





Globalization with Green Technology







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Hyundai Spirit:

Creative Wisdom
Positive Thinking
Unwavering Drive

History



Completion of Engine Plant Comprised of Foundry, Forging, Machining and Assembly Shop



Production of the 1st Marine Diesel Engine (HYUNDAI- B&W 7L55GF)



Diesel Engine Production Recorded 1 Million BHP (2-Stroke Engine)



1984

Dec. Started Production of Crankshaft (2-Stroke Engine)



1985

Apr. Started Production of Marine Propeller



1988

Jun. Started Production of Heavy Duty Pump for Power & Desalination



1992

Nov. Diesel Engine Production Recorded 10 Million BHP (2-Stroke Engine)



Jun. Production Record of 500 Sets of Marine Propellers



1995

Mar. Started Production of Boiler Feed Water Pump

Apr. Production Record of 500 Sets of 4-Stroke Diesel Engines Jun. Completion of DSW 60MW Diesel Power Plant. Dead Sea, Israel



Production Record of 300 Units of Industrial Robots



1997

Dec. Diesel Engine Production Recorded 20 Million BHP (2-Stroke Engine)



1998

Feb. Export of Hyundai Robot Under its Own Brand Name to Japan Apr. Type Approval Test of HYUNDAI-MAN B&W 6S70MC-C Engine Production Record of 1000 Sets of Crankshafts (2-Stroke Engine)



1999

Mar. Completion of the World's Largest 200MW 2-Stroke Diesel Power Plant,

Chennai, India Type Approval Test of HYUNDAI-SULZER 10RTA96C **Aug.** Type Approval Test of HYUNDAI-MAN B&W 7K98MC Engine



04

2000

Type Approval Test of HYUNDAI-MAN B&W 6S90MC-C Engine Feb. Success of Export of Hyundai Robot to Europe (CERV Ltd., Italy)



2012

Nov. World's First Test Run of LNG Package Solution for LNG-Fueled Ship 1,000th Packaged Power Station was Produced



2011

Dec. Successfully Completion of Inclination Type Approval Test for H32/40 **Feb.** Production Record of 5,000 Sets of HiMSEN Engines

Jul. Ground-breaking of New Robot Factory



2010

Mar. Achievement of 20 Million BHP in Total of Medium Speed Engines May Development of High Output Earth-friendly Gas Engine, H35G **Sep.** World's First Production Milestone of 100 Million BHP in 2-Stroke Diesel Engines



2009

Feb. Completion of 2-Stroke Engine Assembly and Test Shop 1-2 **Dec.** Nominated as a World Top-class Products 2009, Marine Propulsion Shafts and Side Thruster



2008

Mav Development of the 8th Generation LCD Transfer Robot Completion of Engine Shop 3, HiMSEN Engine Ass'y and Test Shop Development of High Power HiMSEN Vee-type (16H32/40V)

Development of Ballast Water Management System



2007

The Joint Venture Company (JVC), Wärtsilä-Hyundai Engine Co., Ltd. Founded by HHI and Wärtsilä

Production of the World's Most Powerful 2-Stroke Diesel Engine (Hyundai-Wärtsilä 14RT-flex96C, 108,920 BHP)



2006

Feb. Development of Hyundai Hydraulically Driven Cargo Oil Pumping System Type Approval Test of HiMSEN H32/40



2005

May Achieved the World's First 50 Million BHP Milestone of 2-Stroke Diesel Engines



Oct. Production Record of 10,000 Units of Industrial Robots



Production of the World's Most Powerful Electronically Controlled ME Engine (HYUNDAI-MAN B&W 12K98ME 93,360 BHP) Type Approval Test of HiMSEN "S" Model (H17/28)



2003

May Production Record of 1,500 Sets of Marine Propellers Achieved the World's First 40 Million BHP Milestone of 2-Stroke Diesel Engines



2002

HiMSEN was Awarded as One of "Korea's Top10 Best New Technologies of 2000" Oct. Type Approval Test of HiMSEN H25/33



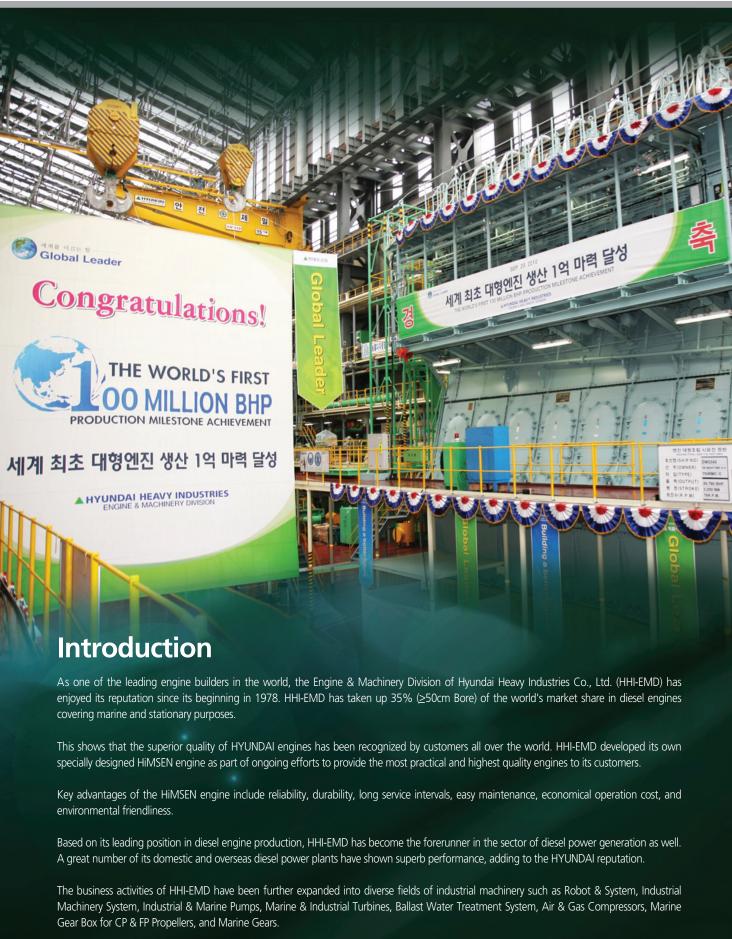
2001

Production of the World's First Electronically Controlled Hyundai-Sulzer RT-flex Engine

Type Approval Test of HiMSEN H21/32 Diesel Engine Production Recorded 30 Million BHP (2-Stroke Engine)

Production of the World's Largest Marine Propeller (Weight: 101.5ton, Dia: 9.1m, Blade: 6) Production of the World's Largest Engine (HYUNDAI-MAN B&W 12K98MC: 93.360bhp)





HHI-EMD Location Guide

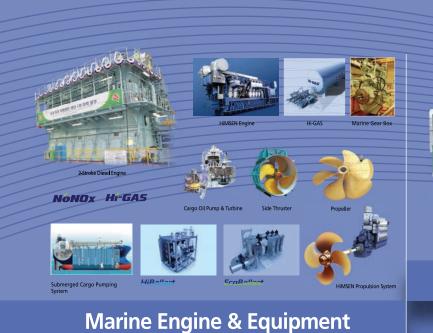


HHI Growth

Hyundai Heavy Industries Co., Ltd. (HHI) had its ground-breaking ceremony in March 1972.

The Hyundai shipyard, located at Mipo Bay in Ulsan on the southeastern coast of Korea, spreads across 1,200 acres with its main production plants and all necessary auxiliary facilities covering over 800 acres. Since the successful construction of its first two 260,000 DWT supertankers in 1974, HHI has built and delivered almost every kind of ship to customers all over the world.

Backed by technology and experience acquired through shipbuilding as well as streamlined modern facilities and highly skilled manpower, HHI has diversified its business activities from shipbuilding into other heavy industrial fields. On this vast compound, Electro Electric Systems, Green Energy and Construction Equipment.



Hyundai integrated GAs Supply system (Hi-GAS) Steam Turbines Gas Turbines

Propellers, Shafts, Rudder Stocks

Marine Propulsion System

Marine Hydraulic Equipment Cargo Oil Pumping Systems

Side Thrusters, Azimuth Thrusters
 Ballast Water Treatment System
 Gas Compressors & Air Compressors

· Marine Gear Boxes

2-Stroke Diesel Engines

4-Stroke HiMSEN Engines• Diesel Engines • Gas Engines
• Dual Fuel (DF) Engines

Engine Components

· Crankshaft · Cylinder Liners

Marine Eco Machinery

Diesel EnginesDual Fuel (DF) Engines



Stationary Engine Power Plants

Packaged Power Stations Gas Engine Power Plants

Pre-Fabricated Power Plants

Barge-Mounted Engine Power Plants

Emergency Diesel Generator (EDG) for Nuclear Power Plants

Dual Fuel (DF) Engine Power Plants

- Sealing
 Palletizing
 Assembly

Robot & System

Robot Applications

- Arc/Spot Welding
- Handling (LCD etc.)

