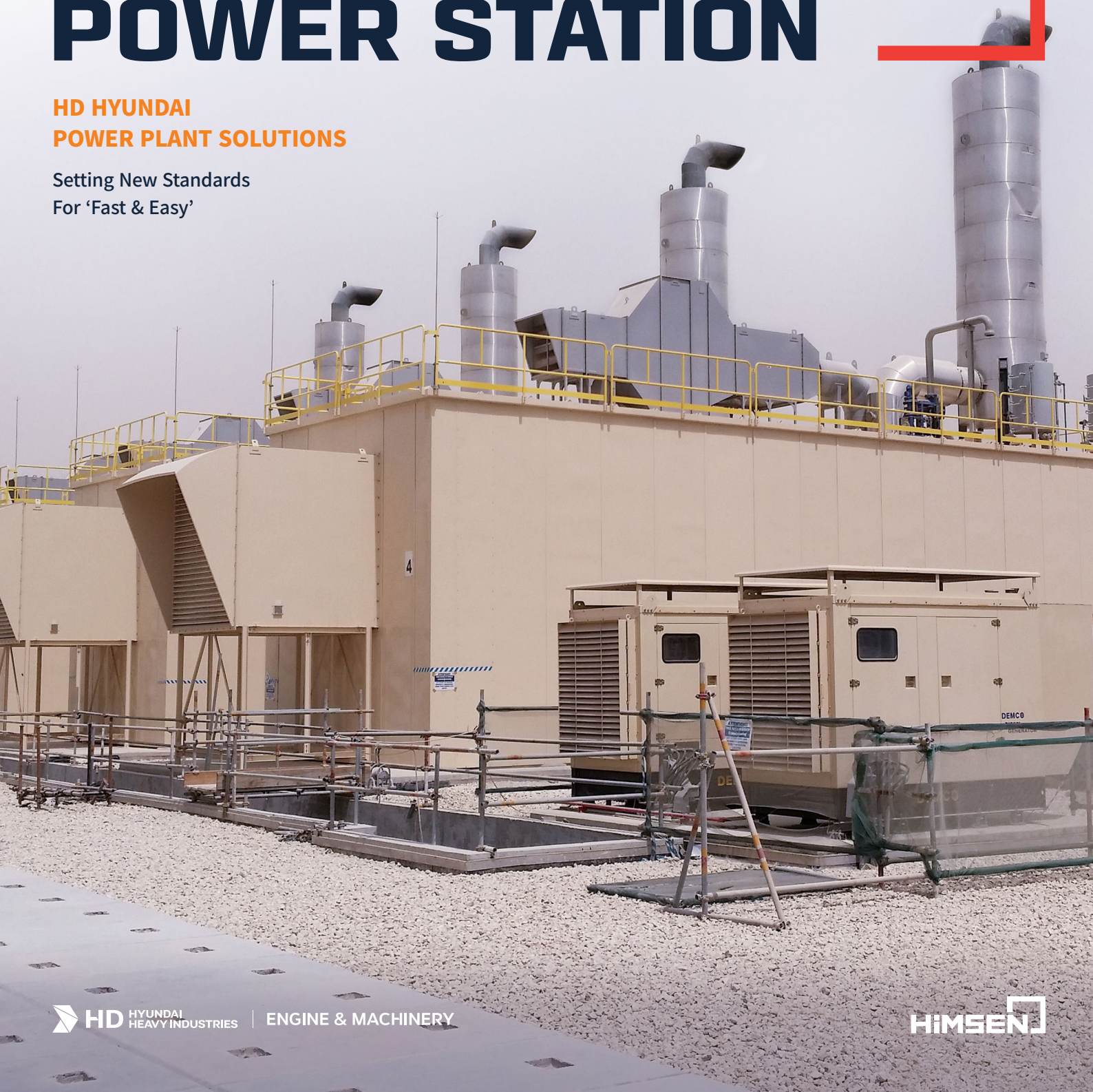
MODULAR POWER PLANT & PACKAGED POWER STATION

HD HYUNDAI
POWER PLANT SOLUTIONS

Setting New Standards
For ‘Fast & Easy’



HD HYUNDAI HEAVY INDUSTRIES | ENGINE & MACHINERY

HiMSEN

ENERGY FOR **REVOLUTION**

CUBA

The Cuban government decided to illustrate HD HYUNDAI's Packaged Power Station(PPS) on their 10 peso note with the quote "Revolution Energetica(Energy Revolution)".

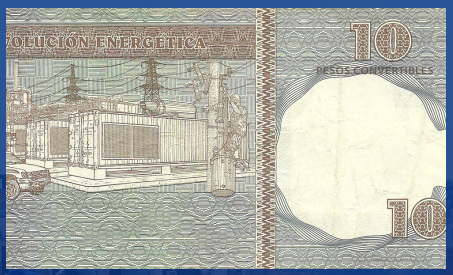
Packaged Power Station & Diesel Power Plant

Energy Revolution

Rapid Construction

30% of CUBA Electricity

In the mid 2000s, Cuba experienced chronic electricity shortages resulting in frequent power outages. To deal with the energy crisis, it set up a plan of upgrading its power infrastructure based on a contract with a foreign supplier. While many companies gave up the project, HD HYUNDAI eventually won the deal in 2005 and met urgent requirements of Cuba with 578MW Packaged power station and 310MW Diesel power plant across the country. For the first time in history, a company product was illustrated on country's currency.



