SINCE 1991

Welcome to DSK

DSK

Brief History

President : Jong Seok, Hwang

1991 Established as **"DAESAN Engineering"**

1992 Designated as for A/S Agency of **STX (ex SSHI) & HHI-EMD**

1996 Authorized Repair Shop of **DOOSAN Engine (ex HSD)**

1998 Renamed to **"DSK Co., Ltd"**

1999 **Authorized Repair Shop Reconditioner of MAN Diesel A/S**

2001 Developed **Piston Crown** for 2 Stroke Diesel Engine
Assigned **NPR Ring Korea Office**

2002 Supplying Piston Crown to **Doosan Engine** as OEM Supplier

2004 Established Technical Research Institute

2006 **Authorized Service Partners Turbochargers by MAN Diesel PrimeServ**

2009 Developed **DSK's own Controllable Pitch Propeller**

2011 Service Agreement with **Wärtsilä Korea**

2013 Service Agreement with **Wärtsilä - HYUNDAI ENGINE CO., LTD.**

Contents

Service

- Recondition repair service
- Engine repair service
- Hull repair service
- Turbocharger repair service
- Power plant service

Production

- Piston Crown
- In-situ Machine

Recondition Repair Service

"Highest technical standard, timely delivery & competitive price" are what we are aiming to. All parts have been reconditioning according to drawing & engine designer's quality specification since we designated as MAN Diesel Authorized Reconditioner during 1998 ~ 2010.

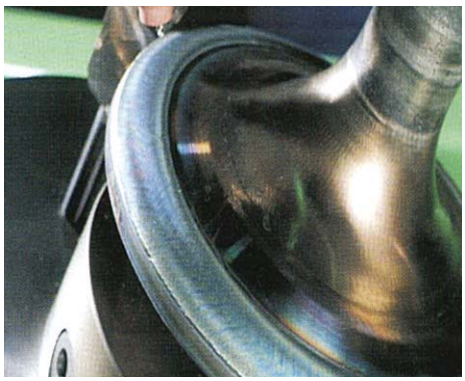
2 Stroke Engine

- MAN Diesel & Turbo
- WÄRTSILÄ
- AKASAKA
- MITSUBISHI UE

4 Stroke Engine

- MAN Diesel & Turbo
- WÄRTSILÄ
- HIMSEN
- YANMAR
- DAIHATSU

▲ Inconel cladding of crown top surface



▲ Valve spindle - disc seat welding

▲ Heat treatment of valve spindle

▲ Fully equipped most modern machineries and automatic welding facilities

Main engine components

- Piston complete
- Cylinder liner
- Exh' valve spindle
- Exh' valve seat
- Exh' valve assembly

Aux. engine components

- Cylinder head
- Piston complete
- Cylinder liner
- Connecting rod
- Fuel pump
- Cylinder units

Fuel equipments

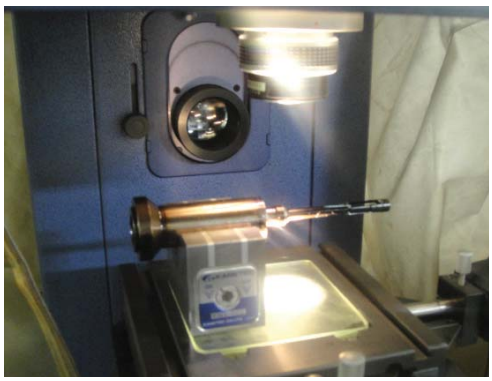
- Injection valves
- Plunger & barrel
- Nozzles etc.

Others

- El. Motor
- Governor
- Hyd' pump etc.

MAN L27/38
Cylinder unit overhaul ▶

Aux. engine cylinder
head reconditioning ▶



Fuel injection
valve insepction ▶

Engine Repair Service

▲ MAN B&W 50MC crankshaft lifting

Diesel engine repair and maintenance has been the core service of DSK for many years. Over 20 years, DSK's highly skilled engineers have been providing wide range of diesel engine service with customer oriented mind. We are focused on minimizing downtime and maximizing efficiency of engine as well as restoring operation as quickly as possible. Our team is waiting to rush to your vessel anywhere at any time in the world.

2 stroke engine

- MAN Diesel & Turbo
- WÄRTSILÄ
- MITSUBISHI UE
- AKASAKA & others

4 stroke engine

- MAN Diesel & Turbo
- WÄRTSILÄ
- HIMSEN
- YANMAR
- DAIHATSU & others

High speed engine

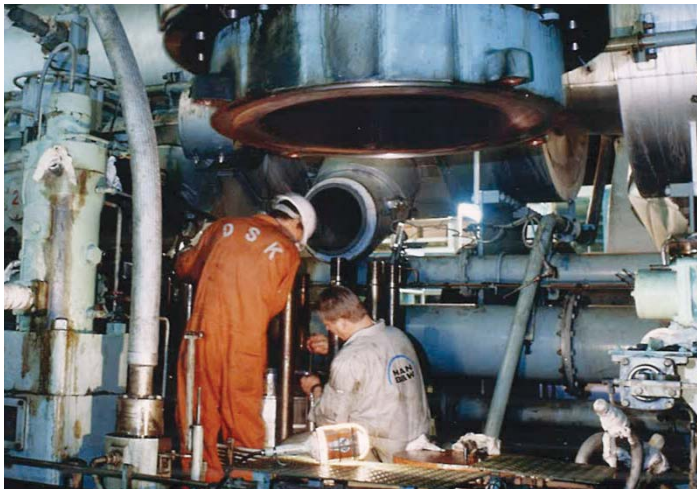
- CATERPILLAR
- CUMMINS & others

▲ Liner honing

▲ Cyl. Cover Stud. Modification

▲ Lock & Stitching

▲ Routine Maintenance



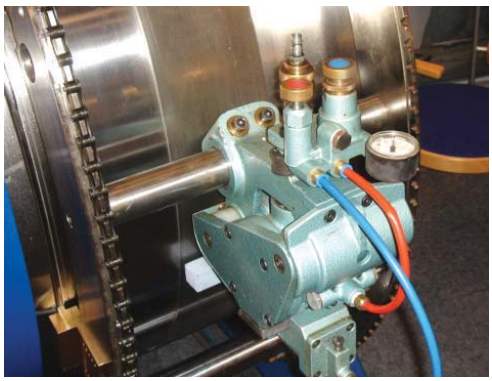
▲ MAN B&W 90MC Inspection of combustion chamber

