



Commercial Marine

WE MOVE YOU.  
WITH RELIABLE  
POWER.



A Rolls-Royce  
solution



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Welcome to the cutting edge

# SUSTAINABLE POWER THAT MATTERS

# 01

We at Rolls-Royce provide world-class power solutions and complete life-cycle support under our product and solution brand **mtu**. Fully utilizing the potential of digitalization and electrification, we strive to develop climate-neutral drive and power generation solutions that are even cleaner and smarter and thus provide answers to the challenges posed by climate change and the rapidly growing societal demands for energy and mobility. We deliver and service comprehensive, powerful and reliable systems, based on both gas and diesel engines, as well as electrified hybrid systems.



#### A solution provider

**mtu** systems power the strongest tugboats, the most modern yachts and the biggest land vehicles and provide energy for the world's most important mission-critical applications. With advanced solutions such as microgrids we integrate renewable energies and manage the power needs of our customers.

For over 110 years we have provided innovative solutions for our customers – meeting even the most demanding drive and power requirements. Our products and services span a wide range of applications and power needs, with both standard and customized options.

#### An expert in technology

**mtu** products are known for cutting-edge innovation and technological leadership. That same spirit of innovation inspires our sustainability efforts. Our focus is on developing and implementing system solutions that both maximize efficiency and reduce emissions – which in turn helps to reduce our impact on the environment.

#### A passionate and reliable partner

We at Rolls-Royce spend every day working together with our customers, to deliver engines, systems and complete life-cycle solutions that best fit their needs. We understand that each application is different and has its own specific demands. Our engineers embrace the challenge of finding the perfect solution for your unique power requirements. Every step of the way – from project planning, through design, delivery and commissioning; to the lifetime care of your equipment – we are dedicated to helping you get the most from your **mtu** investment.

OUR  
MAIN  
ENGINE SERIES  
ARE READY FOR  
SUSTAINABLE  
FUELS.



1 Edda Mistral  
4x 16V 4000 M63L

2 FRS Halunder Jet Helgoland Katamaran  
4x 16V 4000 M63L

3 PSA Tallan  
2x 16V 4000 M63L

# POWERING THE JOURNEY TO NET ZERO

Join us on our journey toward climate neutrality – from diesel engines with exhaust gas aftertreatment and gas engines to their use with sustainable fuels and hybrid systems to methanol engines. With **mtu** NautIQ, this also includes our ship automation products – complete propulsion and control solutions from bridge to propeller.

Vessel intelligence with automation

Diesel-electric propulsion with SCR and automation solutions

Hybrid system solutions for commercial vessels

**mtu** Series 2000 and 4000 ready for sustainable fuels like HVO

Equipment health management system (**mtu** NautIQ Foresight)

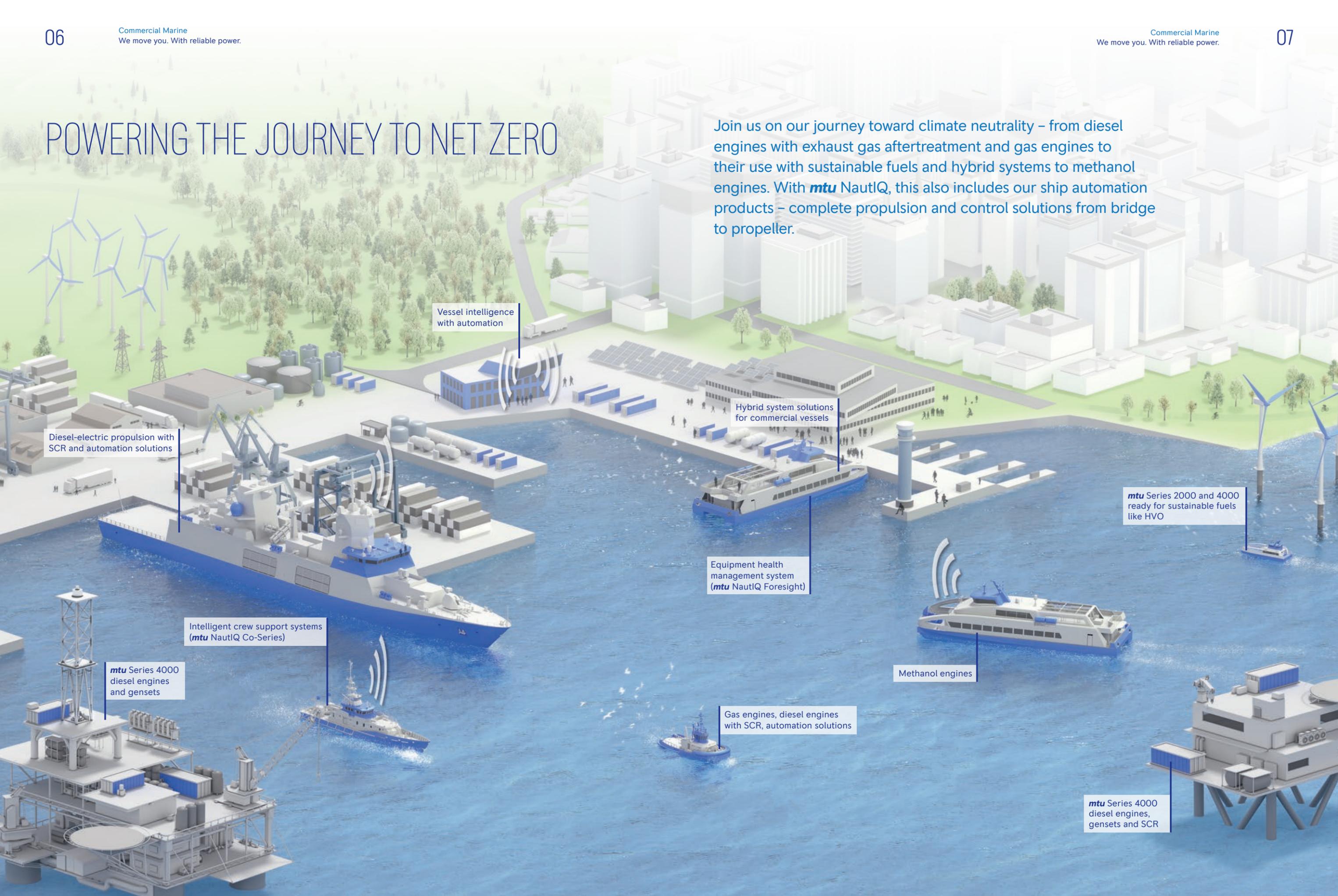
Intelligent crew support systems (**mtu** NautIQ Co-Series)

**mtu** Series 4000 diesel engines and gensets

Methanol engines

Gas engines, diesel engines with SCR, automation solutions

**mtu** Series 4000 diesel engines, gensets and SCR

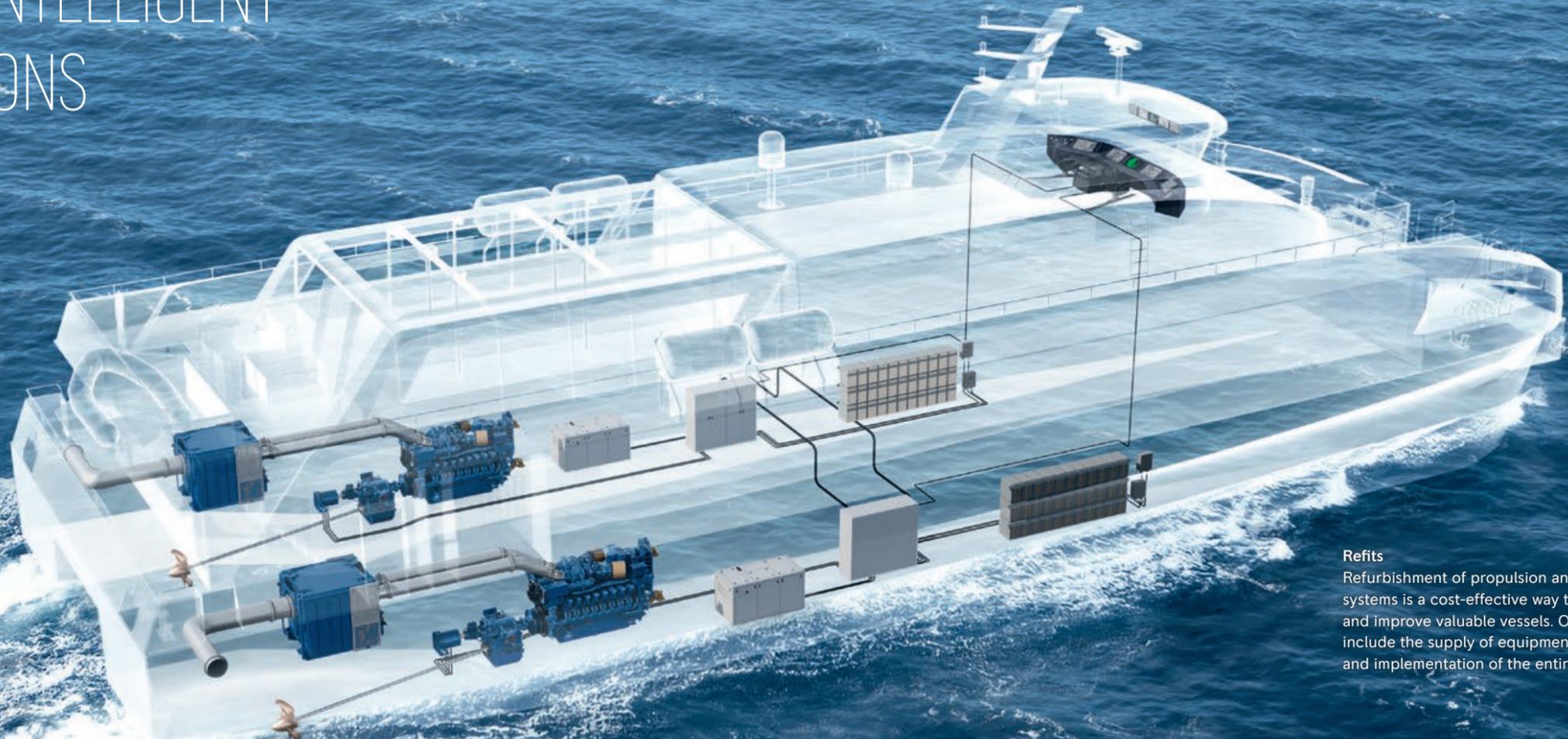




System solutions

PULLING MORE THAN  
100,000 TONS OF STEEL  
TAKES MORE THAN  
A POWERFUL ENGINE

## System solutions

A LIFETIME OF INTELLIGENT  
POWER SOLUTIONS**Planning**

We supply a complete propulsion concept. Our engineers provide extensive analysis, documentation and risk mitigation services, as well as integrated mechanical, electrical and electronic interfaces.