- · Conveyor System

System Applications









Hydraulic Machinery

Pumps for Industrial Use

- Thermal & Nuclear Power Plants
- · Desalination Plants

- Irrigation & Water Supply Projects

Hydraulic Machinery

for Industrial Use

MARINE ENGINE & EQUIPMENT

2-Stroke Diesel Engine 대형엔진 생산 1억 마력

2-Stroke Diesel Engine Assembly & Test Shop





HYUNDAI-MAN B&W 6S80ME-C9



HYUNDAI-WÄRTSILÄ 8RTA82C



HYUNDAI-MAN B&W 8S70ME-GI

Products

HYUNDAI-WÄRTSILÄ 12RT-flex96C

HYUNDAI-MAN B&W / HYUNDAI-WÄRTSILÄ / Engine Components



2-Stroke Diesel Engine

HHI-EMD has been supplying "One out of Three" of the world's two-stroke diesel engines for marine propulsion and power generation in pursuit of providing our valuable customers with high quality and more economical products.

HHI-EMD's established reputation is supported by its superb performance in marine and stationary diesel engines along with its state-of-the-art facilities such as foundry, forging, machining, crankshaft, and assembly & test shops specializing in manufacturing diesel engines.



HYUNDAI-WÄRTSILÄ 14RT-flex96C

Components

- Bed Plates Cylinder Heads
- Cross Head Pins Frame Boxes
- Cylinder Liners Cylinder Frames
- Piston Rods
- Connecting Rods
- CKD/PKD Base Engine Components



Frame Box



Cross Head Pin



Cylinder Head





Cylinder Frame



Cylinder Liner



Piston Rod



Connecting Rod

Turbocharger

Crankshaft

Crankshaft

The Crankshaft Shop can produce semi-built-up crankshafts and monoblock crankshafts, using the most up-to-date CNC and NC heavy-duty crankshaft and crankthrow lathes.



2-Stroke Diesel Engine Crankshaft Assembly











Products

2-Stroke Diesel Engine Crankshaft / 4-Stroke Diesel Engine Crankshaft

Turbocharger

Based on the most up-to-date technology accumulated through its wealth of experience in manufacturing diesel engines and a wide variety of precision machinery, HHI-EMD produces exhaust gas turbochargers: ABB's TPL and A type, and MHI's MET type for turbocharging diesel engines under a technical tie-up with ABB Turbo Systems Ltd. of Switzerland and Mitsubishi Heavy Industries Ltd. of Japan, respectively who themselves have more than 40 years' experience in the field of designing and manufacturing turbochargers.







Products

TPL91-B / TPL85-B / TPL80-B / TPL77-B / A285-L / A280-L / A275-L / A190-L / A185-L / A180-L / A175-L / MET90SE / MET90SEII / MET90MA / MET90MB / MET83SE / MET83SEII / MET83MA / MET83MB / MET71SEII MET71MA / MET71MB / MET66SE / MET66SEII / MET66MA / MET66MB

MARINE ENGINE & EQUIPMENT



Propeller Shop

HHI produces a wide variety of marine propellers, our propellers have a diameter up to 11,000 mm, with maximum unit weight of 114,000 kg, and are made from such materials as manganese bronze and nickel-aluminum bronze

Hyundai employs a comprehensively computerized design, manufacturing, and inspection system for these products.

Max. Production: 114 ton in Weight, 11 m in Diameter
Min. Production: 10 ton in Weight, 3 m in Diameter
Machining Equipment: NC Blade Milling M/C x 3 sets
Boss Boring M/C x 3 sets
Riser Cutting M/C x 2 sets
Horizontal Balancing M/C x 2 sets

Shaft Propeller Shaft / Intermediate Shaft Rudder Stock Straight Type

Max. Production: 150 ton in Weight

2,200 mm in Diameter 18,000 mm in Length

Min. Production: 300 mm in Diameter 2,000 mm in Length











MARINE ENGINE & EQUIPMENT

4-Stroke HiMSEN Engine

HiMSEN Engine Assembly & Test Shop







HiMSEN H35/40GV

HiMSEN H35DF

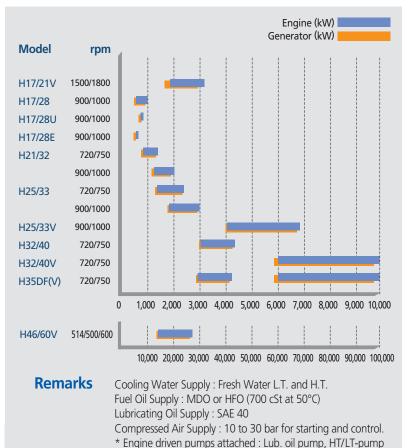
HiMSEN H46/60V

Products

HiMSEN 9H25/33

HiMSEN H17/21V / H17/28(U,E) / H21/32(P) / H25/33(V,P) / H32/40(V,P) / H17/24G / H35/40G(V) / H35DF(V) / H46/60V / Components

Rated Power for Marine GenSets



Components

Cylinder Blocks
 Pistons

Connecting Rod

- Cylinder Liners
 Connecting Rods
- Cylinder Heads
 Piston Crowns
- · Cylinder Covers · Re-engine Services











Cylinder Liner Cylinder Head

4-Stroke HiMSEN Engine

HHI-EMD has developed its own specially designed HiMSEN engines incorporating its valuable experience and technical know-how acquired in manufacturing diesel engines for over two decades.

The theme "Humans, Technology, and the Future" was synthesized in this new engine.

Also, "HiM" means "power," and "SEN" means "strong" in Korean.

The Hi-Touch concept was introduced to make this truly innovative engine a reality for humanity. It was designed to be the "Most Practical Engine" in regards to both humans and the environment.

Through HYUNDAI's accumulated technology and experience, this new challenge has been successfully

HHI-EMD also has received certificates of New Technology(NT) and Excellent Machine, Mechanism & Materials(EM) for the HiMSEN engines from the Ministry of Commerce, Industry & Energy, Korea. HiMSEN Engine H21/32 and H32/40V were nominated for the international design award of the Federal Republic of Germany after winning Red Dot and International Forum, including Pin Up Design Award 2009. Thus, the HiMSEN is a highly advanced product that shows HYUNDAI's deep respect for

its customers and the environment.

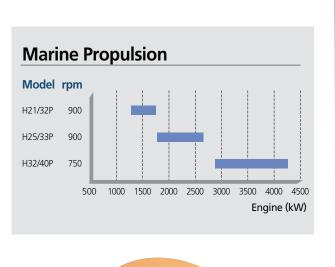
Marine Gearbox & Water-Jet Propulsion

Excellent Performance of

HiMSEN Engine

HiMSEN Propulsion Engine

- Improved Transient Operation with Pulse Charging Turbocharger
- Invisible Smoke with Pulse Charging Turbocharger by Part Load Matching
- Lower Thermal Load engine with Lower Exhaust Gas Temperature
- Low Fuel Consumption
- Low NOx Emission



Propulsion System Long Term Commitment... To Provide the Market with Reliable, Cost Effective and Earth-Friendly Solution

Optimized Matching of HiMSEN Propulsion Package

- HiMSEN H21/32P, H25/33P and H32/40P Engine
- C.P. / F.P. Propeller with shafting
- Pitch and Speed Control
 - Load Control
 Reduction Gear
 - Shaft Generator Auxiliary Machineries





- · Controllable Pitch Propulsion
- · Fixed Pitch Propulsion
- · Azimuth Thruster Propulsion
- · Pump Drive
- · Electric Propulsion

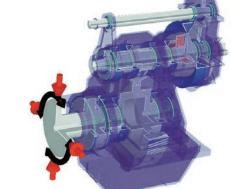


Marine Gearbox for CP & FP Propellers

HHI-EMD produces Reverse-Reduction Gearboxes for FPP ships and Reduction Gearboxes for CPP ships. The ranges of the gearboxes for marine transmissions are offered in a range up to 3,000 kW. Design standards & rules: ISO 6336, DIN 3990, AGMA, DNV, GL, KR, etc.