- Engine maintenance and trouble shooting (2 & 4 stroke)
- A/E Riding Overhaul Service
- Engine Block & Crank Shaft Replacement (2 & 4 stroke)
- Retrofit of Alpha lubricator / Fuel Slide Valve
- Special Work
  - Crank shaft inspection and supervision.
  - Crank shaft & cam shaft polishing works.
  - Lock & stitching.
  - Cyl' cover stud hole repair
- In-situ machining
  : liner honing, crank shaft machining

A/E Riding Overhaul ▶

Aux. Engine Replacement ▶

Crankshaft In-situ Machining ▶



Hull Repair Service

▲ Stern plate modification

DSK's professional hull repair team is covering various range of services, taking quick action and giving best solution to the owner under different condition & limited time.

- Bow Thruster Overhaul and Replacement
- Steel & Pipe Welding & Replacement
- Deck Machinery Repair (Windlass, Winch, Hyd. Motor, Crane Etc)
- Other ship's machinery (Boiler, Air conditioner) Repair and Replacement
- Ballast Water Treatment System retrofit service

▲ Bow thruster replacement

▲ Rewinding of bow thruster motor

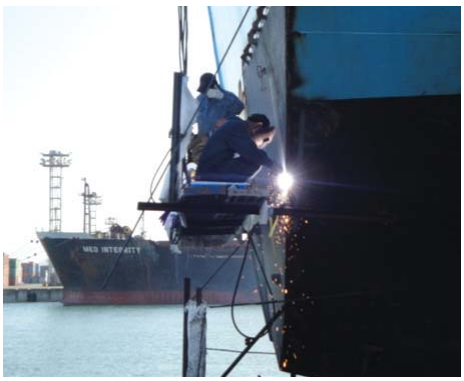
▲ Cable layer installation

▲ Replacement of main bearing saddle (Girder)

We have accumulated our own technique and know-how for Bed frame and A-Frame welding repair through many years of service to engine builders and ship owners.

- Main Bearing Saddle (Girder)
- Support Faces For Second Order Moment
- Rectification For Centre Web Plate
- Cross Head Guide Rail
- Ribs Of Thrust Bearing Housing
- Main Bearing Transverse Plate
- Gear Case (Flange Plate For Gear Wheel)