Cuban currency, 10 pesos

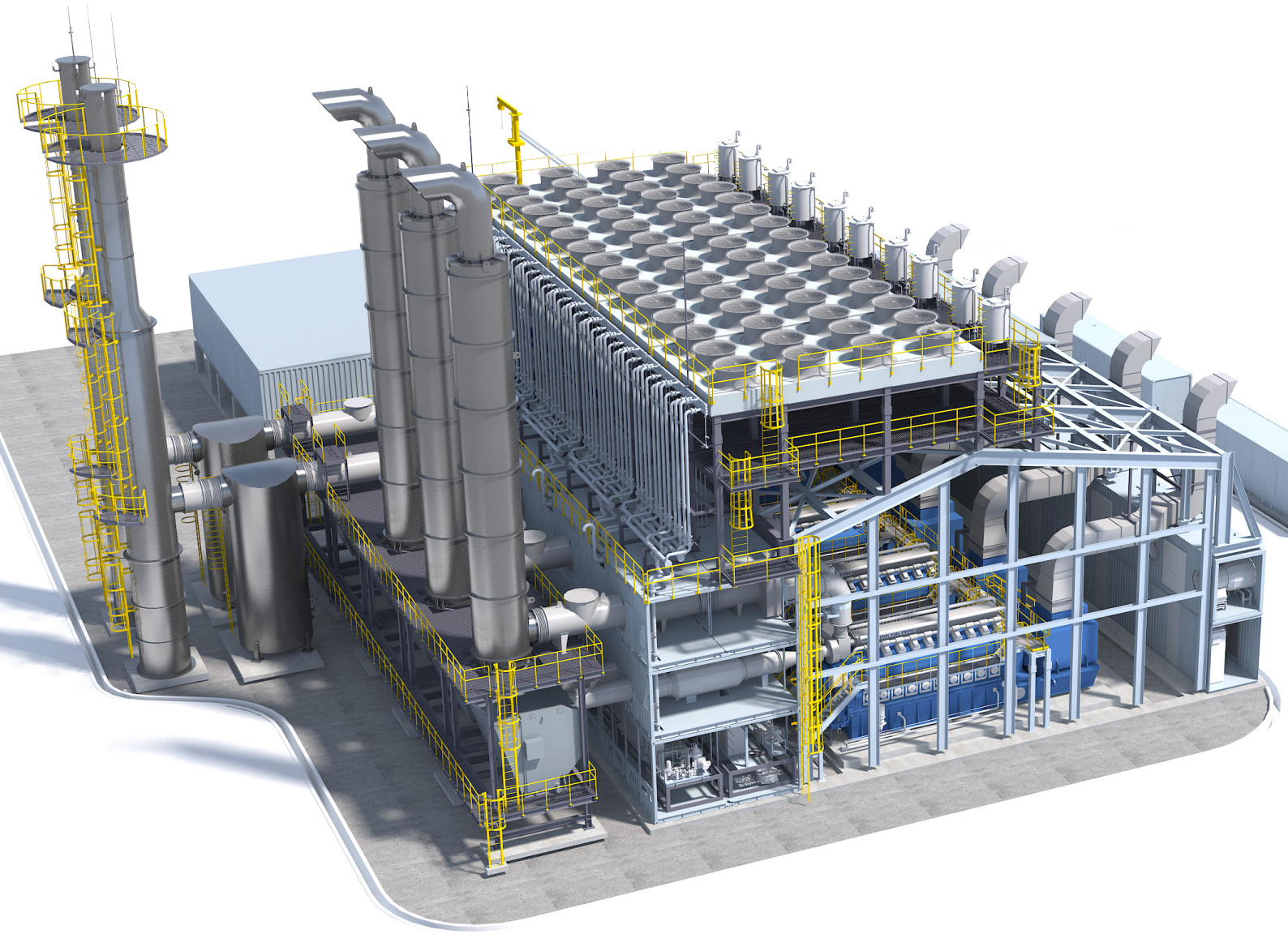
THE FIRST TIME IN HISTORY, A COMPANY PRODUCT ILLUSTRATED ON A COUNTRY'S CURRENCY

KEY FIGURES

Total Output	578MW(PPS)	310MW(DPP)
Customer	Energo Import	
Operating Mode	Base Load	
Gensets	9H21/32 x 340sets	9H25/33 x 124sets
Fuel	Heavy Fuel Oil	
Scope	Genset + Equipment + Engineering	
Delivered	2005~2009	

MODULAR POWER PLANT

Containerized Type Power Plant



Who Is It For?

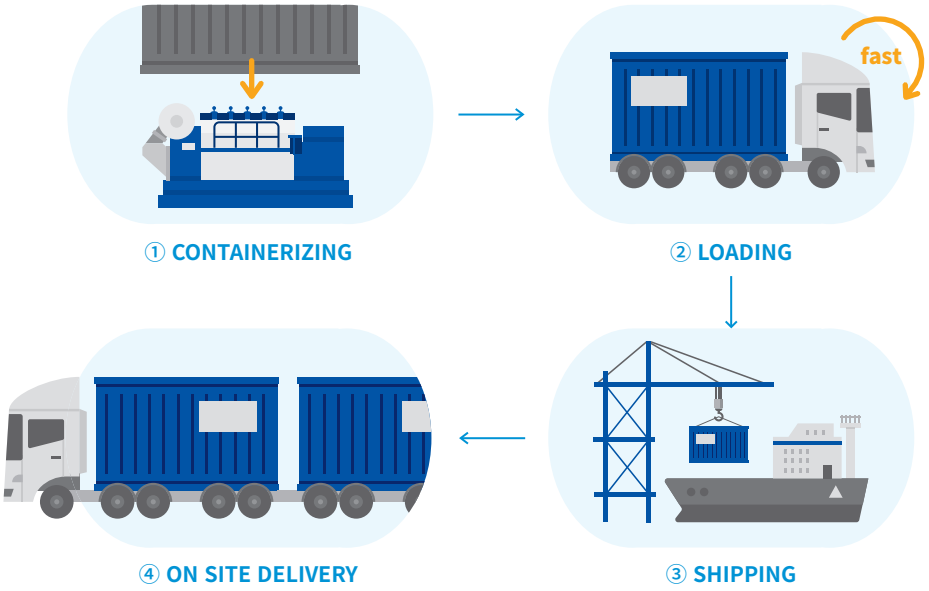
- Small IPPs(Independent Power Producers) who can afford small investment to start their businesses
- Those who need power sources fast track
- Those who are not connected to the national grid
- Places where it is difficult to have infrastructure(e.g. high voltage transmission line)
- Small towns and isolated areas

Why Are They Good?

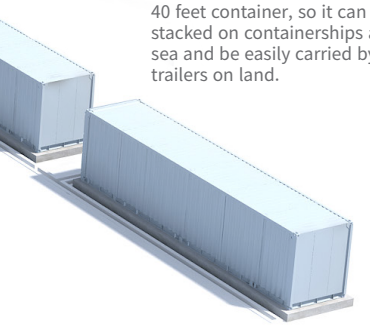
1. FAST DELIVERY AND INSTALLATION

All the process of manufacturing, transportation, installation, and commissioning for a 20MW PPS takes just 9 months.

EASY TO TRANSPORT



The PPS can be installed in a 40 feet container, so it can be stacked on containerships at sea and be easily carried by trailers on land.



Simple installation steps give time savings.

5 months for manufacturing, 1.5 months for transportation, 1.5 months for installation, 1 months for commissioning.

2. EASILY TRANFERABLE

Reinstallation of 1 PPS unit takes just 2 weeks. Even with more units, no additional time is required.

