POWER TRANSMISSION BUSINESS (PTB)

Industrial Gears Industry

Global Industrial Gears Industry Overview

The Global Industrial Gearbox Market is valued at USD 27.01 billion in the year 2022 and is projected to reach a value of USD 36.69 billion by the year 2030. The Global Market is forecasted to grow at a Compound Annual Growth Rate (CAGR) of 3.90% over the forecast period.

Asia Pacific is projected to acquire the largest market share of ~38%, because of the growing demand for gearboxes in various industries, such as manufacturing, power generation, and so on. India, China, Japan, Korea and Australia are among the region's most important contributors.

The global market for industrial gearbox is led by the parallel axis, which is likely to maintain its lead during the forecast period owing to the parallel axis design used in the manufacture of helical and planetary gearboxes.

By 2033, the United States is likely to rule the industrial gearbox market, with a CAGR of 5.1%. Japan's industrial gearbox market is expected to expand significantly, with a CAGR of 4.5% in this period.

Based on type, the helical industrial gearbox led the market share in 2022, and will continue to dominate the sector during the forecast period. Based on the end user, the power generation sector led the market share in 2022, and will continue to dominate the sector during the forecast period.

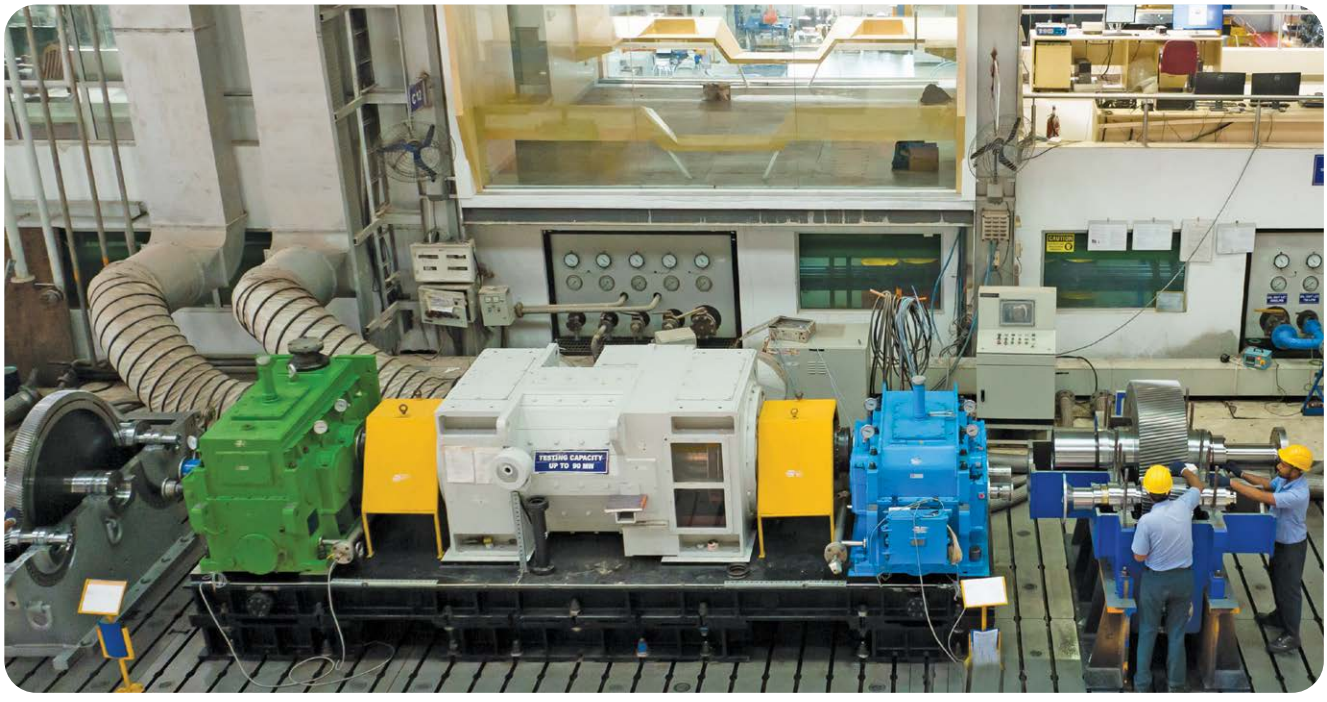
The growth of power transmission gearbox market can be attributed to several drivers, as listed below:

- Increasing demand for energy-efficient systems
- Growing industrialisation and urbanisation
- Increasing demand for high-speed machines
- Growing infrastructure development

The Global Industrial Gearbox market can be primarily divided into the slow-speed and the high-speed segments. The slow-speed segment is largely catalogue and standardised products, while the high-speed segment consists of engineered gear solutions for critical applications for steam turbine drives, gas turbine drives, centrifugal pumps and compressors, etc.

