

HD HYUNDAI MARINE SOLUTION



Beyond Waves, Beyond Boundaries

Greetings

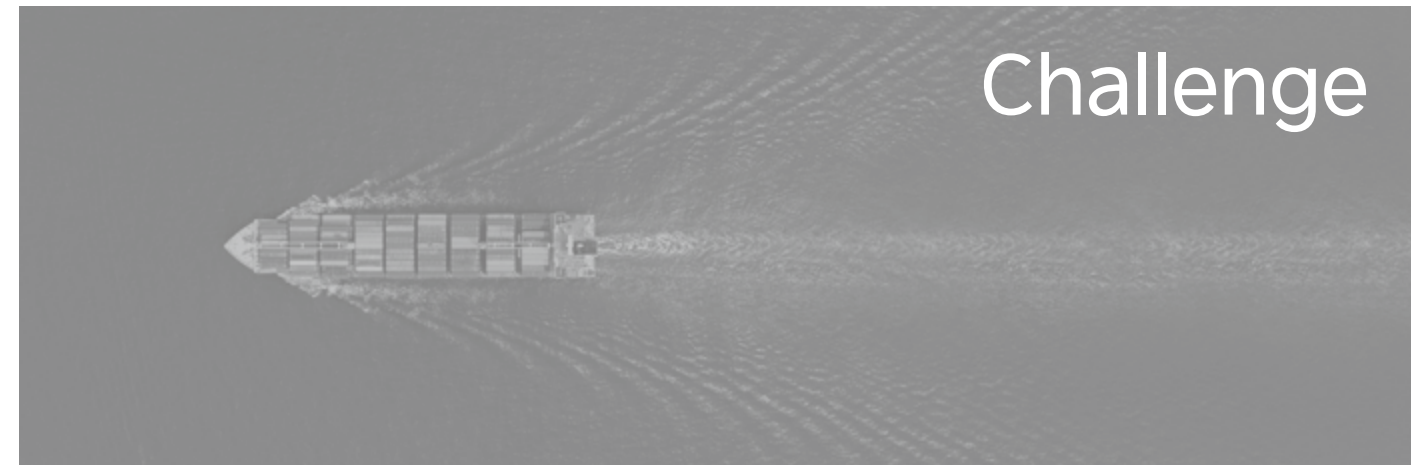
"We support our clients to maintain ships eco-friendly."

HMS was established as an independent company in 2016 to become a global aftermarket (AM) service provider in the shipbuilding and marine industries. HMS's business division was formed by integrating shipbuilding, engine & machinery, electro-electric systems division and other facilities that had been operated separately within HD Hyundai Group (formerly HHI Group). HMS always endeavors to provide the best ship engineering services to its customers based on HD Hyundai Group's 50 years of expertise and our keen insight.

We aim to embark on our next chapter as 'a sole marine comprehensive solutions company' under the new brand name of 'HD Hyundai Marine Solution.' HMS has been leading AM market by establishing new business models for ship SmartCare and supporting fleet management in marine and engine spare-parts based on organic partnership. In line with global trends such as de-carbonization and digitalization of ships, we provide optimal eco-friendly retrofit solutions, e.g. DF engine, LNG re-liquefaction, AMP, etc. and digital solution 'OceanWise' by data AI technology convergence. HMS also constructs a Key Account Management (KAM) team, to foster close-knit relationships and tailor solutions in order to meet the needs of our clients.

HMS now takes a leap forward with these aspirations. While further expanding our influence within the AM business, we aim to drive global ship trends through green retrofit projects and become unrivaled company with maritime big data around the world. To achieve this goal, we are strengthening our global network by advancing overseas logistics centers and continue to invest in R&D to respond to environmental regulations. Furthermore, HMS enriches the parts & service value chain through vertical integration and appropriate acquisition, and strive to preserve company's market competitiveness. HMS is the only company in the market that provides a one-stop-shop and will secure its position as a total solution provider in marine industry.

K. D. Lee, President & C.E.O.

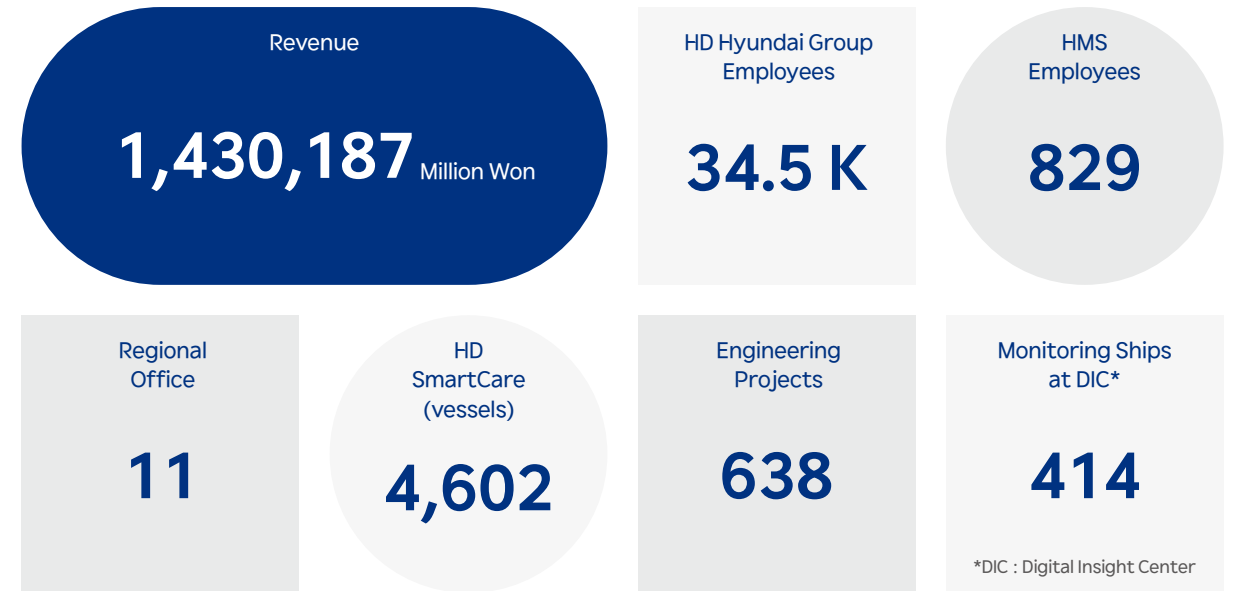


Scope of Business



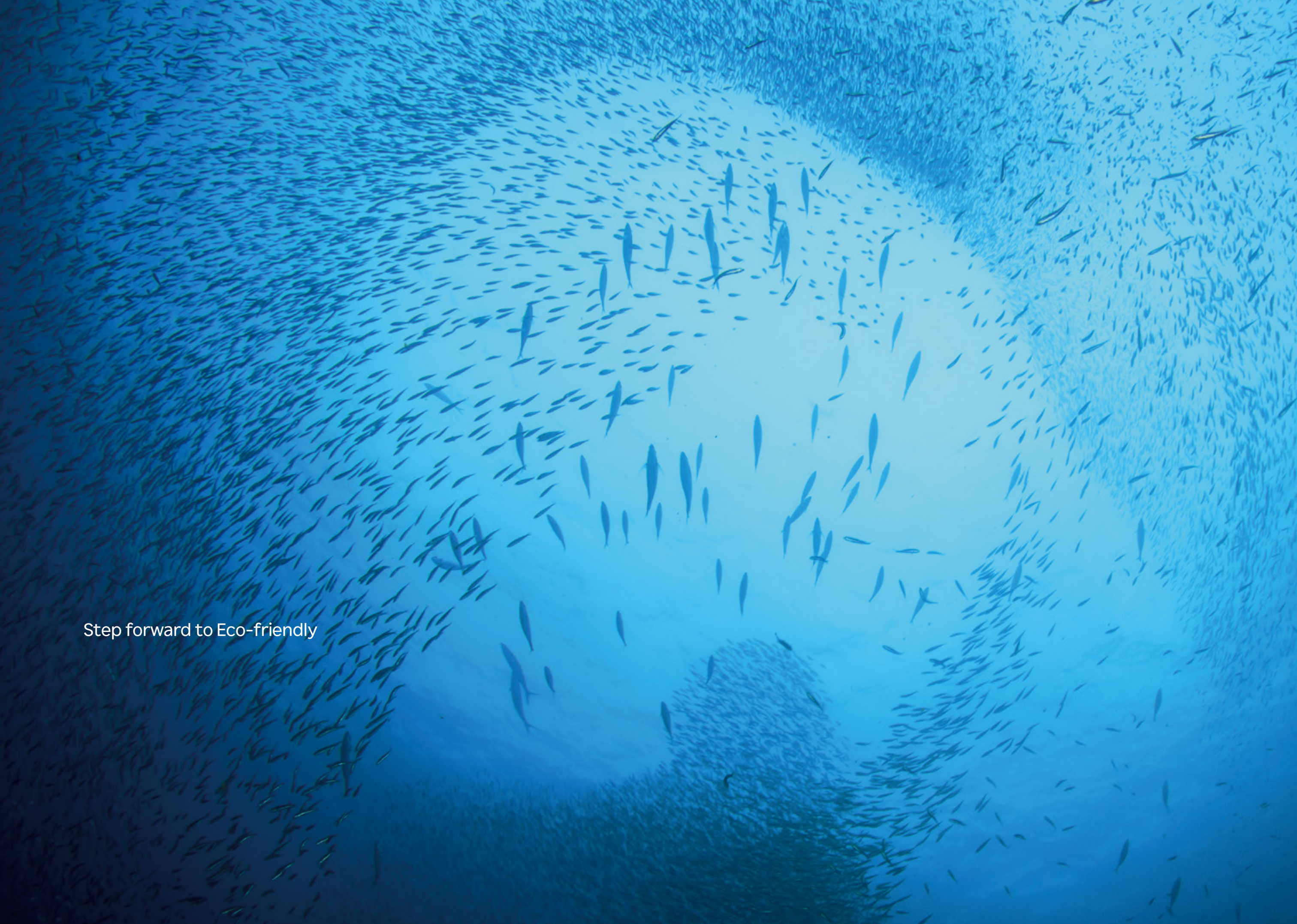
At a Glance

Record Accumulated until 2023



History

2016	2017	2018	2019	2020	2021	2022	2023	2024
<p>12 HD Hyundai Marine Solution inaugurated as a new corporation & commenced independent business</p>	<p>02 Advanced to eco-friendly ship service business</p> <p>04 Acquired Europe corporation (Rotterdam, Netherlands)</p> <p>05 Signed information sharing contract with Hyundai Heavy Industries Engine & Machinery Division</p> <p>10 Established HD Hyundai Marine Solution Americas corporation (Houston, USA)</p> <p>11 Quality Management System (ISO 9001) certification</p> <p>12 Established HD Hyundai Marine Solution Singapore corporation (Singapore, Singapore)</p>	<p>06 Newly established Digital Transformation business division</p> <p>06 Entered into bunkering service business</p> <p>11 Environment Management System (ISO 14001) certification</p> <p>12 Completed the first dual-fuel engine power station, Termonorte Engine Power Plant in Columbia</p>	<p>01 Established Digital Innovation Center for the first time in the shipbuilding industry (Busan, South Korea)</p>	<p>01 Awarded 'Labor and Management Culture Commendation of National Merit' from the Ministry of Employment and Labor</p> <p>02 Information Security Management (ISO27001) certification</p> <p>06 Acquired digital & control system business</p> <p>12 Winner of 'USD 400 million Export Tower'</p>	<p>01 Attracted USD 720 million under a deal with US private equity fund KKR</p> <p>02 Launched Global Digital Center Established (Ulsan, South Korea)</p> <p>08 Acquired AIP for medium-sized regasification modules for LNG-FSRU jointly developed with Hyundai E&T</p>	<p>03 Acquired AIP for Hyundai intelligent Greenhouse gas Solution Platform</p> <p>09 Established HD Hyundai Marine Solution Middle East in Dubai</p> <p>12 Joined HD Hyundai Global R&D center for better synergy</p>	<p>05 Contract Signed for Retrofitting LNG Carriers with Re-Gasification Facilities for 5 Vessels</p> <p>11 Corporate Name Change to HD Hyundai Marine Solution</p>	<p>01 Entered into Ship Cyber Security Solution business</p> <p>02 Contract Signed for Digital Solution 'OceanWise'</p> <p>05 Underwent a successful Initial Public Offering</p>



Step forward to Eco-friendly

Engine Parts

As the licensor of HiMSEN engines, HMS is the sole supplier of genuine parts. Also, as licensees of WinGD and MAN-ES, we provide genuine quality products equivalent to those of the licensors', but at reasonable prices. Based on thorough blueprint information knowledge of all products manufactured by HD Hyundai Group, we can supply spares in a timely and accurate manner.