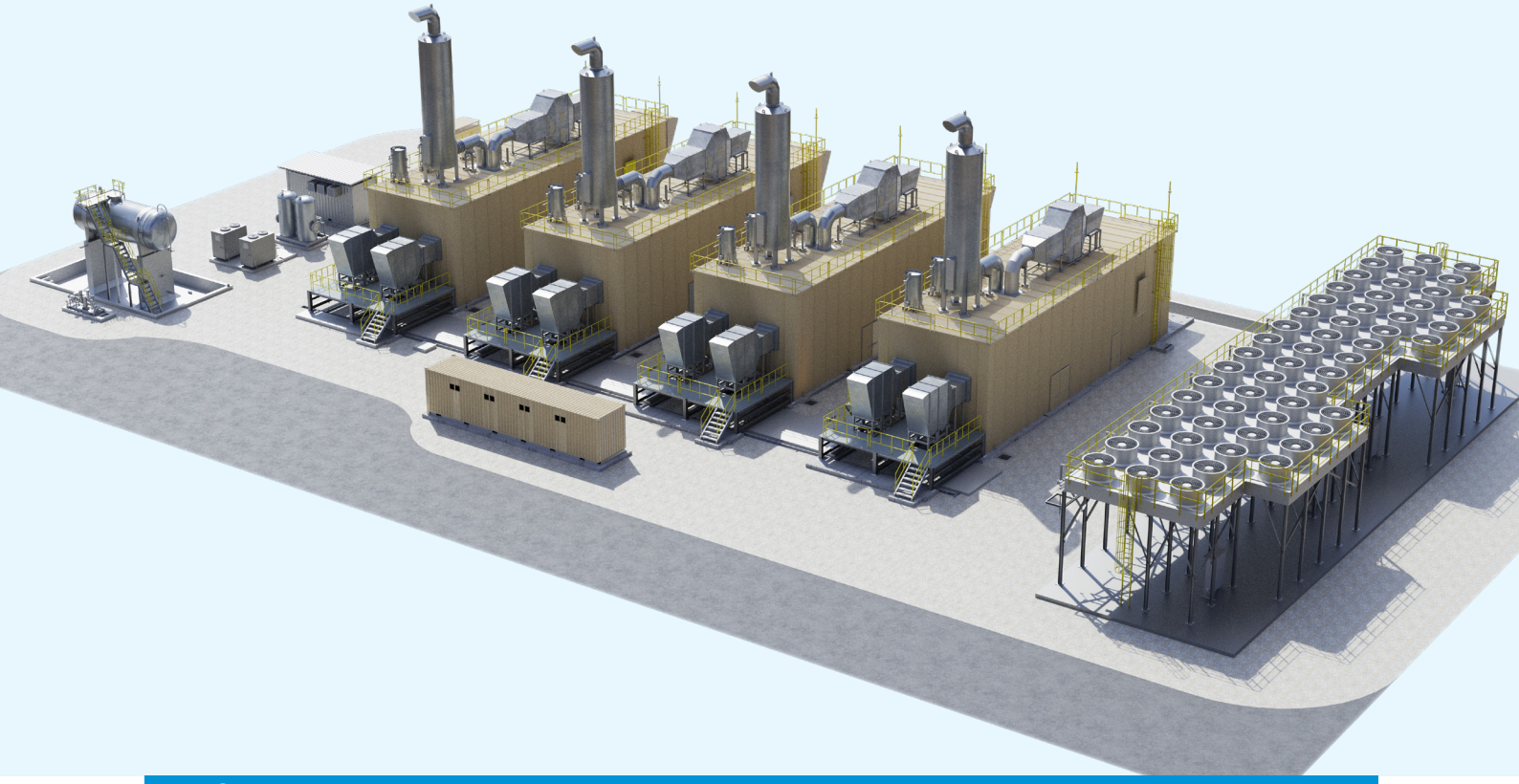
3. LOW OPERATION COST

30~70% lower operation cost compared to high speed gensets.

4. EASY OPERATION

The smart control system gives easy & efficient site operation for O&M managers.

Enclosure Type Power Plant



Case ①： Enclosure type power plant

UHP 16MW Black Start Diesel Generator **Qatar**

WHEREVER POWER SUPPLY FOR HOT AND HUMID DESSERT

Power plant for a 50°C desert in Qatar only took 3 months to construct.
In 2015, HD HYUNDAI provided 16MW black start emergency diesel generator of Facility D project in Qatar. It is the fully equipped enclosure type of BSEDG.
HYUNDAI has supplied a diesel generator with pre-fabricated type of enclosure and built-on type auxiliary system for easy and fast installation at site.
Sound attenuating enclosure is applied for noise reduction and equipment protection. Each genset and its auxiliary equipment are installed inside of enclosure.

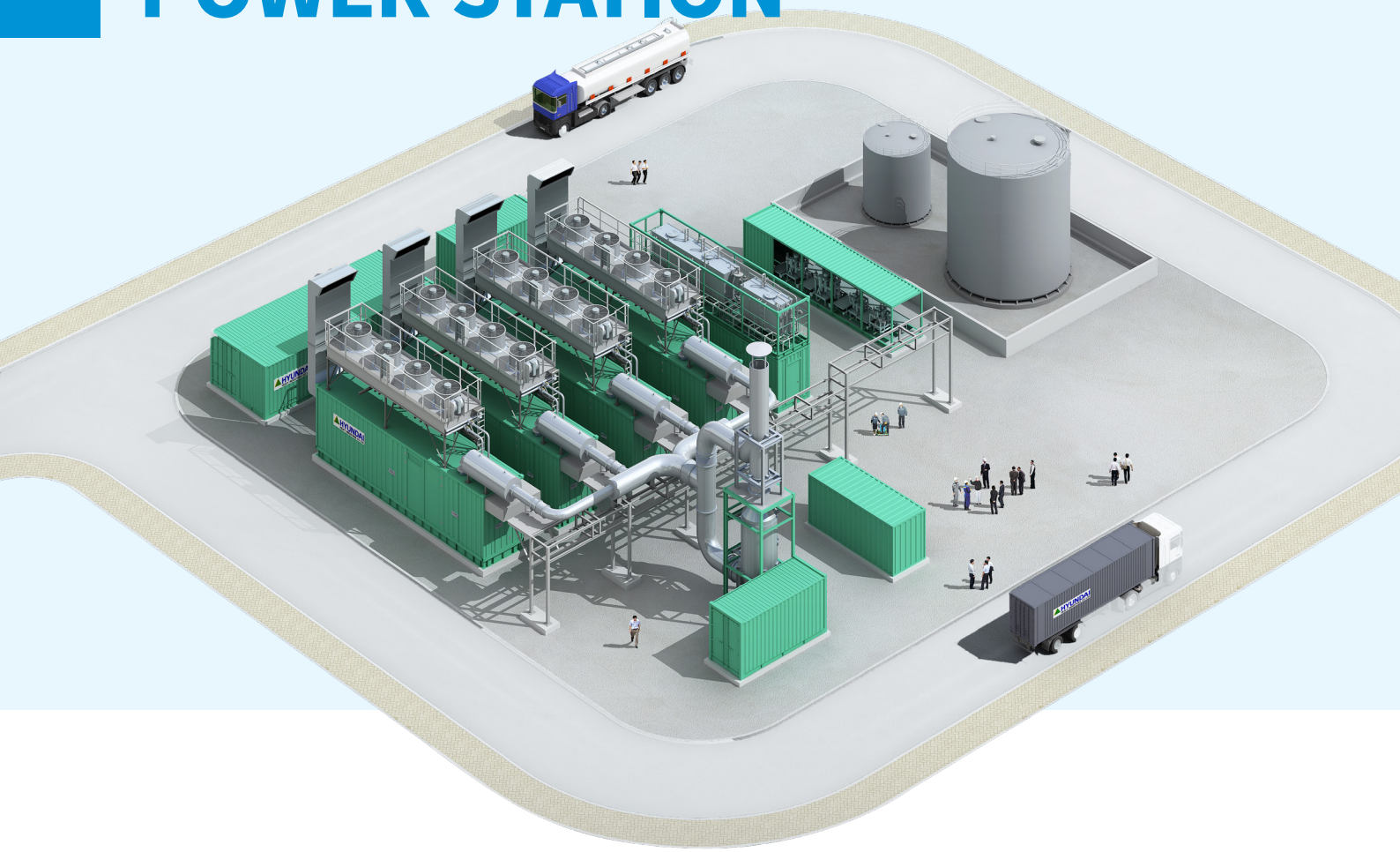
Total Output	16MW
Customer	Samsung C&T
Operating Mode	Black Start
Gensets	9H32/40 x 4sets
Fuel	Diesel Oil
Scope	Genset + Equipment
Delivered	2015