Indian Industrial Gears Industry Overview

We estimate the Indian industrial gear industry at ~USD 500 million, of which the high-speed gear market is estimated at ~USD 30 million. The industry is primarily driven by Government policies on infrastructure, ethanol blending, revival of fertiliser units, and greenfield and brownfield expansion of refineries. The market is expected to grow around 6-7% across all segments. The high-speed gear industry growth is fuelled by Ethanol Blended Petrol (EBP) programme, capacity enhancement of refineries, and investments in Petrochemical complexes attached to refinery, along with captive power requirements across all segments. Higher capacity utilisation is expected to drive higher maintenance spend, propelling the growth of the Aftermarket business. The geopolitical environment with the neighbouring countries is driving higher defence budget spending, leading to self-reliance in the defence sector.



INDIAN DEFENCE INDUSTRY

Defence Industry Overview

Indian Defence Policy and Market Developments

- Make in India Policy of the Government is driving the Indian defence industry to develop indigenous capability and technology in a wide spectrum, including critical areas, to minimise import dependence.
- Ministry of Defence (MoD) has been allocated ~₹ 5,93,538 crore, which is 13.18% of the total budget for FY 24, and is a 13% enhancement over the previous year.
- The allocation to DRDO for Research and Development in Defence, has been enhanced by 9%, with a total allocation of ₹ 23,264 crore in FY 24 Budget.
- MoD is proactive in identifying and encouraging competent and capable vendors.

TRIVENI POWER TRANSMISSION BUSINESS AT A GLANCE

- Triveni's Power Transmission business (PTB) is divided into two streams - Gears & Defence. Within gears, the business segments include Original Equipment Manufacturer (OEM), Built to Print (which together are referred as Product), and Aftermarket.
- PTB was founded in 1976 to meet the increasing demand for high-speed gears for Steam Turbine Generator (STG) applications. Today, this business is synonymous with cutting-edge technology, knowledge, and expertise, covering installations in 70 countries across a wide range of applications. The business has extensive expertise in the design and development of all sorts of gears and gearboxes, as well as a modern, globally benchmarked manufacturing facility.
- PTB has grown to become one of the largest & leading gear manufacturing companies in India with a 46-year track record and a rich history. It has carved a niche for itself by being ubiquitous across industry segments and application spectrums.

OEM Segment:

- PTB caters to international OEMs for their new product requirements, provides durable aftermarket solutions across all brands, and also manufactures built to print gears for some of the world's leading OEMs.
- The Power Transmission business is world-class, with an unwavering dedication to research & development, product excellence, technological superiority, and customer care.
- PTB is being patronised by all the major global OEMs in India, Southeast Asia and other parts of the world, offering power transmission solutions to various applications like Steam Turbine Generators / Gas Turbine Generators / Rotary & Reciprocating Compressor / Centrifugal and Reciprocating Pumps / Blowers, Hydro Turbine Generator / ID-FD Fans.
- PTB gearboxes are compliant to API and AGMA standards, and cater to various industry segments like Thermal, Oil & Gas, Petrochemicals, IPPs, Fertilisers,

Steel, Cement, Sugar, Rubber & Plastics, spanning all geographies.

- PTB gearboxes are optimally designed to comply with stringent API and AGMA standards for installations in extreme ambient conditions of sub-zero or high temperatures. The gearboxes are engineered to various configurations, such as multiple outputs, vertical and horizontal offset, quill shaft. Accessories include in-built and skid mounted lubrication system and temperature, and vibration instrumentation package suitable for hazardous area applications, meeting stringent noise and vibration limits.

- Reliability, built through superior technology, manufacturing and product quality, coupled with with four and half decade of rich experience in high technology gears, is our key strength, which leads to the development of customised gear drives, meeting tough demands of Industries across high-speed as well as niche slow-speed applications.

