Reliable high-power engine solutions

NAVAL DEFENSE

Engineering the Future – since 1758.
MAN Diesel & Turbo
MAN Diesel & Turbo is the world’s leading provider of large-bore diesel engines and turbomachinery. Our portfolio includes two-stroke and four-stroke engines for marine and stationary applications, turbochargers and propellers, as well as gas and steam turbines, compressors and chemical reactors.

Leading the field with future-proof technological innovations is part of our tradition. We are committed to minimizing fuel consumption while meeting emission regulations.

We are the only manufacturer that serves the whole spectrum of maritime defense applications: from fast patrol boats to large auxiliary ships, from offshore patrol vessels to submarines. No less than 59 navies rely on our engines to keep their naval vessels moving.
Specialist expertise

The naval defense segment is growing in the face of national security concerns. At the same time, the growth of asymmetric threats and terrorism demands increasing maritime security. Modern vessels fulfill an extremely varied and complex range of tasks. As long-term partners of the defense market, we know exactly of the requirements and constraints of each application and can design a perfectly tailored solution.

Engines that have to perform, not just run

Shockproof design, noise cancellation and lack of magnetic signature are some of the special demands that navies make on our engines and propulsion systems.
FOUR-STROKE ENGINES FOR NAVAL
Offshore Patrol Vessels

Small and compact, but acting on the open sea, offshore patrol vessels take on a very broad range of missions that include search and rescue, maritime policing, piracy control, environmental monitoring and fishery protection.

Versatile performance

While the engine load profile for a patrol boat has to be very flexible, it almost always has to deliver quick, high-power response, endurance and flawless operation during any mission. Easy operation and maintainability is a must.

Our engine options also offer you freedom and flexibility of design, with solutions for both mechanical and combined electric or diesel propulsion.
MAN 28/33D STC: No compromises
Continuous low load operation capability and high torque for fast acceleration are just two of the features that make the MAN 28/33D STC perfectly suited to offshore action. This powerful engine builds on the heritage of the successful MAN PA6B.

Robust and reliable, not only does the MAN 28/33D STC offer strength and stealth for any mission, it also keeps downtime low for high availability. In mechanical propulsion systems, it gives you torque that is easy to control and optimal acceleration response.

Benefits
- Economic operation
  Low TCO (Total Cost of Ownership) on the market
- Low maintenance costs
  Due to long TBO (Time Between Overhauls) intervals and on-board maintenance
- Best power to weight ratio in its class
  5.3 kg/kW, unexcelled by any other medium speed engine

MAN 175D GenSet: the perfect combination
With its continuous, reliable performance and state-of-the-art technology, the MAN 175D GenSet allows you to focus entirely on your mission. Your crews don’t have to learn to use different systems: interface, maintenance procedures, and documentation are consistent.

Further power solutions
MAN 175D GENSET

Sequential Turbocharging (STC)
Two identical yet independent turbochargers provide high torque at low rpm. Fuel injection quantity, rate, and timing are electronically controlled. For perfect torque and acceleration control.

Low acoustic and thermal signature
Especially suitable for naval applications. It is capable of extended operation at low loads without white smoke.

MAN 28/33D STC
Naval Combatants
Corvettes, frigates and destroyers depend on high-powered, efficient engines that won’t let their crews down or risk the success of their mission—whether on far-from-home deployments or fast escort missions.

Silent and swift
Naval combatant applications usually require high speed for fast escort operations, without compromises on acoustic, thermal, and visual signatures. They also have to withstand shocks or even be CBRN (chemical, biological, radiological and nuclear) capable.

Our powerful and compact engines deliver this level of performance while ensuring maximum availability and outstanding SFOC (Specific Fuel-Oil Consumption). Best-in-class life cycle costs are supported by our worldwide logistic service.
MAN 28/33D STC: Low downtime, high availability

With its compact design and powerful performance, the MAN 28/33D STC is perfect for military vessels. The compact yet powerful engine has a high power-to-weight ratio and is fully compliant with current environmental standards, producing NOx emissions that fulfill IMO II and EPA Tier II regulations.

Maintenance costs are kept low thanks to high engine availability. And with main overhauls only necessary every 32,000 hours, servicing downtime is kept to a minimum. As a result, you can count on low overall operating costs and best-in-class SFOC.

