

HiMSEN Engine H17/28U(E)

Marine & Stationary applications

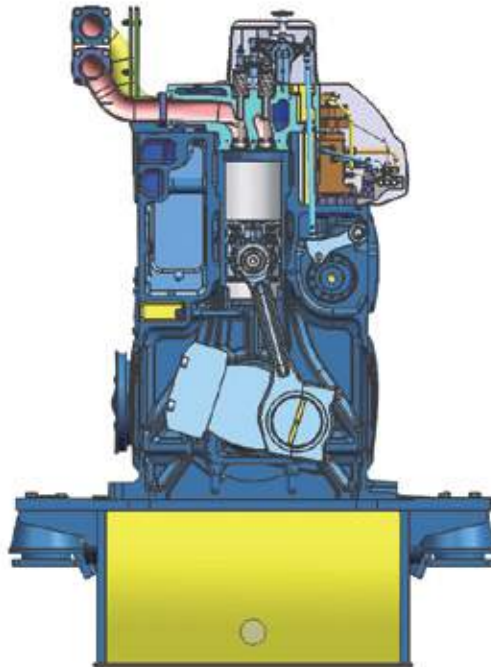


HiMSEN family has been successfully launched into the market since 2001 thanks to support and cooperation from many owners, shipyards and classification societies. We would like to express our sincere gratitude to the everyone involved in this enterprise. And we hope that you have good business with our HiMSEN engines.



Introduction

The HiMSEN H17/28U(E) engine has been developed based on common philosophy of HiMSEN engine with smart, simple and robust. It is specialized engine for marine gensets with the innovative design concept comparing to the current H17/28 engine. The high power density contribute to easy and space-saving marine applications. The most advanced Hi-touch technologies are applied in this engine so that the engine has the excellent performance, low fuel consumption and low emission and so on. HiMSEN H17/28U(E) medium speed engine marks the birth of a new era in earth-friendly engines, boasting a compact structure and simple & stylish exterior.



H17/28E & H17/28U Cross Section

Technical Data

	Unit	H17/28E	H17/28U
No. of Cylinders	-	6	
Rated Speed	rpm	900 / 1000	
Power Per Cylinder	kW	110	134.2
Cylinder Bore	mm	170	
Piston Stroke	mm	280	
Mean Piston Speed	m/s	8.4 / 9.3	
Mean Effective Pressure	bar	23.1 / 20.8	28.1 / 25.3
Compression Ratio	-	15:1	
Specific Fuel Consumption*	g/kWh	189 / 190	191

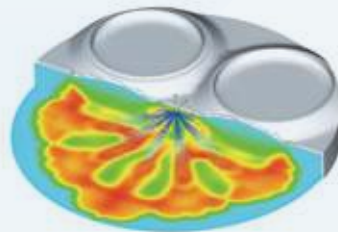
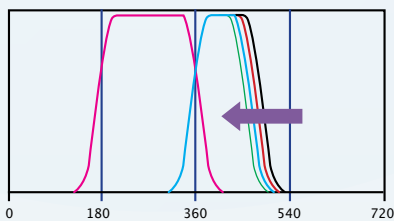
* The SFOC is based on without engine driven pumps and tolerance +5 %

Emission Control Technology

IMO Tier II technologies

The HiMSEN H17/28U(E) engine has countermeasures to meet IMO Tier II regulations with advanced simulation and measurement by using of enhanced miller timing and optimized combustion. The enhanced miller timing with new turbochargers which has higher pressure ratio enables to get benefit in SFOC and lower combustion temperature which is critical in formation of NOx emission.

Furthermore, controlled combustion with optimum combination of the piston bowl shape and F.O Nozzle's specification helps to reduce NOx emission.