Built to Print Segment:

PTB has ventured into built to print gears of high quality for select global customers, leveraging its high-precision specialised manufacturing capability. The precision quality requirements for these select customers resonates well with PTB's forte in high-speed gearing.

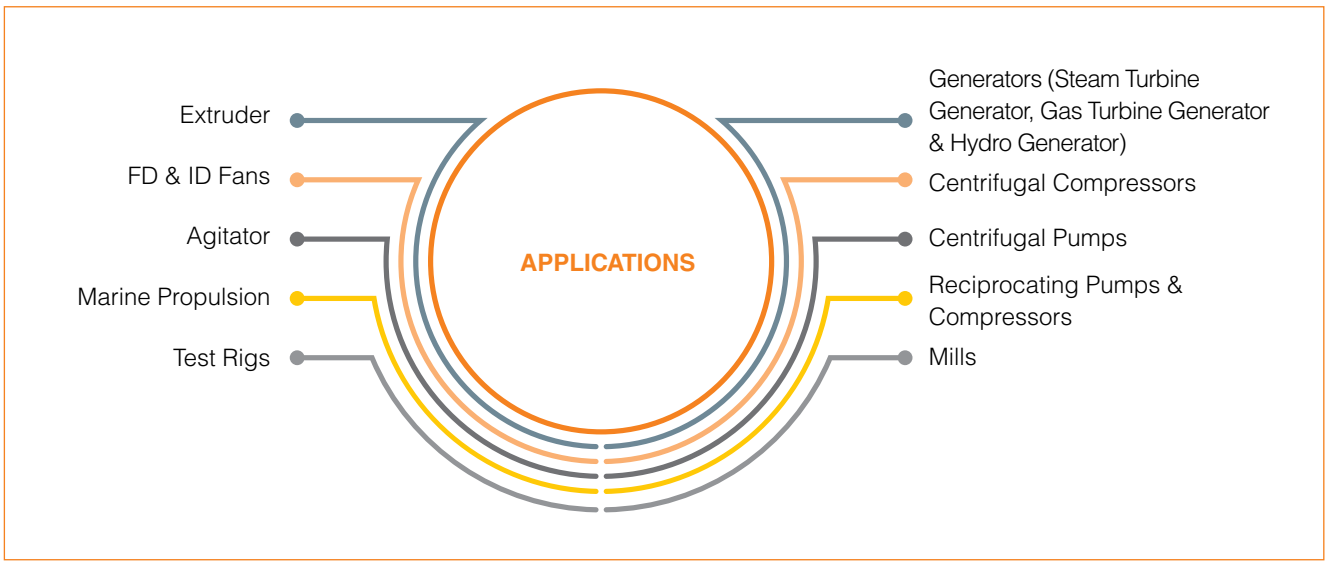
Aftermarket Segment:

- Aftermarket services are integral to the industry. PTB undertakes repair & refurbishment predominantly of world-renowned brands followed by local brands as well.

- A two-pronged strategy is adopted in the event of failure - short-term & long-term solutions. Short-term solution would include minor repair with least lead time to maximise the uptime of the equipment whereas long-term solution is aimed at creating higher order of reliability which includes major repair and replacement of parts.

- PTB's current product portfolio - OEM as well as repair & refurbishing - is supplemented by its service portfolio, which includes:
  - o Diagnostic study and health check-up
  - o Overhauling
  - o Upgradation and automation of existing plants
  - o Installation and commissioning
  - o On-site training and assistance

- Triveni PTB provides reliable 360-degree customised services throughout the product life cycle at lowest cost, thus maximising uptime and performance. Major end customers include Global O&G companies and Refineries, Cement, Sugar, Steel, Fertiliser, IPP, Thermal, Hydro, Paper and Pulp, Petrochemical and Chemical industries.



TRIVENI DEFENCE BUSINESS AT A GLANCE

Triveni's Defence business has emerged as a trusted and reliable supplier for the Indian Navy within a short span of our foray into this niche segment. Triveni is also an approved supplier for the Indian Coast Guard, underlining the sharp technological and innovation edge of our products.

Triveni is an OEM for a host of important products for the Indian Navy and Indian Coast Guard. The Indian Navy has chosen Triveni as its reliable supplier for propulsion shafting and turbopumps for its indigenous sub-surface project. As part of this relationship, we are providing reverse engineering and fully indigenous solutions for the motor & turbo driven auxiliaries for various projects.