**Propulsion System Integration**

We provide comprehensive engineering and technical support for the design and implementation of a vessel's propulsion system. Our application engineering team helps reduce design, installation and commissioning costs.

**Propulsion Systems**

**mtu** engines and propulsion systems are characterized by high power density, low weight, compact design, and mechanical and thermal robustness, as well as simple operation, straightforward maintenance and low life-cycle costs.

**Refits**

Refurbishment of propulsion and automation systems is a cost-effective way to preserve and improve valuable vessels. Our service include the supply of equipment, planning and implementation of the entire refit.

**ValueCare services**

**mtu** ValueCare ensures maximum performance and lasting value, with a complete portfolio of service and support solutions starting from genuine spare parts, training, **mtu** qualified technicians up to various overhaul solutions and our ValueCare Agreements (VCA).

**Integrated Automation System**

Our Integrated Automation System **mtu** NautIQ allow operators to monitor and control the whole propulsion plant, the on-board power supply and the entire vessel. Our Automation Systems are versatile, user-friendly and modular.

Application overview

# PROPULSION SYSTEMS TAILORED TO YOUR NEEDS

## 03

### Offshore service and supply vessels

No matter how rough conditions are at sea: You have to get out there, and your vessels' availability must be guaranteed. So what you need are propulsion systems that are 100% reliable, punctual and safe. We make sure they are: with engines braving even the harshest conditions, with preventive maintenance concepts designed for continuous heavy duty service and, with comprehensive support 24/7.

### Coastal cargo, inland cargo and pusher towboats

Your competitive position and financial success depend on reliable, timely operation. We provide the foundation for this with high quality products, preventive maintenance programs, 24/7 service and as a result, maximum uptime.

### Passenger vessels and ferries

Reliable operation of your fleet is a crucial factor in the success of your business. We lay the foundation by supplying high-quality products and delivering preventive maintenance programs designed to ensure continuous heavy-duty service. You can rely on our 24/7 service – and on securing maximum uptime for your vessel.

### Offshore wind park crew boats

With its long-standing, strong commitment to the marine sector, we have always felt a particular responsibility for the environment – and have lived up to that responsibility in all aspects. That's what makes us the ideal partner for companies active in similar, forward-looking sectors – such as power generation from renewables.

### Special vessels

From fire and rescue boats to research and survey vessels: No matter what specialized task your vessel performs, we can provide exactly the right propulsion solution – involving both high quality products and preventive maintenance programs for the highest level of reliability

### Pilot boats

No matter how rough the sea state, ships have to be guided to harbor, so your vessel's availability must be beyond doubt. You need propulsion systems that are safe, powerful and fully reliable. We make sure your engines can brave even the harshest conditions.

### Tugboats

Harbor and escort tugs must maneuver with high power, precision and speed in all situations. Our engines help you meet these requirements with broad performance maps, proven common-rail technology and sequential turbocharging. The result: impressive bollard pull figures.

### Offshore converter platforms

Maritime conditions demand everything from the technology of offshore converter platforms. Around the clock, all systems must be redundant, low-maintenance and remotely operable. Our marine generator sets are reliable and proven for emergencies and are available with various safety designs and certifications.

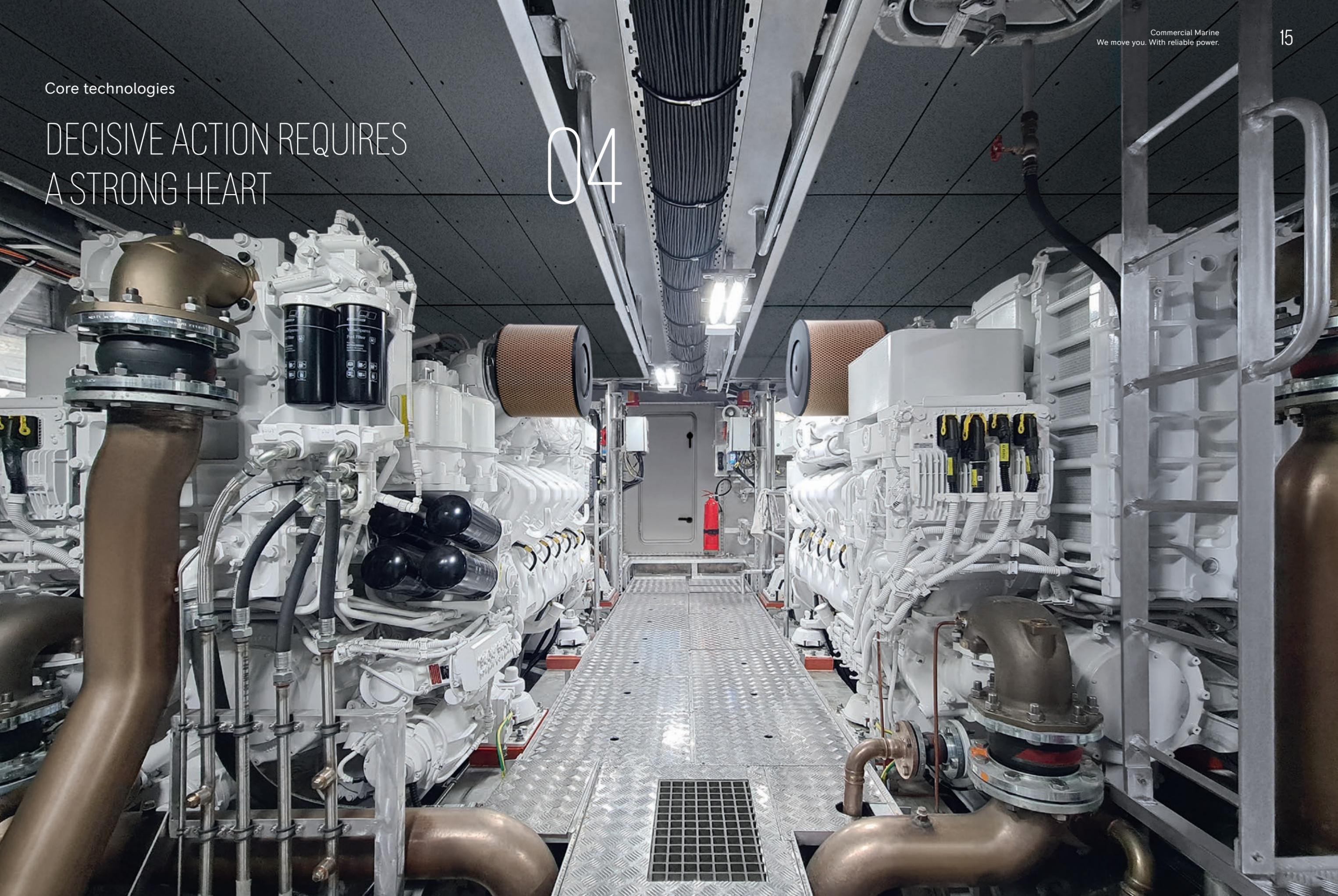
### FPSO, semi-submersible rigs, fixed and jack-up platforms

Our compact, powerful and reliable offshore power generator sets are designed to meet the demanding requirements of the offshore platform power supply where safety is paramount and where engines with high starting and operating reliability minimize the risk of personal injury and material damage.

Core technologies

# DECISIVE ACTION REQUIRES A STRONG HEART

# 04



## Core technologies

## ALL ENGINES AT A GLANCE

For decades, thousands of our engines have been at sea, in rivers and lakes around the world. They perform reliably and efficiently as main or auxiliary drive systems and provide energy as on-board power supply systems. Their performance, power and reliability has been proven time and time again. **mtu** engines for commercial marine are available in the power range of 720 - 9,100 kW (966 - 12,203 bhp).



**mtu Series 2000**  
The powerful heart for maximum agility



**mtu Series 4000**  
One of the most successful heavy-duty engines ever



**mtu Series 1163**  
The proven, evolved engine for the marine industry



**mtu Series 8000**  
The most powerful highspeed engine for the highest demands



For detailed technical data  
scan the QR code

**Analytics**

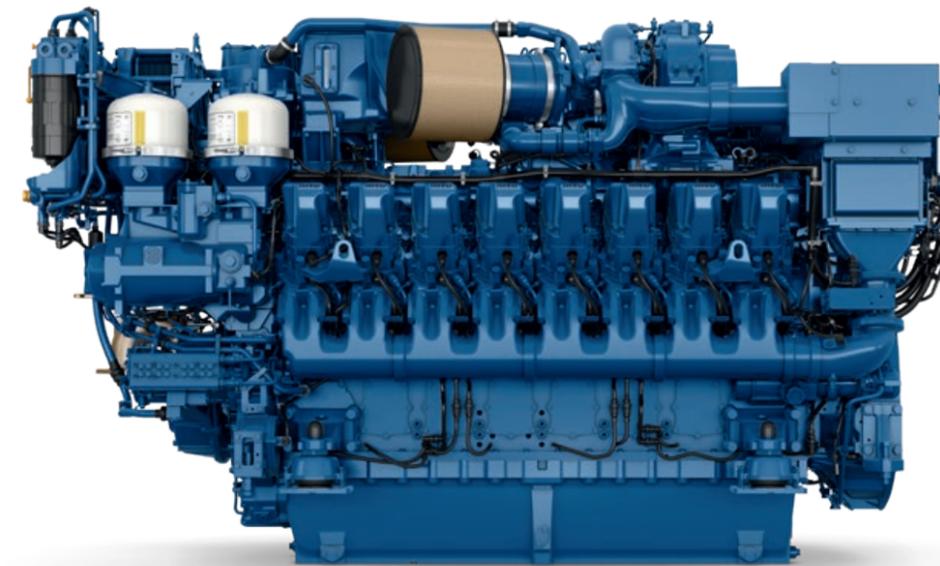
We use the most diverse analysis and simulation tools to develop state-of-the-art propulsion solutions. These include vibration analyses, component strength verification and dynamic response simulations of entire propulsion systems.

**Electronics**

The latest generation of our electronic management system, ADEC (Advanced Diesel Engine Control) controls key systems such as fuel injection and turbocharging that affect engine consumption and emission levels as well as performance.

**Fuel injection**

We optimize fuel combustion in the cylinder by means of its electronically controlled common rail fuel injection system in combination with other technologies such as turbocharging.

**Turbocharging**

We develop and produce its own turbochargers for high-performance applications. Turbocharging helps achieve low fuel consumption and high performance across a broad range of running speeds.

**Sustainable fuels**

Fuels are key to a carbon-neutral future for energy and propulsion. We rely on HVO, methanol, and on other sustainable fuels produced using green, renewable electricity.