Benefits
- Best power to weight ratio in its class
- 3.5 kg/kW, unequaled by any other medium speed engine
- High reliability and low maintenance efforts
- All maintenance in situ, no removal from vessel necessary, no change of crankshaft
- Simple efficiency
- Sequential Turbocharging (STC) promises optimum matching over all loads with only two turbochargers
- Noise and shock optimization
- The Acoustic Propulsion Module dramatically reduces airborne and structure borne noise, and enhances safety – yet is easy to install, operate and maintain.

Further power solutions
MAN 175D GENSET

Military design
Developed in close cooperation with naval forces, the engine has a high power to weight ratio, all pumps are attached and all maintenance can be carried out out by the crew.

Combat capable
The MAN 28/33D STC is built to withstand shocks and achieve enhanced noise emissions levels when fitted with special elastic mountings. It is NBC attack capable.

Cooling system
The concept includes aligned cylinder units to minimize installed weight. The inter-cooler assembly is centrally mounted, also contributing to the engine’s light weight.
High expectations

Great demands are made on amphibious and support ships, including long operational life. Worldwide logistic support missions can be long in range and duration. The engines must offer ultimate shock-resistance, silent operation, and low visual or infrared signatures. The large and complex propulsion systems have to deliver high running hours and are expected to last very long.

Offering reliable, high-power operation at low fuel consumption, our engines pass the test in terms of reliability and economy. What’s more, our systems include powerful generator sets for diesel-electric propulsion systems and onboard electrical power generation.
MAN 32/44CR: Robust design for reliable high power output
The development of the MAN 32/44CR has benefited from many years of experience of industrial sized diesel engine architecture. It has proven itself in merchant navy applications and can provide a solid reference list. Its high reliability ensures long TBO.

Benefits
- Highly efficient Common Rail technology
- Best in class SFOC
- Low operating costs
- Better efficiency and improved maintainability
- Low exhaust emissions
- Complies with IMO Tier II and IMO Tier III (with optional Selective Catalytic Reduction)

Propulsion and auxiliary power in one
The MAN 32/44CR is designed as multi-purpose drive. It can be used for mechanical or diesel-electric propulsion or for diesel-electric power generation. Using it as marine main engine and auxiliary engine brings huge advantages in terms of operation and support.

Further power solutions
MAN 48/60CR

Common Rail injection
Almost flexible setting of injection timing, duration and pressure. This flexibility allows the fuel consumption and emissions be optimized on its operating profile.

High efficiency turbocharger
The use of MAN Diesel & Turbo turbochargers equipped with the latest high efficiency compressor wheels can alleviate the NOx/SFOC trade off. The higher-pressure ratio increases the efficiency of the engine and thus compensates the increase in SFOC normally associated with lower NOx emissions.
Ease of use
Because they are deployed in coastal waters, engines for inshore patrol Craft usually have very high emission compliance standards (IMO Tier III). In terms of performance, extremely fast response is a must in the majority of cases.

The typically small crews on these boats have their own specialized duties, such as rescue, inspection and combat. That means that simple engine operation and maintenance is essential.
MAN VP185: High speed performer

When it comes to high speed diesel engines, the MAN VP185 has certainly proven itself in many applications. In terms of performance, it has one of the highest power densities on the market and full black-starting capability. At the same time, its operation is simple and reliable.

Benefits

- High speed availability
  Full rating available at 45 °C ambient, 32 °C seawater
- High power output
  Power to weight ratio is 2.69 – 2.88 kg/kW
- Low operating costs
  Thanks to ease of maintenance, low fuel consumption and low emissions

Environmental compliance

The high-performance MAN VP185 engine is IMO Tier III compliant when fitted with MAN SCR (Selective Catalytic Reduction). The compact, modular exhaust gas aftertreatment system is the most tested and approved system for achieving NOx reduction rates up to 90%.

Further power solutions

MAN 175D

Two-stage turbocharger

Simple, two-stage turbocharging with no complex control or change-over valves provides a wide torque curve, making the VP185 the ideal propulsion choice for high speed coastal patrol vessels.

Combined charge air heater / aftercooler

Provides optimized air manifold temperature for extended operation at low load without white smoke or maintenance impact.

Water cooled exhaust manifolds

Provide a low surface skin temperature and low heat rejection into the engine room, offering an inherently safe and cooler operating environment.
Ensuring operational safety

A submarine’s engine is also special; it not only has to work underwater, it also has to be extremely quiet and free of vibrations, because stealth is paramount. Maximum engine safety and reliability are essential.