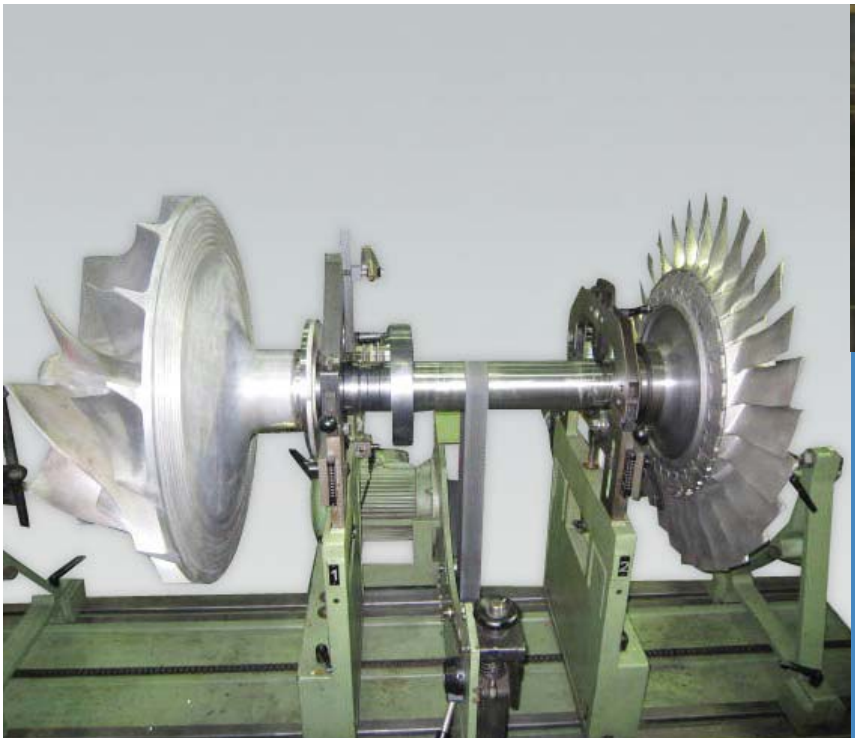
▲ BWTS retrofitting



▲ Renewal of transom bulkhead

▲ Cell guide welding repair

Turbocharger Repair Service



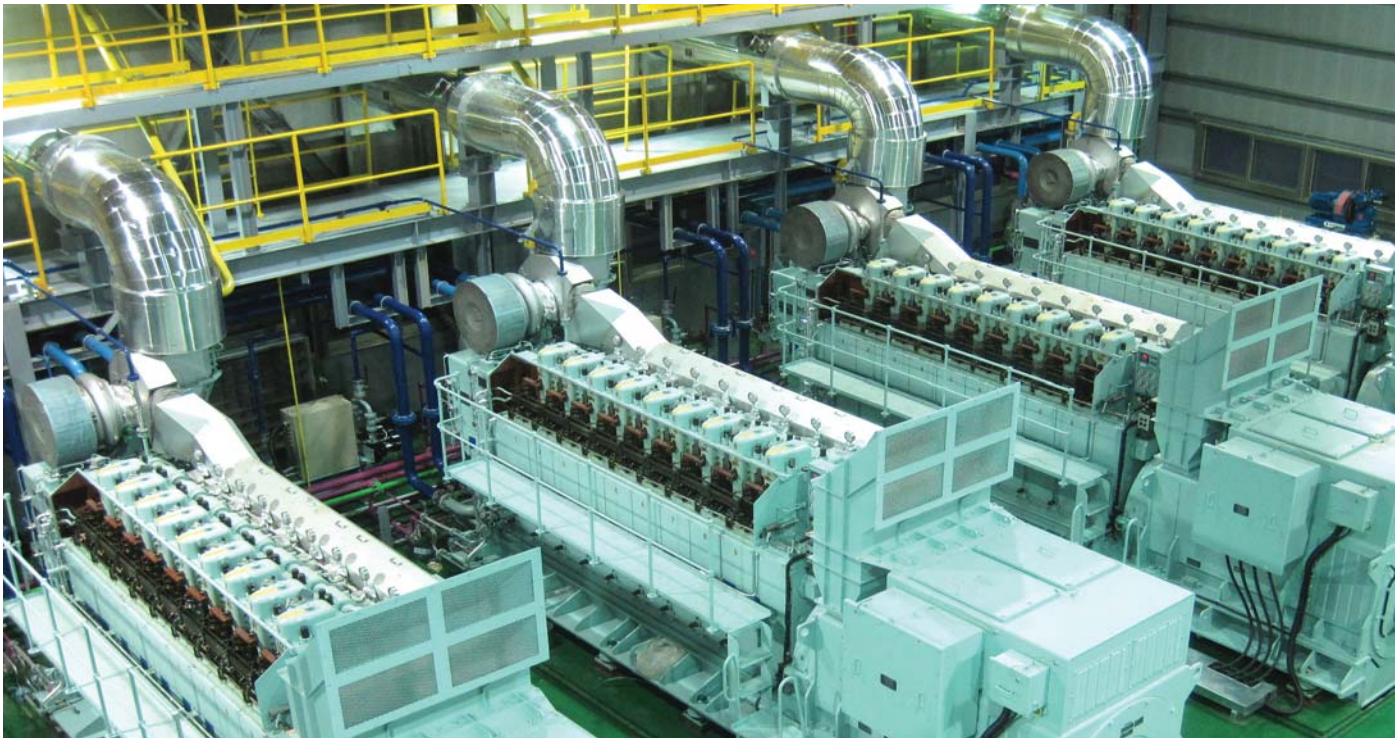
DSK had been an Authorized Service workshop for MAN turbochargers during 2006~2011.
Our own balancing machine, Maker : Nagahama-Schenck, is applicable for all 2 stroke & 4 stroke turgochargers and covers MAN as well as all different makers.

- Overhaul all types of Turbochargers
- Dynamic Balancing of Turbocharger Rotors Assembly
- Turbine Blade and Rotor Shaft Repairs
- T/C cut off & re-activation
- Supply of Genuine Spare Parts

Service for

- MAN Diesel & Turbo (NA, NR, TCA, TCR)
- ABB (VTR, TPS, TPR)
- MITSUBISHI (MET)
- KBB (HPR)
- PBS TURBO

Power plant Service



We have accumulated many experiences for Installation, Operation & Maintenance of Power plant (Domestic & overseas)
DSK's well prepared & fully experienced service team is ready to go whenever customer needs, anywhere in the world.

- Israel DSW (Dead Sea Works) Power Plant (60MW) installation
- Hotel Lotte in Pusan Power Plant (10MW) installation
- Hyundai Heavy Industries - Diesel Power Plant (10MW) installation
- Melawa Power Plant (50MW) O&M (3 years) with HHI
- Guam Carbras Power Plant (60MW) yearly maintenance

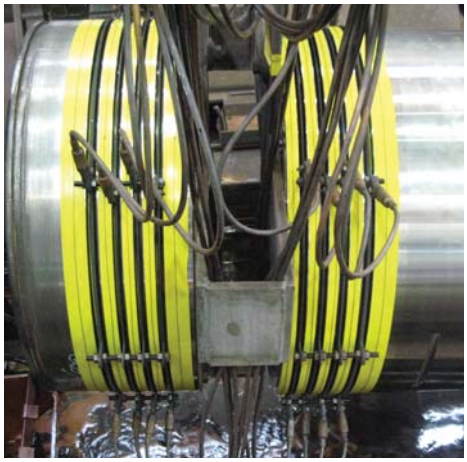
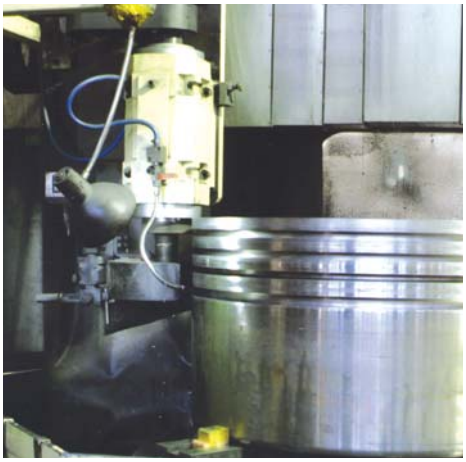
Piston Crown Production

DSK have produced new piston crown **since beginning of 2001.**
We are running our **own environment friendly Cr-plating factory** equipped with **up-to-date facilities.**
For maintaining Cr-plating quality, we are doing periodical hardness and adhesive test.

Based on MAN 70MC, our **annual production capacity is about 2,000 pcs.**
Not only for new piston crown production, by doing piston crown repair, we can give more **competitive price** and give **customer-oriented service.**

Product Range

Licensor		Engine Model
MAN Diesel & Turbo	2-Stroke	26MC - 98MC (ME) / G-Engine
WÄRTSILÄ	2-Stroke	RTA48-96C(RT-Flex)
MITSUBISHI UE	2-Stroke	UEC 33~80 LSE

Quality Assurance

DSK has been involved in intensive quality improvement programs backed by Certifications from internationally recognized Quality assurance organizations.
These include ISO 9001 : 2008 certification and **product certifications by GL, LR, ABS, DNV and all other class society.**

For strong heat resistance of combustion area for crown top surface, we **approved MAN Diesel FTA "4.5mm" & "8mm" Inconel cladding**. Especially for "4.5mm", for the first time approved among the Korean OEM manufacturer.

