Cruise and ferry

MAN Energy Solutions
Future in the making

Intelligent and reliable engine solutions
MAN Energy Solutions is the world’s leading provider of large-bore diesel engines, turbomachinery, and integrated power systems. We make four-stroke and two-stroke engines for marine and stationary applications, turbochargers and propellers, gas and steam turbines, compressors and chemical reactors.

Our marine systems expertise is focused on emission reduction, complete propulsion packages, electrical propulsion, dual fuel, LNG, and digitized services.

Our commitment to minimizing fuel consumption while meeting even the most stringent emission regulations plays a vital role in safeguarding the environment for future generations.
Specialized know-how for your sector

Safety first
The cruise and ferry industry goes hand in hand with the highest standards of safety. Our engines contribute to the overall safety of your ship, its passengers and its crew by means of reliable design and quality.

Environmental and economical factors
Passenger vessels typically sail in environmentally sensitive areas, so their engines must meet stringent emission regulations. At the same time, operating costs must be kept low to ensure the best possible economic result in an increasingly competitive environment.

Intelligent power for your business
We offer a wide range of highly efficient and reliable common rail engines for cruise ships and ferries. Common rail technology allows the independent setting of injection timing, duration, and pressure. This flexibility promotes the highest possible degree of freedom of optimization in fuel consumption, NOx and smoke emissions.
Four-stroke engines for cruise ships and ferries
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Power Range</th>
</tr>
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<tbody>
<tr>
<td>MAN 23/30DF</td>
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- **High efficiency**: 6,900 – 10,350 kW, 13,800 – 20,700 kW
### Cruise ships

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<tr>
<td>MAN V175D</td>
<td>1,499 – 3,700 kW</td>
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Once the preserve of the wealthy, cruises are now affordable to many and this segment is experiencing significant growth. Cruise lines are building spectacularly complex ships that operate all day, practically every day of the year.

**Engineering for environmentally friendly holidays**

The growing awareness of the cruise industry’s environmental impact together with ever more stringent emission regulations, especially in coastal areas, is an important factor in the design of new cruise ships. The ships must also be economical to operate, so as to keep holiday prices attractive.

Today’s cruise ships must accommodate high demands for non-stop reliable, comfortable and silent power generation onboard. We offer highly efficient and reliable common rail (CR) propulsion engines and GenSets, which – thanks to their fully electronic injection system – allow the highest possible degree of freedom of optimization in fuel consumption, reducing NOx and smoke emissions while ensuring the utmost passenger comfort.
Efficient, quiet and clean

MAN 45/60CR
Our common rail technology can be used in combination with a wide range of marine fuels – from high-quality distillates down to low-quality HFO – and allows for improved fuel consumption and emissions, especially in off-design conditions. By adding MAN’s innovative MAN ECOMAP feature, the inherent flexibility potential of our fully electronic injection system can be used to our customers’ maximum benefit. Furthermore, project-specific, tailor-made engine seatings ensure the lowest level of structure-borne vibrations for the highest degree of passenger comfort.

Benefits

**Highest power output in its class**
1,300 kW per cylinder

**Lowest SFOC in its class**
Just 166 g/kWh

**Full compliance with IMO Tier III regulations**
In combination with MAN SCR

**Field-proven common rail injection system with innovative MAN ECOMAP 2.0 technology**
Matching a wide range of load profiles

Committed to the future

MAN Energy Solutions’s development agenda is focused on the matured, risk-controlled introduction of new technologies. Our commitment to continuous innovation without compromising on quality and reliability enables our customers to plan with confidence while staying ahead in terms of technology.

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**MAN ECOMAP**
The innovative MAN ECOMAP feature gives the operator the flexibility to run the engine along different SFOC (specific fuel oil consumption)/power characteristics, each of them having its optimum efficiency at different load points. There is no need to modify anything in the engine’s hardware – it works on the basis of common rail technology and the MAN SaCoS electronic management system.