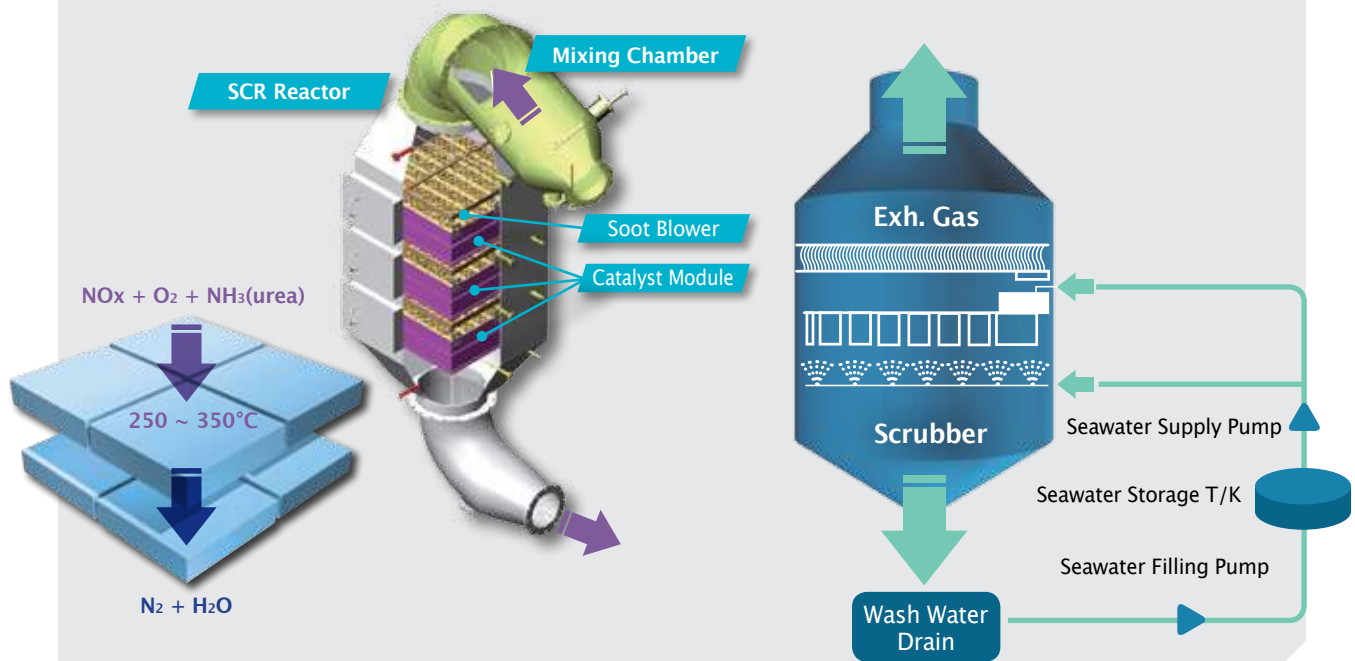


IMO Tier III technologies

Hyundai is already preparing many measures for IMO Tier III.

HHI is already preparing many measures for IMO Tier III. Some of them have already been developed such as Selective Catalytic Reduction (SCR) and Scrubber. Newly developed SCR can reduce NOx emission by upto 95% to meet IMO Tier III regulation. Optimized application depending on customer's requirement is possible including whole installation, performance and engine with low cost and satisfaction.

Exhaust gas scrubbing is an alternative solution for high sulphur content fuels to reduce SOx emissions, and HHI can supply the best Scrubber in the world market.



Main Features

Performance characteristics

- Higher output than similar engines
- Low fuel oil consumption
- Quick acceleration & load response

Maintenance

- Modularized design for easier maintenance
- Minimal the number and kind of components

Earth-friendly engine

- Low NOx emissions
- Complies with IMO Tier II
- Low Vibration & Noise

Main application

- Marine generating sets

Enhanced & Customized Parts

» Engine Block

The engine block is made of monoblock cast iron and has the combustion air chamber, lubricating oil and cooling water channel. There is no need for maintenance normally except for cleaning in side air chamber and outside. And also this is of stiff and reliable to internal and external forces.

The main bearing and main bearing cap for the underslung crankshaft are carried in heavy duty supports tightened by two vertical main bearing studs and two horizontal side bolts.

There are covers for maintenance and access to the crankshaft including connecting rod and camshaft with swing arm for each cylinder. Furthermore, some of crankcase covers are mounted with relief valves complying with classification societies requirement and these will open if oil vapors in the engine block are ignited.



» Crankshaft

The crankshaft is made of CGF (Continuous Grain Flow) die-forged special alloy steel with high tensile strength. The design of the crankshaft satisfies the requirements of all classification societies.

The crankshaft has a counterweight for balancing the mass forces on each crank web, which is fastened with two tensioned bolts.