▲ ABS, LR, BV, GL : Workshop, Welders, WPS certification

▲ ISO 9001 : 2008 by DNV

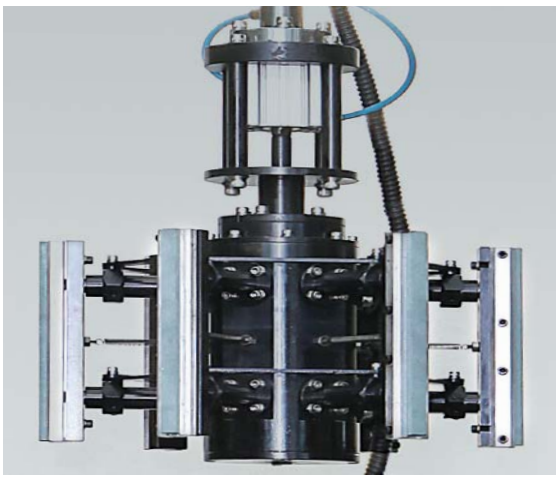
▲ MAN Inconel welding FTA

In-situ Machine Production

Portable Honing Machine

STANDARD TYPE

Cyl' Bore (mm)	Type
250 - 350	DSKH - 4H1
350 - 450	DSKH - 4H2
450 - 550	DSKH - 4H3
550 - 650	DSKH - 2H1
650 - 760	DSKH - 2H2
760 - 860	DSKH - 2H3
860 - 980	DSKH - 2H4
Other Cyl' bore - Available upon request	

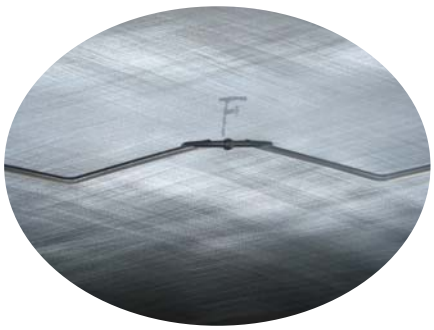


Portable honing machine, Eight & Six arm honing head, is **easy to operate and suitable weight so that optimized for in-situ service.**
As well as electrically driven unit is **powerful enough for restoring any size of Cyl' liner.**

Not only standard cyl' bore, it **can be produced in customized design upon customer's request with reasonable price.**

Why Honing ?

Periodical honing can **minimize operational cost and increase the service life of cylinder liners and piston rings.** For **reducing blow by and scuffing as well as lub-oil consumption**, it is highly recommended to honing the running surface of liner regularly.

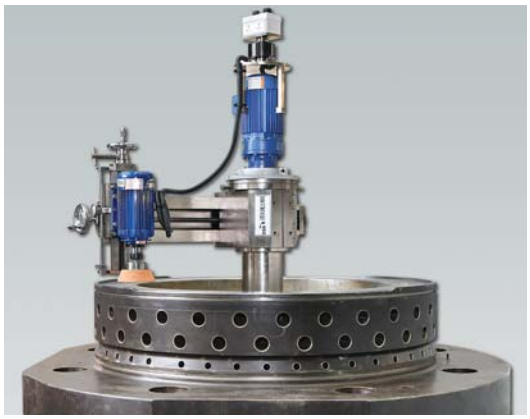


Portable Grinding Machine

Surface Grinding Machine

TYPE : DSKG-100G

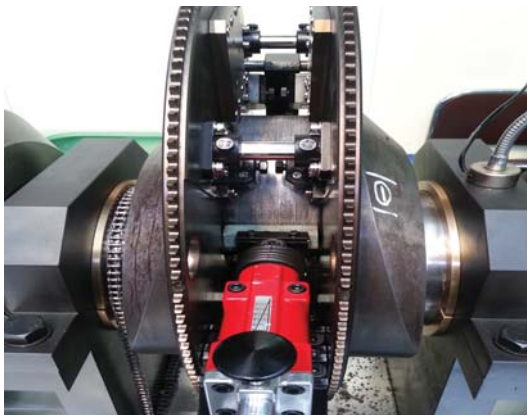
- Eliminate those troublesome water and gas leaks
- Service Range : 600mm to 1,000mm
- Application : Contact Surface of Cyl. Block / Cyl. Liner / Cyl. Head



Shaft Surface Grinding Machine

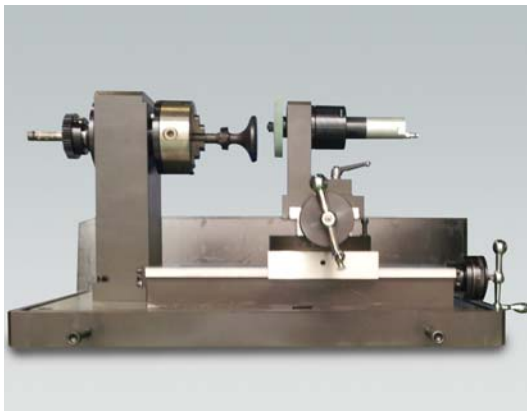
TYPE : DSKG-4G

- Re-machining of the radius and damaged crank pin Super finishing operation in progress
- Service Range : Shaft Dia 180 - 400mm
- Application : Engine Crankshaft



Valve spindle & seat Grinding Machine

- Easy to operate with air driven motor
- Service Range : 4 stroke engine spindle & seat ring
- Application : Valve spindle & seat ring grinder



Oil Sampler

Oil sampler can be used to extract sample from the oil tank of vessel or shore as well as chemical sample for analysis.