Gearbox Ranges

Gearbox Types	Gear Ratio	Engine Power (kW)
CPGV (CPP Gearbox)	2.0 ~ 6.0	~ 3,000 kW
FPGV (FPP Gearbox)	2.0 ~ 6.0	~ 3,000 kW





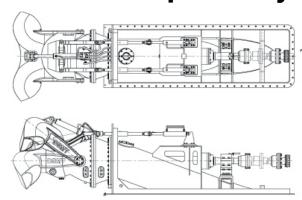


Loaded Gearbox Test with HiMSEN Engine (FPGV-660)

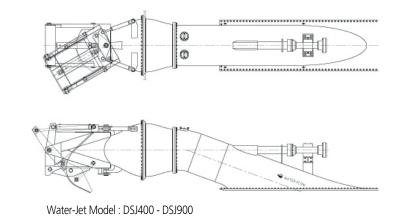


Reverse-Reduction Gearbox for FPP Propulsion System (FPGV-660)

Water-Jet Propulsion System



Water-Jet Model: DSJ100 - DSJ300



MARINE ENGINE & EQUIPMENT

Marine Pump

Cargo Oil Pumping System

With the latest technologies accumulated from the continuous R&D efforts and experience gained over 30 years of producing various kinds of pumps, HHI-EMD has supplied cargo oil pumps/water ballast pumps with steam turbines since 1995 and these products are now enjoying a good reputation for quality.

Advantages

Compact Size

The improved hydraulic configuration and rationalized structural design have resulted in a compact model that generates less noise and vibration.

Easy Maintenance and excellent sealing performance

The cartridge-type and high grade material for mechanical seal facilities easy maintenance & excellent sealing performance.

Improvement of Hydraulic Performance

Adoption of high efficiency discharge volute, high performance suction volute and wear ring configuration.

Cargo Oil Pump: 1,800 - 6,050 m3/h Water Ballast Pump: 1,200 - 5,000 m³/h

Performance Range

Steam Turbines for Marine Pump

HHI-EMD, as a world-wide leader in the fields of manufacturing integrated heavy industrial products, has begun its diversification into supply of various turbines and generators for the application from nuclear and thermal power plants to a variety of mechanical drives under the name of HHI-EMD.

For technical innovation of marine steam turbines, HHI-EMD has developed the technical matter from continuous R&D efforts and experiences gained more than 15 years of turbine production.

In order to keep up with an ever increasing needs for clients all over the world, we present a high efficiency turbine for cargo oil pumps and water ballast pumps.



Standard Model CSV-5 / CSV-14 / CSV-18 / RTV

Cargo Oil Pumps & Water Ballast Pumps

Automatic Vacuum Stripping System (AVSS)

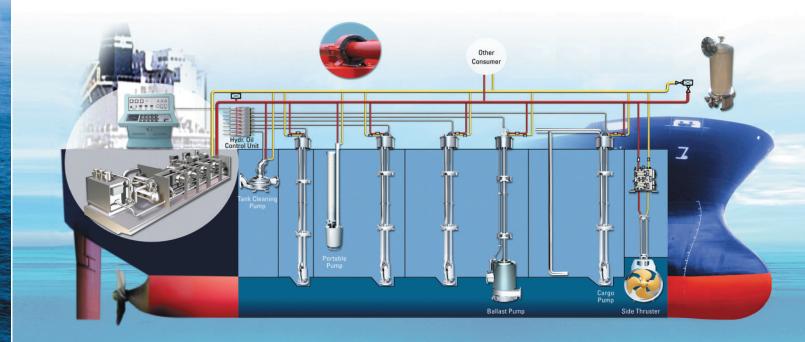
Steam Turbine (COPT & WBPT)

Cargo Oil Stripping Pump

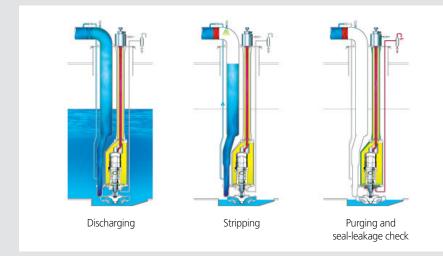
Submerged Cargo Pumping System

Submerged cargo pumping system based upon hydraulically driven submerged cargo pumps, is used for chemical and product carriers, crude carriers, FPSO units and others.

The system is designed for profitable cargo handling, efficient stripping, and tank cleaning. HHI-EMD uses state-of-the-art computer aided design technology, and it is staffed with a qualified and experienced team of engineers and technicians to design, manufacture and factory test each pump.







Major Components

- · Submerged cargo pump
- Hydraulic power package
- Control system
- Ballast pump
- Portable pump with winch
- · Tank cleaning pump
- · Hydraulic oil transfer pump

Optional Components

- Diffuser
- · Side thruster & control block
- Cargo heater

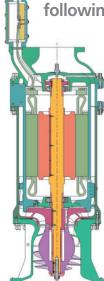
Thruster

LNG Marine Pump

Main Features

LNG Pump

LNG Cargo pumps offers the following advantages:

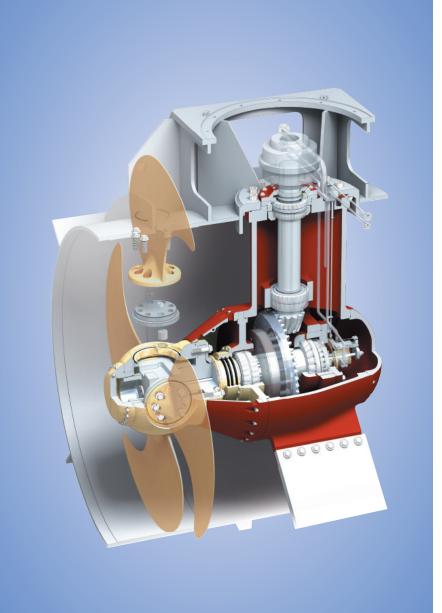


- Designed for utmost NPSHr performance, which provides the highest storage availability and safe ultimate stripping capability.
- Optimized hydraulic design for the best efficiency.
- Highest reliability and availability with minimum maintenance over a design life of 40 years.

Materials

Shaft **Standard Bearings** Stainless steel Inducer & Impeller Aluminum alloy Housings Aluminum alloy **Seal Stators**





Thrusters CP & FP Propeller

HYUNDAI Thrusters can be fitted to a wide range of vessels operating throughout the world. The tunnel thruster is designed to efficiently generate thrust force allowing a ship to maneuver more easily. Thrust system normally consists of a thruster unit with tunnel, hydraulic equipment, a remote control and a prime mover.

A long service-life and easy maintenance are key factors in the design of the HYUNDAI Thruster.

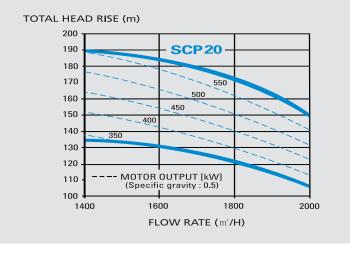
Advantages

- Compact Design / Powerful Thrust
- Low Noise, Low Vibration
- Well-balanced Performance(port / starboard)
- Superior Quality / Easy Installation
- Easy Operation / Easy Maintenance
- Reliable System Interface Control
- Rapid Technical Service
- Quality-oriented Feedback Activity



Hydraulic Coverage

Flow rate and head rise nominal capabilities are shown in this chart. Applications below this domain can be met by existing JC Carter LNG cargo pumps. HHI-JC CARTER-SNECMA can study applications above this domain to fulfill your needs. The safe continuous operating domain ranges from 30% to 120% of the reference flow rate chosen in this operating domain.



Product Range

HSC / HSF Series

T	Model Sp	ecification	
Туре	Propeller O.D	Motor Output	Applications
HSC (CPP)	1,000 mm ~ 3,400 mm	300 kW ~ 4,000 kW	Container Carrier LNG Carrier Car Carrier
HSF (FPP)	1,000mm ~ 2,000mm	300 kW ~ 1,200 kW	Product Carrier

Complete Thruster Packages

· Controller (Aux.)