Triveni offerings in this segment are backed by:

- Research & development expertise on critical turbo products
- Fully equipped design, engineering and analysis capability
- Best-in-class manufacturing infrastructure
- Compliance with the dynamic defence market demands in India
- Stringent adherence to quality requirements
- Vast experience in reverse engineering, retrofitting, and customisation

Triveni Defence business solutions include:

- Above and below the deck mechanical equipment
- Platform level support, propulsion systems equipment, gas turbine generator for auxiliary power generation and individual equipment such as pumps, etc.

Products

- Propulsion gearboxes and other critical gearboxes
- Gas turbine generators for auxiliary power
- Critical turbo and motor-driven pumps
- Propulsion shafting

State-of-the-art Infrastructure

Triveni manufactures quality products, benchmarked to the highest standards, in this segment at its state-of-the-art manufacturing facilities. The facilities have the most advanced world-class multi-axis CNC machinery and equipment-handling capacity of 80 tonnes, and are ideally suited to support the manufacturing of technologically superior products for the Indian Defence sector.

Triveni is an OEM for a host of important products for the Indian Navy and Indian Coast Guard. The Indian Navy has chosen Triveni as its reliable supplier for propulsion shafting and turbopumps for its indigenous sub-surface project.

Given the potential for further expansion and growth in this segment, Triveni is poised to establish a large dedicated multi-modal manufacturing, assembly and testing facility at Mysuru for defence products. This will have 80-100 tonnes handling capability and large-scale machining facility, in addition to dedicated test benches for a range of equipment and system integration capability.

OUR POWER TRANSMISSION BUSINESS PERFORMANCE

- PTB order booking stood at ₹ 263.88 crore, registering a growth of 5% & revenues stood at ₹ 225.25 crore, registering a growth of 22%.
- The Gears business registered a growth of 18% over FY 22, from ₹ 209 crore to ₹ 247 crore in terms of order booking.
- The Gears business registered a growth of 20% over FY 22, from ₹ 185 crore to ₹ 223 crore in terms of revenues.
- Within gears, Product stood at ₹ 147 crore in order booking registering a growth of 24%, and at ₹ 132 crore in terms of revenue, registering a growth of 36%.
- Aftermarket business stood at ₹ 100 crore in order booking, registering a growth of 10%, and at ₹ 91 crore in terms of revenue, registering a growth of 5%.
- Aftermarket contributes ~40% to overall revenue from the Power Transmission Business.
- In FY 23, the business added 18 new customers, driven by the Aftermarket.
- Repeat customers in the Aftermarket segment stood at 85% by value (₹ 77 crore) and 92% by numbers (301).
- Exports' share in order booking stood at ₹ 43 crore, registering a growth of 53%, and at ₹ 35 crore in terms of revenue, registering a growth of 10%.

Gears: Updates from FY 23

Achievements:

- Received the largest order from Latin America for gas turbine driven pump application for a gas pipeline project.
- Multiple orders received from OEMs for high-speed STG segment, to be installed in ethanol projects in India.
- Development of complete gearbox for Seal Gas Compressor as replacement to a European brand.
- Development of volute casing parts for Seal Gas and Cooling Gas compressors as replacement to a European brand, as a separate stream of business.
- Development of gear internals for Oxygen Turbo Compressor for a European brand.
- Development of 15MW gearbox as replacement to a European brand.
- Repair, refurbishment and supply of 9.2MW & 25MW gearboxes as replacement to a Chinese brand.
- Repair & refurbishing of extruder gearbox as replacement to an Italian brand.
- Repair & development of parts for Gas Turbine accessory gearboxes of a European brand.

New Developments

- Gearbox efficiency improvements for high-speed & high-power gearboxes are in progress.
- Capability built across all functions for the business to approach opportunities for global gas turbine accessory gearboxes.
- Providing solutions for complete Integrally Geared Compressor (IGC) gearbox units through reverse engineering and expanding the scope to compressor parts has opened new avenues of growth in refineries, fertilisers and petrochemical complexes.
- New avenue of growth identified for aftermarket repair of shafts using special coating technique, which reduces downtime of customers.
- Increase in shutdown tracking, coupled with site data management with clear correlation, has resulted in increased revenue over the years.