Plant View

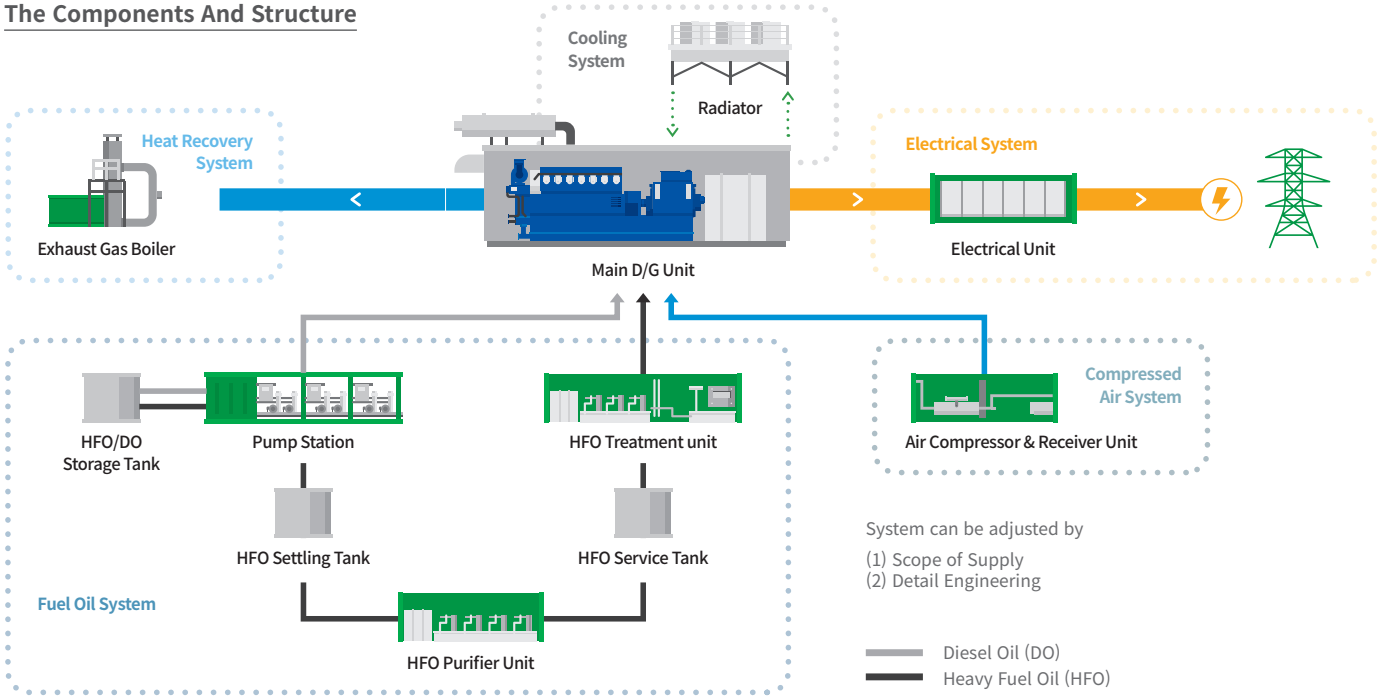
Inside view of Enclosure(Pre-fabricated type)

PPS

PACKAGED POWER STATION



The Components And Structure



Case ② : Packaged Power Station(PPS)

JINRO 57MW PPS **Panama**

FAST DELIVERY & INSTALLATION FOR CUSTOM REQUIREMENTS

> We were in a hurry, and HD HYUNDAI's PPS made it possible to meet our short delivery time.
>
> — Jinro, Project Manager

Total Output	57.8MW
Customer	JINRO POWER
Operating Mode	Base load
Gensets	9H21/32 x 34sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment
Delivered	2015

Jinro Corporation bought their IPP which had a very short time until the COD(Commercial Operating Date). They wanted to find a company which could match their demands for fast procurement, fast construction, reasonable price and easy operation and decided to move forward with HD HYUNDAI.
With the products and full technical support by HD HYUNDAI, the power plant was successfully constructed in only 9 months after the contract.

Plant View

Fuel Tank

Case ③ : Packaged Power Station(PPS)

HAITI 61MW PPS **Haiti**

EARTHQUAKE-RESISTANT **RELIABLE** POWER PLANT

> HD HYUNDAI's power stations were the only power stations to successfully supply power to areas near Haiti's capital Port-au-Prince, which damaged by the 7.0-magnitude quake in January.
>
> — MK Business News

Total Output	61MW
Customer	EDH
Operating Mode	Grid Back-up
Gensets	9H21/32 x 36sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment
Delivered	2008

HD HYUNDAI's PPS remained intact and well ran in its full capacity throughout the catastrophic earthquake of Haiti in 2010.

Many power facilities were damaged by 7-magnitude earthquake of Haiti in 2010. The sturdy power plant provided by HD HYUNDAI were undamaged and ran continuously. HD HYUNDAI gained trust for its stability and safety by the Haitian government.
In 2008, HD HYUNDAI provided a 34MW power plant for Haiti's capital Port Au Prince. This power plant produces power with 40% less cost than other power plants do.

