th>
<th>Fall · Dro facility</th>
<th>Fire · Explosion · Leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 cases including promotion of effective risk assessment</td>
<td>6 cases including thorough on-site safety training</td>
<td>27 cases including work area arrangement</td>
<td>19 cases including control and autonomy within conveyor belt facilities</td>
<td>12 cases including light tower collision protection measures</td>
<td>4 cases including installation of toe guards on aerial work platforms</td>
<td>27 cases of safety measures including installation of oil dikes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General cargo port site</th>
<th>Liquid cargo port site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Improvement factor discovery</strong></td>
<td>Arranging work zones, securing traffic safety</td>
</tr>
<tr>
<td><strong>Management system improvement</strong></td>
<td></td>
</tr>
</tbody>
</table>
Safety accident prevention activity

Occupational Safety Guidance Group activities | Reinforcement of inclusive safety management for safety vulnerable groups

Resolving safety blind spots due to lack of safety education, and reduction of life-threatening accidents and serious accidents by production of safety education videos and implementation of education by industry

Production of customized safety training videos for each industry

Implementation of customized safety training for each industry

Problems
In the case of lineman and cargo fixer, they were in a dangerous work group, but were in a blind spot for safety due to the lack of safety education content.

Improvement
Production and distribution of safety training videos for port-related service businesses (lineman, cargo fixing business)
Implementation of customized safety training for each industry

Establishment of an inclusive safety net for the safety-vulnerable class and those excluded from safety education
Safety accident prevention activity

Occupational Safety Guidance Group activities | Reinforcement of inclusive safety management for safety vulnerable groups

Enhancing the safety of all workers in the port by providing safety training for temporary visitors to the port who are not subject to compulsory training

Before

☑ Inadequate management of temporary visitors (many daily workers) and safety training in port workplaces
  • Absence of grounds for compulsory safety training other than port service workers (according to the current ‘Port Transport Business Act’)

After

☑ Implementation of compulsory training for dockers
  • Implementation of regular compulsory education for all workers entering and exiting the port
    - Temporary accessor safety training program design
    - Education place maintenance (2021.10) → Training is possible at all times even for one visitor

Establishment of training programs and permanent training centers for all port workers

Monthly average
1,729 people

Yearly
20,748 people

Can use training rooms
Development of “Unloading Safety Index” I Representative case of comprehensive port safety management

Development of the first domestic port safety index measurement tool through subdivision and quantification of port safety measurement factors

(Background) As industrial accidents continue to occur in ports, the demand for public institutions’ countermeasures for port loading and unloading safety management is expanding.

(Before) The number of industrial accidents in the port sector, which is compiled by the Port Logistics Association, is the standard for accident prevention due to the absence of quantitative indicators of loading and unloading safety.

Comprehensive diagnosis of loading and unloading safety level at Ulsan Port and development of measurement tools capable of providing feedback

Apr 2022
Establishment of safety management system and consultation on loading and unloading safety index design
Composition of working group by cargo

Sep 2022
Pier operator safety level diagnosis Statistical data collection (1st)

Dec 2022
Safety index for each pier operator Data research for calculation (2nd)

Dec 2022
Hold the final briefing session on the development/calculation of loading safety index

Cooperating institutions

Participation of 13 companies located in Ulsan Port

Development of “Unloading Safety Index” I Representative case of comprehensive port safety management

Derivation of detailed elements (budget, person in charge, training, accident rate) required for port safety management and formula-based safety index section setting

Unloading safety index = \[\sum_{i=1}^{7} \text{Weight} \times \text{each element formula}\]

<table>
<thead>
<tr>
<th>Category</th>
<th>Safety budget investment rate</th>
<th>Safety budget execution rate</th>
<th>Percentage of safety and health managers</th>
<th>Safety and health related education support rate</th>
<th>Number of on-site safety inspections</th>
<th>Safety inspection improvement rate</th>
<th>Increase and decrease in fatal accidents compared to the previous year</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response average</td>
<td>6.05</td>
<td>6.11</td>
<td>6.11</td>
<td>5.32</td>
<td>5.34</td>
<td>5.47</td>
<td>5.63</td>
<td>40.03</td>
</tr>
<tr>
<td>Normalization (weight)</td>
<td>0.151</td>
<td>0.153</td>
<td>0.153</td>
<td>0.133</td>
<td>0.137</td>
<td>0.141</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Health and Safety Budget Investment Ratio Score = \[\text{Weight} \times \frac{100}{15} \times \left(\frac{\text{Safety budget}}{\text{Institutional budget}}\right)\times 100\]