Propeller Unit

Electric Motor

Controller (Main)

· Hyd. Oil Unit (HPU)

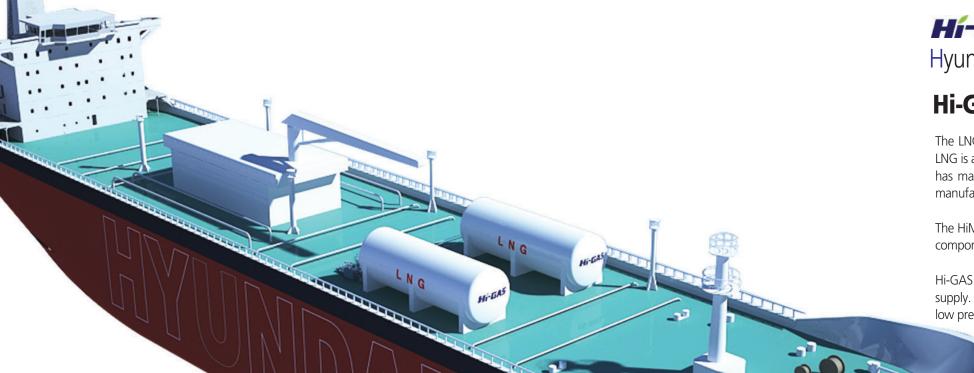
HPU Starter

Gravity Tank

Motor Starter



Hi-GAS(FGSS) System



Application







HHI-EMD can supply complete LNG package solutions for LNG carriers and LNG-fuelled ships.

Hí-GA5[™]

Hyundai integrated GAs Supply system

Hi-GAS[™] Package solution LNG Fuel Gas Supply System

The LNG market is developing rapidly, and the demand for LNG carriers and LNG fueled ships is increasing because LNG is a very attractive solution from an emission and economic point of view. The high efficiency of dual fuel engines has made the engine market the preferred prime mover choice for new projects, HHI-EMD has rich experience in manufacturing both the ME-GI engine and the 4-stroke dual fuel engine HiMSEN.

The HiMSEN GenSet can use both diesel and LNG on LNG carriers and conventional LNG fueled ships. One of the key components for LNG fueled ships is the LNG fuel gas supply system for both dual fuel engine types.

Hi-GAS is a remarkable design of the LNG fuel gas supply system for dual fuel engines based on high and low pressure supply. This means that Hi-GAS can effectively supply high pressure CNG to the ME-GI engine while also supplying low pressure CNG to the 4-stroke DF GenSet, essentially doing the work of two fuel supply systems.



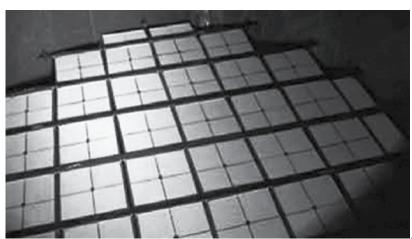
HYUNDAI NONOx[™] SCR System

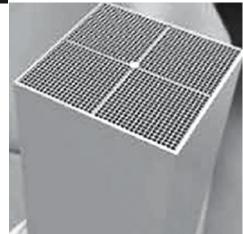
NoNOx[™] SCR system designed by Hyundai Heavy Industries

NoNOx_{TM} is brand name of HYUNDAI SCR system, aimed to reduce NOx in exhaust gases. SCR (Selective Catalyst Reduction) is proven technology, which can reduce NOx up tp 95% and meet forthcoming IMO Tier III regulation by itself.

PILC(Pillared Inter- Layered Clay) catalyst, specially designed for marine application is adopted, which makes higher de-NOx efficiency and stronger resistance against thermal stresses comparing to conventional type of catalyst.

The state of the art control system is provided based on ACONIS(Advanced CONtrol & Integration System designed by Hyundai Heavy Industries) hardware platform, which makes full automatic control and perfect interface with other system. Control system can be fully integrated to hull AMS(Alarm Monitoring System) if it were based on ACONIS and optimizing of detergent dosing system can be optionally provided in by real time feed-back from NOx sensor.





Size & Weight of NoNOx[™] standard SCR Chamer

Engine power [kW]	Dime D [mm]	ension of SCR Cha W [mm]	amber H [mm]	Weight of SCR chamber Incl. Catalyst [kg]
~1000	1200	1200	4100	1900
~1500	1200	1200	4100	2500
~2000	1500	1500	4400	3000
~2500	1500	1500	4400	3000
~3000	1500	1500	4400	3300
~3500	1800	1800	4700	4000
~4000	1800	1800	4700	4200
~4500	1800	1800	4700	4300
~5000	2100	2100	5000	5100
~5500	2100	2100	5000	5400
~6000	2100	2100	5000	5600
~6500	2400	2400	5300	6400
~7000	2400	2400	5300	6700
~7500	2400	2400	5300	6800
~8000	2400	2400	5300	6900
~8500	2400	2400	5300	7100
~9000	2700	2700	5600	8000
~9500	2700	2700	5600	8200
~10000	2700	2700	5600	8400

NoNOx[™] can meet customer's requirement for tailor made of SCR chamber if optimized size of chamber is required, besides standard dimension shown above table. Please contact us for more information.



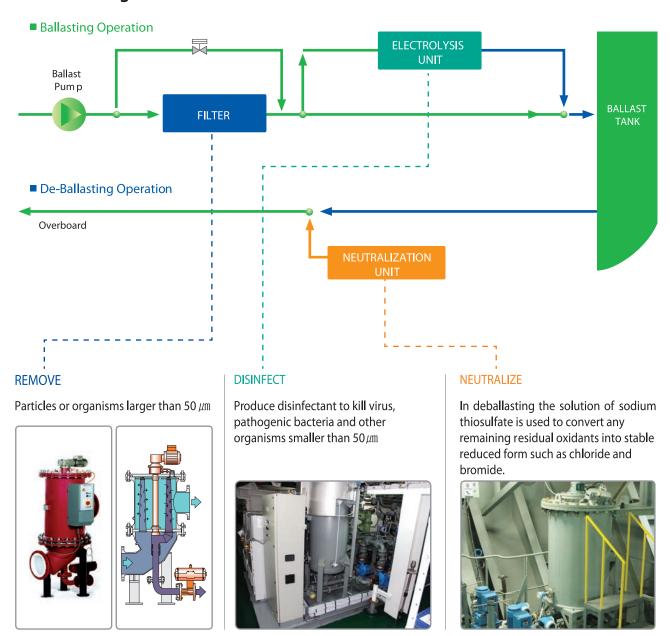
Ballast Water Treatment System, HiBallast

How *HiBallast*™works

HiBallast is a disinfection system by electrolysis of sea water

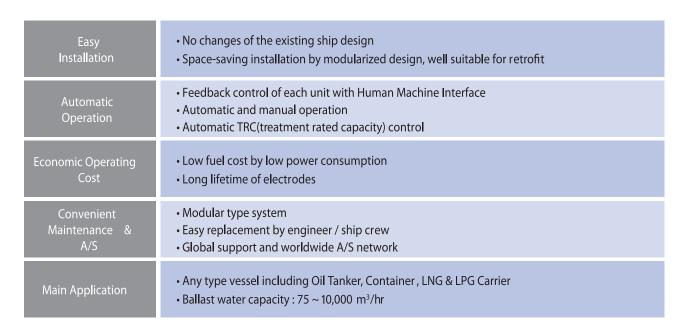
- Components : filter, Electrolysis Unit, Neutralization Unit, TRO Sensing Unit
- Required sea water capacity for electrolysis : only 1% of total ballast capacity
- Disinfectants : Sodium Hypochlorite
- Neutralizing agent : Sodium Thiosulfate
- Safety first: No harmful to human & vessel, No dangerous by H₂ gas separation, No risk to ballast tank coating

Process Configuration

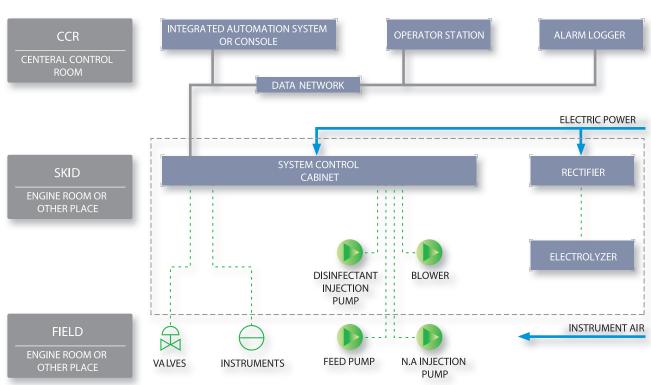


In deballasting operation, the system needs to be neutralized prior to the discharge with neutralization agent to avoid environmental damage of the sea water .