Plant View

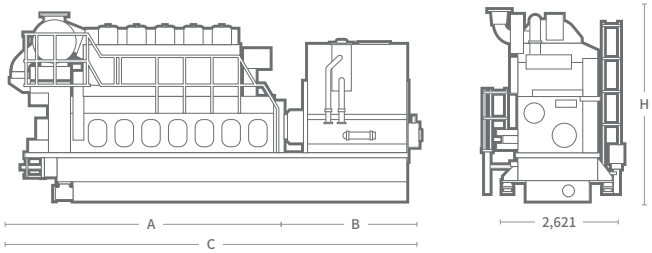
Plant View

HiMSEN Engine Line-up for Stationary Gensets

'HiMSEN'® is the registered brand name of HD HYUNDAI's own design engine and the abbreviation of 'Hi-touch Marine & Stationary ENgine'.

Gas Fuel

H35G Bore: 350mm Stroke: 400mm

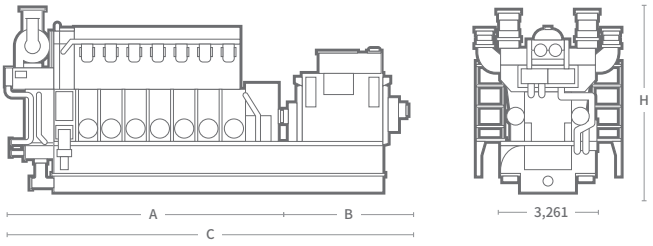


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H35/40G	2,880	2,764	3,000	2,880	5,760	3,130	8,890	3,959	33.7	68.6
7H35/40G	3,360	3,225	3,500	3,360	6,112	3,374	9,486	4,130	38.6	77.1
8H35/40G	3,840	3,705	4,000	3,860	6,602	3,594	10,196	4,130	41.5	82.0
9H35/40G	4,320	4,168	4,500	4,342	7,092	4,097	11,189	4,130	44.6	89.1

Based on alternator efficiency of 96~96.5%.

H35/GV Bore: 350mm Stroke: 400mm

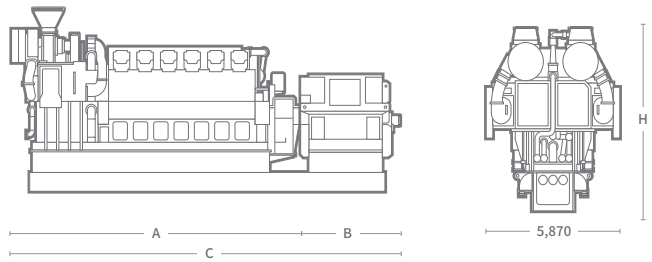


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H35/40GV	5,760	5,558	6,000	5,790	6,624	3,760	10,384	4,723	56.0	108.8
14H35/40GV	6,720	6,518	7,000	6,790	7,295	3,860	11,155	4,723	63.3	121.3
16H35/40GV	7,680	7,449	8,000	7,760	7,914	3,479	11,393	4,723	69.1	130.9
18H35/40GV	8,640	8,380	9,000	8,730	8,585	3,859	12,444	4,794	76.3	141.2
20H35/40GV	9,600	9,312	10,000	9,700	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5~97%.

H54GV Bore: 540mm Stroke: 600mm



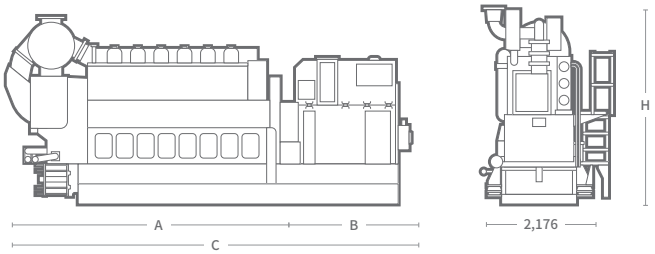
Main Data

Speed	600rpm		600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H54GV TSTC [1]	16,800	16,380	16,800	16,380	12,511	4,638	17,149	7,994	294.0	381.0
14H54GV TSTC	19,600	19,110	19,600	19,110	13,661	4,582	18,243	7,994	324.0	421.0
16H54GV TSTC	22,400	21,840	22,400	21,840	15,086	4,757	19,843	8,383	361.1	467.0

Based on alternator efficiency of 97.5%.
1)TSTC : Two Stage Turbo Charger

Dual Fuel

H27DF Bore: 270mm Stroke: 330mm

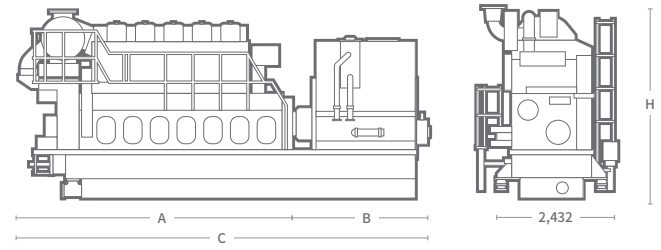


Main Data

Speed	900rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H27DF	1,710	1,624	1,860	1,767	4,414	2,262	6,676	2,835	21.2	30.8
7H27DF	1,995	1,905	2,170	2,072	4,794	2,262	7,056	3,241	23.5	34.9
8H27DF	2,280	2,177	2,480	2,368	5,311	2,340	7,651	3,371	25.1	40.5
9H27DF	2,565	2,462	2,790	2,678	5,691	2,490	8,181	3,371	27.2	46.0

Based on alternator efficiency of 95~96%.

H35DF Bore: 350mm Stroke: 400mm

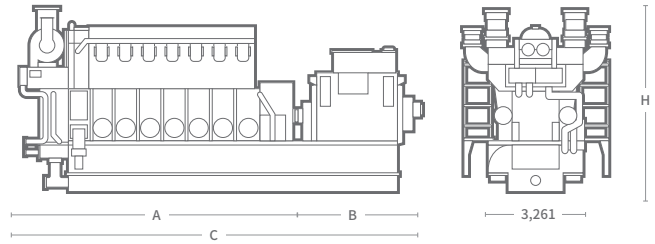


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H35/40G	2,880	2,764	2,880	2,764	5,760	3,130	8,890	4,367	34.7	69.6
7H35/40G	3,360	3,225	3,360	3,225	6,112	3,374	9,486	4,583	39.6	78.1
8H35/40G	3,840	3,705	3,840	3,705	6,602	3,594	10,196	4,583	42.5	83.0
9H35/40G	4,320	4,168	4,320	4,168	7,092	4,097	11,189	4,583	45.6	90.1

Based on alternator efficiency of 96~96.5%.