Health and Safety Budget Execution Rate Score = \[\text{Weight} \times \left(\frac{\text{Actual executive budget}}{\text{Health and safety budget}}\right)\times 100\]

Percentage of Safety and Health manager Score = \[\text{Weight} \times \frac{100}{5} \times \left(\frac{\text{No. of safety and health managers}}{\text{Total number of employees in the institution}}\right)\times 100\]

Safety and health related education support rate score = \[\text{Weight} \times \left(\frac{\sum_{i=1}^{n}(\text{Statutory training hours} \times \text{number of completed students}) \times 0.5 + \sum_{i=1}^{n}(\text{Statutory training hours} \times \text{number of completed students})}{\text{Expected education hours per person} \times \text{number of port transportation workers}}\right)\times 100\]

On-site safety inspection score = \[\text{Weight} \times \frac{100}{24} \times (\text{Number of safety inspections conducted at unloading work sites})\]

Safety inspection improvement implementation rate = \[\text{Weight} \times \left(\frac{\text{Number of improvements}}{\text{On-site safety inspection pointed out}}\right)\times 100\]

Fatal accident compared to previous year

\[\begin{align*}
\text{Formula 1} & \text{ if decreased from previous year} \\
\text{Weight} \times \frac{10}{6} \times \left[30 + \left\{ \frac{1}{6} \times \left( \frac{\text{Previous year}}{\text{Previous year}} \times 1 + \frac{\text{Previous year}}{\text{Previous year}} \times 1 + \frac{\text{Previous year}}{\text{Previous year}} \times 1 \right) \right\} \times 7 \right]
\end{align*}\]

Ulsan Port Safety Index = 100 pts

<table>
<thead>
<tr>
<th>Index</th>
<th>Point</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
<td>90~100 pts</td>
<td>Over 90 pts</td>
</tr>
<tr>
<td>Good</td>
<td>80~89 pts</td>
<td>80 pts</td>
</tr>
<tr>
<td>Normal</td>
<td>70~79 pts</td>
<td>70 pts</td>
</tr>
<tr>
<td>Inadequate</td>
<td>50~69 pts</td>
<td>50~60 pts</td>
</tr>
<tr>
<td>Bad</td>
<td>~49 pts</td>
<td>Under 50 pts</td>
</tr>
</tbody>
</table>
Artificial intelligence-based vessel berthing accident prevention Around View Intelligence System for Ship”

Utilization of AI technology, support for smart berthing

- Prevention of accidents caused by human error when berthing a ship

Patented “Corner protection device” for night navigation and enhanced berthing safety

- Buffer function when docking a ship
  - Equipped with LED light
  - Reinforcement of the safety of ship navigation at night

Two-way & real-time SNS safety communication window “Ulsan Port Safety Keeper”

- Ulsan port weather and disaster information provision
  - Receipt of safety hazards such as real-time accidents
  - Increased safety and convenience for vessels using Ulsan Port
Utilization of the Around View Intelligence System for Ship (AVISS)! The world’s first AI-applied vessel docking monitoring system

Reinforcement of vessel berthing safety through the development of the world’s first AI-applied vessel berthing monitoring system

Around View Intelligence System for Ship technology development background

When a ship enters a port, it depends on the eyes of the sailor and crew. Vessel docking and unloading is done only with experience and intuition. The possibility of human error always exists.

Development of a safe quay docking and unloading support system for ships using artificial intelligence technology.
Utilization of the Around View Intelligence System for Ship (AVISS) - The world’s first AI-applied vessel docking monitoring system.

Supports safe navigation from entry to departure of the ship through real-time provision of automatic analysis of the AI berthing vessel and surrounding environment.

**AVISS introduction**
- Provides real-time situation information through automatic analysis of the surrounding environment of the ship docking based on AI technology.
- Provides port operation assistance data from vessel entry to departure to increase operational efficiency and safety.