Main Features



Control System Configuration



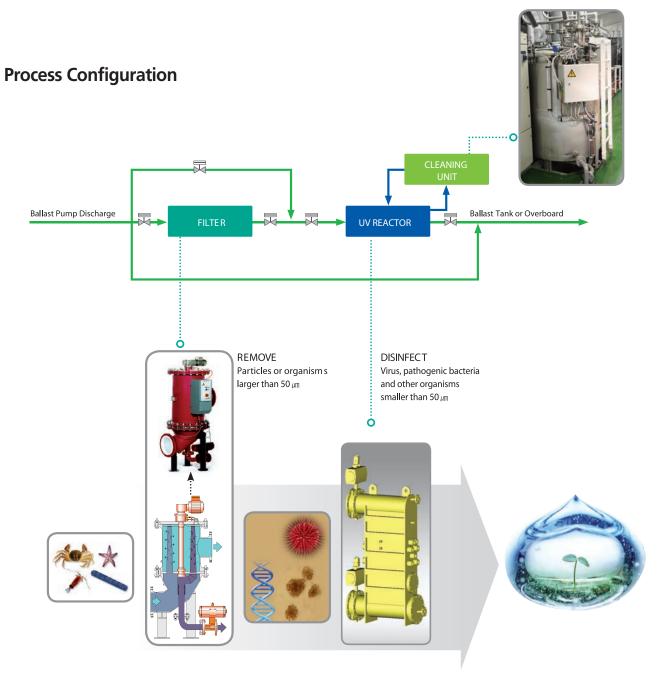
How *EcoBallast*[™] works?

EcoBallast is a ultra violet disinfection system

• Components : Filter, UV Reactor, CIP (Cleaning In Place) Unit

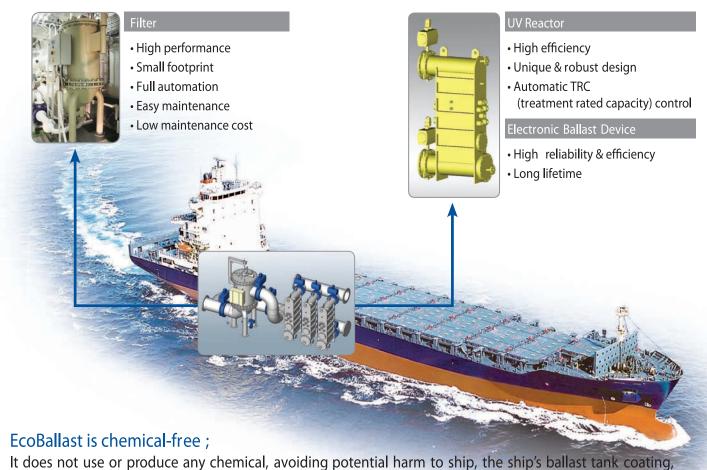
Disinfectants: UV-C lightEco-friendly disinfection process

• Safety first : No harmful to human & vessel



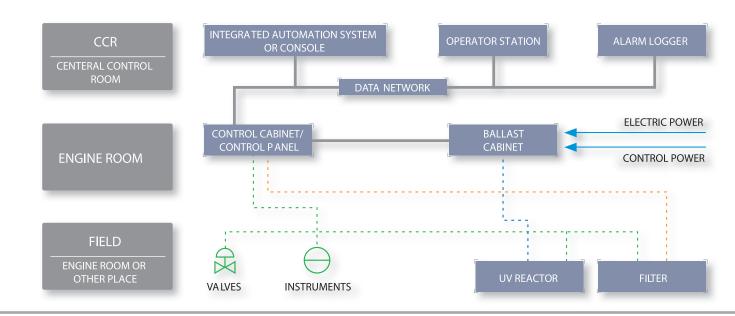
The ballast water is treated during ballasting and once again during de-ballasting.

Main Features



It does not use or produce any chemical, avoiding potential harm to ship, the ship's ballast tank coating the crew, and the marine environment.

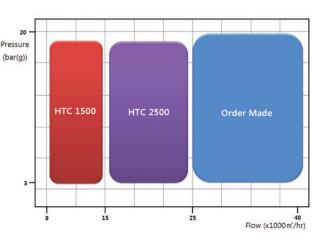
Control System Configuration



Air Compressor

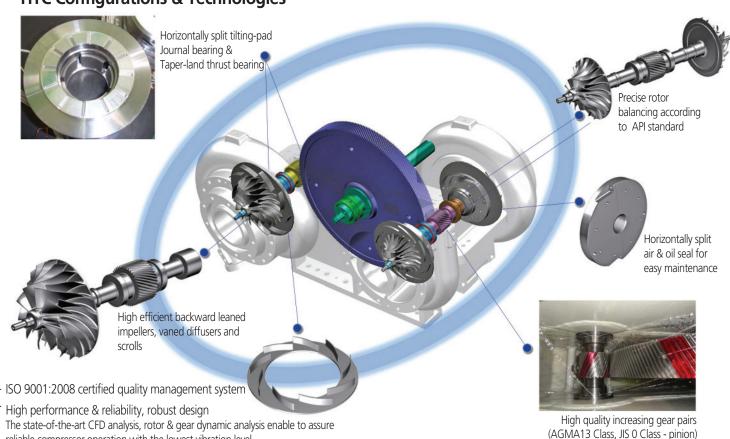
1250 HP Turbo Air Compressor



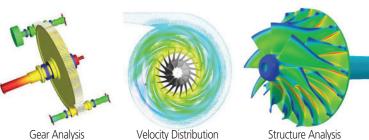


· Five(5) units compressor operating in On-san, Korea.

HTC Configurations & Technologies



The state-of-the-art CFD analysis, rotor & gear dynamic analysis enable to assure reliable compressor operation with the lowest vibration level.



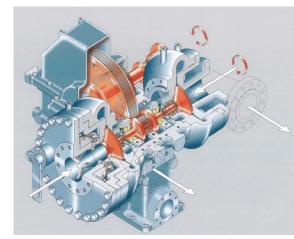
Major Features

- · Auto-dual & Modulating operation (Customer can select)
- Easy recognition of operating condition (Graphical view)
- Genius Anti-surge control (4-season mode selection)
- · Superior database management (Graphical time history)
- · TCP/IP communication with remote control room
- Database auto save & file transfer using USB (max. 6 months)

Gas Compressor

HHI-EMD has added Gas Compressors to its business lines as a new product in 2011 through License Agreement and Collaboration with Mitsubishi Heavy Industries Compressor Corporation (MCO).

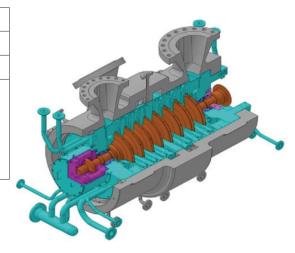
Integrally Geared Centrifugal Compressor



Model	2C, 3C and 4C
Flow	up to 17,600 A m ²/h
Discharge Pressure	up to 40 Bar A
Application Service	Gas Field Application (Fuel Gas Compressor) · Industrial Plant · Simple or Combined Cycle Gas Turbine Power Plant

Vertically Split Centrifugal Compressor (In-Line Compressor)

Model	3V, 4V and 5V				
Flow	up to 48,000 A m /h				
Discharge Pressure	up to 150 Bar A				
Application Service	Gas Field Application (Offshore / FPSO / Onshore) · Gas Processing · Gas Lift · Gas Treatment · Gas Injection · Gas Gathering				









Engine Power Plant

Prime Mover:

2-Stroke Diesel Engine

Ever since HHI-EMD successfully completed a 20MW-class diesel power plant in Jeju, Korea, it has expanded its activities in the power sector and filled a key role in the global power market by completing quality diesel power plants around the world as an EPC contractor.

Recently, HHI-EMD successfully completed a 60MW diesel power plant in Israel, a 50MW and a 36MW diesel power plant in Malaysia, a 200MW diesel power plant in India (the largest diesel power plant in the world using a diesel engine as its prime mover), two 30MW diesel power plants in Mauritius, and a 42MW diesel power plant in Mexico.