**Mountings**

Our engines are installed on special rubber mountings to reduce the transmission of structure-borne noise to the vessel's hull. Double resilient mountings are available as an option, and assist the single resilient mountings in achieving even more effective noise reduction.

**Aftertreatment**

As installation space is always restricted inside the engine room, our inhouse developed airless SCR (Selective Catalytic Reduction) solution is compact and maintenance friendly.

**Low Lifecycle Costs**

Our engines are fine-tuned to provide maximum uptime. Our long overhaul intervals of up to 96,000 hours ensure economical operation and reliable performance.

## Generator Sets

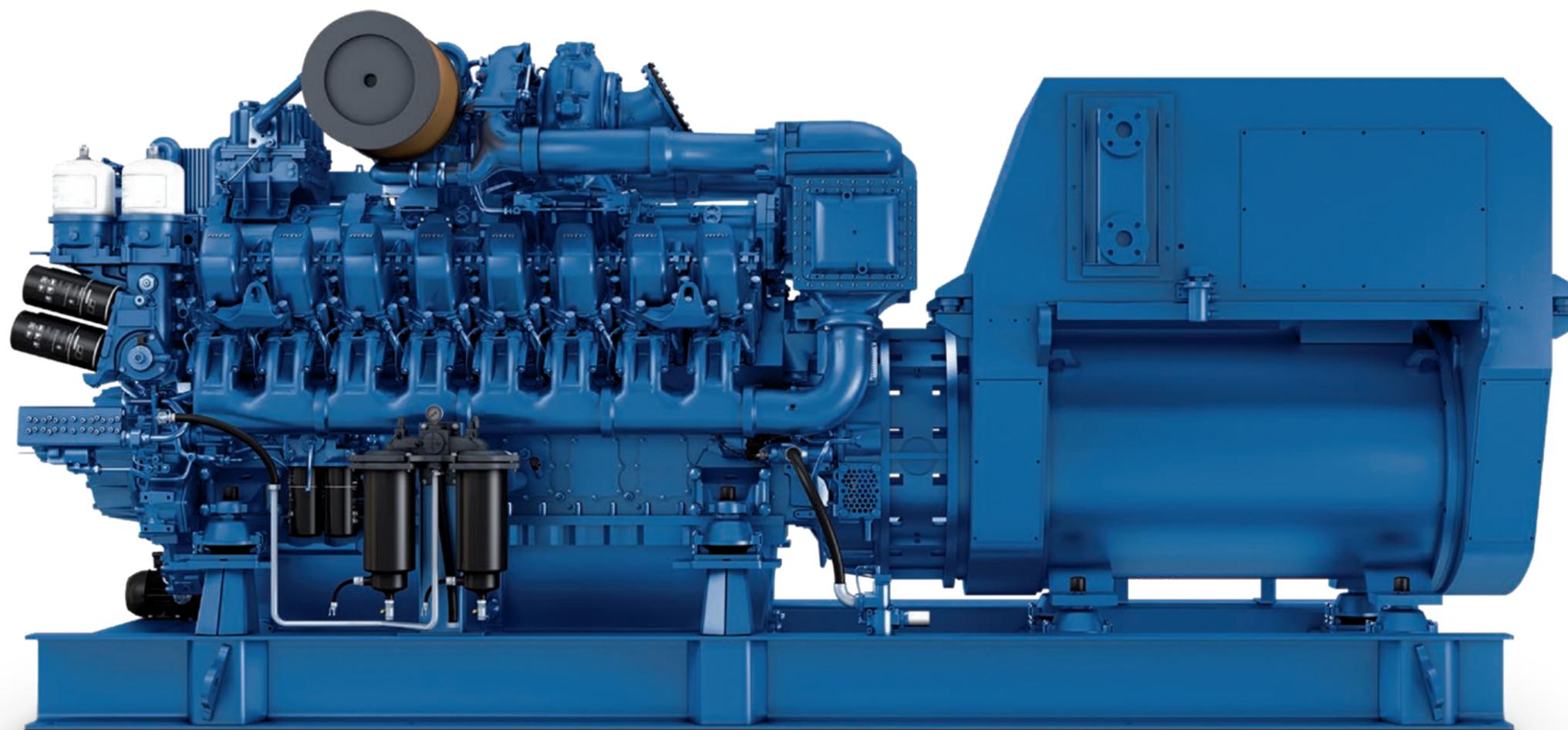
GENERATING  
POWER

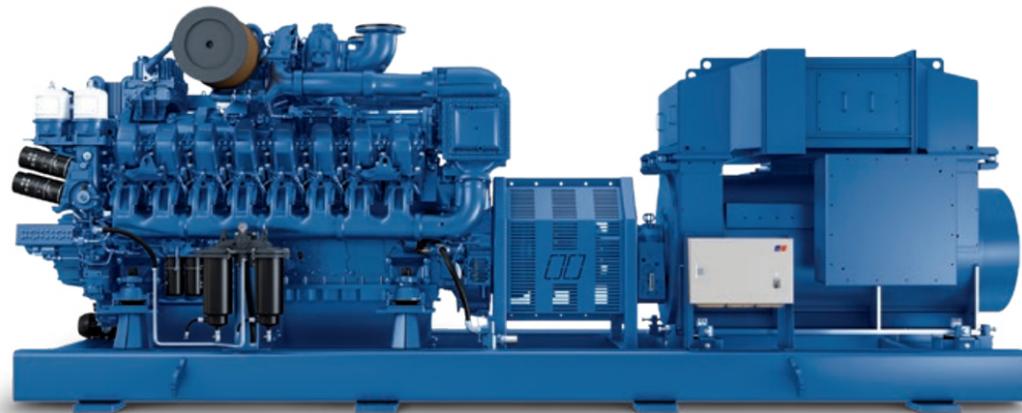
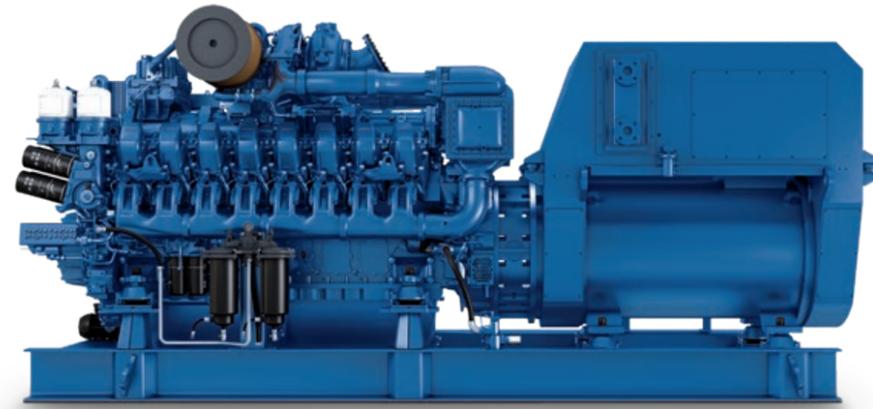
05

We offer a complete genset portfolio for commercial applications – from 720 to 3,100 kW – for auxiliary and emergency power generation and diesel-electric propulsion. Obtainable as 50/60 Hz versions, our gensets feature numerous options and accessories such as soundshields, control panels, PTOs for fire fighting pump drives, etc. High uptime and long time between overhauls of up to 60,000 hrs ensure economical operation and reliable performance.

As a system supplier specializing in generator sets and automation systems, we configure complete propulsion solutions, implementing the best possible technologies for your needs. From cost-efficient pre-engineered standardized gensets designed and qualified by our central engineering headquarters in Germany to customized, advanced solutions as well as variable speed gensets – our quality and reliability have been proven in the field, all over the world, for decades.

Available for prompt delivery, our constant-speed gensets are easy to configure thanks to their modular design. This helps shorten project time frames while enabling our global network of partners and distributors to provide complete genset solutions backed by our factory engineers. Local content requirements can be met by means of global component sourcing and worldwide manufacturing options.





### Variable speed generator sets

# FLEXIBLE POWER FOR LOWER LIFE-CYCLE COSTS

Do you want a flexible system with advanced technology for super-efficient operation? Our variable speed gensets makes this possible, maximizing operational flexibility and minimizing operating costs. The patented Superior System Controller (SSC) determines the best operating point in the engine performance map in relation to the electrical power demand. And for customers who prefer to use a generator of their choice, we offer a precise simulation and calculation to ensure safe, economical operation.

**Benefits:**

- Less fuel consumption at part load, up to 15%\*
- Longer maintenance intervals and up to 20%\* lower maintenance costs
- Lower noise signature

\* can vary significantly depending on project / operation profile (efficiency gain depends on system losses and generator operating curve)

**Flange-mounted or free-standing**

We supply gensets with flange-mounted or free-standing generators on a common baseframe as per customer requirements.

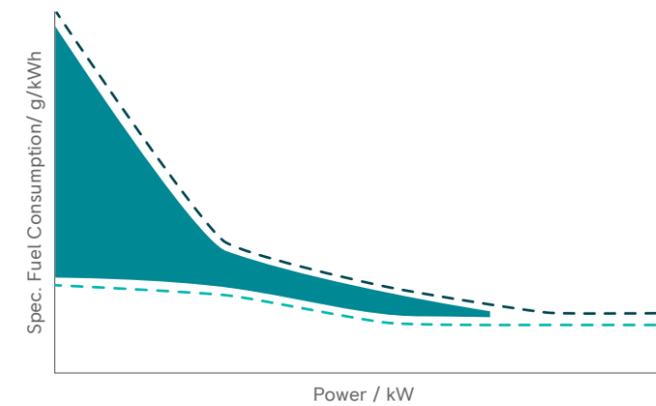
**Flange-mounted benefits:**

- Cost effective solution
- Compact design saves installation space and offers more room for cargo or crew
- Easy service access inside the engine room

**Free-standing benefits:**

- Longest maintenance intervals based on sleeve bearings and maintenance-free, non-aging and heat resistant coupling
- Easy in-vessel serviceability