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**Further power solutions**
- MAN 35/44DF
- MAN 32/44CR
- MAN 51/60DF
- MAN 48/60CR
Combining comfort and speed

Fast ferries
When quick shore-to-shore connections become too long for bridges or inconvenient to be reached by driving around the coast, that’s where fast ferries come in. Their task: to transport passengers and vehicles quickly, safely, reliably, and on time.

Improving performance

Fast-ferry operators provide rapid shore-to-shore connections with high-power, low-weight ship designs that ensure their economic viability compared to other means of transportation. At the same time, they have to ensure passenger comfort with low noise and vibration levels as well as compliance with stringent emission limits in their typical areas of operation.

Our answer is a set of engines that deliver the necessary power quietly with minimum impact on payload and operating costs.
High-speed economy

MAN 28/33D STC
High speed, fast acceleration, and continuously high power – the MAN 28/33D STC really moves. The compact yet powerful engine has a high power-to-weight ratio and is fully compliant with current environmental standards, producing NOx emissions that adhere to IMO Tier II and EPA Tier II regulations.

Benefits

Economic operation
Lowest 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
5.7 kg/kW, unequaled by any other medium-speed engine

Easy on maintenance and costs
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.

Sequential turbocharging (STC)
Two identical yet independent turbochargers provide high torque at low rpm. Fuel injection quantity, rate, and timing are precisely managed by microprocessors. For perfect torque and acceleration control.

MAN SaCoS (safety and control system on engine)
Two identical yet independent turbochargers provide high torque at low rpm. Fuel injection quantity, rate, and timing are precisely managed by microprocessors. For perfect torque and acceleration control.

Further power solutions
MAN 175D
The advance of clean technologies

RoRo passenger vessels
Modern ferries place high demands for reliability and comfort on their main engines. Growing public awareness with respect to ship emissions and, in particular, the expected increase of future NO\textsubscript{x} emission control areas in important regions of ferry operation have made environmental compliance another key factor for modern RoRo passenger vessel designs.

**Improving economic performance**

As well as dealing with environmental concerns, ferry operators have to keep operating costs at a low level to ensure their viability in a very competitive business environment.

We offer a wide choice of efficient diesel engines (running on heavy fuel or distillate) that make an economic difference and comply with IMO Tier III NO\textsubscript{x} limits through the addition of our MAN SCR system for cleaning exhaust gas. Our closed-loop system control, supplemented by an intelligent regeneration algorithm for the MAN SCR, enables the engine and the catalyst to operate with minimum urea consumption and the best possible fuel efficiency. Of course, we also offer dual fuel engines that are IMO Tier III-compliant when running on gas.
State of the art

MAN 51/60DF
This highly efficient dual fuel engine with low emissions can switch conveniently from gas mode to liquid fuel mode and vice versa without interruption. In a multiple dual fuel engine plant, the MAN 51/60DF ensures high reliability and speed flexibility at any time and load. The high-efficiency variant offers best-in-class fuel consumption for low operating costs while the high-power variant offers best-in-class load pickup for dynamic applications. The engine also provides 100% MCR even at low gas fuel qualities down to methane number 70.

**High power output**
Up to 1,150 kW per cylinder

**Excellent engine performance**
Best-in-class fuel consumption or load pickup

**Operating stability and flexibility**
Seamless switch from HFO to gas mode and vice versa, gas operation even above 100% MCR and gas start capability

**Full environmental compliance**
IMO Tier III in gas mode and liquid mode (with optional MAN SCR)

**Lower maintenance costs**
Intelligent use of the engines enables the minimization of yearly maintenance costs.

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**Safety beyond the standards**
The MAN 51/60DF comes fully equipped with a safety and control system developed for full compliance with classification society standards. MAN SaCoSone allows for safe engine operation in liquid fuel or gas mode, offering optimum fuel consumption and very low emissions. In addition to all safety-relevant engine features, we offer an integrated safety concept for the whole engine room, tailor-made for each specific application.