New References

- Entry into new series of Integrally Geared Compressor (IGC) internals with high precision accuracies for a renowned European customer to enhance market share in critical high-speed integrally geared market.
- Breakthrough order for a high-power compressor gearbox, which opens opportunities in domestic & global market to increase market share and installation base.

- Design, development, refurbishing & commissioning of high-speed Double Helical Planetary Gearbox as replacement to a European brand for a fertiliser complex through reverse engineering route has created a good reference, and can be used to secure similar business in the same industry or other industries with similar design configuration.
- Successful repair of gearbox of critical gas turbine application in situ at one of the largest refineries in India has created a distinguishing reference for horizontal deployment of this solution to other refineries.
- Entry into mud pump & draw-works gearbox used in onshore oil rigs through Built To Print.
- Providing maintenance support and troubleshooting through AMCs to multiple upstream & downstream refineries and gas complexes, enabling references and replication in different sectors.
- Overhauling of twin-screw extruder gearbox at one of the leading petrochemical complexes in India has provided valuable experience and expertise, which can be leveraged to other industries for similar applications not only for service but also for development of spares.

Defence: Updates of FY 23

- A new multi-modal facility is being set up, with large-scale infrastructure for testing of various naval marine equipment.
- PTB has ventured into a specialised vertical of propulsion shafting post winning an order for main propulsions shafting for sub-surface platform with in-house design & engineering. The technology developed will enable participation in various other shafting projects for Navy.
- Design, engineering, development & delivery of special application pump for Navy, which will pave way for similar requirements in future.
- Venturing into propulsion shafting, coupled with in-house capability to design & develop a wide range of rotary equipment and machinery and capability acquired through collaboration with Indian & overseas partners, will facilitate participation in shafting projects and machinery systems. This would be a pioneering initiative aligned to the Atmanirbhar Bharat policy of the Government of India

Power Transmission Business strengths

Product:

- Triveni Power Transmission Business (PTB) is one of the top five high-speed gear companies globally.
- 46 years of rich history of producing high-speed gearboxes.
- Population of 12,000+ high speed gearbox installations globally.
- Enjoys majority domestic market share across OEMs, and patronised by global OEMs across the application spectrum, spanning STGs / GTGs / Compressors / Pumps / Blowers / ID-FD Fans.
- Products are supplied across industry segments like Steel / Sugar / Cement / Fertiliser / Refineries / Gas Complexes, etc.
- Capability to design and manufacture high-power, high PLV gearboxes for all high-speed applications.
- Triveni is one of the few companies globally catering to AGMA & API standards and supplying gearboxes for hazardous and sub-zero temperatures.
- Highly experienced team with exceptional troubleshooting capability and sound understanding of system dynamics, including vibration analysis expertise.

Aftermarket:

- Triveni-PTB is one of the few companies operating globally in this segment, having replaced and refurbished 1200+ gearboxes of 80+ global brands across the application spectrum and across industry segments.
- It is highly responsive and is able to comprehend solutions (short-term & long-term) aligned to the demands of the industry.
- It has contributed immensely to energy conservation projects, which include power enhancements and speed change, which has a positive impact on plant production in some of the petro-chemical applications.
- It offers comprehensive solutions, including analysis, supply and services, in the aftermarket space, leading to drastic reduction in product lifecycle cost from the time of engagement.

Defence:

- Ab-initio design capability of critical machinery for marine application, leveraging existing expertise & experience in rotary engineering.
- In-house capability to design & develop a wide range of rotary equipment and machinery, coupled with capability acquired through collaboration with Indian & overseas partners.
- In-house precision manufacturing capability.
- A new multi-modal facility is being set up, with large-scale infrastructure for testing of various naval marine equipment.

CASE STUDIES - AFTERMARKET

Case Study 1:

Problem statement:

Damage to casing bore on barring and starting device idler shaft of 35MW gas turbine gearbox (combined load & accessory).

Site constraint:

The casing was grouted in concrete and removal would have caused destruction of the foundation.

Solution:

PTB provided a comprehensive in situ solution, where the gearbox casing bore was rectified in its original position by using special fixtures and in situ boring arrangement. Bore axis parallelism with existing bore was maintained within 0.05mm. New idler shaft with gears integrated with clutch arrangements and tooth contact with barring and starting shaft lines. Unit was put back into operation within three months.