Comparison of fuel consumptions



- Constant speed
- Variable speed
- Potential fuel saving

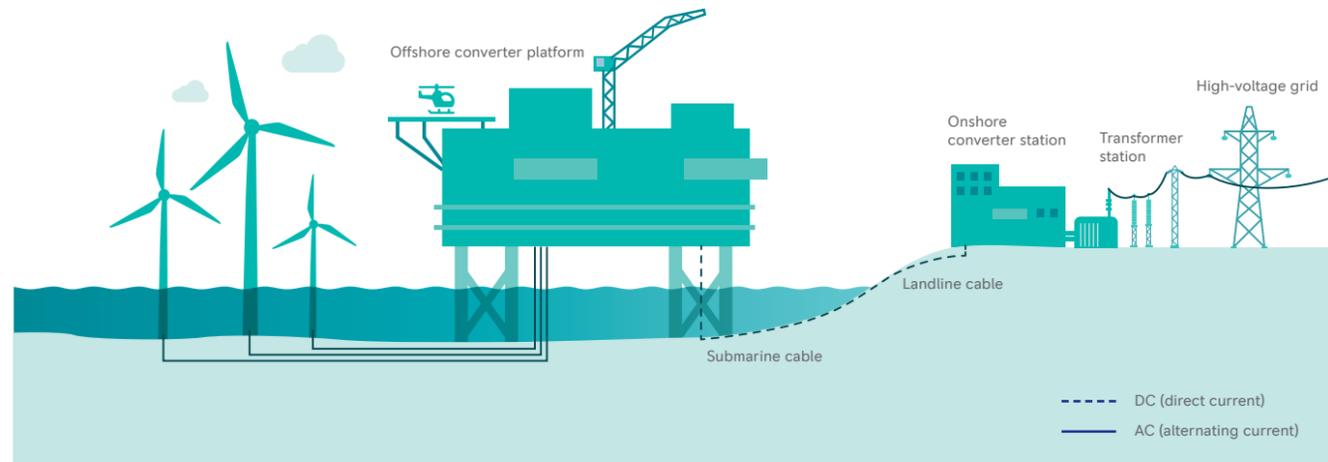
Rev counter showing variable range of RPM



## Offshore wind converter stations

SAFEGUARDING SEA WIND  
ENERGY STABILITY

Innovative grid connection designs enable modern wind energy operations at sea to transmit power to the mainland much more efficiently. Offshore converter stations now play a key role as does the safe, sustainable and reliable supply of power. That's where our power generation solutions enter the picture.



Our offshore wind energy portfolio comprises engines, generator sets, SCR packages and more.

Leveraging the skills and expertise gained from decades of offshore project experience, **mtu** diesel engines and generator sets are specifically designed to ensure the uninterrupted power supply of offshore converter stations.

Light, compact, rugged and highly efficient, they pack a lot of performance in very little space, making them an excellent choice for auxiliary/emergency backup power on the high seas.

**Low emissions**

Incorporating advanced selective catalytic reduction (SCR) exhaust aftertreatment technology, **mtu** Series 4000 engines are IMO Tier III certified to meet all relevant local emissions and environmental standards.

**All-around support**

With service sites located around the world, our team of experts is able to provide 24/7 support wherever and whenever needed, including with our specially trained offshore wind operations staff. In addition to maintenance and repair support, we also offer a range of data analysis as well as remote services.

We specialize in complete, integrated and thoroughly tested power generation solutions from a single source. Everything we develop is designed to ensure optimal long-term performance, thereby prolonging preventive maintenance and overhaul intervals.

**Flexibly customizable**

Featuring a modular design, **mtu** generator sets can be customized to seamlessly integrate with virtually every type of offshore converter platform setup. Our comprehensive offshore power generation portfolio also includes compact and highly flexible SCR packages that can be tailored for individual needs.

**Our offshore wind farm portfolio**

- Diesel engines
- Generator sets
- SCR packages
- Documentation of hardware & software configurations
- Offshore wind park crew boats\*

\* For more on our mobile offshore wind park solutions, see pgs. 12 and 13



**mtu** Series 4000 marine engine

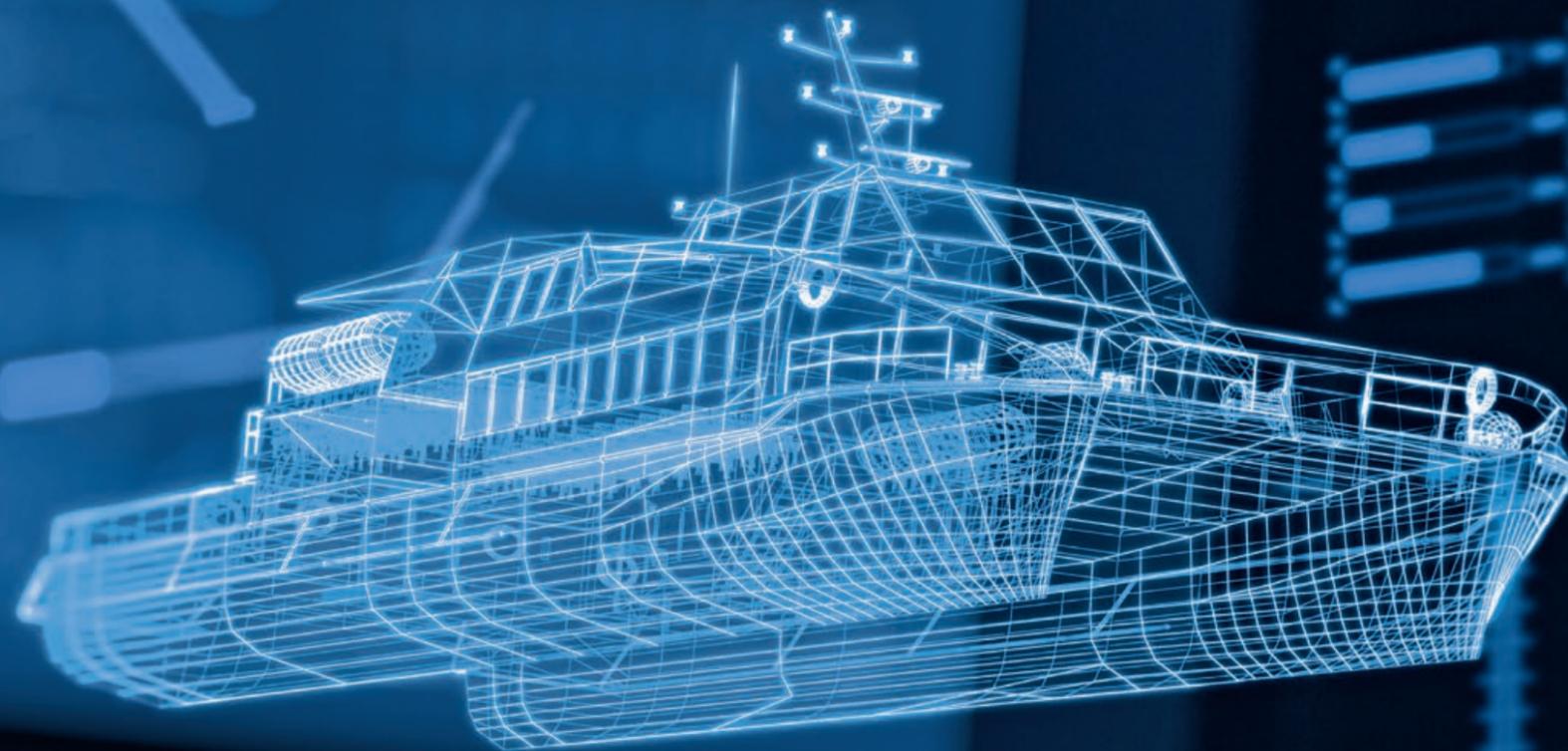


**mtu** Series 4000 marine generator set with SCR solution

Ship automation systems

# POWER UNDER CONTROL

# 06



# mtu NAUTIQ PORTFOLIO

## THE FUTURE OF MARINE CONTROL

### PERFORMANCE & EQUIPMENT HEALTH MANAGEMENT

#### mtu Go

Track, analyze and improve your yacht operations.

#### mtu NautIQ Foresight

Our fleet & engine health management system allows you to monitor and have real-time awareness of the technical condition of your vessel from bridge to propeller.

The system maximizes the availability of your vessel, and you can even use it to monitor your whole fleet.

With **mtu** NautIQ Foresight you can collect and analyze data from **mtu** systems and key third party components on the vessel, considering additional factors such as navigational data.

### VESSEL AUTOMATION AND INTEGRATED BRIDGE

#### mtu NautIQ Bridge

The navigation equipment and all the yacht subsystems necessary to monitor and control the entire vessel can be seamlessly integrated on one platform. There is no need to modify third-party equipment or subsystems integrated into **mtu** NautIQ Bridge.

#### mtu NautIQ Core

This Alarm, Monitoring and Control System (AMCS) is an entry-level system that offers a reliable and highly cost-effective solution, designed using pre-engineered building blocks and specifically created to deliver COTS (Commercial Off-The-Shelf) solutions for all Marine sectors.

#### mtu NautIQ Master

As an integrated platform management system (IPMS), **mtu** NautIQ Master offers optimal solutions for complex vessels requiring highly flexible, redundant, and integrated solutions.

### OPERATOR ASSISTANCE

#### mtu NautIQ Co Series

NautIQ Co is a family of innovative solutions which improve the safety and capability of your vessel. Through advanced technologies such as computer vision and autonomous or remote operation, the onboard crew can rely on **mtu** NautIQ Co systems to augment their bridge operations with enhanced real-time perception of marine traffic, navigational hazards, and even floating objects which could be missed by the naked eye.

### POWER AND PROPULSION MONITORING & CONTROL SOLUTIONS

#### mtu NautIQ BlueVision NG

BlueVision NG systems offer precise control and monitoring for **mtu** propulsion plants. The modular scope of supply offers a selection of local operating panels, compact displays, touchscreen monitors, and propulsion control solutions, in classified or non-classified configurations. **mtu** NautIQ BlueVision NG can also be interfaced to 3rd party systems, or seamlessly integrated with **mtu** NautIQ vessel automation or integrated bridge systems.

## mtu NautIQ

# INTEGRATED SHIP AUTOMATION

**mtu** NautIQ Master is an Integrated Platform Management System and offers the optimal solutions to meet a wide range of requirements for all types and sizes of vessels. Typically used on complex commercial projects.



Scan the QR-code for more details about **mtu** NautIQ Master

### Integrated Platform Management System (IPMS)

With marine design becoming more sophisticated, and more capability being integrated with fewer people on board, only proven designs and software functionality can truly meet the demands within modern project time scales and risk profiles. As world experts in the field of integration, we introduce **mtu** NautIQ Master, the latest evolution of our powerful IPMS solution, allowing more COTS product integration. It is a true System of Systems capable platform.

This powerful mix of **mtu** NautIQ Master distributed processing and highly redundant architecture, coupled to industry standard equipment and protocols allows for a truly supportable platform, with minimal obsolescence risk. This reduces platform cost, integration time and commissioning/installation issues, whilst retaining the survivability and power of the original **mtu** NautIQ Master, with its scalability and flexibility in terms of system architecture.

**mtu** NautIQ Core Alarm, Monitoring and Control System (AMCS) option is an entry-level system that offers a reliable and highly cost-effective solution and is designed using pre-engineered building blocks incorporating built-in expansion for future proofing. A selection of display systems are available to meet operational requirements and console design.