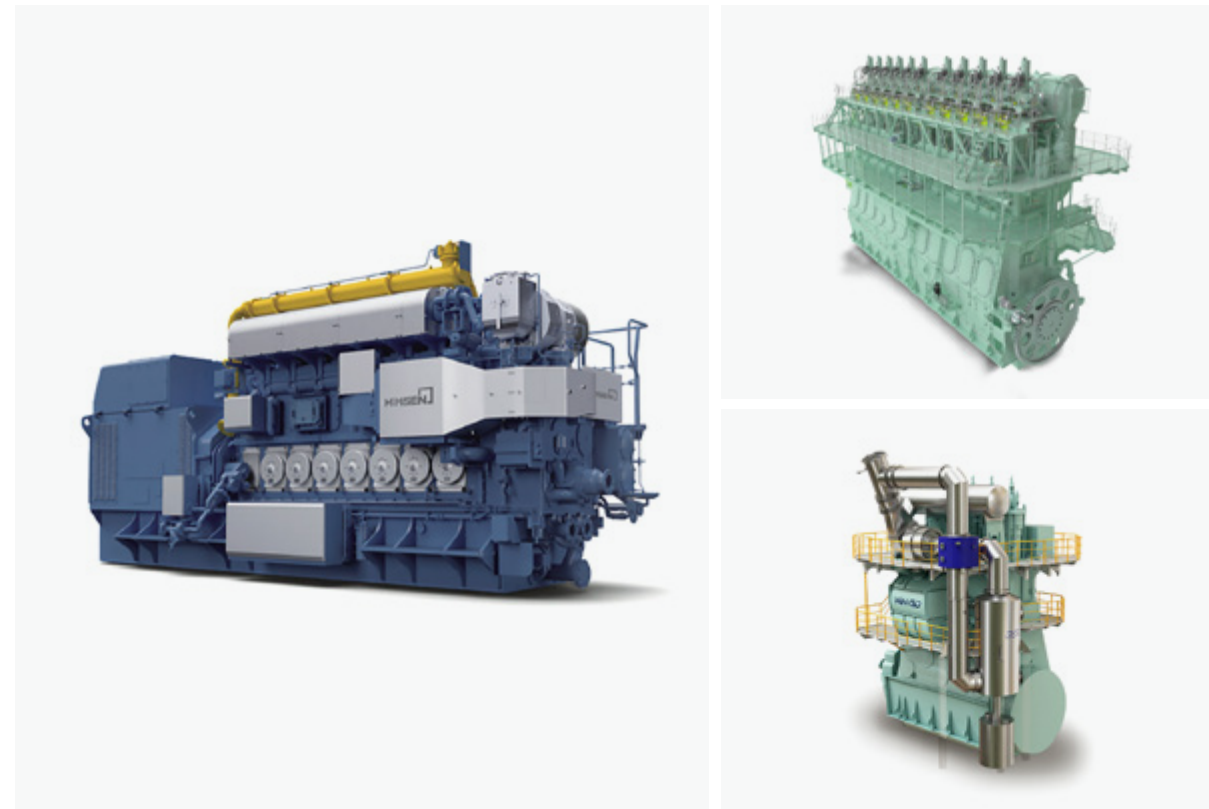
In addition, we enhance client satisfaction by serving the latest product design information that complies with recent environmental regulation changes. Based on our longstanding experience in the industry, we maintain cooperative relationship with makers, supplying HD Hyundai Group and other excellent manufacturers. As a result, we are able to supply all parts stably throughout the entire lifecycles of ships.

Main Products

- Engine Parts (HiMSEN, MAN, WinGD)
- Propeller, SCR

Global Warehousing Service

Our service partners are located across the world and we operate warehouses in Korea(Busan), Europe(Rotterdam), Singapore, the United States(Houston) and Middle East(Dubai). Through these networks, we ensure the fastest delivery of genuine parts to locations preferred by clients.



Electric Equipment

HMS is a one-stop total solution provider for the HD Hyundai Electric equipment in Aftermarket business.

Equipment For Initial Spare Parts



Alarm Monitoring System



Switchboard



Motor



Generator

Service We Provide By Pre-D/D Health Check



Generator

- No load & Performance test
- Diode & Varistor measurement
- Bearing & Housing visual inspection
- Insulation resistance measurement
- Excitation equipment inspection
- Terminal box inspection cleaning
- Connection tightness check
- PT-100 measurement
- Air gap measurement



Switchboard

- Visual inspection
- Function test for HiMAP-BC/BCG
- Function test for HiMAP-FI/M/T
- Test for mechanism link of VCB/VCS
- Interlock test of VCB(VCS)
- Interlock test of earthing switch
- Meter Calibration



Breakers (ACB/VCB)

- Construction Inspection & Cleaning
- Measurement of resistance on main contact
- Mechanical operation test
- Motor charging characteristic
- Over current relay test
- Operation characteristic
- Vacuum interrupter check
- Insulation resistance test



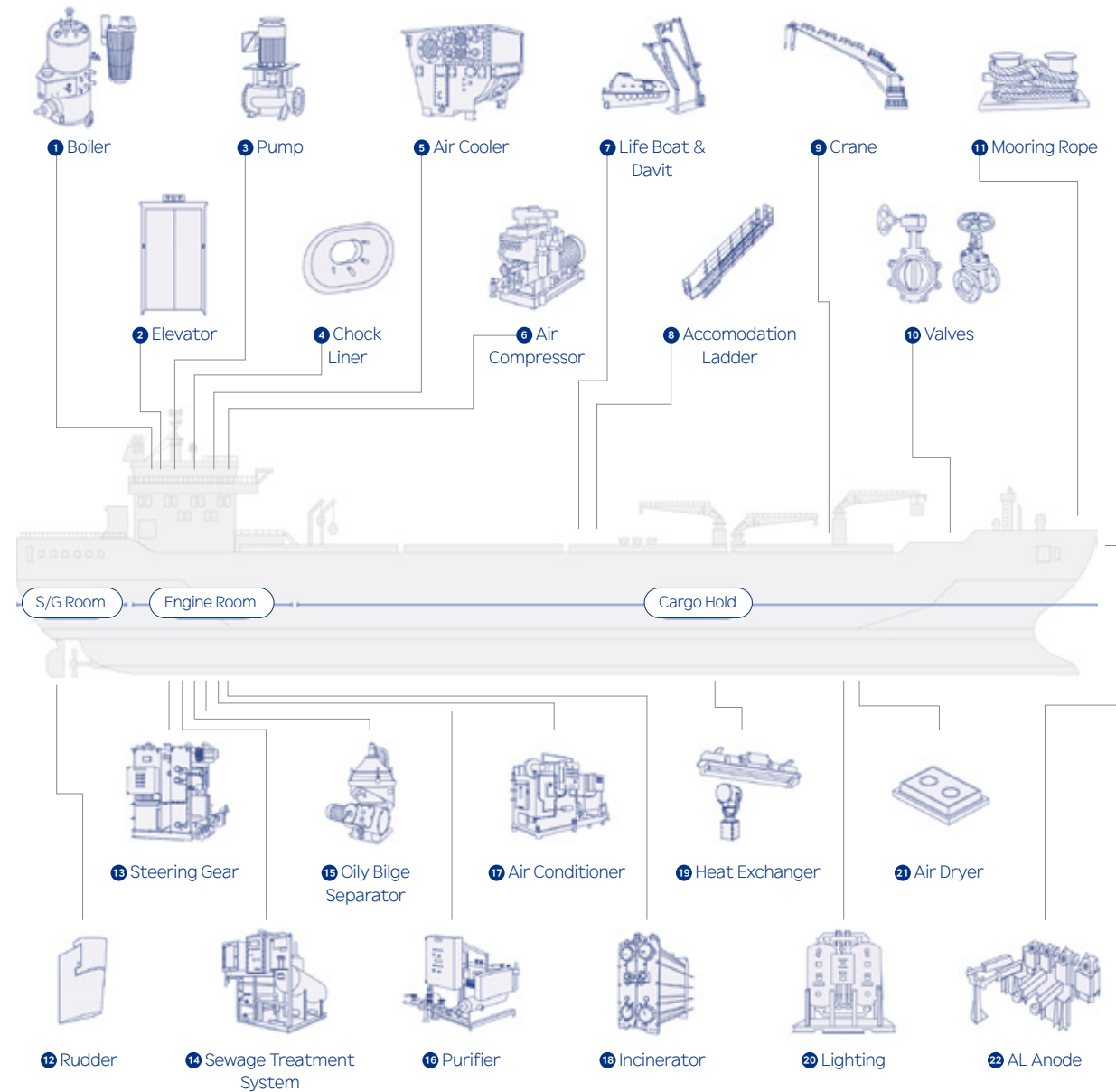
Motor

- Filling the bearing Grease
- Overhaul inspection (for sleeve bearing)
- Measurement of resistance for the coil
- Inspection for Main terminal box
- PT-100 measurement
- Insulation Resistance
- Visual Inspection



Marine Equipment

HMS provides spares & service for the Marine equipment, installed to the vessel. Especially, we provide Genuine products in same quality with the original maker at reasonable prices by virtue of strong business relationships with the KOREAN makers & manufacturers from Newbuilding.



With on-hand historic data from Newbuilding(HHI, HSHI, HMD) & Warranty



Offering Recommended spare part List per each machinery/ maker

→ Spare & service solution for initial & Dry dock package

BWTS/ COP/ Side Thruster

BWTS - Recommended Spare Parts

Recommended spare parts by HMS could be able to assist you to make your fleet stay competitively as always. We devote ourselves to analyze and select necessary spare parts for safety based on decades of our own accumulated experience.

- **MUST have** – Critical or Essential : Spares that affect operational performance
- **NICE to have** – Recommended : Recommended for preparing in advance

BWTS - Recommended LTSA (Long term service agreement) list

Most efficient and cost-competitive comprehensive service covering from scheduled maintenance to dry dock inspection.

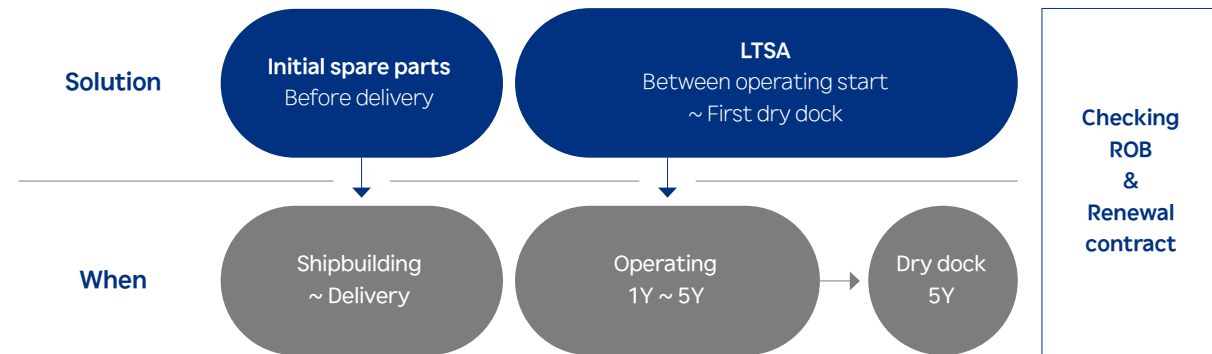
COP & Side Thruster - Recommended list for Dry dock maintenance and overhaul

We provide Customized recommendable overhaul list considering equipment specification of the vessel.