Range of 2-Stroke Stationary Engine

Diesel Engine		No. of Speed(rp		(rpm) Output(kW)/C		V)/Cylinder
Model	Type	Cylinders	50Hz	60Hz	50Hz	60Hz
	K98MC-S	9-14	103.4	102.9	5,680	5,650
	K90MC-S	7-12	107.1	109.1	4,290	4,260
	K80MC-S	7-12	107.1	109.1	3,390	3,360
HYUNDAI - MAN B&W	K60MC-S	7-14	150	150	1,980	1,980
	K50MC-S	7-14	176.5	180	1,420	1,450
	L42MC-S	7-12	187.5	189.5	1,060	1,070
	L35MC-S	7-12	214.3	211.8	6,450	6,400







GMR Vasavi 200MW Diesel Power Plant, India (HYUNDAI-MAN B&W 12K90MC-S x 4)

Prime Mover:

4-Stroke Diesel Engine

HHI-EMD provides a wide range of services:

- Feasibility study
- Financial resource assistance
- Operation and maintenance
- Training
- Rehabilitation
- Tool and spare parts supply
- Local presence of expert personnel





Range of 4-Stroke Stationary Engine

	gine	No. of	Speed	d(rpm)	Output(kV	Output(kW)/Cylinder	
Model	Туре	Cylinders	60Hz	50Hz	60Hz	50Hz	
	H17/21V	12~20	1,500	1,800	176	154	
	H17/28	5~9	900	1,000	115	120	
		_	720	750	160	160	
	H21/32	5	900	1,000	192	-	
	1121/32	6.0	720	750	160	160	
		6~9	900	1,000	200	200	
	H25/33	6~9	720	750	240	250	
HiMSEN	П23/33	0~9	900	1,000	290	300	
	H25/33V	12~20	900	1,000	320	320	
	H32/40	6~9	720	750	475	475	
	H32/40V	12~20	720	750	475	475	
	H17/24G	5~9	1,000	1,200	110	91	
	H35/40G	6~9	720	750	480	480	
	H35/40GV	12~20	720	750	480	480	
	H35DF(V)	6~9	720	750	480	480	
	H46/60V	12~20	600	514	1,145	1,300	





Fort George 60MW Diesel Power Plant, Mauritius (HYUNDAI-MAN B&W 9K80MC-S x 2)



60MW BLPC Diesel Power Plant, Barbados (HYUNDAI-MAN B&W 9K80MC-S x 2)







300 MW Global I&II, Brazil (HiMSEN 9H25/33 X 120)

148 MW Camacari, Brazil (HiMSEN 9H25/33 X 60)

Packaged Power Station



Santa-Elena 90 MW PPS in Ecuador (HYUNDAI-HiMSEN 9H21/32 x 53 Sets)



Puerto-principe 34 MW PPS in Hitai (HYUNDAI-HIMSEN 9H21/32 x 20 Sets)



Masaya 61 MW PPS in Nicaragua (HYUNDAI-HIMSEN 9H21/32 x 36 Sets)



BioBio 13.6 MW PPS in Chile (HYUNDAI-HIMSEN 9H21/32 x 8 Sets)



REGLA 47.6MW Packaged Power Station in Cuba (HYUNDAI-HIMSEN 9H21/32 x 28 Sets)



Namibia 10 MW PPS in Namibia (HYUNDAI-HiMSEN 9H21/32 x 6 Sets)



J-Project 5.6 MW PPS in Japan (HYUNDAI-HIMSEN 9H21/32 x 4 Sets)

Packaged Power Station

Prime Mover : HiMSEN Engine

HHI-EMD has developed the Packaged Power Station using HiMSEN engines for captive power such as those used in factories, shopping malls, hotels, rental businesses and so on. The Packaged Power Station, a result of HHI-EMD's creative and technological prowess, will bring contentment to previously unsatisfied power customers.

Features

- · Base Load Operation
- · Diesel Oil / Heavy Fuel Oil / Natural Gas Use
- · Compact 40-Feet Container Size
- · Mobile Type(option)
- · Environmentally comfortable
- · Low operation and maintenance cost

General Specifications

•							
Engine Model	6H17/28		6H21/32	8H21/32	9H21/32		
Engine (kW)	690 / 720	920/960	1,200	1,600	1,800		
Generator (kW)	645 / 673	865 / 902	1,140	1,520	1,710		
Total Weight (ton)	24	30	42	48	50		
Dimension (W x H x L)		2.4mX3.4	mX12m (Con	tainer Size)			
Cooling Method	Radiator / Cooling Tower						
Speed	900 rpm / 1,000 rpm						
Fuel		Diese	el Oil / Heavy Fu	uel Oil			

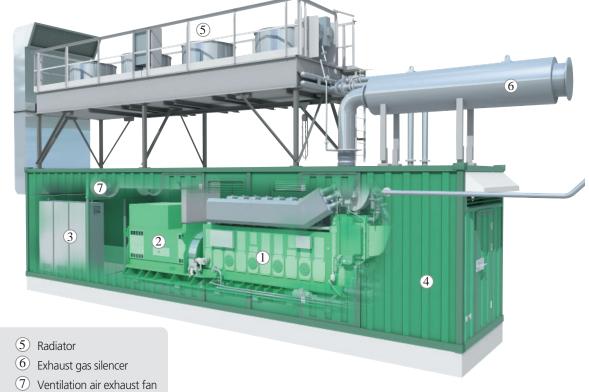
Engine Model	5H17/24G	6H17/24G	7H17/24G	8H17/24G	9H17/24G	
Engine (kW)	455 / 550	546 / 660	637 / 770	728 / 880	819/990	
Generator (kW)	428 / 817	513 / 620	599 / 723	684/827	770 / 930	
Total Weight (ton)	22	24	25	26	28	
Dimension (W x H x L)		2.4mX2.9mX12m (Container Size)				
Cooling Method		Radiator / Cooling Tower				
Speed	1,000 rpm / 1,200 rpm					
Fuel		Natural Gas				

The MCR will be based on ISO condition.

Application

- · Captive Power · Construction Site · Isolated Area

- · Rental Business · Pumping Station · Independent Power Producer



- 1 Engine ② Generator
- 3 Control panel

HYDRAULIC MACHINERY

Seawater Lifting Pump for Thermal Power Plant

1000MW X 2 Units / Younggwang Nuclear Power Plant, Units 3 & 4



Drainage Pump for Drainage Pumping Station



Feedwater Booster Pump for Nuclear Power Plant Model 600 X 400HDRM



Horizontal Single-Stage Steam Turbine

Variable Pitch Vane Pump



Industrial Pump

HHI-EMD has supplied various kinds of pumps all over the world with the best quality and timeliest delivery. Accordingly, we have gained an excellent reputation with our clients at home and abroad which has led us to expand our pump production range to various fields, including thermal & nuclear power plants.

Products

Thermal and Nuclear Power Plant:

Circulating Water Pump Boiler Feed Water Pump Feed Water Booster Pump Condensate Pump / Seawater Lift Pump Concrete Volute Pump

Desalination Plant:

Brine Recycle Pump / Seawater Intake Pump Brine Blowdown Pump / Distillate Pump

Petrochemical Plant : Cooling Water Pump Flood Control : Drainage Pump

Irrigation & Water Supply Project : Intake Service Pump / Boosting Pump

Dry Dock : Dewatering Pump

Industrial Steam Turbine

Horizontal Single-Stage Steam Turbine

Components

· Barrel (Fabrication) · Shaft (Round Bar) · Casing (Casting)









Shaft (Round Bar)

Casing

ROBOT & SYSTEM

Steam Turbine

Steam Turbine

HYUNDAI-MITSUBISHI Marine Propulsion Steam Turbines

The combination of Hyundai's and Mitsubishi's expertise has produced the best quality marine steam turbines.

MS-2 Series marine steam turbines are the typical standard products manufactured by Hyundai under the technical license of Mitsubishi.

HYUNDAI-MITSUBISHI marine steam turbines are the most modern in design and feature both high output and economy, which are essential prerequisites to the successful operation of various kinds of ships.

We are confident that the MS-2 Series steam turbines will satisfy any requirements of their users.