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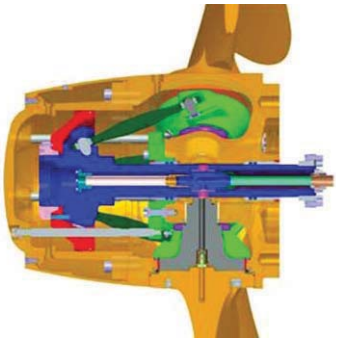
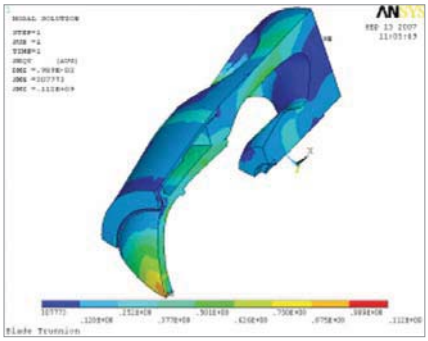
DSK

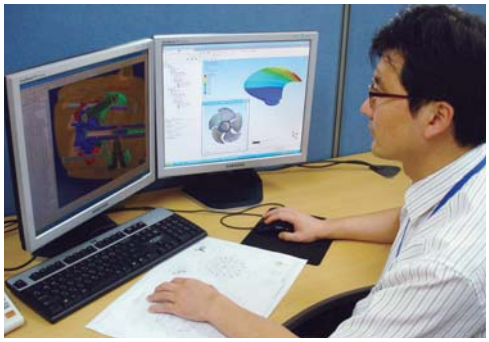
Controllable Pitch Propeller

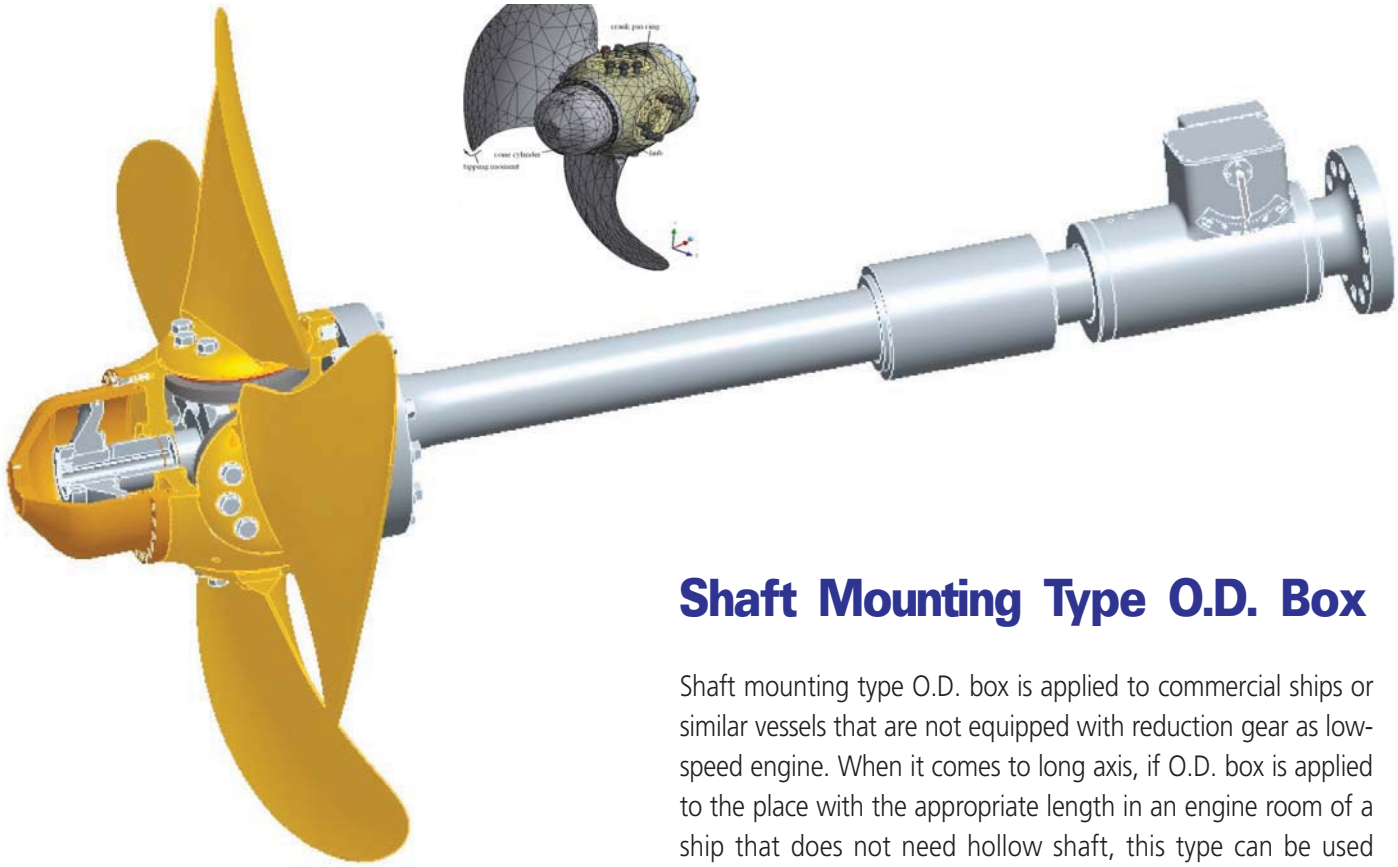
Design Principles

DSK predicts an outline of controllable pitch propeller system through independent design program according to design conditions required by classification, and decide designs of propeller assembly as per results of propeller model test.
DSK performs designs depending on a shafting system & structure type of internal hub through 3D design tool (Pro-Engineer).
Primarily, we carry out engineering calculations by MathCAD and verify designs of components.
Secondly, we perform repetitive design clarification by finite element analysis through design analysis tool(ANSYS Program), so we converge the optimal design.