Long Term Service Agreement (LTSA)

Always In Top Shape



We, HD Hyundai Marine Solution (HD HMS), would like to suggest two (2) simple ways in order to keep your vessel as fit as a fiddle.

- **Initial Spare Parts:** It is quite essential to have minimum spare parts to maintain stable operation against unexpected problems. We highly recommend to prepare for these crucial parts before delivery.
- **LTSA:** It is the most efficient and cost-competitive comprehensive service covering from scheduled maintenance to dry dock inspection. We will take care of your heart of vessel from A to Z.

Scope Of Initial and LTSA

Initial	Must have Major OVHL parts	Nice to have Long lead time parts	Critical Electronic and Sensor
LTSA standard	Spare parts Long life genuine components	Service Performed by HD HMS TECH	
	Academy On/Offline crew training	HD. Voyage Web based customer portal	
Extra options	Analysis & Report, Voyage Management, CII rating estimation, Onshore Service * Some functions need integrated smart ship solution (ISS) on your ship.		

Reference

Over 500 vessels of 50+ customers across the globe are managed by HD HMS' special management programs since 2018.

1 Initial spare parts for reducing downtime

	Low Speed Engine	Medium Speed Engine (HiMSEN)
Must have	Overhaul spares of major parts for two (2) cylinder	Overhaul spares of major parts for one (1) engine
Nice to have	Long lead time parts Casting, forging, bearings	Long lead time parts Casting, forging, pumps
Critical*	Various electronic & Gas components	Governor, various sensor & Gas components

International Association of Classification Societies(IACS) is advising to have spare parts for dual fuel and electronically controlled engine, recommended by the designer/ manufacturer.

By providing recommended spare parts, HD HMS aims to enhance your fleet's competitiveness. We carefully analyze and suggest necessary safe spare parts based on decades of accumulated experience.

Mixed 1 initial and 2 LTSA service 15 available for more water-tight management.

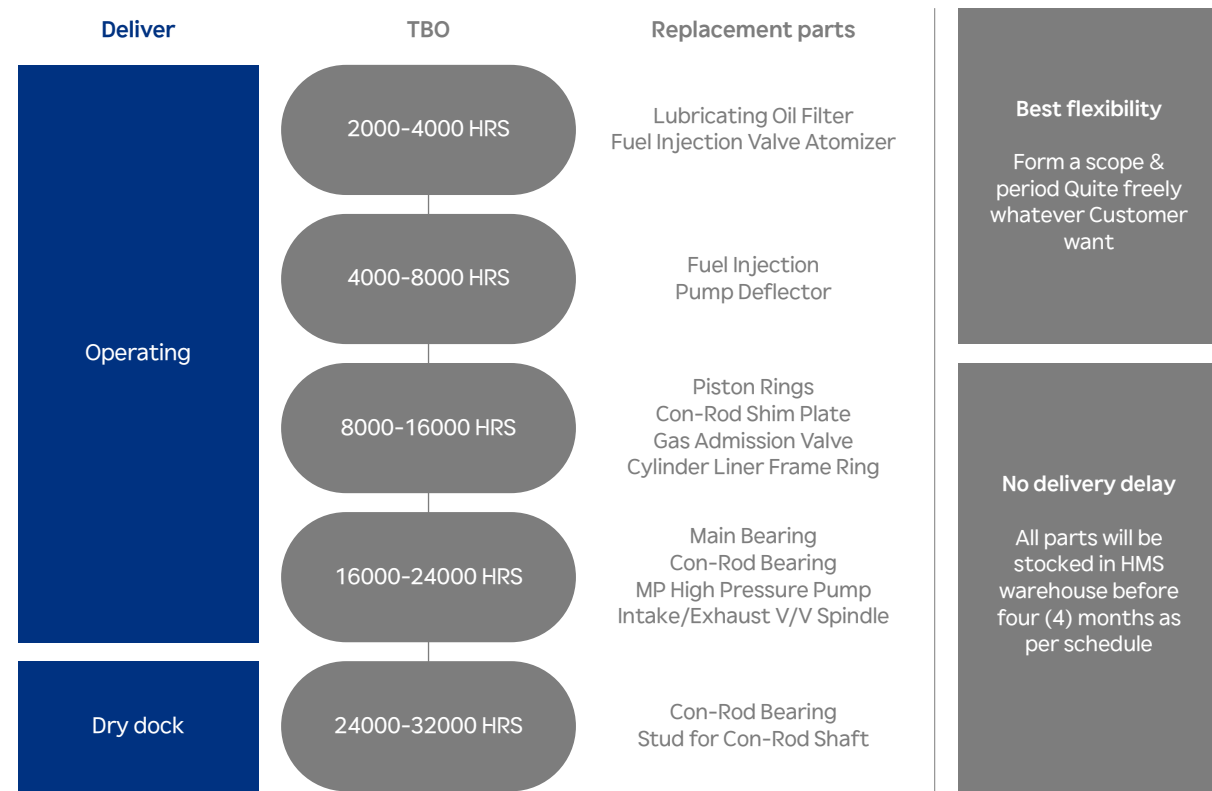
2 LTSA, tailored management just for your vessel

Period	From one (1) to five (5) years and dry dock			
Scope	Main Engine	Generator Engine	Electric equipment	SCR, BWTS and ETC.

HD HMS provides spare parts and services for major overhaul works according to her Time Between the Overhaul(TBO) with a fixed rate from one (1) to three (3) years and/or five (5) years extensively.

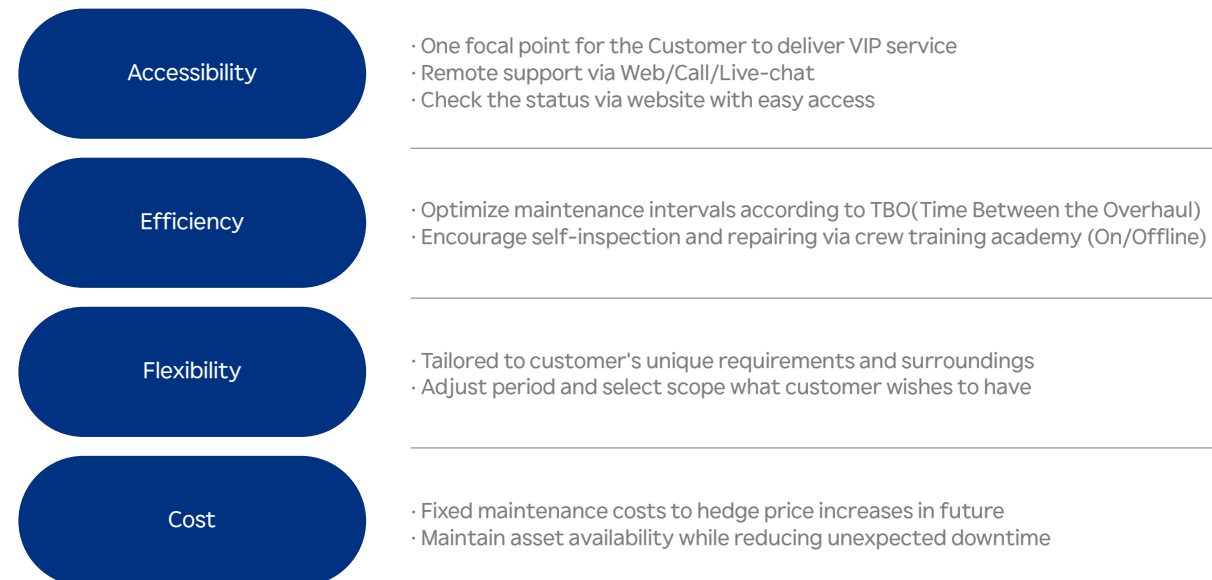
Scope of parts and services are adjustable upon the request of individual vessel and customers. For example, customer could exclude some of the parts that are already on the vessel(Remaining On Board). This helps stock management efficiently preventing duplicate purchase of unnecessary parts.

LTSA overhaul interval and needed parts(sample of H35DF HiMSEN engine)



* Major parts will be supplied and include all necessary consumable parts.

Key benefit



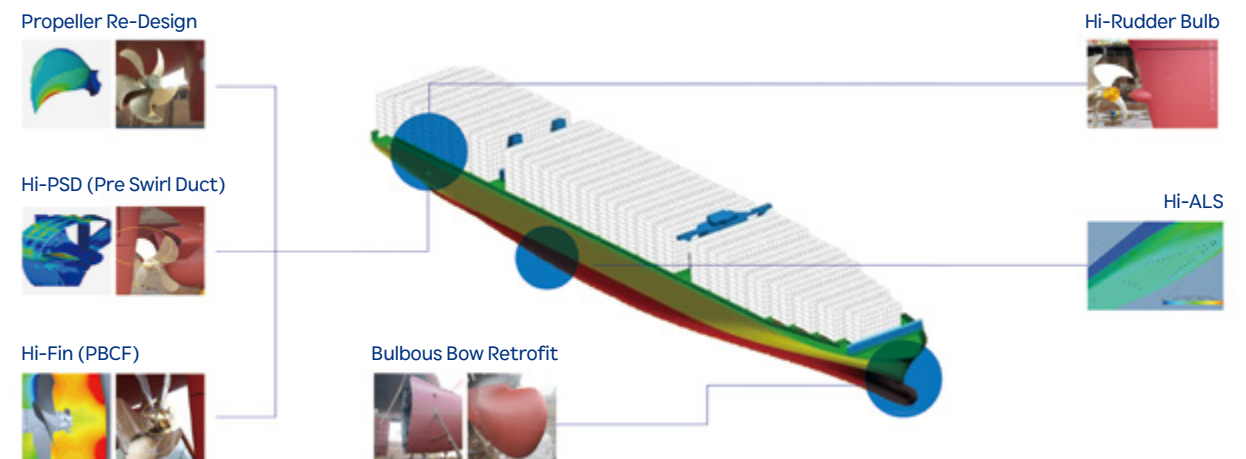
De-Carbonization Solution

HMS helps customers meet the IMO strategy on reducing GHG emissions for ships with various optimal solutions. These solutions include technology optimization and operational efficiency improvement to comply the Energy Efficiency Existing ship Index (EEXI) and to enhance the Carbon Intensity Indicator (CII).

HMS can enhance operational efficiency with Energy Saving Devices (ESD) that improve performance based on simulation. Our customers can choose from a range of ESD options and combine them for maximum energy savings.