Standar Output in KP	rd Frames	20		30			4	
Turbine	Designation	M24-2	M28-2	MS32-2	MS36-2	MS40-2	MS45-2	MS50-2
HP Turbine	Designation	H-	20		H-22		H-	-26
nr ruibine i	Speed in rpm	67	00		5950		48	350
LP Turbine	Designation	L-14	L-	16	L-	18	L-	20
Li Turbine	Speed in rpm	4600	40	00	34	100	31	00
Main Reduct	ion Gear	Most :	Suitable Reduction Gear System (Tandem Articulated Type or Dual Tandem Articulated Type)			ed Type)		
Main Thrust	Bearing	T-9	T-10	T-12	T-13	T-15	T-17	T-19
Main Conde	nser		According to Heat Balance Diagram					
Total Approx	Weight in ton	260	280	300	320	350	400	430

Components

- Rotor Shaft
- HP/IP Turbine CasingBladeLP Turbine CasingDynamic Balancing Test









Hyundai Robot System for Car Body Shop

INDUSTRIAL MACHINERY SYSTEM



Industrial Robot

Human-like touch and flexible operation couples precision and lifelong stability

Features

Wide Working Envelope, High Speed, High Reliability

- · Easy and Simple Operation with programming Language Similar
- Easy Maintenance Using On-line Display Function
- Advanced Control Technology with Dynamic, Vibration Suppression
- Safety with ANSI/RIA15.6_1999 and CE Directives
- Compatibility and Connectivity with Field Bus, Ethernet, Serial



Car Body Shop

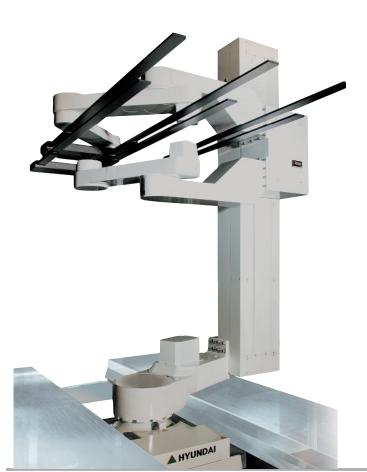


Arc Welding for Car Body





Spot Welding Robot System for Train Panel Handling Robot for Press









4.5G Cylindrical Type

4.5G / 5G / 5.5G / 6G Beam Type





5G Link Type

8G Beam Type



Products

Press / Conveyor System / Iron & Steel Line

Press

HHI-EMD is a reliable partner to the users of presses with automatic systems suitable for easier maintenance, smoother operation, and



Business Lines

Mechanical Press

- Tandem Press Line 500 ton ~ 2500 ton
- Transfer Press Line 1500 ton ~ 3500 ton
- Die Tryout
- 1500 ton ~ 2300 ton - Blanking Press Line 400 ton ~ 1000 ton

Automation System

- Destacker
- Robot System Inter Presses
- Servo Transfer Feeder
- Auto Palletizer
- Exit Conveyor

Tandem Press Line



Transfer Press Line



Die Tryout



Blanking Press Line

Conveyor System

HHI-EMD has supplied various kinds of Conveyor Systems with high quality and reliable services along with our accumulated experience and technology since 1983.

- Electric Monorail System
- Skillet Conveyor
- Power & Free Conveyor
- Overhead Shuttle
- Floor Shuttle
- Rail Guided Vehicle
- Slat Conveyor
- Free Flow Conveyor



Engine Mounting RGV-Contactless



Trim & Final Line



Chassis Line



Painted Body Storage



Iron & Steel Line

HHI-EMD makes a feature of the state of the art design of the system as well as the manufacturing technology of the equipment from HHI's excellent production facilities.

Business Lines

- CGL(Continuous Galvanizing Line)
- CCL(Continuous Color coating Line) • SPML(Skin Pass Mill Line)

Pickling Line

Coil Blanking Line

- · Rolling Mill Line
- Strip Finishing Line • Torpedo Ladle Cars, Ladle Cars



Color Coating Line (CCL)



Continuous Galvanizing Line (CGL)



Pickling & Cold Mill Line (PL&CRM)

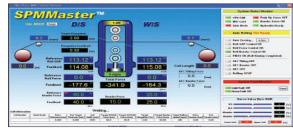


Torpedo Ladle Car

Skin Pass Mill Line Foundry & Forging Shop

Skin Pass Mill Line











Description	Hot Strip Process Line	Cold Strip Process Line				
Туре	Hydraulic p	ush up type				
	Width: 600 ~ 2,000 mm	Thickness: 0.2 ~ 2.3 mm				
Production	Width: 600 ~ 2,000 mm	Width: 600 ~ 1,600 mm				
	Weight: Max. 35 ton	Weight: Max. 35 ton				
Production Capacity	1,000,000 ton/year	250,000 ton/year				
Roll Size	Work Roll: Ø570~Ø630 mm	Work Roll: Ø400~Ø600 mm				
NOII SIZE	Back up Roll: Ø1,100~Ø1,200 mm	Back up Roll: Ø730~Ø1,000 mm				
	1.2≤t≤3.2 mm: 600 mpm	0.2≤t≤0.6 mm: 180 (Max. 200) mpm				
Rolling Speed	3.2≤t≤6.5 mm: 300 mpm	0.8≤t≤1.0 mm: 135 ~ 85 mpm				
эреса	-	1.2≤t≤1.6 mm: 90 ~ 53 mpm				
	Threading: 30 mpm	Threading: 60 mpm				
Rolling Force	Max. 1,500 ton	Max. 500 ton/1,000 ton				
Elongation	Max. 4%					





Foundry Shop

The Foundry Shop can produce 66,000 tons of castings annually.

The modern melting facilites include 1 unit of 24 tons and 1 unit of 20 tons of a medium-frequency induction furnace to produce various kinds of castings.

To produce the best quality products with high reliability, the Foundry Shop is equipped with computerized facilities that allow an integrated production control system that ranges from raw materials to machining, assembling and





Shot Blast Machine

Forging Shop

The Forging Shop is equipped with four forging press including two 10,000-ton press which can produce various forgings up to 150 tons in unit weight.

The Forging Shop can produce 81,500 tons of forgings annually.









10,000-ton Free Forging Press 10,000-ton Free & Die Forging Press

2,500-ton Die Forging Press 4,000-ton Free Forging Press

Customer Service

Machining Shop / Assembly & Test Shop

Machining Shop

Our Machining Shop is equipped with over 185 sets of machine tools including up-to-date computerized and numerically controlled machines.

Our CAD/CAM system provides technical assistance so that any kind of high precision products can be made in response to various customer requirements.

Major Facilities

- CNC: ab. 250 Sets
- Plano Miller: 40 Sets
- Horizontal Boring M/C: 50 Sets
- Lathe: 70 Sets
- Grinding M/C: 10 Sets



Machining Shop



Cross Head Pin



Cylinder Cover



Cylinder Liner

Machining of Cylinder Frame



Intermediate Shaft

Assembly & Test Shop

2-Stroke Engine Assembly & Test Shop

- HYUNDAI-MAN B&W
- HYUNDAI-WÄRTSILÄ

4-Stroke Engine Assembly & Test Shop

• HYUNDAI-HIMSEN











Our target is to provide the quickest and most precious technical support and parts supply towards the customers

We do our utmost to minimize the trouble and inconvenience from the ship owners which might be occurred due to the damage caused by the accident.

Easy Access to Engine CS Department

Regardless of the guarantee period whether it is over or not, HHI will make it a rule to support the clients with immediate service in the order of the receipt by e-mail or through homepage. But, considering its seriousness of the damage or the schedule of the vessel, the provision timing of our technical support including repair may be adjusted.

Genuine Spare Parts Purchase Guide

HHI's authorized sales agents will supply the clients with the original genuine spare parts at the competitive condition in aspect of price, delivery time and quality etc. Please do not hesitate to contact our sales agent with the inquiry or questionnaire.

Technical Support

After the guarantee period is expired or in case that the free support is limited even during the guarantee period due to special reason, we also provide the technical support including supervision, reconditioning, conversion, retrofit of alpha cylinder lubricator and technical consultancy etc.

Global Service Network

HHI is very proud of its well organized global service network which is efficiently and systematically designed to meet every requirement of the clients. HHI's direct service centers are established at Rotterdam, Singapore, and Havana in Cuba.

Quality Management





HiMSEN Global Academy

HHI-EMD's HiMSEN Global Academy offers tailored programs that deliver expertise to engine operators in power plants and vessels.

We teach the purpose of main components, engine performance theory, engine operation & maintenance, electrical systems, and engine control systems Courses also include hands-on training programs.

The goal of HiMSEN Global Academy is to train engine operators and maintenance staffs of HiMSEN engines and support their safe operation.

We promise that you will learn everything about our HiMSEN engine for power plants and vessels when you graduate from our HiMSEN Global Academy.

For more information, please contact Engine Customer Service Department through our email "enginecs@hhi.co.kr".

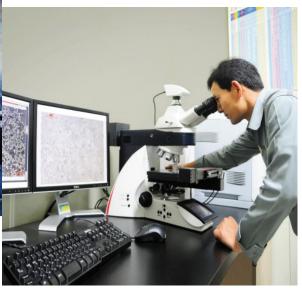












Metallographic Microscope

Quality Management System

The Quality Management System of the HHI-EMD has the primary goal of supplying products and services, ranking among the best in the industry, in total compliance with both contractual and regulatory requirements.

To fulfill this primary goal, and to continue to offer the quality on which our strong reputation has been built, combined efforts are required from our quality assurance, engineering, and production personnel.

It is the policy of HHI-EMD to constantly maintain an effectively and efficiently documented Quality Management System, complying with the requirements of International Standards (ISO9001, KS A9001) and customer contractual requirements. The basic policies developed and documented within the Quality Management System must be adhered to by all HHI-EMD personnel.