H35DFV Bore: 350mm Stroke: 400mm

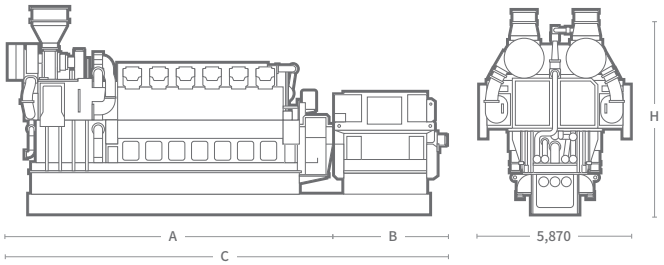


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H35DFV	5,760	5,558	5,760	5,558	6,624	3,760	10,384	4,723	58.0	110.8
14H35DFV	6,720	6,518	6,720	6,518	7,295	3,860	11,155	4,723	65.3	123.3
16H35DFV	7,680	7,449	7,680	7,449	7,914	3,479	11,393	4,723	71.1	132.9
18H35DFV	8,640	8,380	8,640	8,380	8,585	3,859	12,444	4,794	78.3	143.2
20H35DFV	9,600	9,312	9,600	9,312	9,344	3,659	13,003	4,794	86.0	155.9

Based on alternator efficiency of 96.5~97%.

H54DFV Bore: 540mm Stroke: 600mm



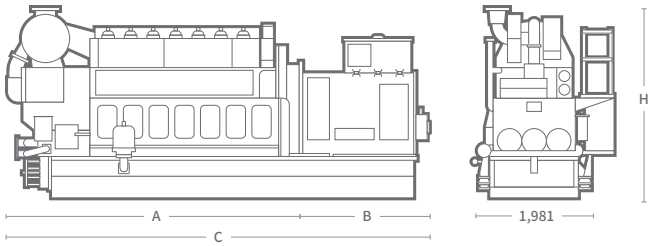
Main Data

Speed	600rpm		600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H54DFV TSTC [1]	16,800	16,380	16,800	16,380	12,511	4,638	17,149	7,994	303.0	391.0
14H54DFV TSTC	19,600	19,110	19,600	19,110	13,661	4,582	18,243	7,994	335.0	431.0
16H54DFV TSTC	22,400	21,840	22,400	21,840	15,086	4,757	19,843	8,383	373.0	480.0

Based on alternator efficiency of 97.5%.
1)TSTC : Two Stage Turbo Charger

Liquid Fuel

H21/32 Bore: 210mm Stroke: 320mm

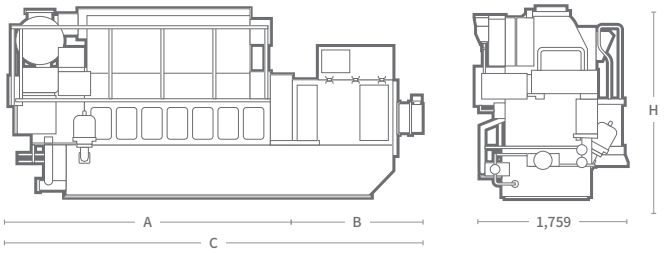


Main Data

Speed	900rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H21/32	1,200	1,128	1,200	1,128	3,781	1,896	5,677	2,781	13.4	26.1
7H21/32	1,400	1,323	1,400	1,323	4,235	1,900	6,135	2,781	15.1	28.6
8H21/32	1,600	1,512	1,600	1,512	4,453	2,175	6,628	2,911	16.7	29.1
9H21/32	1,800	1,710	1,800	1,710	4,783	2,265	7,048	2,911	18.4	31.7

Based on alternator efficiency of 94~95%.

H21C Bore: 210mm Stroke: 330mm

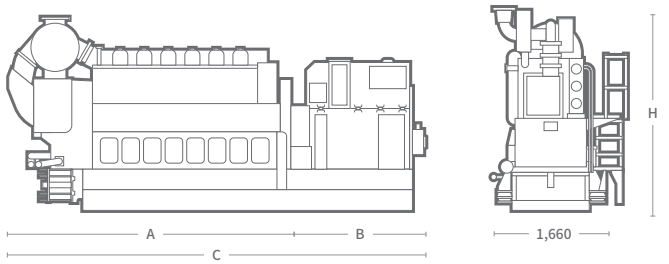


Main Data

Speed	900rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
5H21C	1,200	1,128	1,200	1,128	3,735	2,249	5,984	2,600	14.3	22.1
6H21C	1,440	1,360	1,440	1,360	4,085	2,249	6,334	2,600	16.0	24.9
7H21C	1,680	1,587	1,680	1,587	4,435	2,305	6,740	2,600	17.8	28.3
8H21C	1,920	1,824	1,920	1,824	4,785	2,305	7,090	2,653	19.4	30.2
9H21C	2,160	2,062	2,160	2,062	5,135	2,450	7,585	2,653	21.0	33.6

Based on alternator efficiency of 94~95.5%.

H25/33 Bore: 250mm Stroke: 330mm

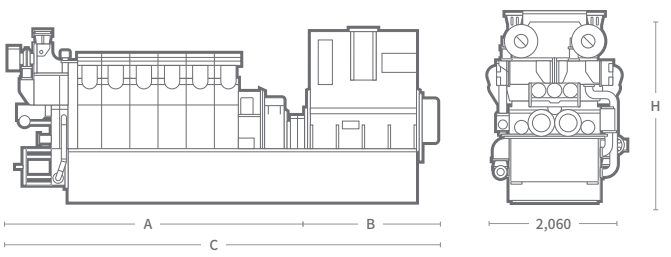


Main Data

Speed	900 rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60 Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H25/33	1,740	1,661	1,800	1,719	4,414	2,262	6,676	2,961	20.2	29.8
7H25/33	2,030	1,938	2,100	2,005	4,794	2,262	7,056	3,241	22.5	33.9
8H25/33	2,320	2,215	2,400	2,292	5,311	2,340	7,651	3,371	24.1	39.5
9H25/33	2,610	2,505	2,700	2,592	5,691	2,490	8,181	3,371	26.2	45.0

Based on alternator efficiency of 95.5~96%.

H25/33V Bore: 250mm Stroke: 330mm

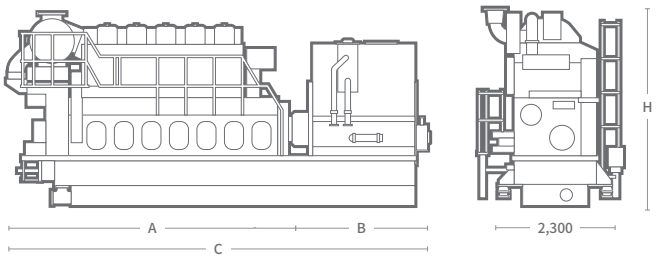


Main Data

Speed	900rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H25/33V	3,840	3,705	3,840	3,705	5,524	3,334	8,858	3,750	33.5	58.2
14H25/33V	4,480	4,323	4,480	4,323	5,944	3,504	9,448	3,750	36.5	63.4
16H25/33V	5,120	4,940	5,120	4,940	6,364	3,682	10,046	3,750	39.5	69.6
18H25/33V	5,760	5,558	5,760	5,558	6,784	3,772	10,556	3,750	42.5	77.5
20H25/33V	6,400	6,208	6,400	6,208	7,204	3,727	10,931	3,750	45.5	79.5

Based on alternator efficiency of 96.5~97%.