Category		CO ₂ Reduction Efficiency (%)	Lead Time (Months)	Recommended Vessel
Dual Fuel Engine Conversion	LNG Dual Fuel Ship	20~25%	20~24	CNTR, VLCC, VLOC
	LPG Dual Fuel Ship	13~18%	18~21	VLGC
	Methanol Dual Fuel Ship	Abt. 11%/100% (Fossil/Bio-&e-)	20~24	15K CNTR, 50K MR PC
Emission Control at Berth	Alternative Maritime Power ¹⁾		5	CNTR, PCTC, Tanker
	Alternative Maritime Steam Production ²⁾	TBD	6	All Except for Tanker
Miscellaneous	Rotor Sail	3~8%	13~14	Bulk Carrier, Tanker
	Air Lubrication System	3~6%	11~12	LNGC, PCTC, RORO
	Engine Part Load Optimization ³⁾	1~4%	6~14	All
	LED Light ⁴⁾	-	2~3	All
	Waste Heat Recovery System	-	8~9	All
Conventional Energy Saving Device	Hi-Fin	0.5~1.5%	4~5	All
	Hi-PSD	2~6%	9~11	All (excl. LNGC)
	Bulbous Bow+ Propeller Re-design	4~7%	10~12	CNTR
SOx Emission	Exhaust Gas Cleaning System	-	5	Above Aframax Tanker
OceanWise	Voyage Optimization	5~15%	3~4	All

1) Mandatory item specified in ports (USA, Europe, China) / 2) Zero carbon emission with AMP / 3) Fuel saving at slow steaming operation / 4) Low OPEX



Under the enforcing regulations, HMS could facilitate the ship owners, by providing consulting & analysis to reduce carbon emission for each type of vessel.

HD HMS offers a package of energy saving devices which are integrated into the supplementary Hull lines, making them adaptable for older vessels. Leveraging the extensive expertise of HD Hyundai Group, HD HMS is fully committed to support the enhancement of fleet's performance.

Dual Fuel Conversion

With rich experiences and advanced technology accumulated from the shipbuilding and marine engine industry over the past decades, HMS, a total solution provider, provides engineering, procurement, and commissioning packages.

HMS does provide a total dual fuel retrofit package that 'JUST FIT YOUR NEEDS' in the way of the most economical and optimized solutions to the LNG propulsion systems, having appropriate and rich resources from HD Hyundai Group.

Benefit



Proven reliability through full scale test & most advanced design



Design & documents with full automatic interface within engine system



Proven technology & the world best reference



Qualified marine service provider in the shipping industry

Hi-Gas

Hi-GAS & Hi-LFSS is an LNG/LPG fuel gas supply system for dual-fuel engines based on high and low-pressure gas supply. The Hi-GAS & Hi-LFSS are designed to be the most optimized for both CAPEX and OPEX.

Dual Fueled Ship Package

Design capability

- Fuel tank
- Fuel gas supply system
- Ship to ship compatibility
- Bunkering & BOG handling
- Safety verification



LNG / LPG Fuel tank deck tank



Fuel supply system



Bunker station



DF Main engine



DF Generator engine



DF Boiler

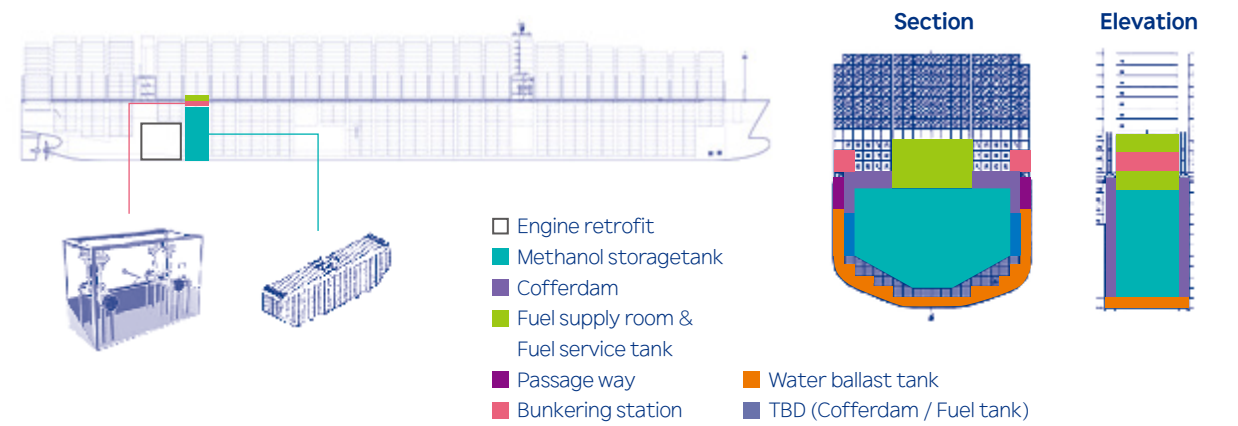
Gas fueled ship package

Methanol Dual Fuel Conversion

HD HMS has carried out FEED engineering for methanol dual fuel conversion with HD Hyundai affiliates and Class KR. At the result of FEED, we have received Approval in Principle for 16K CNTR methanol dual fuel conversion in Dec, 2023.

Target of this AIP is to study and assess the technical feasibility of Ship Conversion Design for Methanol Dual Fuel retrofit. This AIP aims to develop and certify principle design concept of ship conversion for retrofit conventional diesel engine to methanol dual fuel engine.

HMS provides total engineering for alternative fueled vessel conversion including Engine Modification, Fuel Supply system & installation, hull modification & Tank Construction with vessel's efficiency improvement together.



General Concept - Scope of Work & Supply

Category	Item	Current (as-is)	Retrofit (to-be)
Major Equipment	Main Engine	MAN ME model	ME-LGIM Conversion
	Generator Engine	HiMSEN model	H32DF-LM Conversion
	LFSS	Nil	<ul style="list-style-type: none"> • Methanol Service Tank • Methanol Fuel Supply Unit • LFSS Control System
	Methanol Tank	Nil	• *TBD
Aux. equipment & bulk material	Nil	<ul style="list-style-type: none"> • Aux. Equip: <ul style="list-style-type: none"> - N2 Generator - Gas detection, Fire Fighting Sys. so on • Bulk: Piping, Valves, Elec & Cables, Steel Reinforcement so on 	
Engineering / Class	Nil	<ul style="list-style-type: none"> • Basic, Detail, Production • HAZID/HAZOP, Analysis • Class approval 	
Retrofit & Commissioning	Nil	<ul style="list-style-type: none"> • Hull Modification / Installation work • General Service, Bulk material & consumables • Commissioning / Sea Trial 	
Project Management	-	Included	

Engine Part Load Optimization (EPLO)

According to analysis from various Class Societies, a number of vessels will be classified as D (3 years) or E (1 year) within a few years.

A revised SEEMP including the corrective actions for CII reduction shall be submitted to the authorized administration or any organization for verification in accordance with the regulation 28.8 of MARPOL Annex VI.

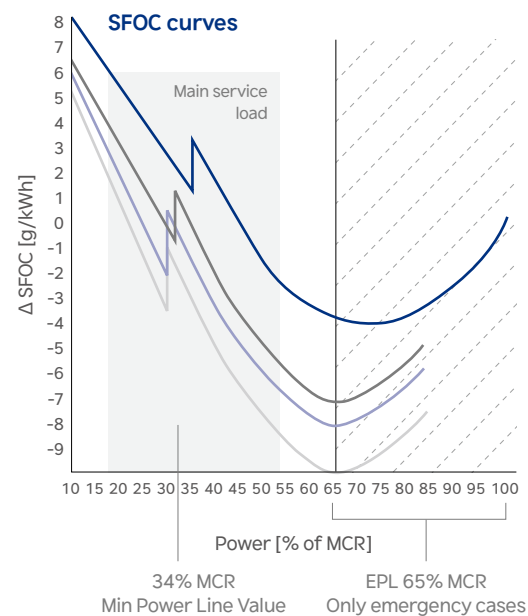
In the long-term perspective, utilizing carbon-neutral fuels is a fundamental solution. However, there are some critical concerns such as availability of supply for alternative fuels, fuel prices, and bunkering infrastructure. The EEXI and CII regulation can be met by lowering operation speed through the application of Engine Part Load Optimization (EPLO).

EPLO is the solution that matches and optimizes the turbocharger performance required by the engine according to the actual slow operating vessel speed.

The operation of ships with slow steaming have a potential to reduce fuel oil consumption by a part load optimization. Especially, for 2-stroke Hyundai MAN B&W engines, mechanically controlled (MC type) and equipped ABB Turbocharger shows meaningful outcome.

We would like to summarize the advantage of EPLO as a fuel consumption saving, reducing negative environmental affect & financial benefits. EPLO solution divides 3 variants with expectation of Specific Fuel Oil Consumption.

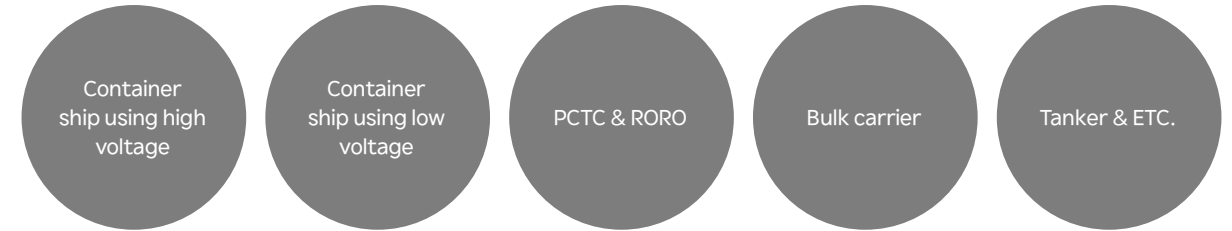
Variants	#1	#2	#3
SFOC savings (preliminary)	2-3 g/kWh	3.5-4.5 g/kWh	5-6 g/kWh
Derating	85%	85%	85%
Engine Setting	VIT setting	VIT setting	VIT setting
Aux. Blower Setting	>> 2pm lower	>> 4pm lower	>> 8rpm lower
T/C Nozzle Ring	Smaller	Smaller	Smaller
NOx Re-certification	Required	Required	Required
Torsional Vibration	BSR	BSR	BSR
Compressor Wheel	-	Smaller	Smaller
Wall Insert	-	Larger	Larger
Turbine Blade & Shaft	-	-	Smaller
T/C Modification	Slight	Moderate	High
Engine Modification	Slight	Slight	Slight
Effectiveness	Moderate	Moderate	Highest
Investment Cost	Lowest	Low	Moderate



Alternative Maritime Power (AMP)

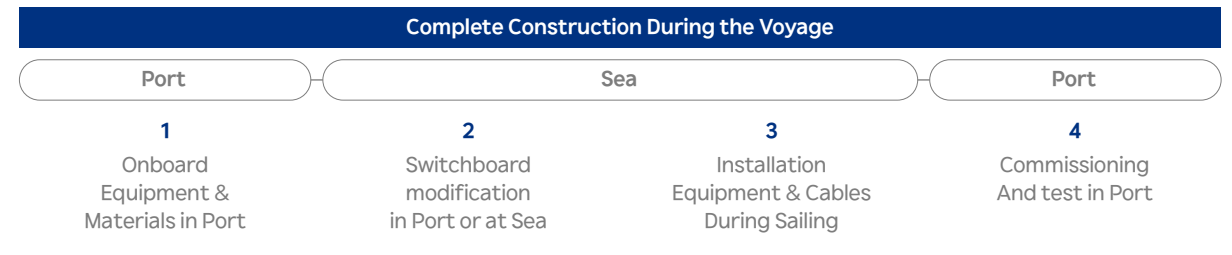
World widely, port regulation forces to shut down auxiliary diesel engines to reduce emissions from the vessel. Mainly CARB (California Air Resources Board, USA) has been applied mandatory. Other regions, including the EU and China, will be applied soon. AMP would bring the most promising effects for air pollution and meet the mandatory requirement at the port. HMS is a turnkey provider for AMP retrofit and provides AMP retrofit solutions for all kinds of vessel, including as following.