Scan the QR-code for more details about **mtu** NautIQ Core

**mtu** NautIQ Core has been specifically created to deliver Commercial Off-The-Shelf (COTS) solutions for all shipping sectors including: tugs and salvage vessels, ferries, offshore support vessels, inland waterway

or pilot boats. The standard **mtu** NautIQ Core packages are future-proofed allowing for later integration of additional hardware, software and auxiliary equipment through the vessels lifetime.

mtu NautIQ Foresight

# FROM BRIDGE TO PROPELLER

Our Fleet & Engine Health Management System allows you to monitor and have full control over the technical condition of your vessel from bridge to propeller.

The system maximizes the availability of your vessel, and you can even use it to monitor a whole fleet. By providing system status at a click, **mtu** NautIQ Foresight makes availability management easier than ever before. It provides support for the maintenance and upkeep 24 hours a day, 7 days a week – and thus helps minimize vessel downtime.

With **mtu** NautIQ Foresight you can collect and analyze data from **mtu** systems and third-party key components on the vessel, considering additional factors, such as navigational data.



### Improved vessel availability

It's all about uptime. Real-time data analytics combined with artificial intelligence and machine learning techniques reduce unplanned downtime and maximize asset availability. The real-time sensor data on vibration, pressure, and temperature is compared with long-term figures for the respective operating conditions and ideal characteristic curves. The results enable optimum operation.

### Optimized life cycle costs

Maximized availability and peaked performance optimize life cycle costs. Due to the improved plannability, downtimes are reduced to a minimum and unplanned maintenance is turned into planned maintenance.

### Peaked performance

Monitoring fuel oil consumption and measuring torque is the first step to understanding the state of the vessel. This information, combined with the health monitoring data, allows you to analyze and improve the vessel's performance. Weather and navigational data let you draw conclusions about factors such as hull condition. Additionally, the optimal speed can be determined. This performance monitoring system enables fuel cost optimization and contributes to reduced emissions.

### Reduced emissions

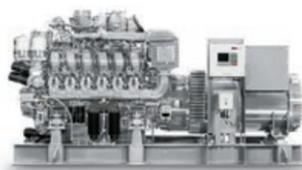
**mtu** NautIQ Foresight bundles all operational data in one system. The combination of engine, power generation, navigational and weather data enable in-depth analytics of the vessel's movement and its performance. In the next step, the operation of the vessel can be adjusted to run in a more efficient and environment-friendly manner.



Scan the QR-code for more details about **mtu** NautIQ Foresight

**mtu** NautIQ Genoline NGSTANDARDIZED AND  
SYSTEM SOLUTION

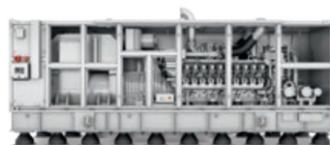
**mtu** NautIQ Genoline NG is an non-classified and classified automation system for on-board power generation plants. The modular system design guarantees optimum adaptation of the diesel engine and generator to the diversity of operating conditions for the on board power generation. It is available for **mtu** Series 4000 engines.

**mtu** NautIQ Genoline NG offers the following applications

**On-board service power**  
non-classified  
and classified



**Diesel-electric propulsion plant**  
non-classified  
and classified

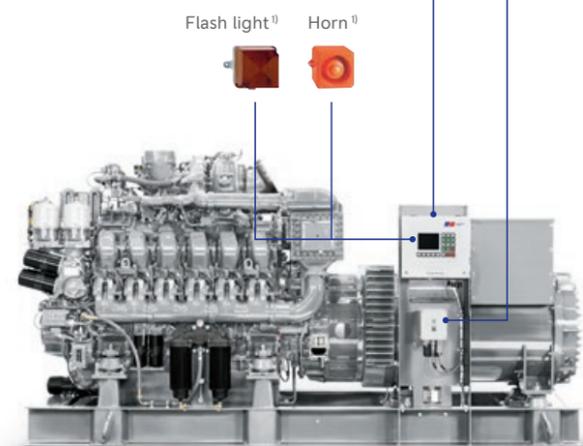


**Special applications**  
- MIL  
- Shock  
- EMC etc.

**mtu** NautIQ Genoline NG automation system is an innovative high-end developed system with LOP (Local Operating Panel).

**Customer interfaces**

Interfaces	I/O signals	Power supply	Power supply
MODBus RTU	(hardwired)	main and	230 - 440 VAC
MODBus TCP/IP - (only Genoline NG)	for monitoring and control	emergency (redundant)	(50/60 Hz)
J1939		24 VDC	

Priming pump and control<sup>1)</sup>

1) Optional features

**mtu** NautIQ CoDirectWHEELHOUSE CONTROL FROM  
THE BEST VANTAGE POINT

**mtu** NautIQ CoDirect is a wireless, remote-helm system that controls a vessel's engines, steering and transmission as well as payload functions like pumps, winches or cranes. It allows marine crews to operate a vessel from a distance of up to 1,000 meters – from the safest vantage point.

**More visibility for tugboats and pushboats**

In many cases, tugboats have limited visibility from the wheelhouse during complex maneuvers, such as dockings. **mtu** NautIQ CoDirect allows crews to perform the primary control from practical vantage points, such as the dock or the deck of the main vessel. For pushboats, **mtu** NautIQ CoDirect allows the master to control thrusters from the front of the barge train.

**Enabling safer emergency response**

Dangerous response missions such as marine fires, spills and search-and-rescue operations can benefit from using a remotely controlled vessel to avoid putting crews at risk. Survey and offshore operations in hazardous environments also require reduced operational risk.

**More efficiency for tenders**

Tenders ferrying people and cargo from ship to ship or a harbor to a superyacht can be operated remotely, with minimal crew.

**mtu** NautIQ CoOperate is an optionally self-piloting ship navigation and command system. It enables off-boat remote command, including payloads on board, and offers situational awareness using cameras, sensors and other equipment, from a second location on another vessel or on shore.

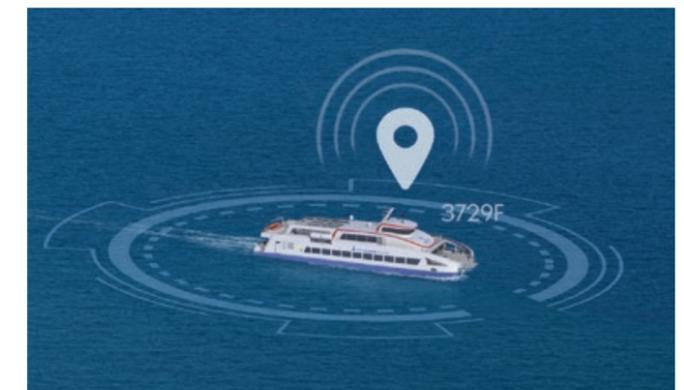
**Autonomous self-piloting capabilities**

**mtu** NautIQ CoOperate consists of an onboard enclosure with flexible sensor integration and a ruggedized laptop. The system can also be used with the optional **mtu** NautIQ CoDirect beltpack for remote control when operated within 1,000 m of the vessel.

Where a secure link infrastructure is available, **mtu** NautIQ CoOperate allows vessels to be commanded from anywhere using IP radio, 4G networks, or satellite communications. The vessel can also move autonomously from waypoint to waypoint, execute a survey or search-and-rescue pattern, or match the course and speed of the mothership. The system can also be set for timed tasks, such as loitering at a waypoint or timed tasks.

**Autonomous command applications**

Autonomous command and control integrates with existing vessel systems and sensors to manage pre-planned and dynamically charted missions.



SUSTAINABILITY MEETS  
PERFORMANCE.

07

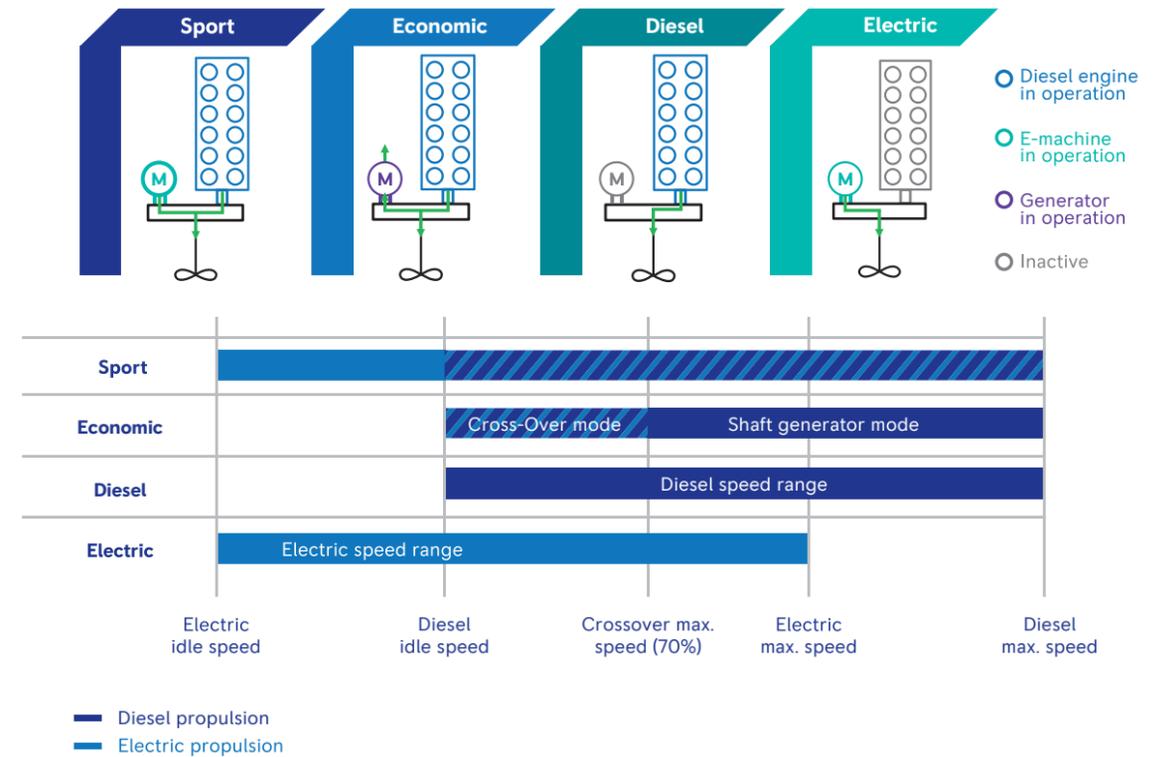


Hybrid system solutions

# HYBRID DRIVE – THE BENEFITS OUT OF TWO WORLDS

The **mtu** Hybrid PropulsionPack offers different propulsion modes for each operation condition which will cause a perfect power availability in every scenario possible.