At the free end there is a gear wheel for camshaft driving and it is also connected to lub. oil, cooling water pumps. A vibration damper (or tuning mass) will be mounted depending on the result of torsional vibration calculation for each project.

» Main Bearing

The suitable bearing load and oil film thickness is realized by using of advanced CFD (Computational Fluid Dynamics) analysis and the special running layer with excellent corrosion resistance is applied.



» Connecting Rod

The connecting rod is made of special die-forged steel, which is composed of a two-piece 'serration' type. The careful investigation with the advanced finite element analysis has been completed in order to optimize the geometries and enhance the durability.

The 'serration' type connecting rod can provide the simple maintenance for overhauling big end bearings easily (just removing the big end bearing cap).



» Piston & Piston Rings

The piston is of composite type with steel crown and Al-alloy skirt for unlimited heavy fuel suitability. Cooling of piston is done by engine's lubricating oil and cocktail shaking principle is applied. It has two compression rings and one spring loaded oil scraper ring. The piston ring grooves are case-hardened and first compression ring is side-coated for excellent wear resistance and for low fuel consumption.



» Camshaft

The camshaft is of a split type for each cylinder. And each camshaft is jointed by screws. Each piece of camshaft has a fuel cam, an intake cam and an exhaust cam. The surface hardening is done for the each cam profile. Furthermore, the fuel cam with high load is located very close to the camshaft bearing. The gear wheel for driving the camshaft as well as the gear wheel for connection of governor drive are mounted on the front side. The extreme miller timing for intake cam has been applied to reduce NOx emissions.



» Cylinder Head

The cylinder head has been designed taking the thermal load distributions and the maximization of flows for charge air and exhaust gas into considerations. The cylinder head is made of ductile cast iron and has cast-in passages for cooling water, intake air and exhaust gas. The cylinder head also has drilled holes for supplying lube oil to valve drives from engine block. The robust structure of the cylinder head design provides suitable and uniform sealing between the cylinder head and cylinder liner. The cylinder head unit including rocker arms can be dismantled without removing the all of connections. It is tightened by means of four hydraulic studs which are screwed into the engine block.

» Cylinder Liner & Flame Ring

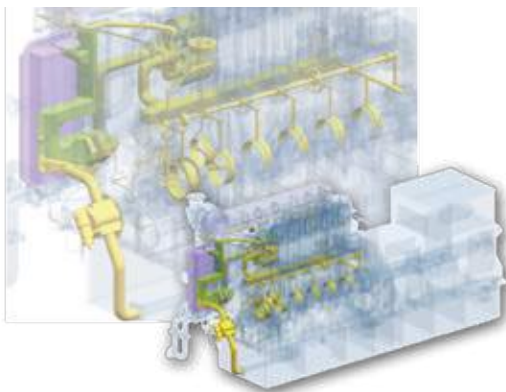
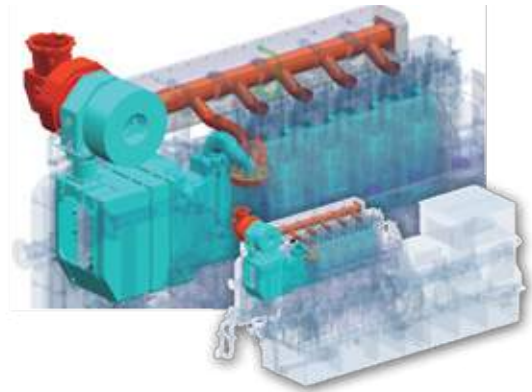
The cylinder liner is made by sand casting of a special cast iron for good wear resistance and high strength. It is fitted in a bore in the engine block and fixed by cylinder head. The wall thickness of top part for liner is optimized for both the resistance from the combustion force and the effective cooling. The lower part of the liner is uncooled in order to maintain the suitable temperature for preventing the cold corrosion. So there is no water in the engine block. To reduce bore polishing and lubricating oil consumption, the flame ring is fitted on the top of the cylinder liner.



Environment-friendly & Progressive System

»» Air and Exhaust Gas System

The high performance turbocharger, applied on this engine, H17/28U(E), ensure not only the highest performance such as high part-load efficiency but also optimized installation with simplified interface. A simple and trustworthy device which is totally automatic for cleaning is available as standard. The direct air injection system, offered as a standard, ensure the high efficiency and fast response of engine. The charge air chamber is designed for preventing pressure loss and optimized intake performance. The exhaust system guarantees the supreme efficiency of turbocharger according to optimized design for gas flow. The design of exhaust system is based on the gas exchange dynamics, thermal expansion and so on; moreover, it is easy and simple for the maintenance.