H32/40 Bore: 320mm Stroke: 400mm

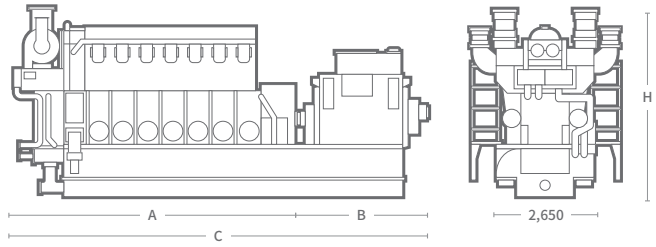


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H32/40	3,000	2,880	3,000	2,880	5,055	3,490	8,545	3,759	33.7	65.2
7H32/40	3,500	3,360	3,500	3,360	5,545	3,490	9,035	3,882	38.6	72.6
8H32/40	4,000	3,860	4,000	3,860	6,035	3,785	9,820	4,132	41.5	78.6
9H32/40	4,500	4,342	4,500	4,342	6,525	3,685	10,210	4,132	44.6	82.7

Based on alternator efficiency of 96~96.5%.

H32/40V Bore: 320mm Stroke: 400mm

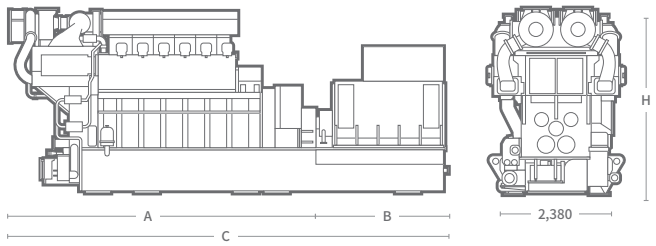


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H32/40V	6,000	5,790	6,000	5,790	6,624	3,760	10,384	4,723	56.0	108.8
14H32/40V	7,000	6,790	7,000	6,790	7,295	3,860	11,155	4,723	63.3	121.3
16H32/40V	8,000	7,760	8,000	7,760	7,914	3,479	11,393	4,723	69.1	130.9
18H32/40V	9,000	8,730	9,000	8,730	8,585	3,859	12,444	4,794	76.3	141.2
20H32/40V	10,000	9,700	10,000	9,700	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5~97%.

H32CV Bore: 320mm Stroke: 450mm

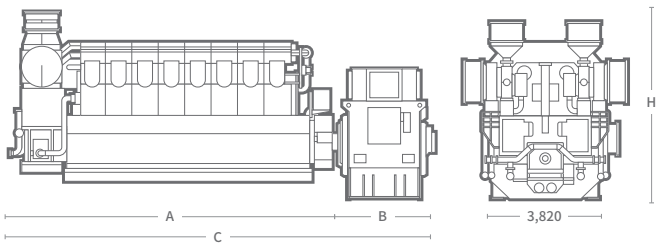


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H32CV	7,200	6,984	7,200	6,984	7,526	3,900	11,426	4,362	78.0	121.2
14H32CV	8,400	8,148	8,400	8,148	8,126	4,100	12,226	4,362	88.0	137.9
16H32CV	9,600	9,312	9,600	9,312	8,726	4,300	13,026	4,448	96.0	152.6
18H32CV	10,800	10,476	10,800	10,476	9,326	4,500	13,826	4,448	106.0	169.3

Based on alternator efficiency of 97%.

H46/60V Bore: 460mm Stroke: 600mm



Main Data

Speed	600rpm		600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H46/60V	13,800	13,455	13,800	13,455	10,610	3,474	14,084	5,611	193.0	243.9
16H46/60V	18,400	17,940	18,400	17,940	12,610	3,724	16,334	5,611	235.2	296.7
18H46/60V	20,700	20,182	20,700	20,182	13,610	3,767	17,377	5,895	260.3	334.3

Based on alternator efficiency of 97.5%.

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).
Note) All dimensions and weight are approximate value and subject to change without prior notice.

MODULAR DESIGN

‘FASTER, EASIER, AND EVEN BETTER.’

Compared with traditional design, HD HYUNDAI's prefabricated modules shorten and simplify the procurement and installation process, even with lower price.

TIME SAVING

Enable to reduce 5 to 6 months of time in planning and construction.