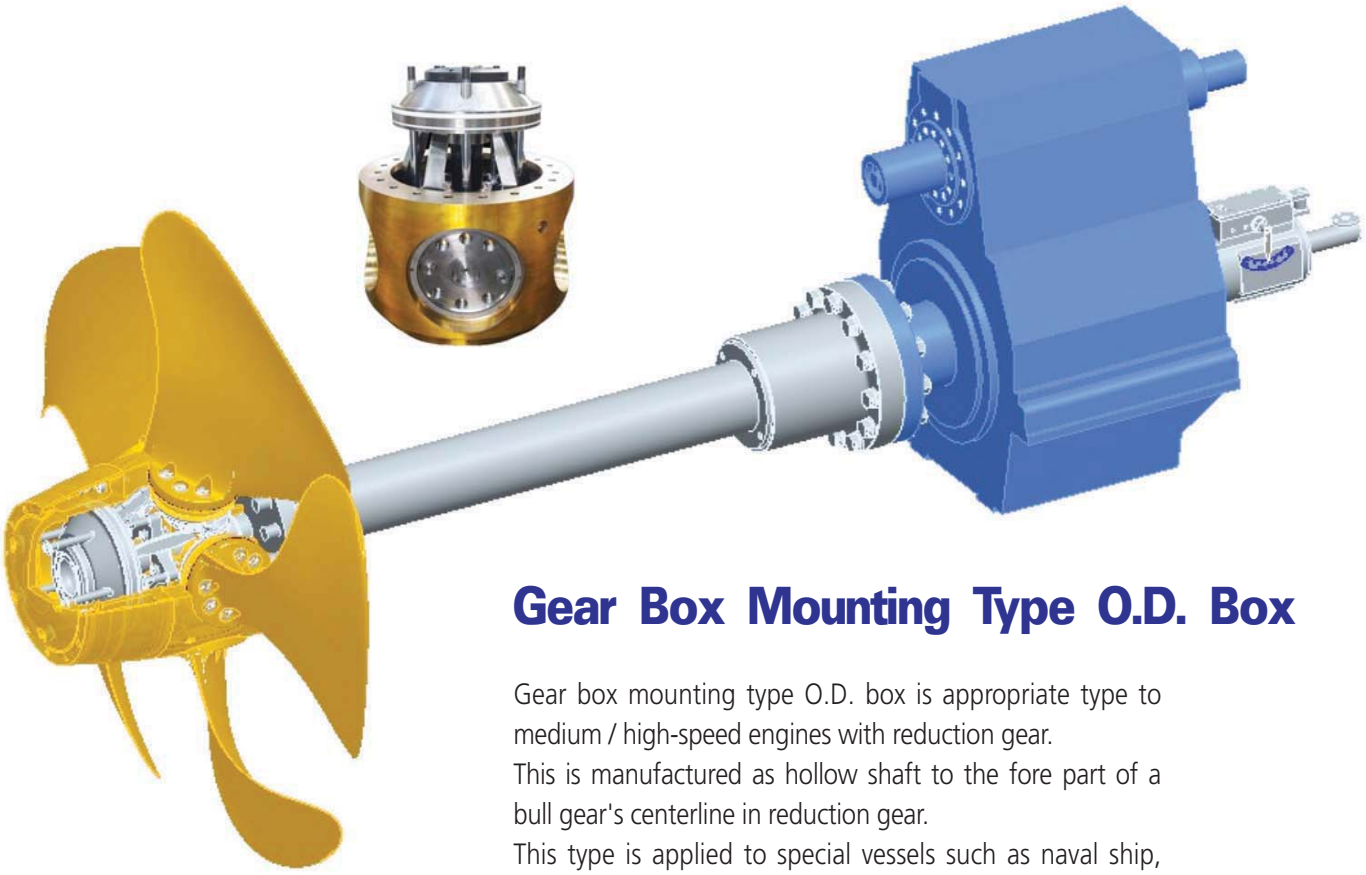






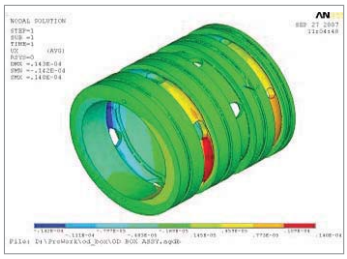
Shaft Mounting Type O.D. Box

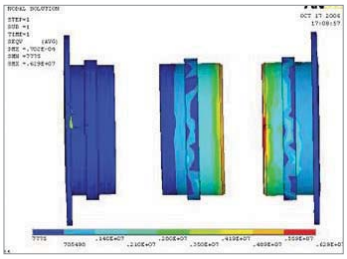
Shaft mounting type O.D. box is applied to commercial ships or similar vessels that are not equipped with reduction gear as low-speed engine. When it comes to long axis, if O.D. box is applied to the place with the appropriate length in an engine room of a ship that does not need hollow shaft, this type can be used efficiently and economically.



Gear Box Mounting Type O.D. Box

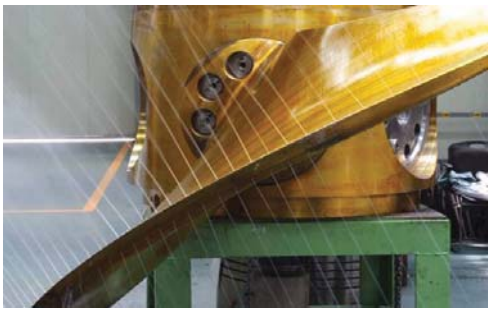
Gear box mounting type O.D. box is appropriate type to medium / high-speed engines with reduction gear.
This is manufactured as hollow shaft to the fore part of a bull gear's centerline in reduction gear.
This type is applied to special vessels such as naval ship, high-speed ferry etc..

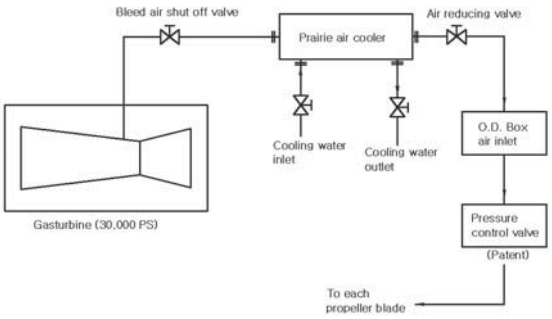




Masking Air around Propeller Blades for Naval Vessel

- Development of tactics capability for antisubmarine.
- Silent operation with air emission system will not detect from submarine.
- Reduction of cavitation and noise from propeller blades.
- Application to CPP for naval ships.





Model Test

Propulsion performance tests of model ship and model propeller are performed to make optimal propeller blade designs for evaluation as follows.

1. **Wake test** : The velocity distribution measured from the stern of a model ship's propeller is an important element of propeller design and analysis. For high cavitation test, countercurrent flow reappear using large cavitation tunnel.

2. **Resistance test** : A model ship equipped with model propeller performs resistance test to an exact estimate of required horsepower.