Vessel Type

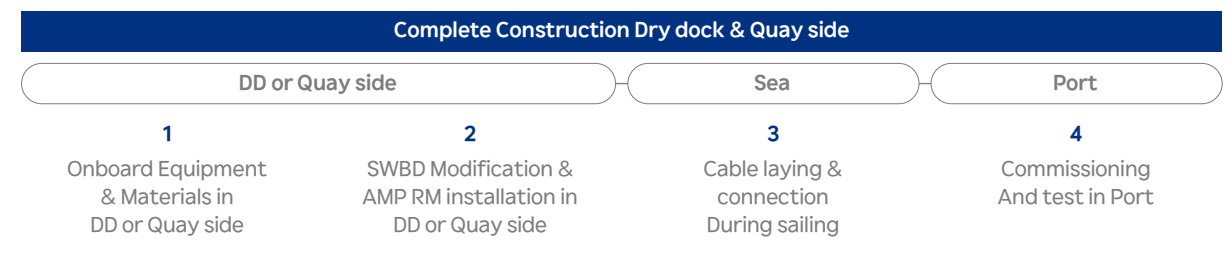


HMS can customize engineering with references for retrofit items, own equipment including switchboard, cooperation with cable reel maker and various experience in installation even sailing and optimal engine and its auxiliary equipment performance, thus minimizing our clients' CAPEX and OPEX.

Construction Process For Container & Bulk Carrier



Construction Process For PCTC & Tanker



LNGC Re-Liquefaction Plant Retrofit

Re-liquefaction technology is one of the solutions for DFDE LNGCs to manage BOG and reduce emissions. Turbo-brayton technology uses a closed-loop refrigeration cycle to cool the BOG and re-liquefy the gas, which can be used as fuel on board or sold as LNG. With Re-liquefaction plant, the burden of cargo taxes and cargo loss can be minimized. Furthermore, if the BOR rate is more severe, the ROI is expected to be much faster, allowing shorter payback period and complying with GHG regulations.

Re-Liquefaction Plant

Turbo-Brayton System

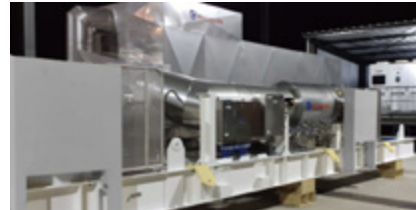


Image Source : "Air Liquide"

- Indirect liquefying BOG
- Refrigerant : N2
- Suppression of BOG

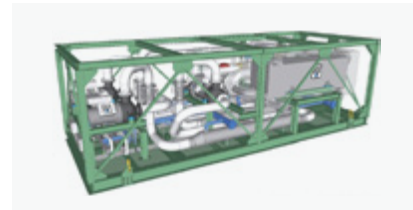


Image Source : "CRYO STAR"

- Using sub-cooled LNG
- Major Equipment
 - 1) Motor-Turbo Compressor-Expander
 - 2) Cold Box

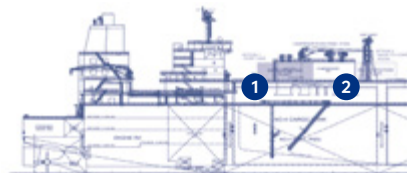
General Arrangement

Compared with newbuilding, the Turbo-Brayton system is suitable for retrofit vessels since this system can be replaced anywhere and has a low impact on an existing ship's cargo handling system. Generally, the Turbo-Brayton system can be applied to both Moss and Membrane type LNGC, and it is a built-in port or starboard side with an electric cabinet room.

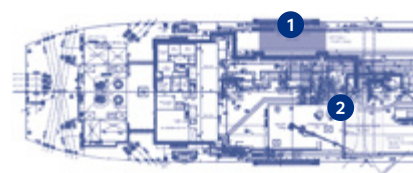
Reliquefaction Plant

- Option 1. Port Side
- Option 2. Near to Comp. Room

Side View



Top View



Reference List

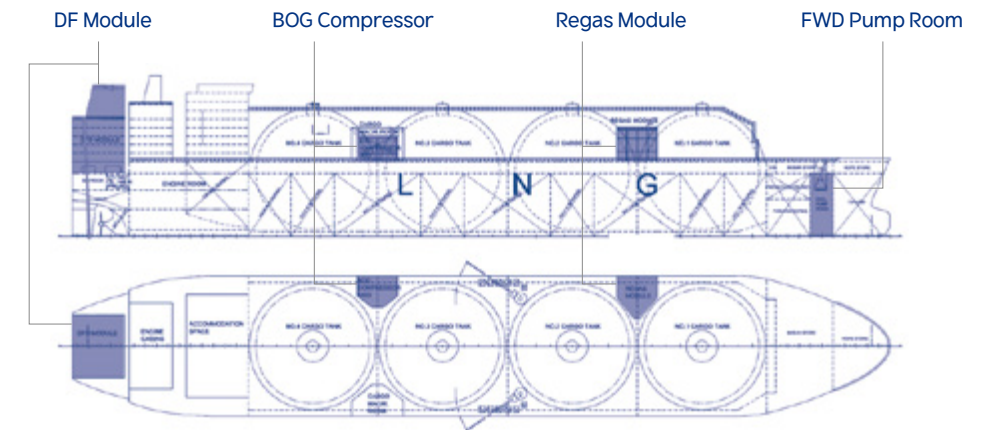
No	Owner	Type of vessel	Type of retrofit	D/D
1		160K LNG	EPIC	2024
2		162K LNG	EPIC	2024
3	EUROPE	162K LNG	EPIC	2024
4		170K LNG	EPIC	2024
5		170K LNG	EPIC	2025
6	GREECE	152K LNG	EPIC	2025
7		160K LNG	EPIC	2026
8	U.S.A	160K LNG	EPIC	2026
9	EUROPE	162K LNG	EIC	2025
10	EUROPE	162K LNG	EIC	2025

LNGC To FSRU Conversion

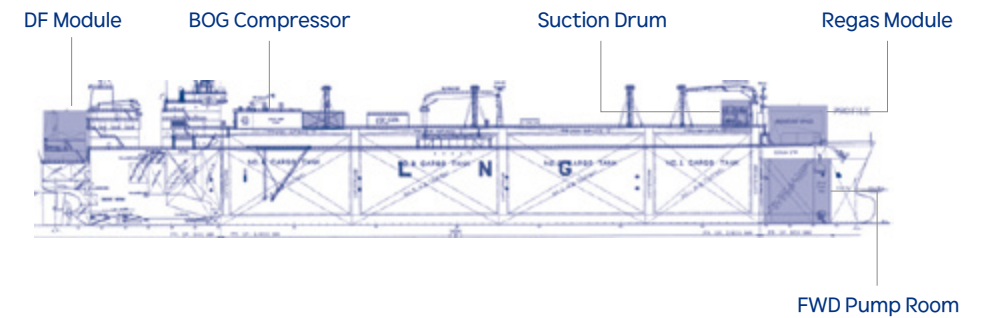
General Arrangement

Compared to the Newbuild FSRU, FSRU Conversion based on LNGC for Moss and Membrane types typically has less lead time and cost. It simply requires the installation of Regas modules and DF modules. The Regas module is usually built as a separate module or compartment and retrofitted onto the LNGC in a shipyard to minimize time.

Moss LNGC

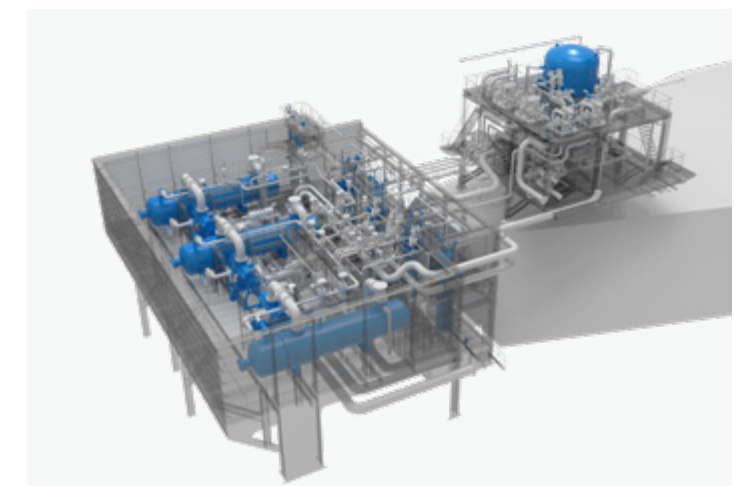


Membrane LNGC



Hi-ReGAS

HD Hyundai developed own Re-gasification system which changes LNG from liquid to gaseous state. With an advantage of power saving by optimized booster pump figuration, it is safe and reliable by non-flammable heating medium.



OceanWise

OceanWise solution has been started with the idea of Ocean Transformation from CES 2023, to use the scattered data from the vessel and ocean to achieve more insight and contribute to carbon reduction that will be beneficial for both charterers and ship owners. Our main objective is to use any form of data from Noon Report or Data Collecting System to provide accurate vessel performance models and use these models for CII Monitoring, Simulation, Voyage Optimization, SEEMP III Guidance, and more. With our high accurate models we have integrated A.I technology to create value that evolves together with the given and public data. This solution is just our first step into the Ocean Transformation journey and the OceanWise solution can expand this MetaOcean Database into something much bigger and more customized.

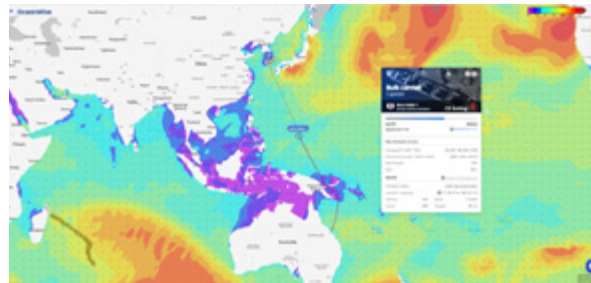
Essential Functions:

1. Vessel Performance Modeling for CII Monitoring & Prediction
2. Simulation for Vessel Management using Port Congestion Data
3. Advanced Voyage Optimization for increase in Fuel Efficiency.
4. SEEMP Part III Guidance Report.

And OceanWise is:

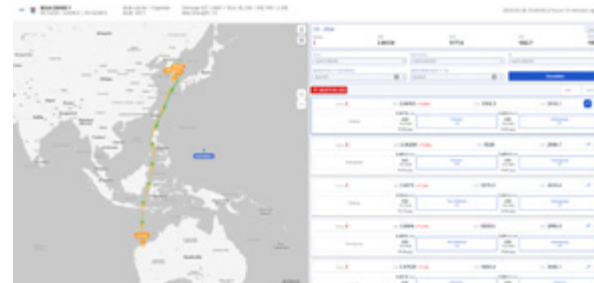
1. Hardware Free - High Accessibility
2. Leveraging A.I Technology + World Leading Ship Building Knowhow
3. Simple Input – Significant Output

CII Monitoring



AI model accuracy 95% to monitor vessel performance with CII rating

CII Voyage Simulation



Using Accurate model to simulate voyages to find most suitable port for vessel and understand future carbon emission

Advanced Route Optimization



Integrating Port Congestion with Route Optimization, Weather Information for most cost-efficient and safe route

Decarbonization Assistance



SEEMP Dashboard to understand vessel status and to provide SEEMP III Guidance for vessels that does not meet required CII Rating

Experience the Ultimate Emission Reduction and Fuel Efficiency with the Autonomous Navigation Solution from OceanWise

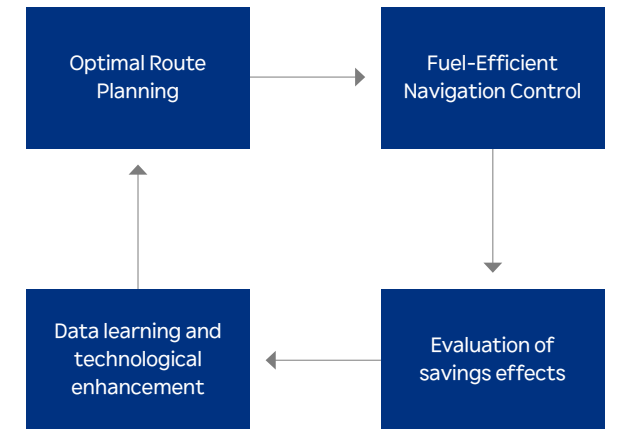
Enhanced AI performance with OceanWise provides:

1. MetaOcean Database AI Models accurately predict ship performance across various sea conditions.
2. Optimal Route Planning benefits with sophisticated routing algorithms for efficient navigations.