<p>1 Silent cruising</p>	<p>2 Performance</p>	<p>3 Eco-friendly cruising</p>
		
<p>Imagine a vessel which moves like by magic, with no noise, no vibration &amp; no air pollution resolving into superior comfort. The silent mode offers your customers an enjoyable journey trough costal or nature reserve areas without the side effects of a conventional propulsion system.</p>	<p>Combining the best out of two different worlds, the high torque of an electric machine and the superior power density of an combustion engine, is resolving into an compact high performance system. Even the toughest jobs are not an obstacle for you and your crew.</p>	<p>Live the green image and be a decarbonization pioneer within the commercial shipping community. Participate of the newest Rolls-Royce developments to lower your carbon and your air pollution footprint.</p>



**Different hybrid modes fulfill all customer use cases**

The propulsion modes for a vessel can be selected using a control lever. This lever allows the operator to choose between different hybrid modes. Depending on the selected mode, the system provides the necessary power. On the other hand, the power supply modes can be selected on a display. This enables the operator to choose how the vessel will receive power, whether it is from the diesel engine, electric machine, or both.

**Fully integrated modular system**

The **mtu** Hybrid PropulsionPack offers a fully integrated modular system out of one hand which addresses the top five requirements of shipyards:

- Quick commissioning
- Short lead time
- Full documentation
- Low cost of modifications
- Fast response

Hybrid system solutions

# QUIET. CLEAN. SMART. THE **mtu** HYBRID PROPULSIONPACK

Get the best of two worlds in green, modular and flexible propulsion efficiency. Not only does hybrid power reduce on-board noise levels, emissions and vibrations, it also improves dynamics and comfort.



Intelligent, intuitive vessel control thanks to cutting-edge automation



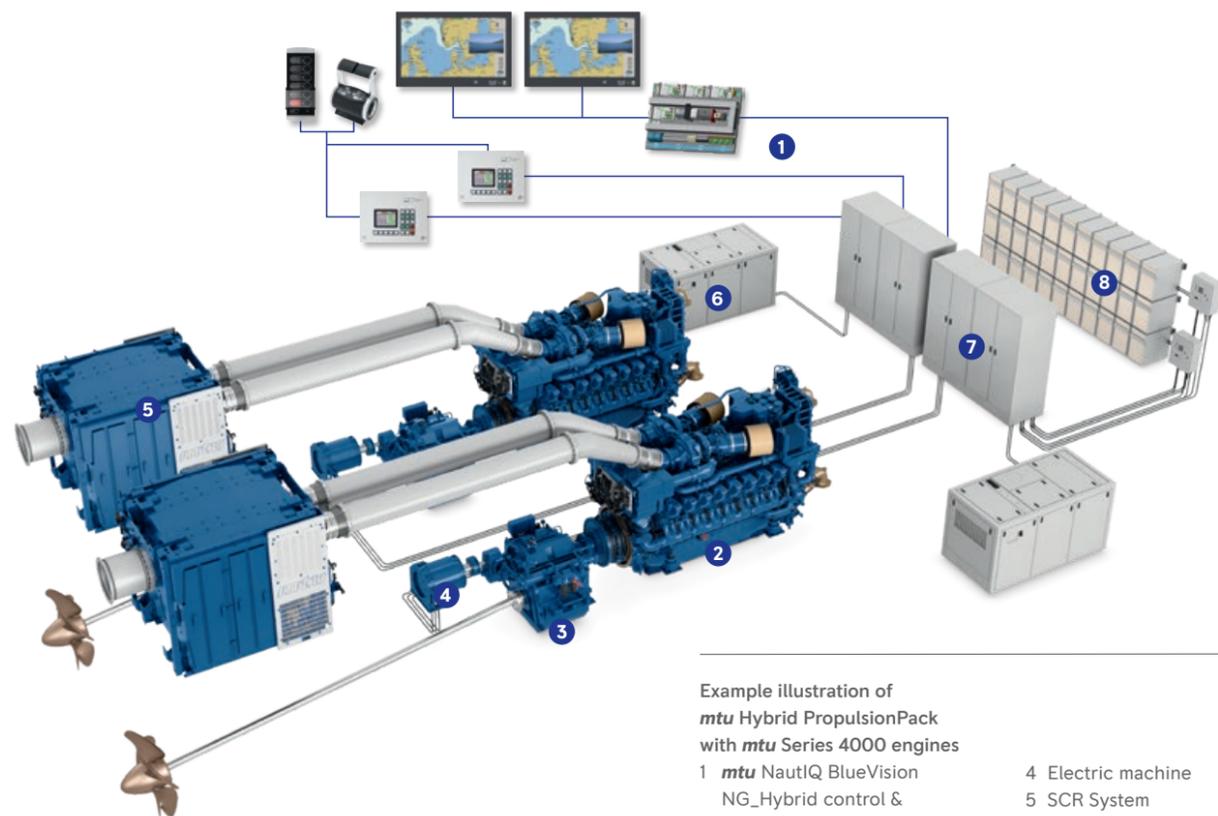
Seamless component integration



Wide-ranging propulsion options

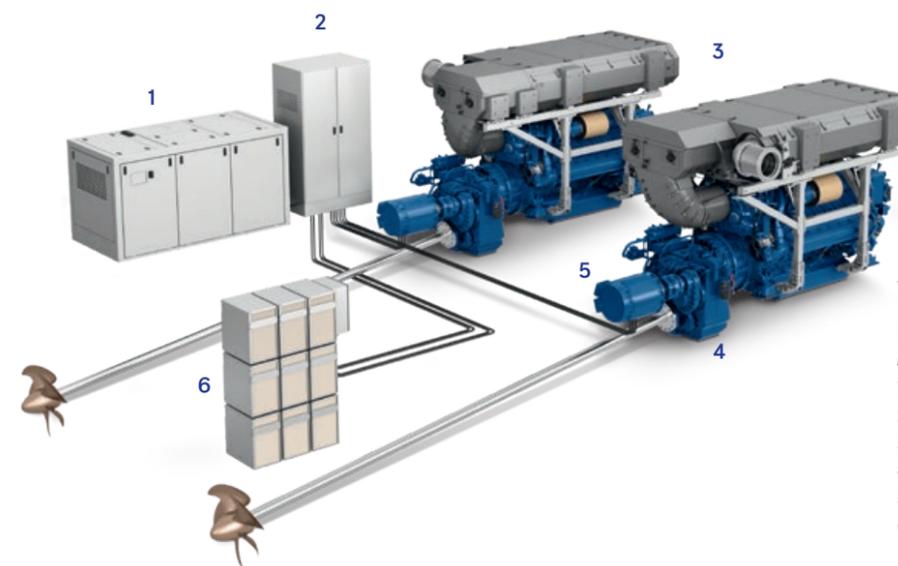


Silent, emission-free operation in sensitive areas



Example illustration of **mtu** Hybrid PropulsionPack with **mtu** Series 4000 engines

- 1 **mtu** NautIQ BlueVision NG\_Hybrid control & monitoring system
- 2 **mtu** Series 4000 engine
- 3 Gearbox
- 4 Electric machine
- 5 SCR System
- 6 Genset
- 7 Power distribution unit
- 8 BatteryPack



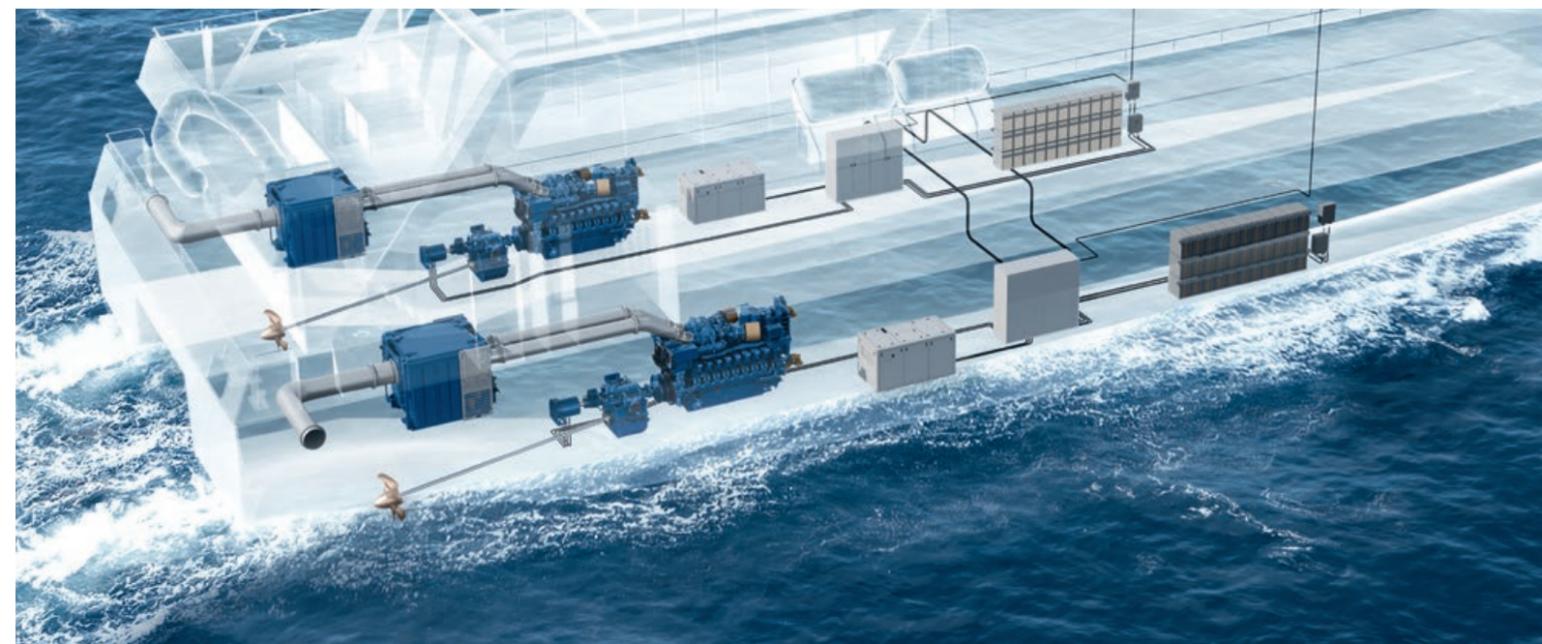
Example design of our **mtu** Series 2000 Hybrid PropulsionPack

- 1 Genset
- 2 Power distribution unit
- 3 Main diesel engines **mtu** Series 2000
- 4 Gearbox
- 5 Electric machine
- 6 BatteryPack

## **mtu** NautIQ Blue Vision NG\_Hybrid

The automation system **mtu** NautIQ BlueVision NG\_Hybrid monitors and controls the entire hybrid propulsion system. Based on a scalable and classifiable series automation modular system, the scope of delivery can be individually adapted to customer requirements.