3. **Propeller open water test** : Propeller open water test evaluates performance when propeller alone operates at uniform flow field. This is performed for self propulsion test's analysis & propeller performance's evaluation.

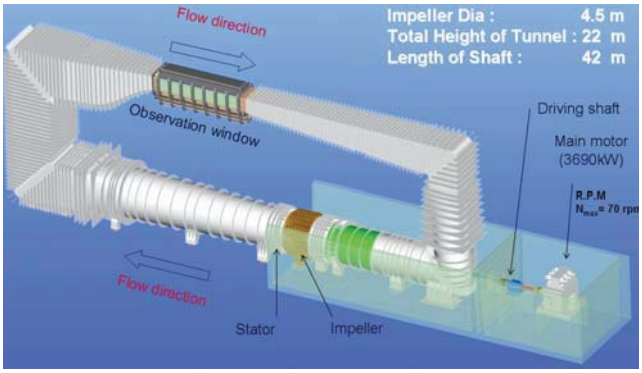
4. **Self Propulsion Test** : For self-propulsion experiments the model is fitted with stern tube or tubes, shafting, and such external fittings as stern post, rudder and, in multi-screw ships, bossings or open shafts and struts.
   The propellers are driven from inboard by an electric motor, with dynamometers in the shaft line which record thrust, torque and revolutions.
   The model is attached to the resistance dynamometer on the towing carriage in the same way as for resistance experiments. The carriage is run at any desired steady speed and the difference between the model resistance and the propeller thrust is measured on the dynamometer.

Model ship with model propeller

5. **Cavitation test** : In order to study cavitation and its effects using propeller models it is necessary to ensure both geometric and flow similarity, as any deviation from these similarity requirements causes a scale effect to occur. Geometric similarity requires that the model is a geosim of its full-scale counterpart and that considerable care has been taken in the model manufacture to ensure that the tolerances on design dimensions are satisfactory for model testing proposes.

6. **Fluctuating pressure test** : It is measured fluctuating pressure at the upper part of propeller and performs frequency analysis of the propeller blades.

In addition to these important tests, DSK can solve all problems in the model testing phase by utilizing the world's best test facility operating in the domestic country. So, we attempt the best full-scale ship's performance qualities by reflecting resolved problems in the model test stage.

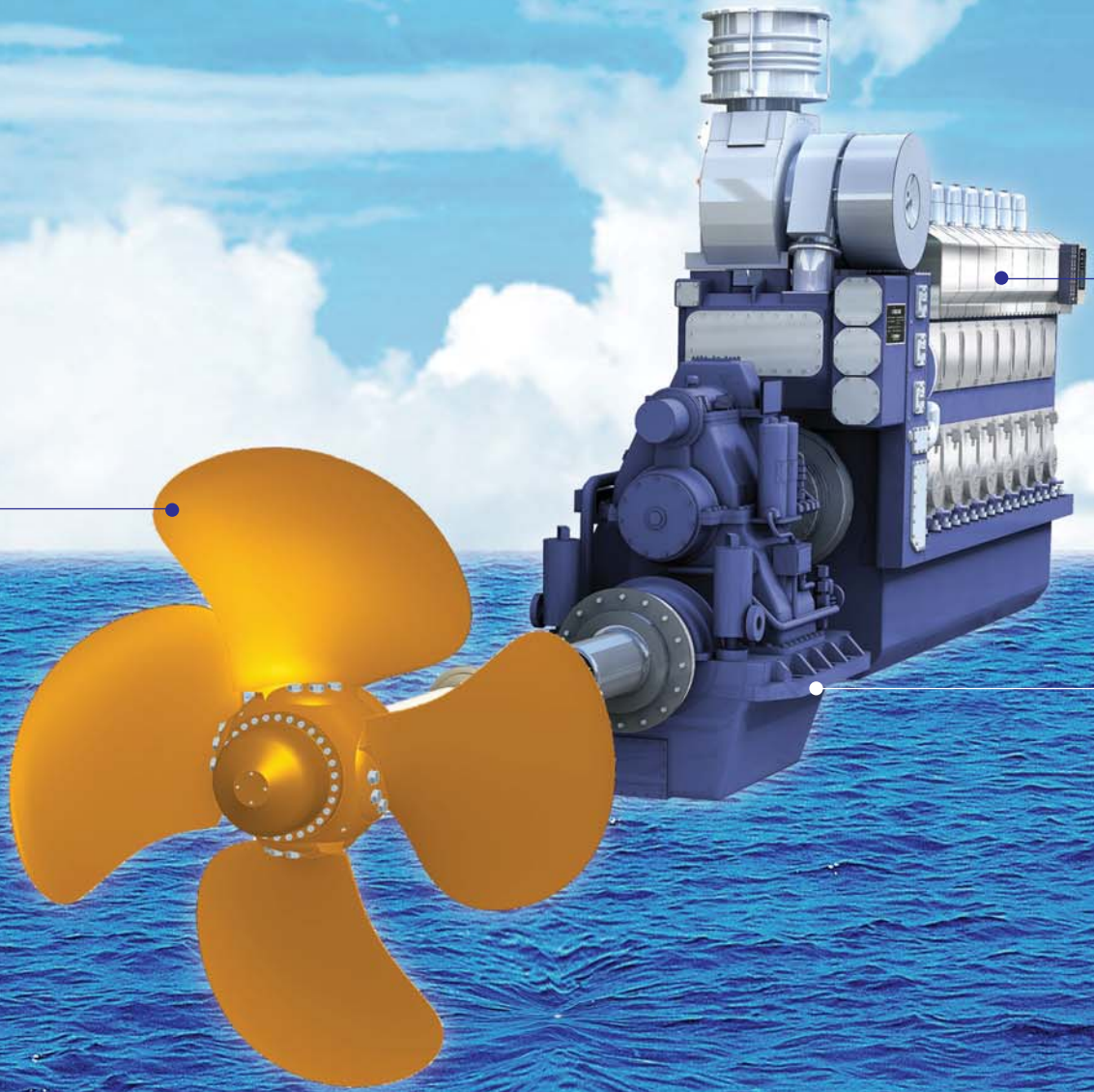


CIS (Cavitation Inception Speed) examination using the LCT (Low Noise Large Cavitation Tunnel)