Precision Control with HiNAS Control Systems provides:

HiNAS Cruise Control ensures precise adherence to planned routes and minimize resistance.

By integrating OceanWise's routing plans and HiNAS's system control, we enable efficient, fuel-saving operations. The process is based on MetaOcean data cloud, allowing for ongoing assessment and enhancement through advanced data learning and technology improvement. Fuel savings of up to 10% can be expected with OceanWise optimal routing, up to 15% when combined with HiNAS, and we are continuously accumulating valid and reliable cases.



HiNAS by Avikus (Hyundai intelligent Navigation Assistance System)



NAS Navigation is a computer vision and AI-based system that assist safe navigation by displaying detected ships and navigation information in AR images. Also, it enables to overcome the limitation of conventional sensors of the ship through sensor fusion technology.

Key feature

Vision sensing

1. Deep learning-based automatic object detection
2. AI-supported camera-based lookout assistance

Sensor fusion

1. Sensor fusion-based situational awareness
2. Radar, AIS and camera sensor fusion for higher accuracy and robustness

AR visualization

1. Augmented Reality visualization
2. Intuitive navigation assistance and collision & grounding alarm

NAS Control

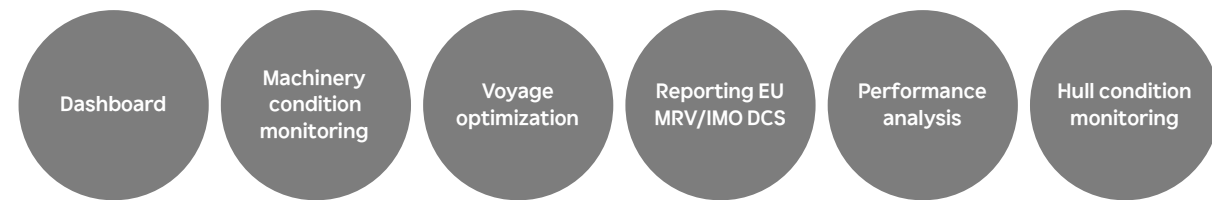
Autonomous navigation assistant system that has the functions of route optimization, route tracking, and collision avoidance

Integrated Smartship Solution (ISS)

Integrated Smartship Solution (ISS) helps to reduce operational costs during voyages. It estimates the optimal voyage considering the weather forecasting, operational condition, voyage schedule, etc. Clients can make a better decision by comparing the current status of their voyage and the optimal voyage recommended by ISS. ISS tracks the client's vessel's energy flow and has an intuitive understanding through the machinery management module. Reports such as noon, voyage, MRV and DCS can be generated by the solution to assist the user's document work.



Features



What is Hi4S ?

Hi4S (Hyundai intelligent Smart Solution Service System) provides the one-stop solution through 24/7 S.M.A.R.T. care service system. Our best skilled experts monitor and analyze all the collected data from your fleet/ships to provide what you need to know for optimal operation. You can easily access Hi4S web service to monitor and operate your fleet at your convenience.



DI Report (Digital Insight Report)

Experts analyze the operation data of voyage and machineries collected from onboard and provide DI Report to clients. It also provides essential information such as warranty service information and the latest service news.

- Voyage analysis with potential fuel savings
- Engine performance analysis and load diagram



Engine Analysis Report

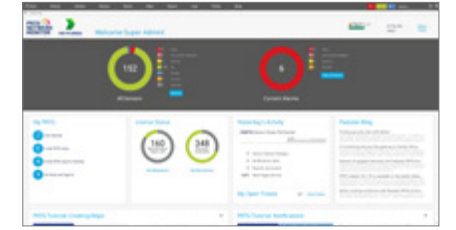
It shows engine performance analysis at a glance, precisely quantifies optimization potential in a systematic way, and offers recommendations for adjusting and maintaining marine engines.

- Optimized engine performance and fuel efficiency
- Less maintenance costs
- Increased reliability



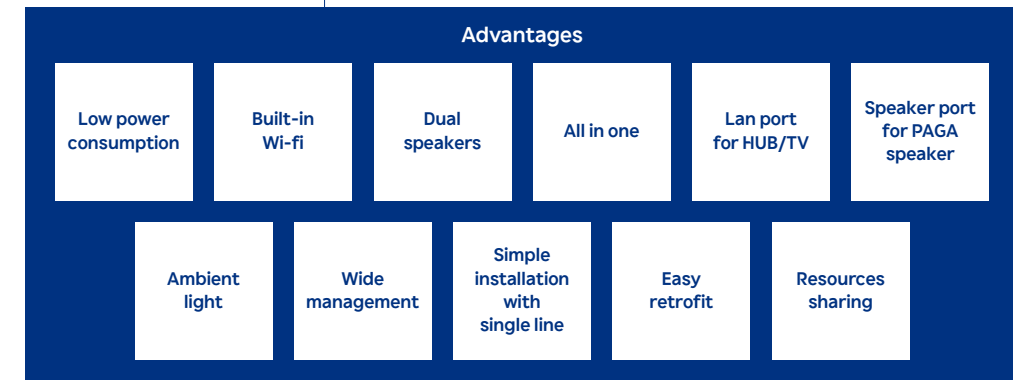
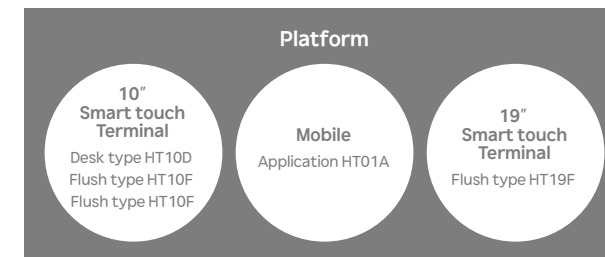
Hi-Secure

Hi-Secure is a state-of-the-art cyber security solution tailored for maritime applications. Designed with user-friendliness in mind, it enables both experts and non-experts in network management to efficiently secure their systems. Hi-Secure integrates critical security functions— NMS (Network Management System), firewall, and NAC (Network Access Control, optional)—into a cohesive system that is specially developed for the marine environment.



Integrated Smart Communication System (ISCS)

Hyundai ISCS is the world's first intelligent integrated communication system for ships. ISCS interfaces and manages all different communication systems.



Console, GCP, BNWAS

All the main equipments can be monitored and controlled necessary for the operation of the ship.

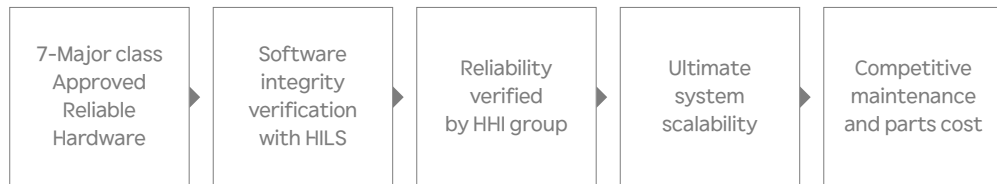
- BCC (Bridge Control Console)
- ECC (Engine Control Console)
- CCC (Cargo Control Console)
- BWC (Bridge Wing Console)
- GCP (Group Control Console): Navigation & Signal Light Control
- BNWAS (Bridge Navigational Watch Alarm System): Detecting Operator Disabilities to Prevent Marine Accident



Integrated Control And Monitoring System (ICMS)

ACONIS (Advanced Control and Integrated System) is a competent and proven solution for marine applications such as ICMS (Integrated Control and Monitoring System), cargo handling system, BWTS, and SCR (Selective Catalytic Reduction).

HiCONIS (Hyundai intelligent Control and Integrated System) is an Integrated Automation System (IAS) that supports multi-functional alarm monitoring, data acquisition, and control functions of ships. It is adaptable for all ships, e.g., LNG, LNG-FSRU, drillship, drilling rigs, container ships, bulk carriers, cruise vessels, reefers, and other special purpose vessels.



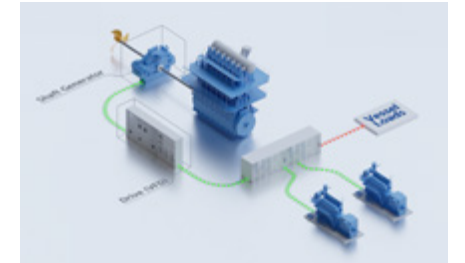
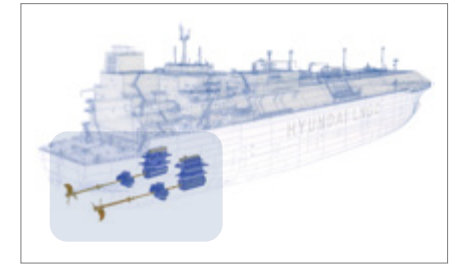
Items	Specification
System Capacity	<ul style="list-style-type: none"> • 1,152,000 Total Tags • 256 Stations
Server Type	<ul style="list-style-type: none"> • Multi-Server • Historian
HMI	<ul style="list-style-type: none"> • Layer/Script/Zoom In-Out • Multi-Display
Redundancy	<ul style="list-style-type: none"> • Dual Network(Workstation, Processor) • Dual Processor(MPM)
Programming Language	<ul style="list-style-type: none"> • IEC61131-3 standard 5 languages • Standard Function Block
Database Update	<ul style="list-style-type: none"> • Initial/Online Download
Simulation	<ul style="list-style-type: none"> • Process/Control Logic Simulation (Online)

Shaft Generator Package

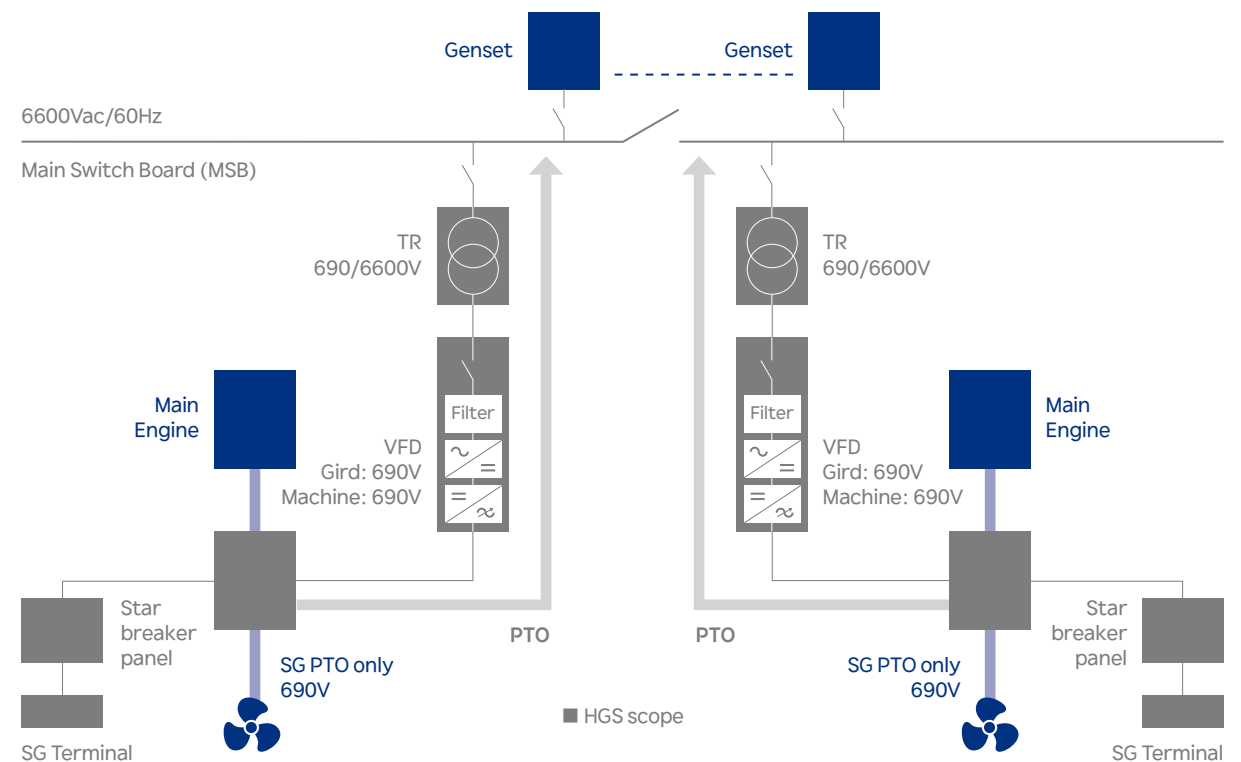
HMS provides optimal Shaft Generator solution which is customized as per customer's requirement, operating concept and installation space according to various vessel type.