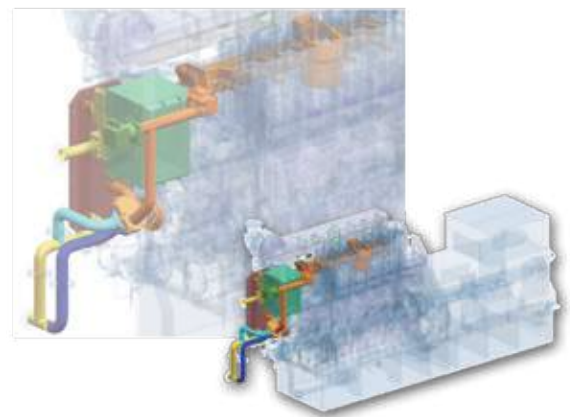


»» Lubrication System

The lubrication system consists of lubrication oil module with thermostatic valves, a duplex oil filter, a centrifugal filter and Lubrication oil cooler. The main Lubrication pump with regulating valve and pre-lubrication pump are also parts of the system. The lubrication oil flow through the engine is based on optimized bearing clearances, ensuring large safety margins.

»» Cooling water System

The cooling water system consists of the low-temperature (LT) and high temperature (HT) in the engine. The housing of pump and thermostatic valve housing are combined so it is possible to ensure the optimized water-flow and protection in all condition.



»» Fuel System

The fuel system is designed for a reliable combustion of Heavy Fuel Oil as well as Diesel Fuel oil.

The fuel oil filter and fuel oil drain alarm tank are combined in the fuel oil filter module. This offers a 'convenient' fuel system environment for easy access and maintenance. It also means the simplified design of appearance. High-pressure block is adjusted for compact design and easy maintenance with high performance. Optimized design of other components in fuel system ensures the low maintenance expense and convenience of operator.