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**Further power solutions**
- MAN 23/30DF GenSet
- MAN 28/32DF GenSet
- MAN 21/31 GenSet
- MAN 27/38
- MAN 35/44DF
- MAN 35/44DF GenSet
- MAN 32/44CR
- MAN 45/60CR
- MAN 51/60DF
- MAN 48/60CR
Sustainable transport solutions

RoRo cargo ferries
RoRo cargo ferries play an essential role in connecting the roads and railways of regions separated by sea. Loading and unloading take little time, because the cargo is simply driven on and off board. This enables the just-in-time delivery of products such as food.

**Ensuring commercial reliability**

Driven by global growth, the mobility of wheeled cargo – both domestically and internationally – has increased rapidly in recent decades. Sustaining this increase depends on reliability and punctuality.

Reliability allows the operator to guarantee departure and arrival times. Without reliability, there can be no planning of local transport logistics or global supply chains.

We offer a wide range of highly reliable and efficient engines for powering ferries. Whether large ferries sailing in international waters or smaller ones operating on local routes, they all benefit from our advanced engine portfolio, whether for operation using conventional marine fuels or LNG.
Power for reliable logistics

MAN 48/60CR
The MAN 48/60CR combines high power output with low fuel consumption. It delivers top performance, operational flexibility and ultimate reliability.

Benefits

**Fuel savings**
Thanks to common rail technology and our innovative MAN ECOMAP optional feature

**Low maintenance costs**
Maintenance-friendly design with long service intervals

**High reliability and availability**
Due to established, robust design

**Dual fuel option**
Our dual fuel engine derivatives and conversion solutions are safe and powerful. We also offer complete solutions for gas-burning propulsion plants with dual fuel engines, onboard LNG storage and fuel gas supply systems (thanks to the recent acquisition of Cryo AB).

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**Common rail safety concept**
All high-pressure pipes are screened or have a double wall design. Flow-limiting valves at each cylinder prevent uncontrolled injection. Redundant high-pressure pumps and sensors safeguard the operating ability. In single-engine plants, the electronic control units are redundant as well.

**MAN SaCoS** engine management system
Ease of operation, outstanding reliability, and fast commissioning are the key features of the MAN SaCoS. The system is highly standardized and its modules can be replaced quickly.

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**Further power solutions**
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- MAN 32/44CR
- MAN 45/60CR
- MAN 51/60DF
Improving your environmental performance

Equipped for strict emission regulations

We are firmly committed to reducing emissions with minimum impact on your operating costs. This includes an active partnership with environmental institutions and development banks. For our customers, it means engines and system packages that are extremely well matched with integrated, intelligent and dynamic controls.

Benefit from overall system competence

MAN Energy Solutions unites under one roof the core technologies and competencies which decisively influence the performance of our products: injection systems, turbocharger, controls for both, engine and aftertreatment systems. This enables us to design and implement highly efficient emission-reduction packages for both new constructions and retrofits.

Selective catalytic reduction (MAN SCR) is the most field-tested and reliable system for achieving NO\textsubscript{x} reduction rates of up to 90\%. Due to a chain of chemical reactions taking place between catalyst and exhaust gas, harmful NO\textsubscript{x} substances are transformed into ecologically benign constituents.
25

Improving your environmental performance

90 Percent of NOx reduction
MAN PrimeServ

Service with passion
MAN PrimeServ is the dedicated MAN Energy Solutions 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 spares, as well as maintenance, repair and comprehensive individualized service plans.

MAN PrimeServ provides

- 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
Worldwide service

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 maximize 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.

Our service does not vary according to location. We know that a vessel may be built in Asia, operated in Europe for ten years and then move to Africa for the next ten years. That does not alter our focus on dedicated training, fast delivery of strategic spare parts, a comprehensive approach, or our tailored maintenance contracts.

For more information please visit www.man-es.com/primeserv
100 service centers worldwide
Get your engines started …

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

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.
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