The operator stations use an attractive HMI concept to show the operator the most important information about the propulsion and energy management system at all times. The automation system can be extended on a project-specific basis so that a wide range of information from the ship's area can also be integrated. The plug & play concept also supports simple installation.



## Emission reduction technologies

WORKING WITH A  
CLEAR CONSCIENCE

Operating on the water means working in a sensitive environment. Assuming responsibility for protecting the water and air and keeping them clean is second nature to us. We have always played a leading role in developing environmentally friendly engines and, in particular, solutions for reducing emissions. Since we have all the relevant key technologies bundled within our company in addition to our core business of building engines, we have been and will always be leaders in this field. Our engines are an embodiment of the most state-of-the-art technology available.

**SCR solution**

Knowing that installation space inside engine rooms is limited, we developed an airless selective catalytic reduction (SCR) solution that is particularly compact and maintenance-friendly. In addition to doors that enable easy access for SCR catalyst replacement, the system features integrated diesel exhaust fluid (DEF) dosing directly in the SCR. By eliminating the need for a separate DEF mixing pipe, it provides tremendous pipework flexibility between the engine and the SCR box. The space needed to fit the exhaust gas aftertreatment is kept to a bare minimum. Ammonia slips are prevented by a closed loop regulated control system.

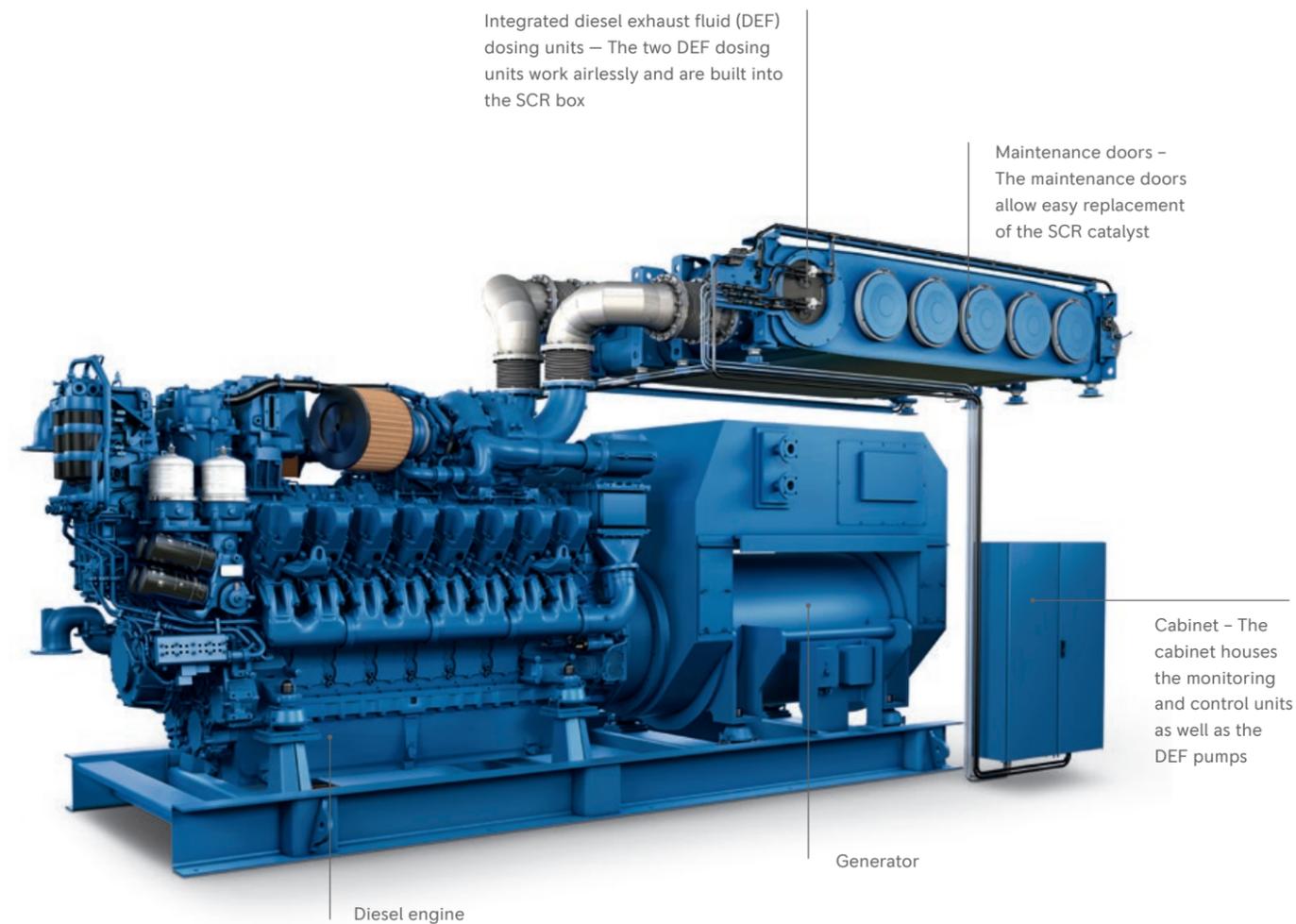
Besides the exhaust emissions related features, our SCR system also reduces noise.

**SCR – the ideal solution for the marine world**

When using EGR (Exhaust Gas Recirculation) technology, the quality of the fuel is essential. Fuel with more than 15 ppm sulfur will lead to the formation of sulfur acid in the EGR cooling process. Sulfur acid will cause substantial engine failures over time. As many vessels operate worldwide, especially in the offshore service and supply business, *mtu* evaluates SCR as the preferred solution to maintain reliability of our engines and the safety of your vessel and crew. SCR technology allows operation with lower fuel quality.

Developing all major key technologies inhouse like, SCR, EGR, turbocharging and common rail fuel injection, means we are able to shape the ideal solution to meet IMO III and EPA Tier 4 emissions regulations.

At *mtu* we treat EGR as the ideal solution for applications like mining or oil&gas onshore, but within the marine world we are convinced that SCR technology grants much higher availability and component lifetime.



Integrated diesel exhaust fluid (DEF) dosing units – The two DEF dosing units work airlessly and are built into the SCR box

Maintenance doors – The maintenance doors allow easy replacement of the SCR catalyst

Cabinet – The cabinet houses the monitoring and control units as well as the DEF pumps

Diesel engine

Generator

Diesel-mechanical propulsion solution or generator set with SCR box

# mtu SERVICE SOLUTIONS – A LIFETIME OF VALUE

# 08

Our service solutions for engines and propulsion systems are designed to maximize performance, extend life, and provide expert support. These solutions are categorized into three main value propositions: Secure, Sustain, and Support.



Enjoy peace of mind with maximizing asset performance and reducing operational risks

- Extended coverage
- **mtu** ValueCare Agreements
- Digital solutions

## SECURE



## SUSTAIN

## SUPPORT



Extending equipment life and reducing costs while protecting the environment

- Reman/overhaul solutions
- New exchange engine
- Upgrades and refits



Expert service from a reliable partner to keep operations running smoothly

- Maintenance & repair
- Genuine spare parts & consumables
- Training
- Support services

## Extended coverage

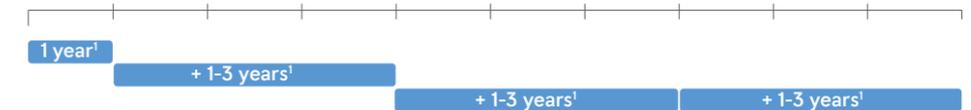
# PROTECT YOUR INVESTMENT



With Extended coverage, you can be assured that the costs of unplanned repairs are covered, with service performed by **mtu** certified technicians – upholding resale value and ensuring long-term confidence in your **mtu** investment.

Equipment lifecycle from handover

Standard warranty  
Extended coverage (EC new)\*  
EC Extension\*



### Costs covered

In case of a corrective claim: material, labor, travel cost (if applicable)

Exclusions: e.g. Removal & reinstallation of engine, gearbox etc. and all preventive maintenance

### Covered equipment

Engine and on-engine electronics (only **mtu** Scope of Supply)

Optional: Gearbox & Automation



Flexible options and local support to suit your needs (e.g. operating hours)



100 % genuine parts and components



Protection against unexpected repair costs

### Place of performance

Nearest authorized **mtu** service center, defined place or other locations as advised by **mtu**

### Deductible

No deductible or optional 500 EUR per repair visit and propulsion line

\* See your EC Terms & Conditions for details

<sup>1</sup> Maximum validity period limited by extended warranty end date / max. operating hours, whatever occurs first

mtu ValueCare Agreements

FOCUS ON YOUR OPERATIONS  
LEAVE THE REST TO US



You've got a tough job. With us as your partner, you'll get the power, performance and peace of mind to get it done right. The digitally connected power systems of our ValueCare Agreements make it easy to keep your business running smoothly and reduce total cost of ownership by maximizing uptime, optimizing lifecycle costs and helping you avoid equipment-related business disruptions through preventive maintenance.

Service solutions designed around your priorities

mtu ValueCare Agreements make it easy to optimize lifecycle costs, maximize uptime and devote more time and resources to your core business, with tailored solutions to move your business forward.

<p><b>Bronze</b></p> <p>Ensure parts availability and price stability</p> <ul style="list-style-type: none"> <li>- Digital connectivity (mtu Go Connect) and access to mtu Go platform</li> <li>- Automated delivery of parts (preventive) at a predefined rate based on operating hours</li> <li>- Preventive maintenance labor options to fit your business needs</li> <li>- Dedicated support for technical issues</li> </ul>	<p><b>Silver</b></p> <p>Eliminate unexpected maintenance costs</p> <ul style="list-style-type: none"> <li>- Proactive maintenance planning, troubleshooting and remote engine health monitoring</li> <li>- Fixed pricing per operating hour for maintenance and repairs</li> <li>- Key corrective maintenance components always in-stock at our main warehouses</li> <li>- 24/7 standby service with remote technical support</li> </ul> <p><i>Silver also includes all benefits of Bronze level</i></p>	<p><b>Gold</b></p> <p>Maximize operational uptime</p> <ul style="list-style-type: none"> <li>- Operational uptime commitment to meet or exceed your availability targets</li> <li>- Regular supervision by local service partner (e.g. monitoring of parts stock, improvements)</li> <li>- 24/7 emergency assistance with on-site support</li> <li>- Monthly reports, including availability and average repair times</li> <li>- Asset health monitoring</li> <li>- Annual performance meetings and trend analysis with us to address technical updates, engine fleet data, operational optimization and more</li> </ul> <p><i>Gold also includes all benefits of Silver &amp; Bronze levels</i></p>

Digital solutions

YOUR POWER.  
YOUR SERVICE. CONNECTED.