−20˚ 0˚ 20˚

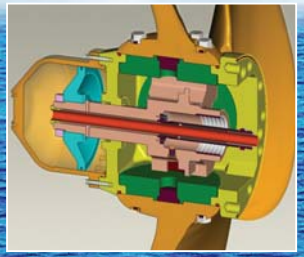
Cavitation test

HYUNDAI HIMSEN CPP PACKAGE



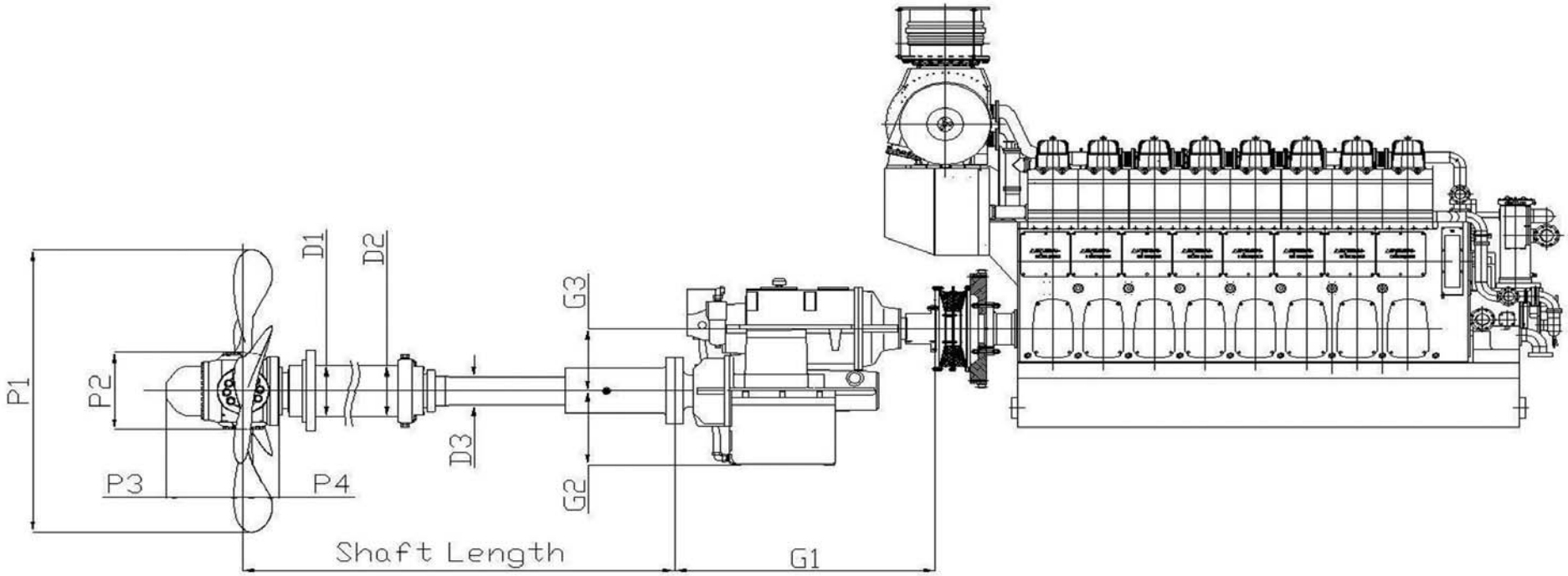
Hyundai Himsen Engine

DSK CP Propeller



Jake Gear Box

HYUNDAI HIMSEN CPP PACKAGE DIMENSION



Himsen Engine				JaKe Gear Box							DSK CP Propeller										
Typical Vessel	Speed	Engine type		Gear box model /gear ratio		Gear box & coupling dimension(mm) & dry weight(kg)				Propeller speed	CPP Model / Major Dimension				Hub Dimension			Shaft Dimension			
Cargo vessel (DWT)	knots	POWER (kWxrpm)	kW/N1	vertical offset (model)	Gear Ratio (Max) (Min.)	G1	G2	G3	Gear Dry Weight	rpm	CPP Model	Diameter ∅mm (P1)	Min. Dia.	Max. Dia.	P2	P3	P4	D1	D2	D3	Prop+Hub Weignt (kg)
1000	15	6H21/32P (1200x900)	1.33	PWVC 425A	3.75	965	900	750	6390	240	CDH-660	2360	2260	2460	660	622	232	190	184	180	1885
2000	15	8H21/32P (1600x900)	1.78	PWVC 475A	3.91	965	900	750	6390	230	CDH-720	2580	2480	2680	720	681	253	212	206	200	2447
3000	15	9H21/32P (1800x900)	2.00	PWVC 530A	4.50	965	900	750	6390	200	CDH-800	2850	2750	2950	800	748	279	232	225	220	3357
3000	15	6H25/33P (1800x900)	1.93	PWVC 530A	4.29	965	900	750	6390	210	CDH-800	2850	2750	2950	800	748	279	232	225	220	3357
5000	15	8H25/33P (2320x900)	2.58	PWVC 670B	5.29	965	900	750	6390	170	CDH-920	3250	3150	3350	920	860	320	265	258	250	5105
6000	15	9H25/33P (2610x900)	2.90	PWVC 750B	5.29	965	900	750	6390	170	CDH-940	3360	3260	3460	940	886	330	275	268	260	5446
8000	15	6H32/40P (3000x750)	4.00	PWVC 850B	5.00	1085	1000	850	9010	150	CHD-1050	3700	3600	3800	1050	971	361	305	293	285	7590
12000	15	8H32/40P (4000x750)	5.33	PWVC 950B	5.56	1120	1120	950	12440	135	CDH-1150	4150	4050	4250	1150	1096	407	345	334	325	9971
16000	15	9H32/40P (4500x750)	6.00	PWVC 950B	6.25	1120	1120	950	12440	120	CDH-1250	4550	4450	4650	1250	1191	443	375	361	350	12804

All data subject to change without prior notice.

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