**AVISS process**
- Acquire information
- Information analysis & data transmission
- Real-time information web service

**Diagram**
- Sensor module
- Wireless communication / server
- PC & Mobile
Utilization of the Around View Intelligence System for Ship (AVISS)

The world's first AI-applied vessel docking monitoring system contributes to achieving ZERO accident at Ulsan Port

Key Achievements of Around View Intelligence System for Ship (AVISS)

0 Achieving ZERO accidents occurrence when berthing ships
   Reduction of port facility maintenance expenses such as replacement of insect repellents and pier damage repair

1 Developed the world's first AI-applied vessel docking assistance system
   Implementation of advanced port safety using digital technology

Representative cases of introducing major ports nationwide

- Incheon Port
  - Incheon liquid vessel quay

- Ulsan Port
  - Ulsan liquid quay
  - Ulsan Yanggok quay

- Yeosu/Gwangyang Port
  - Jungheung quay
  - Nakpo quay

3EA

5EA

2EA
Port detachable corner protection device | Development of UPA patented safety device to support ship navigation at night

 Contributing to improving night navigation safety and berthing safety of ships in the port and reducing port facility maintenance costs

Development of Port detachable edge protection device, technology and domestic patent application

Sep 2021

Obtained a domestic patent for Port detachable edge protection device

Jan 2022

Applied international patent for Port detachable edge protection device

Sep 2022

Prototype production and installation work carried out for Port detachable edge protection device

Feb 2023

Complete installing prototype of Port detachable edge protection device

Prevention of ship safety accidents during night navigation in Ulsan Port – Contributing to the establishment of a safe port

Port removable edge protector facility structure

Facility features

- Detachable structure (Feature) Modular structure allows each part to be separated
- Upper cover: Equipped with shock absorber function such as adjuster spring and aluminum bar
- Equipped with a light to output light at night
Port detachable corner protection device | Development of UPA patented safety device to support ship navigation at night

Contributing to improving night navigation safety and berthing safety of ships in the port and reducing port facility maintenance costs

Before
- Port facility edge simple protection function
- In case of partial damage, maintenance of the entire facility is required → Excessive maintenance period and cost

After
- Prototype of patent edge protector
- Example of LED lighting at night
- LED lighting facility
  - Supporting ship navigation safety at night and strengthening berthing safety
- Buffer system (internal spring)
  - Reinforcing ship docking safety, minimizing damage to port facilities
- Detachable structure (module design)
  - Replace damaged parts only → Quick and economical maintenance

Existing edge protection

Establishment of Onsan Pier 1 in Ulsan Port
Established and operated “Ulsan Port Safety Keeper”, a real-time and two-way safety communication channel for safe navigation of ships, such as utilization of SNS platform, disaster safety information and weather information at Ulsan Port.

Introduction background

(Previous) Port operation information and weather information are provided on the website to prevent safety accidents and improve customer service at Ulsan Port.

(Problem) Information can be obtained only through website access, and it is difficult to respond immediately to disaster safety related issues.

Improvement operation

(Improvement) Use of SNS platform → Provide real-time information → Two-way communication → Disaster safety issues Immediate response and Reinforcing Safety Accident Prevention
Strengthening Ship Safety


Weather Info
- Provide local weather information for Ulsan Port
- Weather (wind speed/wind direction/wave height/atmospheric pressure/precipitation, etc.)
- Typhoon information provided (by 4 hours)
- Big data-based storm and flood disaster response

Port Info
- Notification of control/resumption of Ulsan Port due to bad weather, etc.
- Provision of port operation information (pilot/berth operation, etc.)

Disaster & Safety Homepage
- Connection to Safety Report Center
- Receive/respond to safety hazards in real time
- Communicate port operation information (anchor control, etc.)

Safety ‘Hot-Line’
- Connection to Safety Report Center
- Receive/respond to safety hazards in real time
- Communicate port operation information (anchor control, etc.)

Real-time counseling channel operation
- Provides real-time consultation on weekdays from 9:00 to 18:00

Service Users
- 2019: 689 people
- 2022: 1,677 people

Messages Received
- 2019: 7,421 messages
- 2022: 233,397 messages

Activation of real-time two-way communication platform

01 Operation of real-time disaster safety information provision channel
- Increased safety and convenience of vessels using Ulsan Port

02 Operation of two-way communication system
- Strengthen on-site monitoring
- Improving the level of disaster prevention management at Ulsan Port
Ulsan Port Authority will embrace the safety of Ulsan Port's facilities, workers, and ships, and further protect the country's assets and the safety of its citizens.