Planning

-3 months

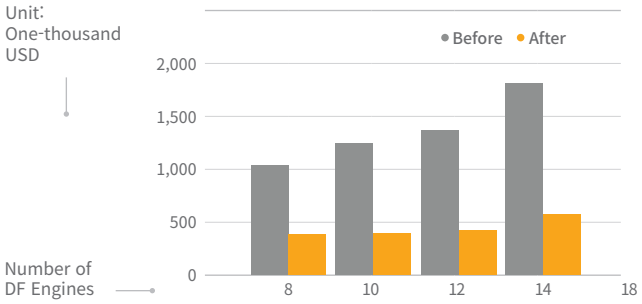
• For 10(Ten) 20H35DF Engines

Construction

-2 months

• For Engines Inside DG Building + Aux.Equipment + Piping

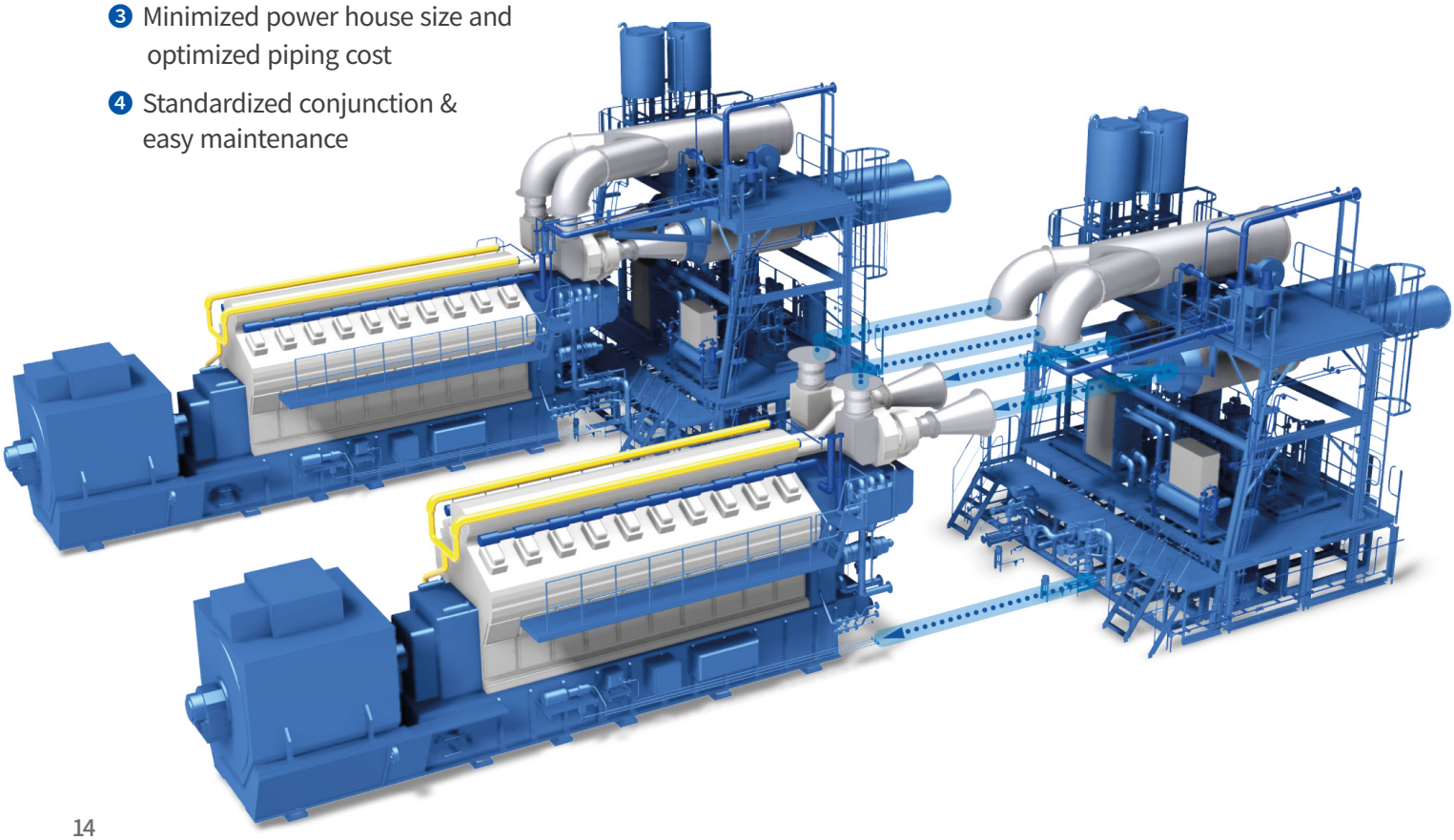
COST SAVING



∗ The estimated numbers are for cases where there are IPP/EPC contracts (DF Engine), and it may differ among countries.

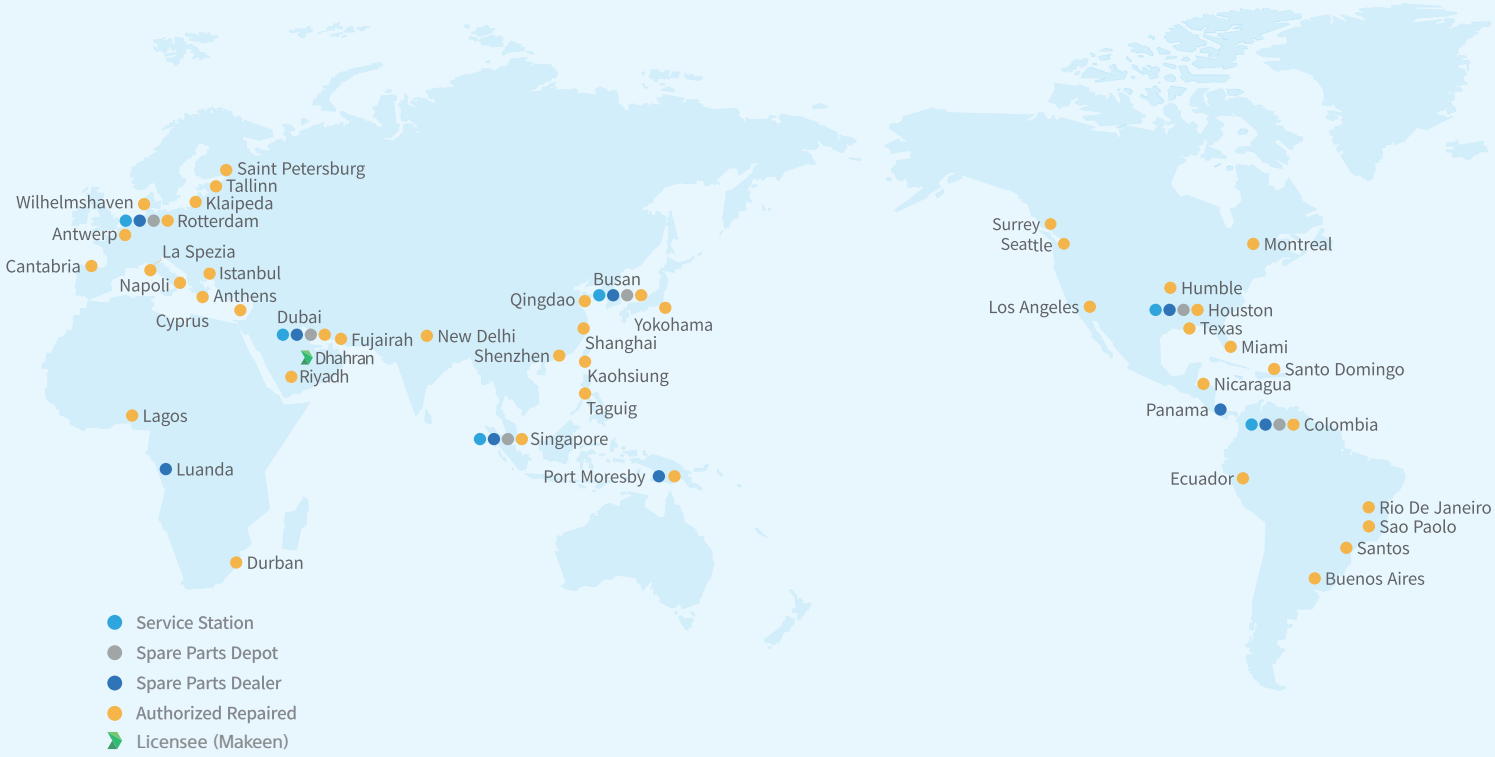
HiMSEN Aux. Module(HAM)

1. Faster and simple construction on site
2. Consistent control
3. Minimized power house size and optimized piping cost
4. Standardized conjunction & easy maintenance



RELIABLE & POWERFUL SUPPORT AROUND THE WORLD

- Optimized Solutions For Each Customer's Needs
- Genuine Spare Parts From The Original Equipment Manufacturer
- Fast and Reliable Response Through Our Global Service Network
- 24/7, Immediate Support



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