Delivering actionable insights through digital solutions



Our cloud-based mtu Go portfolio aims to enhance your equipment performance through asset-related tools and services. For that, we have tailored packages suited to your needs.

**Connect all your equipment**  
Data collection from your fleet, asset, system and engine

Connectivity is the basis for all the advantages of digitally supported service. Using our edge software connected to the control unit, you and your service network can monitor relevant deviations from the optimum conditions remotely. We offer several ways to collect data, including the creation of interfaces to already existing data sets. In doing so, we always adhere to the highest data privacy and security standards of our industry.

- Access your data**
- Remote monitoring, available for individual assets, as well as complete fleets worldwide
  - Data privacy and security to the highest industry standards



**Asset Management**  
Access comprehensive real-time and recent performance data for all assets worldwide, conveniently from one centralized platform

With the mtu Go platform, predefined users, such as on-site technicians or managers, can view the system data and perform initial analyses by using diagnostic tools. By accessing the same information, your service network can provide fast support in handling alarms and planning necessary maintenance together with you.

- Keep track of your data**
- All important data and alarms available at a glance for efficient fleet monitoring
  - Intuitive and clear design for easy operation
  - Visual comparison of data using the diagnostic tools for initial analyses



**Equipment Health Management**  
Digital solutions for your detailed data analysis on necessary actions

Supported by mtu Go your Service Network is able to analyze all relevant data from your equipment and compare it with data sets from other systems. From this we together can proactively derive recommendations for action. Enhance operational continuity and prevent equipment failure by leveraging proactive monitoring services. Utilize analytics to identify critical states and trends, ensuring optimal availability.

- Packages coming soon (under development)**
- Maintenance Management: Forecast, plan, and execute service tasks based on maintenance schedules and operating hours
  - Guided Troubleshooting: providing a user-friendly and guided fault resolving experience for your technicians

Reman/overhaul solutions

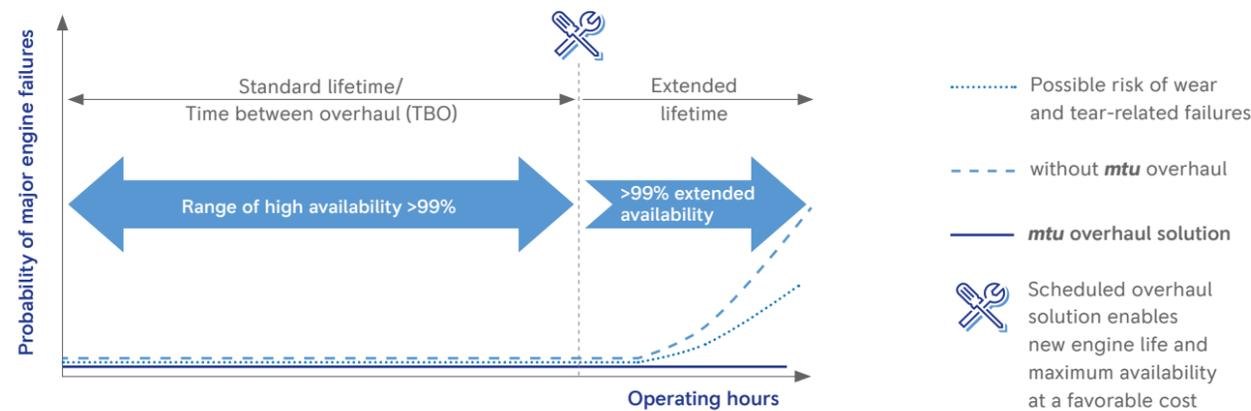
WHATEVER YOUR CIRCUMSTANCE  
— WE'VE GOT YOU COVERED



**mtu** engines are built to last thanks to high engineering standards and an unwavering commitment to service and support. At the end of its first service life, we also offer solutions to refurbish your engine to like-new factory condition.

Provided by the same experts that originally built your engine, **mtu** reman and overhaul solutions make it run like new again. How? By delivering the same high standards of performance, service life and quality as with new **mtu** products. What's more, we offer fixed pricing and turnaround times up front along with a full factory warranty.

In addition to our factory remanufacturing offer, you can also choose from three different overhaul solutions, including in-situ options directly inside the ship. While the decision for a reman or overhaul solution is determined by a variety of factors, including the engine series and type, you can always count on one thing: high-quality results.



**mtu** reman solutions – optimizing uptime and efficiency

**Exchange and save**

To reduce downtime, many **mtu** engines can simply be exchanged for a factory remanufactured unit – without waiting. When you return your original core, we give you credit based on its technical condition. We even handle the total costs to replace it, thereby protecting you from any unforeseen costs. We also offer swing engines to keep your operation running if servicing requires engine removal. **mtu** reman is available for the **mtu** Series 2000 and 4000.

**Environmental benefits**

Restoring end-of-life products rather than discarding them minimizes the need for raw materials and energy to produce new parts. It also significantly reduces waste and CO<sub>2</sub> emissions. This efficient use of resources and energy not only benefits the environment. With many engines, the process can be repeated multiple times to greatly extend the life span of these non-renewable products.

Your engine has a unique history that takes into account everything from its specific operating conditions to how it integrates with your existing equipment. In order to safeguard its continued reliability and performance, a customized overhaul at an **mtu** factory is of vital importance.

**mtu** factory overhaul solutions are also conducted by the experts that originally built the engine. The same rigorous standards as with our factory remanufacturing process are applied. In essence, we breathe new life into your engine, restoring it to a like-new condition. Whether for **mtu** Series 183, 396, 493, 538, 595, 652, 956 and 1163 or

for **mtu** Series 2000 and 4000, you can expect an overhauled product that delivers the same high level of performance, service life and quality as a new one. From the gearbox to the automation, electronics and loose parts (e.g. oil cooler), the entire unit is fully restored.

**mtu** in-situ overhaul solutions directly inside the ship – saving time and costs while benefitting the environment.

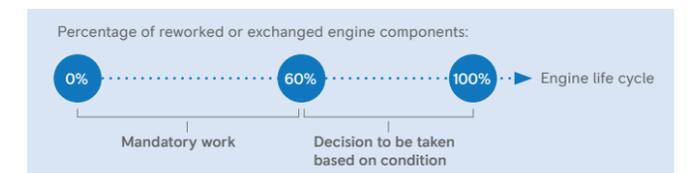
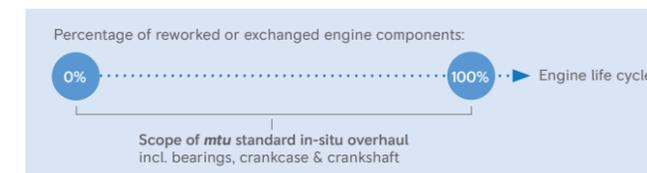
In addition to factory-based overhauls, we also offer in-situ overhaul solutions directly inside the ship. Our in-situ overhaul solutions are ideal when circumstances do not allow engine removal from the vessel. With our in-situ options, you can choose between a comprehensive standard overhaul or a more basic, condition-based service.

**mtu standard in-situ overhaul**

This comprehensive offer covers the replacement, overhaul and/or reconditioning of all engine components. The work performed fully complies with overhaul manual and maintenance specifications. The engine's service life is extended by a full cycle before the next scheduled overhaul.

**mtu condition-based in-situ overhaul**

With this more basic in-situ offer, replacement and overhaul of a defined scope of parts and components is mandatory. A list of other parts and components are also examined to determine whether to overhaul, exchange or continue using them. This option can potentially reduce the work scope, downtime and costs.



Support services

# DEMAND GENUINE

Only we can guarantee genuine spare parts that are designed, tested and approved specifically for **mtu** engines and systems to reach maximum uptime.



Genuine parts maximize performance, prolong engine life and meet today's strict requirements (e.g. emission regulations), all thanks to years of intensive research and development, quality audits, and progressive modifications — making them the best possible match for your engine and guaranteeing state-of-the-art technological fit. We offer a supply chain management, optimizing your purchasing and ordering processes.

**Take advantage of broad benefits of mtu genuine spare parts:**

- Engineered to secure high engine reliability and availability
- Value sustainability of your equipment / the only parts that live up to our standards
- Factory / OEM warranty coverage incl. professional service support
- Long-term supply solutions through the entire equipment lifetime
- State-of-the-art Parts Logistics Centers

Non-genuine parts are simply not worth the risk of endangering your mission.



# THE VALUE OF PROFESSIONAL TRAINING

Count on our experience and expertise

Correct training is the best way for operators and maintenance technicians to become proficient with **mtu** engines and systems so they can get maximum efficiency from the equipment. It is essential for the reliable functioning of the systems, maintaining the value of the investment and preventing breakdowns.

Whether you need operators to learn how to use the equipment effectively or are developing your own on-site maintenance capabilities, count on our experience and expertise to set you up for success.

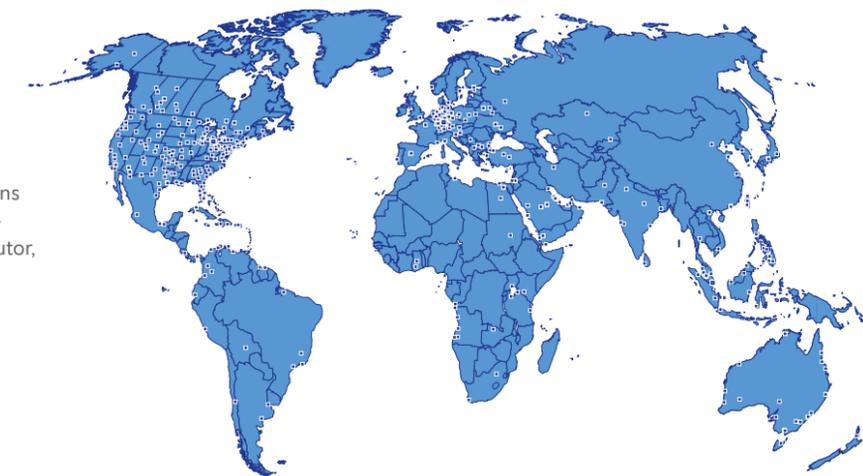


Whenever and wherever you need expert support, our specialists are available.

Our global service network of more than 1,200 locations – backed by our cutting-edge parts logistics centers – provides you this assurance. To find your local distributor, visit [www.mtu-solutions.com](http://www.mtu-solutions.com).

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[info@ps.rolls-royce.com](mailto:info@ps.rolls-royce.com)



More than 1,200 service locations worldwide.



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