Case Study 2:

Problem statement:

Diesel engine supplier has gone wrong in the direction of rotation and it would have been a costly affair to replace engines with reverse directions & that too in a short span of time.

Site constraint:

Fire pump bevel helical gearbox needed direction of rotation change without altering the foundation elevation and footprint to match the newly procured diesel engine in off-shore oil rig.

Solution:

PTB provided a solution of new gearbox casing, using existing parts of gearbox to maintain moment of inertia from the torsional compliance perspective of the system. PTB shifted mesh location of the input shaft to ensure direction change on output shaft. The bearing location in casing was suitably optimised to ensure mesh consistency during load operations.

OUTLOOK FOR INDUSTRIAL GEARS & DEFENCE INDUSTRY AND OUR POWER TRANSMISSION BUSINESS

Gears Industry and Triveni Gears Business Outlook

- Outlook for domestic product segment within high-speed gears is promising across key sectors:
  - **Sugar and Distillery:** The Steam Turbine Generator (STG) market is expected to grow in the smaller power range for Sugar and Distillery sector. The ethanol production capacity in India currently is ~1,000 crore litres, which is expected to go up by 25% to 1,250 crore litres by the end of 2023. In order to achieve the target of 20% blending by 2025, ~1,000+ crore litres of ethanol will be required. With ~300+ crore litres for other usage, there is need to create capacity of ~1,700 crore litres, assuming that the plants operate at 80% efficiency.
  - **Oil & Gas:** The domestic Oil & Gas sector is doubling the refining capacity by 2030, leading to gearbox requirements for Steam Turbines, Gas Turbines, Pumps and Compressors. India's oil consumption is forecast to rise from 4.05 MBPD in FY 22 to 7.2 MBPD in 2030. Consumption of natural gas in India is expected to grow by 25 billion cubic metres (BCM), registering an average annual growth of 9% until 2024.
  - **Steel and Cement:** Infrastructure growth is providing stimulus for expansion of Steel and Cement for Waste Heat Recovery (WHR). Cement companies are on an expansion spree and are expected to add 80-100 million tonnes (mt) of fresh capacity by FY 25 despite the looming challenges of rising input cost and uncertainty on the demand front. The Union Cabinet approved a ₹ 6,322-crore PLI scheme in July 2022, to boost the production of speciality steel in India. The Government aims to double the country's annual crude steel making capacity to 300 million tonnes from 150 million tonnes at present.
  - Growing potential is seen in the **Waste-to-Energy (WtE)** through agricultural and municipal waste.
- Focus on market share gains in product segment, especially from the international market through greater promotion of technology and thrust on new and existing customer relationships.
- Increasing footprint to capture high-growth opportunities for Aftermarket segment through a combination of own efforts and expanding the agents' network.

Collaborating with global technology OEMs in select areas for participation in marine propulsion gearboxes aligned to the naval & coastguard requirements

- In the Defence segment, the business expects increased order booking from key segments of Gas Turbines packaging, gearboxes and special application pumps, where the key activities of qualifications and Request For Proposal (RFP) have progressed considerably in the last couple of years.

Defence Industry and our Defence Business Outlook

- Development of in-house technology, engineering & design for propulsion shafting, for marine application, is under way.
- Collaborating with global technology OEMs in select areas for participation in marine propulsion gearboxes aligned to the naval & coastguard requirements.
- Expanding portfolio of special application pumps with indigenous design and development.
- Indigenous manufacturing and assembly of Base Frame and Acoustics Enclosure for propulsion gas turbines for naval marine application.
- New multi-modal Defence facility is planned to be commissioned by early 2024 in Mysuru, and will cater to the assembly and testing needs for a wide range of defence equipment, starting with the ones for Naval marine application. The modern facility shall cater to all the current and future development programmes that the Company is venturing into. The master plan shall cater for expansion in future into Army and Air Force projects as well.
- Triveni-PTB is developing multiple product lines for Naval applications, like Stabilizers, Light Weight Gearboxes, Propulsion Shafting & System, Steering Gear and Special Application Pumps for a range of marine platforms. Aggressive efforts are on for enlistment with Navy & Coast Guard as approved vendor.
- Triveni-PTB is foraying into small power Gas Turbine Generators for Naval Marine application in collaboration with world renowned OEMs.