The QM Manager, through Quality Awareness Training, should ensure that new/existing personnel are aware of the objectives and philosophy of the Quality Policy being implemented within the company.

Approval Status of Quality Management System

Product or Service Ranges	Certifying Agency
Design and Manufacture of Two-stroke Diesel Engines, Four-stroke Diesel Engines, Marine Propellers, Pumps & Valves, Press, Conveyor, Robots for Industrial Purposes, Steam Turbine, Gas Turbine, Diesel Power Plants and Engine Components including Turbochargers, Crankshafts, Cylinder Liners, Forged Steel, Shafting	ISO 9001:2000, KS A 9001:2001 ISO 14001:2004, KS A 14001:2004 OHSAS 18001:1999 (DNV)
Nuclear Diesel Generator (Class 1E), Pump and Butterfly Valve	Qualification Approval (KEPIC)
Forging Shop	
Casting Shop	
Propeller	Works Approval (ABS, BV, CCS, DNV, GL,
Semi built-up Crankshaft	KR, LR, NK, RINA)
Solid Crankshaft (TR Forging Crankshaft)	
Welding Workshop & Overlay Welding on Cylinder Cover	Works Approval (GL)









Brinell Hardness Tester

Polishing Machine

Cutting Machine

3D Measuring Instrument

World top-Class Products

Research & Development

HMRI (Hyundai Maritime Research Institute)

Research & Development

Inaugurated in 1984, HMRI integrates all major hydrodynamic facilities under one roof.

The comprehensive R&D activities of HMRI comprise all preproduction phases including computer-aided hull/propeller/ engine design and manufacturing.

Also HMRI's research activities include topics such as the following

Optimum Hull Form Development / Resistance & Propulsion / Seakeeping & Maneuvering Offshore Engineering / Structure Analysis / Noise & Vibration



HIRI (Hyundai Industrial Research Institute)

HIRI was established in 1983 to improve HHI's productivity and quality in welding.

It plays a vital role in the advancement of production technologies such as welding, casting, plastic deformation, engine performance simulation, flow dynamic analysis, and other material processing methods including development of automatic production facilities.

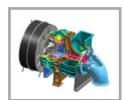
HIRI is equipped with advanced analyzing equipment and powerful simulation facilities for developing new concepts in design and production technology.



HEMRI (Hyundai Electro-Mechanical Research Institute)

HEMRI, a cradle of technical innovation in the 21st century, is continuously making efforts to secure the company's distinctive core technologies.

It also supports production with advanced technological assistance in solving technical problems.



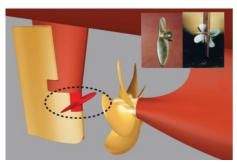
Frontier Technology Institute

The Techno Design Institute's main roles are in coordinating design development and supporting optimal design technologies by supplying new designs for various products and constructions.

Furthermore, the Techno Design Institute contributes to the creation of a new culture of enterprises and actualizes high-value business by obtaining its own design technologies.



Super High-speed Foil Catamaran



Thrust Fin



Combustion Analysis

HHI-EMD, 15 World Top-Class Products (2001~2011)

Since 2001, with the support of Korea's Ministry of Knowledge Economy to promote exports, the World-Class Product Award has been given to domestic products which are ranked within the top five in the global market, have a market share over 10%, and market volume of over USD 50 million.



LCD Handling Robot



Marine Propulsion Shaft



Side-Thruster



2-Stroke Engine Cylinder Frame 2-Stroke Engine Turbocharger 4-Stroke Diesel Power Plant







Packaged Power Station



Cylinder Liner



Cargo Oil Pump



Industrial Robot

2006

4-Stroke Diesel Engine Crankshaft

2003

2-Stroke Diesel Engine



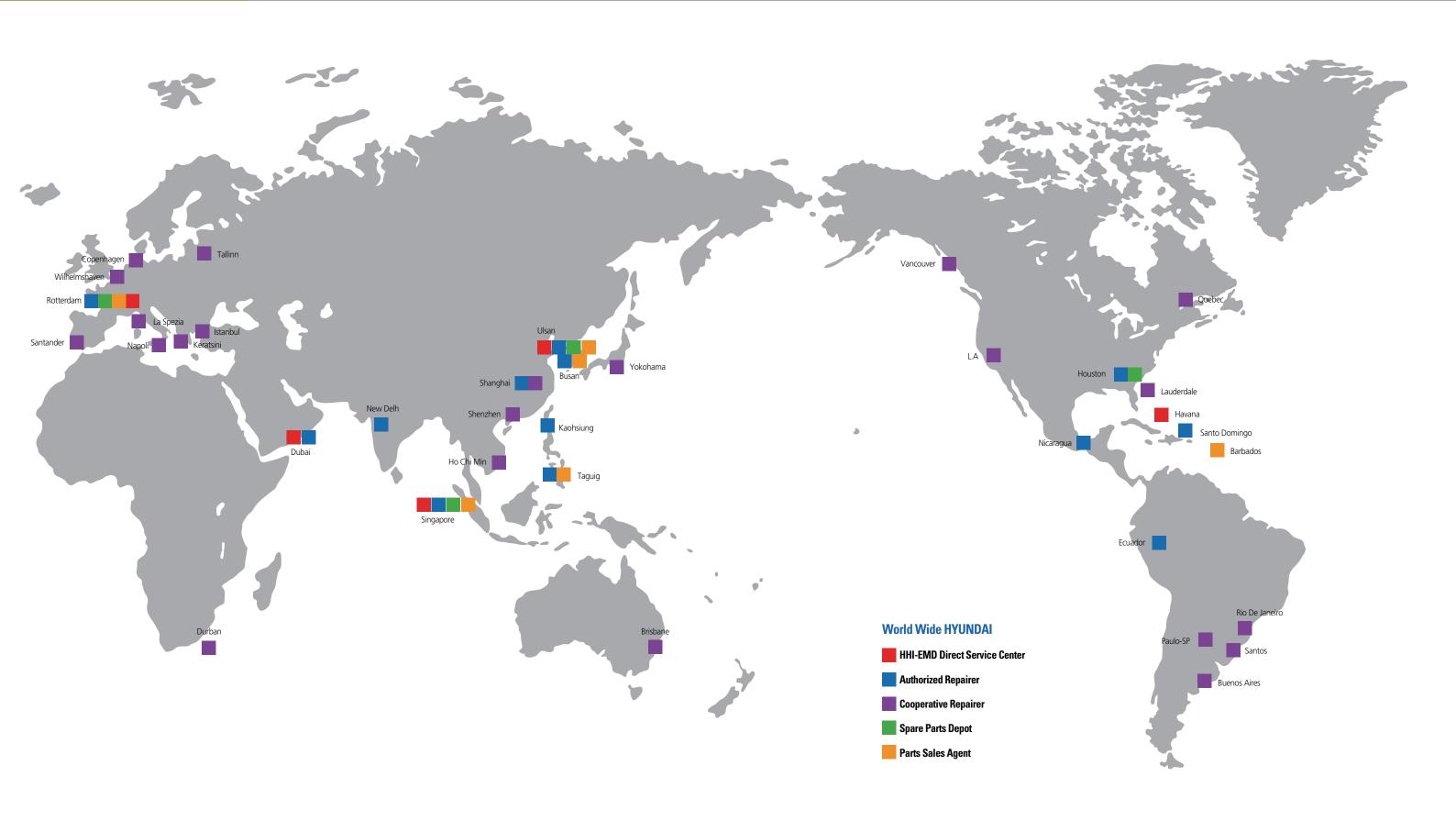
4-Stroke Diesel Engine



Propeller



2-Stroke Diesel Engine Crankshaft







Dong-gu, Ulsan, Korea

1000, Bangeojinsunhwan-doro,

Marine Engine & Equipment

Tel: +82-52-202-7291/7281

e-mail: k110@hhi.co.kr/k150@hhi.co.kr

Eco/Turbo Machinery

Tel: +82-52-202-7336 e-mail: K220A@hhi.co.kr

Engine Power Plant

Tel: +82-52-202-7301 e-mail: k120hhi@hhi.co.kr

Hydraulic Machinery

Tel: +82-52-202-6191 e-mail: pump@hhi.co.kr

Robot & System

Tel : +82-52-202-7901 e-mail : robot@hhi.co.kr

Customer Service

Tel: +82-52-202-7411 e-mail: K190A@hhi.co.kr oyright 2013 Hyundai Heavy Industri