Drawing on our extensive understanding of the unique conditions faced by underwater craft, we have developed one of the most reliable submarine diesel engines in the world, capable of working under high exhaust backpressures and low suction pressures.

Submarines

Submarines are, of course, very special. They have tasks such as surveillance and intelligence gathering; they may be used for the deployment or recovery of special operation teams; sometimes they are even armed with nuclear weapons.
MAN PA4: Operational reliability under water

The MAN PA4 engine is the power source of choice for conventional submarines. Proof of our expertise is that MAN PA4 engines are installed on board nearly 100 submarines. The model represents the very best in performance and power for diesel generators in submarine applications. Its unique supercharging system features an engine-driven compressor and exhaust-gas turbocharger. With its 90 degree V configuration, this 12-cylinder workhorse offers unrivalled power output in its class.

Benefits

- "Variable Geometry" combustion system
  For low mechanical stress, low noise and low vibration emissions
- Mechanically driven compressor
  Safest submarine solution for producing energy with supercharged diesel engines
- Black start capability
  MAN PA4 is able to start without any electrical supply

Safe snorkeling

The greatest advantage of the MAN PA4 is its very low sensitivity to variations in snorkeling conditions. Its proven design is recognized worldwide as representing the most reliable technology for total operational safety.

Further power solutions

MAN PA4 SMDS

Supercharging system

Features an engine-driven compressor and exhaust-gas turbocharger. This system combines all the advantages of mechanically supercharged engines (e.g., insensitivity to suction and exhaust conditions) with all the benefits of conventional turbocharged engines (e.g., high power density).

Mechanically driven compressor

The safest solution in a submarine to produce energy with supercharged diesel engines is to use a suitably dimensioned mechanically driven compressor to adequately compensate back pressure.

Turbocharger

Each compressor is fitted with a charge air intercooler so that after compression the charged air can recover after its specific gravity to ensure good combustion.
MAN Diesel & Turbo: one source provider of propulsion solutions

MAN Diesel & Turbo has a strong track record in the engineering and servicing of complete propulsion packages, main engines, reduction gearboxes, propellers, and propulsion control systems for navies and coastguards across the globe. We know what you expect: high propulsion performance and operational flexibility at low hydro-acoustics.

Highly efficient propellers

Our propellers can be found on many types of ships – from small coastal cutters or supply and inspection vessels to larger, more powerful OPVs, command support vessels, and frigates.

We offer propeller blades with conventional high-skew profiles for our four- and five-blade series (CPP/FPP), as well as propellers for a shaft power of up to 40 MW. Highly efficient Kappel designs with specially modified fin tips ensure low noise signatures. And this impressive portfolio of products also includes a variety of water-lubricated stern tube systems.

Benefits of a complete propulsion system

Together with our affiliates RENK (gearboxes) and ALPHA (propellers and shafts), we can create complete solutions for the complex propulsion needs of large ships.

- **MAN engines**
  - Reliable and high-powered
- **MAN RENK gearboxes**
  - Special navy design
- **MAN ALPHA propellers**
  - Noise-optimized
MAN PrimeServ

MAN PrimeServ is the dedicated MAN Diesel & Turbo service brand. Via a network of over 100 service centers worldwide, MAN PrimeServ provides 24/7 service across the globe. Our range of services includes technical support, consulting and OEM spare parts, as well as maintenance, repair and comprehensive individualized service plans.

MAN PrimeServ’s aim is to provide:
- Prompt delivery of high-demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored O&M contracts
- Ongoing training and qualification of operators and maintenance staff
- Global service, 24 hours a day, 365 days a year
- Diagnosis and troubleshooting with our high-performance Online Service

SERVICE WITH PASSION
MAN PrimeServ

We offer retrofitting and upgrade services to bring engines and turbochargers already in service up to the very latest standards of performance and efficiency. Using the latest digital technology, we enable you to maximise the performance and availability of your MAN equipment by accessing real-time data analysis, remote support and rapid solutions. We also offer an extensive range of training courses at MAN PrimeServ academies around the world.

Armed forces must always be ready for action and so is our service team, offering continuous support, dedicated training and fast delivery of spare parts wherever your military operations take you.

For more information please visit: www.man.eu/primeserv
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An interactive experience

Download our MAN Brochure Store app from the App Store. Use its exciting interactive features to explore our complete range of products and services. Suitable for iPhone or iPad.

Explore our latest news via an app

DieselFacts brings you the most recent news from the world of two-stroke and four-stroke engines, including the latest technical papers, in-depth features and videos.