With our knowledge & experience of ship operation and automation system as a member of HD Hyundai Group, we are confident to provide best solution as a qualified system integrator based on collaboration between HD KSOE(HD Hyundai Group's R&D specialized company) and HDE(Electrical equipment manufacturer).

Our shaft generator package provides various outputs from 0.5 to 5MW. In addition to supplying induction type shaft generators, which are traditional type, we mainly supply Permanent Magnet type shaft generators that have recently attracted attention for their efficient and compact size compared to induction type.



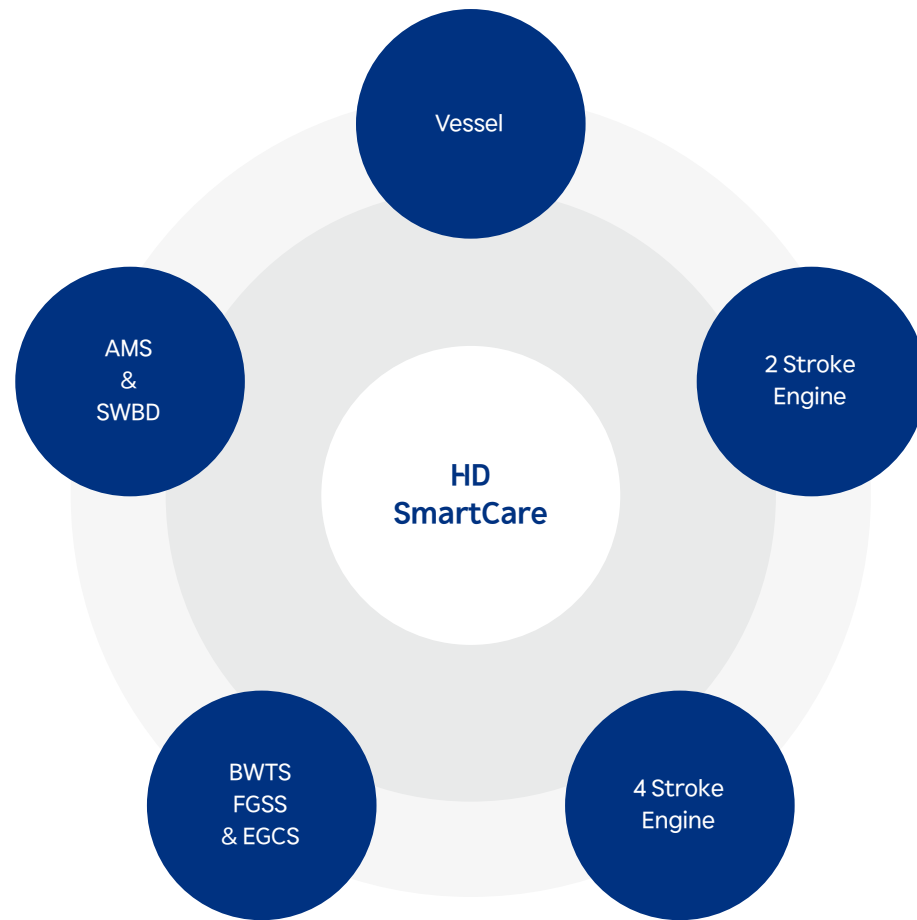
Items	Specification
Mode	<ul style="list-style-type: none"> • PTO / PTI / PTH Mode
Machinery type	<ul style="list-style-type: none"> • Induction / Permanent Magnet
Power capacity	<ul style="list-style-type: none"> • 0.5 ~ 5 MW
System Efficiency	<ul style="list-style-type: none"> • Over 90 % (Depends on configuration)
Vessel type	<ul style="list-style-type: none"> • All kinds of vessels (LPGC, LNGC, CNTR, TNKR, PCTC, etc.)
Battery solution	<ul style="list-style-type: none"> • O (Possible to supply)
VFD topology	<ul style="list-style-type: none"> • AFE (Active Front End)



HD SmartCare

HD SmartCare is our service brand for all HD Hyundai Group products. We offer worldwide, 24/7 service 365 days a year. HD SmartCare provides customer warranty service for HD Hyundai Group vessels, engines, machinery, power & automation control equipment, and eco-friendly products.

HD SmartCare eliminates unsafe factors and risks in products through a warranty, and prioritizes the safe and optimal operation of vessels.



Solution Orientation

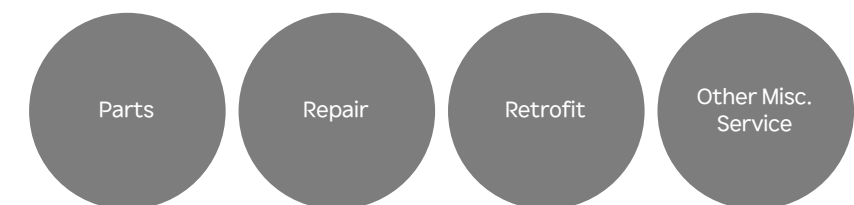
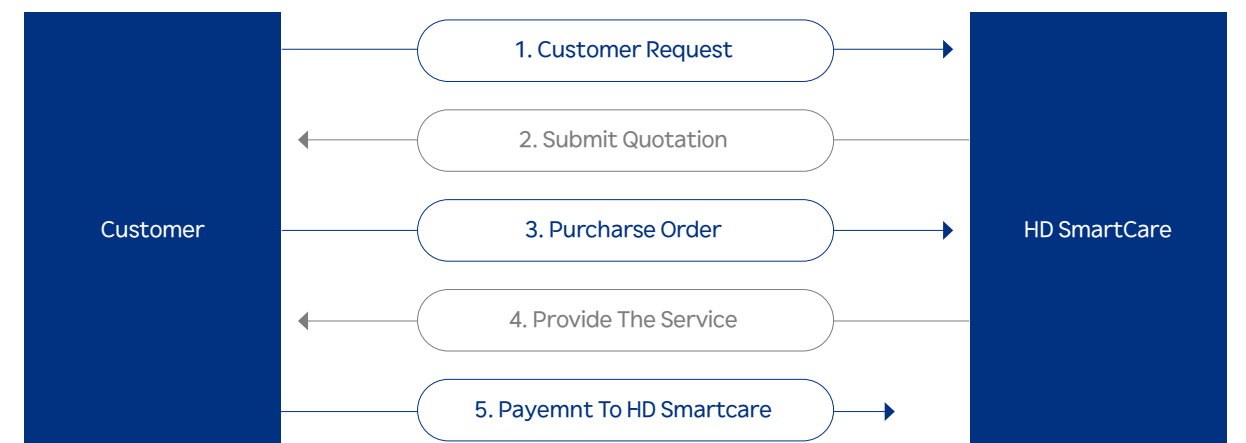
HD SmartCare offers powerful and quick way after-sales service through a HD Hyundai Group global network. In order to repay customers with the best quality, HD SmartCare reviews and provides feedback from the various lessons learned, which it turns into big data to improve the standards of vessels and products built by HD Hyundai Group and to carry out activities to prevent the recurrence.

Life Time Service

HD SmartCare is dedicated to offering comprehensive customer care throughout the vessel's entire life time. In order to respond to customer's demands after the guarantee period, HD SmartCare provides a 'Post Warranty Service' to the customers. Using our 'Post Warranty Service' is the most convenient way to ensure that your vessel will meet the safe and optimal operation. HD SmartCare 'Post Warranty Service' is available for 24/7 from our HQ, Global branches and online.



Procedure



Bunkering Service

HMS supplies qualified marine fuels for global vessels throughout the Korean ports in association with one of the top oil refinery companies in Korea, HD Hyundai Oilbank. HMS supplies ISO 8217:2010 and MARPOL Annex VI guaranteed marine fuels, through experienced and safe barging operation.

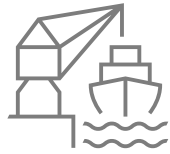
Not only ensuring our position in bunkering business in South Korea, we also expanded our business to Singapore to grow as a global bunker trading company. The bunkering experiences to new-built vessels within HD HHI group has led us to extend our service scope to global operating vessels. We are developing ourselves to serve our customer globally and building long-lasting relationships continuously.

As one of the first movers in the supply of alternative fuels, HMS continues comprehensive preparation to reduce emissions of carbon dioxide and other greenhouse gases and we aims to sail together in net-zero with our clients.

Since 2009



Clients **200+**



New-Builds **370+**



Ships **10,000+**



Sustainability – Alternative Fuels

As HMS well recognize the importance of alternative fuels in shipping, we are seeking to diversify the energy mix to reduce reliance on conventional fuels. Diversification of the fuels not only benefits the environment but also enhances energy sustainability.



HMS provides marine fuels certified by ISCC-EU, and is working with HD Hyundai affiliates and global shipping companies to develop our business portfolio toward various types of alternative marine energies.

We are taking the initiative in Eco -friendly fuels including biofuels, methanol, ammonia, and hydrogen while following stricter international regulations and global trends. Starting with the trial of a biofuel bunker, HMS is now ready for methanol bunkering service on ships as well. We also launch 'UREA' for vessels which ensure a high purity with reasonable price.

At HMS, we are actively involving in promoting environmental sustainability. We devise the best possible ways to enhance the experience in vessels' operation at every stage of vessels' entire life span.



Power Plant

Total Care Solution

HMS is the specialized total service provider of power plant covering warranty, O&M, spare parts, engineering, fuel conversion and training. For engine based power plants, HMS have provided its power plant service for over 1,700 units, a total of 5,900MW in 59 countries.

Full O&M Service

- Provides daily, weekly, and monthly operation reports by professional engineers.
- Execute proper maintenance, whether scheduled or unscheduled.
- Managing all kinds of risks and decisions at the right time.