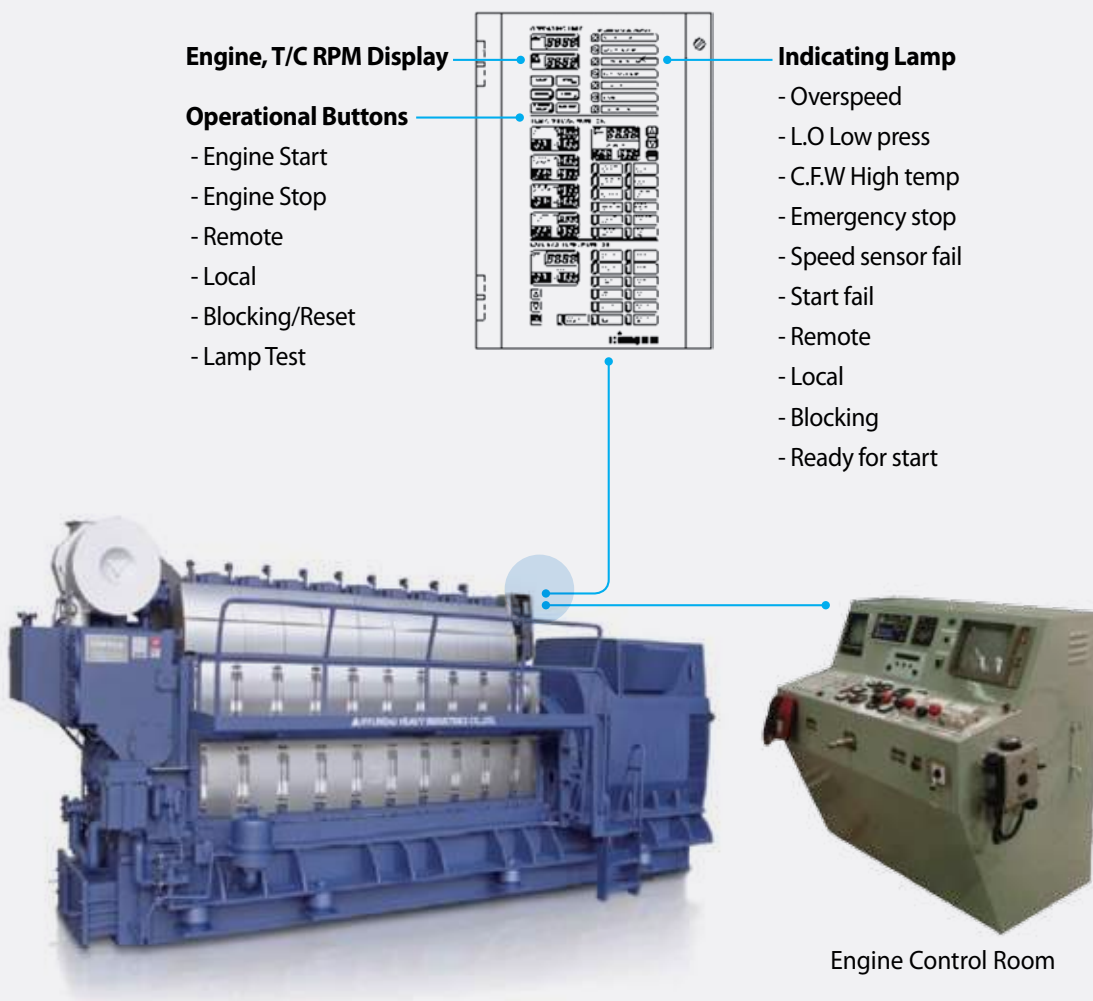
» Engine Automation

HiMSEN Gen-sets provide automation system for engine safety, control and indicating based on programmable logic controller. The system is independently installed in each engine and also can be connected to the remote system, for example main switch board of engine control room via hard wired communication cables.

In addition to fulfilling the requirements of all classification societies and IACS, the system provides more friendly features to customers.

For example,

- Compact size and easy installation
- Digital display (Engine & T/C RPM)
- Simple operation and no maintenance free



Rated Output of Gen-set at 100% load

Engine Type	900 rpm / 60 Hz		1000 rpm / 50 Hz	
	Engine	Generator	Engine	Generator
6H17/28U	805	750	805	750
6H17/28E	660	618	660	618

Remarks

The Generator outputs are calculated by an efficiency of 93.2~94% and a power factor of 0.8 lagging.

Dimensions and Weights

Engine Type	Dimensions (mm)				Dry Weight (ton)	
	A	B ₁₎	C ₁₎	H	Engine ₂₎	Genset _{1) 3)}
6H17/28U	2,744	2,069	4,843	2,393	7.1	13.8
6H17/28E	2,744	1,939	4,713	2,323	6.9	13.0

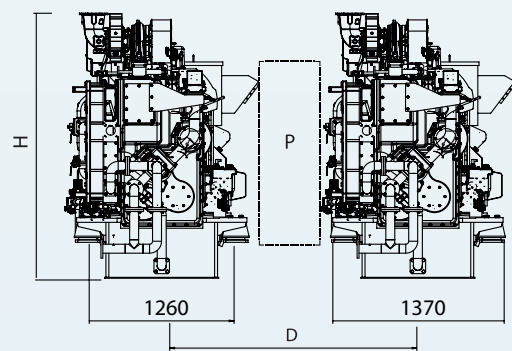
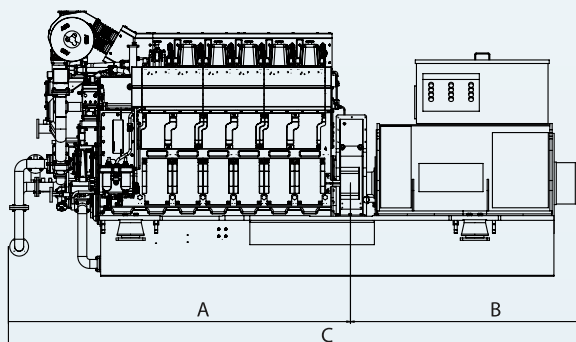
Remarks

- 1) Depending on alternator.
- 2) Without common base frame.
- 3) With common base frame & alternator (Maker : HHI-EES).

D : Min distance between engines 2,445 mm (with gallery).

P : Free passage between the engines, width 600 mm and height 2,000 mm.

Note) All dimensions and weight are approximate value and subject to change without prior notice.



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