Work Scope



Total Install Capacity
5.9GW

In-Service
4.5GW

Reference

Colombia, Termonorte	Africa, Cabo Verde	Angola, Prodel
20H35/40DFV x 10 Sets	9H21/32 x 2 Sets	20H35/40DFV x 10 Sets
5 Years Full O&M Contract from December 2018	7 Years Full O&M Contract from March 2020	4 Years O&M + Supervision from September 2013

Work Scope By Service

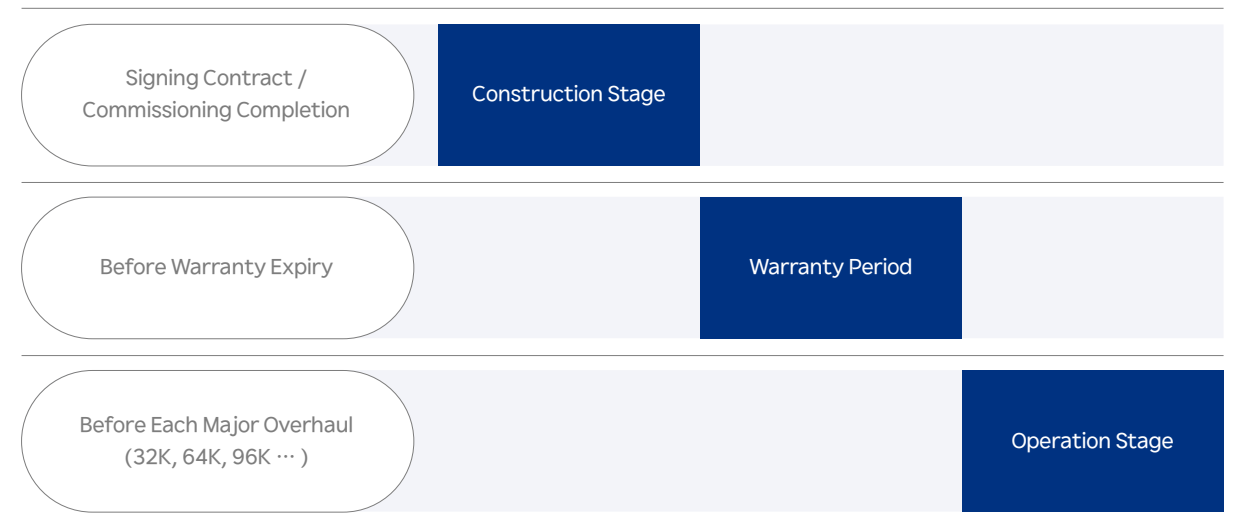
○ Included × Not Included ◌ Optional

Work Scope	PO Based Service	LTPA	LTSA	O&M
OEM Spare Part Supply	○	○	○	○
OEM Spare Part Supply in Stock	×	○	○	○
Technical Support	○	○	○	○
Supervision for Scheduled Maintenance	◌	◌	○	○
Execution for Scheduled Maintenance	×	×	×	○
Plant Operation	×	×	×	○
Unscheduled Maintenance	×	×	×	○
Lube Oil Supply & Service	×	×	×	◌
Guarantee for Reliability	×	×	×	◌
Guarantee for Output	×	×	×	◌

Work scope is flexible and can be customized upon client's demand. We offer Long Term Part Agreements (LTPA) and Long Term Service Agreements (LTSA). Both agreements include OEM Spare Part supply in stock and Technical Support through regional service hub worldwide. LTSA's are suitable for engine with a minimum of 24K and a maximum of 48K running hours. We recommend contract period from 3 to 6 years to serve best efficiency.

Best Timing To Consider LTSA

1. At the start and end of power plant construction
2. At the end of the warranty period
3. Before Major Overhaul Period



Global Academy

HMS Global Academy offers tailored programs to deliver expertise to ship and power plant engineers. We provide training services on 4-stroke HiMSEN engines, electrical facilities, and environmental products.

Various manners such as theoretical lecture, simulators, and hands-on practice are employed for effective training. We promise that you will learn essential items about our products when you complete the Global Academy programs.

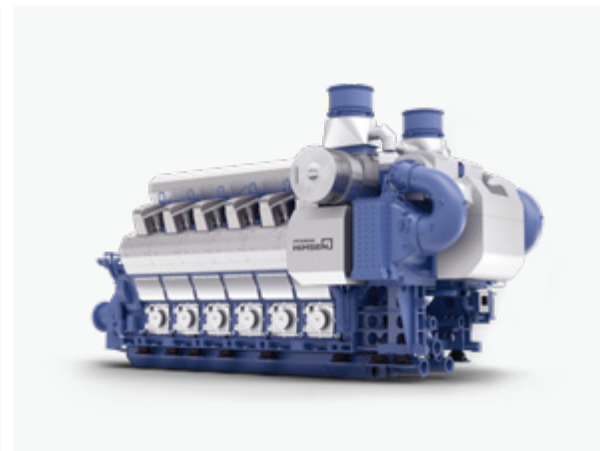
HMS can conduct training at its Global Academy and onboard or on-site, regardless of the location of the training venue. As for theoretical training, we can provide trainees with online training that they can access anywhere. Since online training also offers real-time Q&A sessions, there is no difference between online and in-person training in trainees' comprehension of the training material.

Training Method

HMS Global Academy goes beyond theoretical education by providing high-quality training utilizing advanced simulators and equipment. Based on this foundation, we offer practical hands-on training in disassembly and assembly for various engine parts, as well as on-board and site training.

Main Training Course

- HiMSEN Diesel
- HiMSEN DF
- Main Engine
- Stationary Power Plant Major Aux. Facility
- BWTS
- NoNOx SCR
- SOx Scrubber
- Turbocharger
- Alarm Monitoring System (ACONiS & HiCONiS)
- Switch Board
- Circuit Breaker
- Hi-VDR



Facility

Lecture hall

Practice center

Safety training center

Equipment

6H32/40(DF) HiMSEN

5H21/32 HiMSEN

DF engine simulator

ACONiS Simulator



Training Courses

16

Educators

16

Trainees/Year

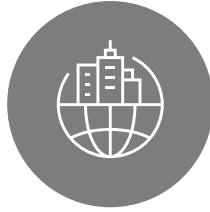
500+



Everywhere, we are there



HD Hyundai Marine Solution Tech



Founded in
APRIL 1, 2022



Employee
128 People



6 Branch Office
(Rotterdam, Singapore, Dubai,
China, Panama, Athens)

We are moving towards becoming the world's best technology solutions company that leads the sustainable future of the maritime industry.

HD Hyundai Marine Solution Tech, a subsidiary of HD Hyundai Marine Solution, was established in April 2022 with the purpose of providing professional technical services related to HD Hyundai Group's ships, engine machinery, and electrical and electronic businesses.

Since its establishment, the company has stabilized its business faster than initially planned and secured top talent, establishing itself as a specialized service provider. In addition, Based on the expertise of highly skilled engineers in the field of marine / engine machinery / electrical and electronic systems, we quickly provide technical sales support and technical support for the maintenance and repair of customers' ships.

HD Hyundai Marine Solution Tech has established service network bases in major ports such as Rotterdam, Singapore, Dubai, China, and Panama to expand the provision of real-time services that can respond to any region of the world, and aims to grow as a technology leader by developing customized services according to the diverse needs of customers.



At the request of our customers, HD Hyundai Marine Solution Tech's expert technicians provide fully customized technical services for all vessels and equipments supplied by HD Hyundai Group at any time, anywhere in the world, depending on the condition of the equipment.

Proactive Maintenance and Planned Maintenance System by specialized engineers and skilled technicians will keep your vessel in optimal condition. This ultimately enables stable vessel operation by reducing downtime and preventing off-hire.

HD Hyundai Marine Solution Tech operates various businesses such as Engine Service, Electric/Control Service, Dry-Dock Maintenance Service, Propeller & Rudder Package Service, and Workshop Recondition Service to build customer trust.

- | | |
|--|---|
| <p>1 On Board(Site) Service</p> | <ul style="list-style-type: none"> • Main / HiMSEN Engine Service (Including Gas/DF) • MSBD / AMS / PMS / VCB / ACB / GENERATOR • BWTS / Thruster / COP(T) / SCR / Scrubber • Purifier / Oil Separator / Others |
| <p>2 Dry-Dock Maintenance Service</p> | <ul style="list-style-type: none"> • Main Engine / HiMSEN Engine / Thruster Overhaul • Re-Engine Service / DF Retrofit • MSBD / AMS / PMS / VCB / ACB / Generator • BWTS / COP(T) / SCR / Scrubber |
| <p>3 Workshop Recondition Service</p> | <ul style="list-style-type: none"> • Main Engine Reconditioning • HiMSEN Engine Reconditioning • VCB Reconditioning • HiMAP Reconditioning |
| <p>4 Propeller & Rudder Package Service and Others</p> | <ul style="list-style-type: none"> • Propeller Package • Rudder Package • Refrigerant Gas Retrofit in HVAC Sys. as per the EU F-gas regulation(517/2014) |

HD HMS Europe

Work Scope

- Technical Service (Maintenance, Reconditioning and others)
- Spare parts sales
- Fleet Demand Survey Spares & Service
- Long Term Service Agreement
- Warranty & Lifetime Service
- Retrofit Conversion
- Training Service

Warehouse

Area
3,100m²

Inventory

- Aux. Engine Parts (Himsen Engine)
- Main Engine Parts (MAN, WinGD)
- Total 10,000 Types of Spare parts
- Stock Amount Approx. USD 40M(in 2023)

Branch Offices

- Athens (Greece)
- Hamburg (Germany)



Founded in
August 28, 2015



Employee
109 people



HD HMS Americas

Work Scope

- Technical Service
- Spare Parts Sales
- Warranty & Lifetime Service
- Maintenance Service
- Retrofit Conversion
- Reconditioning
- Training Course

Warehouse / Workshop

Area
2,274m² (24,477ft²)

Inventory

- Aux. Engine Parts (HiMSEN Engine)
- Main Engine Parts (MAN, WinGD)
- Total 2,000 Types of Engine Parts
- Stock Amount Approx. USD 5.5 M



Founded in
August 2, 2017



Employee
21 people



Area 3,296m²
(35,477ft²)



HD HMS Singapore

Work Scope

- Technical service
- Spare parts sales
- Warranty & life time service
- Maintenance service
- Retrofit conversion
- Reconditioning
- Training course
- Health check (M/E, A/E, ACONIS/SWBD/BWTS)

Warehouse

Area
1812.14m²

Inventory

- Aux. Engine Parts (HiMSEN Engine)
- Main Engine Parts (MAN, WinGD)
- Electric Parts (ACONIS/SWBD/ACB)
- Total 7,000 Types of Engine Parts
- Stock Amount Approx. USD 18M



Founded in
December 5, 2017



Employee
45 people



HD HMS Middle East

Work Scope

- Technical service
- Spare parts sales
- Warranty & lifetime service
- Maintenance service
- Retrofit conversion
- Reconditioning
- Training course

Warehouse

Area
574.56m²

Inventory

- Aux. Engine Parts (HiMSEN Engine)
- Main Engine Parts (MAN, WinGD)
- Total 1,200 Types of Engine Parts
- Stock Amount Approx. USD 2.5 M



Founded in
September 1, 2022



Employee
17 people





Headquarter

477, Bundangsuseo-ro,
Bundang-gu, Seongnam-si,
Gyeonggi-do, Republic of Korea

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hms.service@hd.com
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Power Plant Team
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+82-2-479-9912

Digital Transformation Division
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+82-2-479-9824/9871

Bunkering Team
bunkering@hd.com
+82-2-479-9825

- Headquarter
- Subsidiary & Warehouse
- Branch Office



Subsidiaries

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Centum jungang-ro, Haeundae-gu, Busan,
48058, Korea

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3068AX Rotterdam, The Netherlands
SHIPSERV ID: 240571
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sales.nl_2@hd.com (All)
service.nl@hd.com (All)

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77084, United States / sales.us@hd.com /
SHIPSERV ID 251590

Singapore
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Suntec Tower Two, Singapore 038989,
Singapore / sales.sg@hd.com /
SHIPSERV ID 252426

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Simirni, 171 21, Athens Greece /
athens.gr@hd.com

Fujairah (UAE)
B-C, Phanse-1 Fujairah Freezone, Fujairha,
UAE

Tokyo (Japan)
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1-7-1, Yuraku-cho, Chiyoda-ku Tokyo
100-0006, Japan

Taoyuan (Taiwan)
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Rd., Luzhu Dist., Taoyuan City 338, Taiwan
R.O.C

Ningbo (China)
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Daxie Development Zone, Beilun District,
Ningbo, China

Panama
PH Torre Global Bank, Calle 50,
Corregimiento de San Francisco, Ciudad
de Panamá

