

Yacht, Commercial Marine

MTU E-Drive Systems



Power. Passion. Partnership.

MTU E-Drive Systems
**Innovative
propulsion.**

For minimal emissions, reduced operating costs and maximum comfort, combined systems – such as E-Drive systems – are the preferred solution. Conventional E-Drive systems can be enhanced with optional battery modules, enabling emission-free silent running in harbor areas.

Advantageously combining diesel engine and electric motor, E-Drive systems are available in two primary combinations:

- Diesel-mechanical
- Diesel-electric propulsion

Due to the added complexity of E-Drive systems in comparison to conventional propulsion systems, it is essential to:

- Choose the right basic components (engine, electric motors, power electronics, controls and optional battery system)
- Seamlessly integrate them into a working system

MTU MELT Engineering (mechanical, electrical, logical and thermal system integration) helps to manage the complexity of E-Drive systems. We design and supply customer-specific E-Drive systems based on the proven Series 2000 and Series 4000 marine diesel engines.

MTU MELT Engineering
**One stop to your
E-Drive propulsion
system.**

With MTU MELT engineering your customized propulsion system is just one step away: MTU is your trusted single system supplier for the entire propulsion plant. You can be sure that all components will work together seamlessly while gaining the benefits of a complete system from a single trusted source that meets MTU's high quality standards.

Benefits:

- Perfectly integrated components provide your cutting-edge propulsion system with the same reliability as conventional propulsion solutions
- Shorter project times
- Customer specific propulsion design matched to individual requirements of each application, such as tug boats, OSVs, PSVs and Yachts



**MTU's systems expertise provides
peace of mind.**

For more than 100 years MTU has developed and manufactured diesel engines. We have earned our reputation as a technology leader by maintaining an unwavering focus on the future. In the most recent decades, that has meant developing and perfecting our automation systems and electronics technology.

Together with our strategic partners – and backed up by decades of success developing customer-specific solutions – MTU has the know-how and engineering expertise to design and integrate customer-specific E-Drive propulsion systems that include:

- Diesel engines
- Transmission, gearbox and gensets
- Electric motors
- Switchboards, including power electronics
- Battery modules
- Automation systems

MTU E-Drive Systems
**High performance
and comfort.
Low total costs
of ownership.**

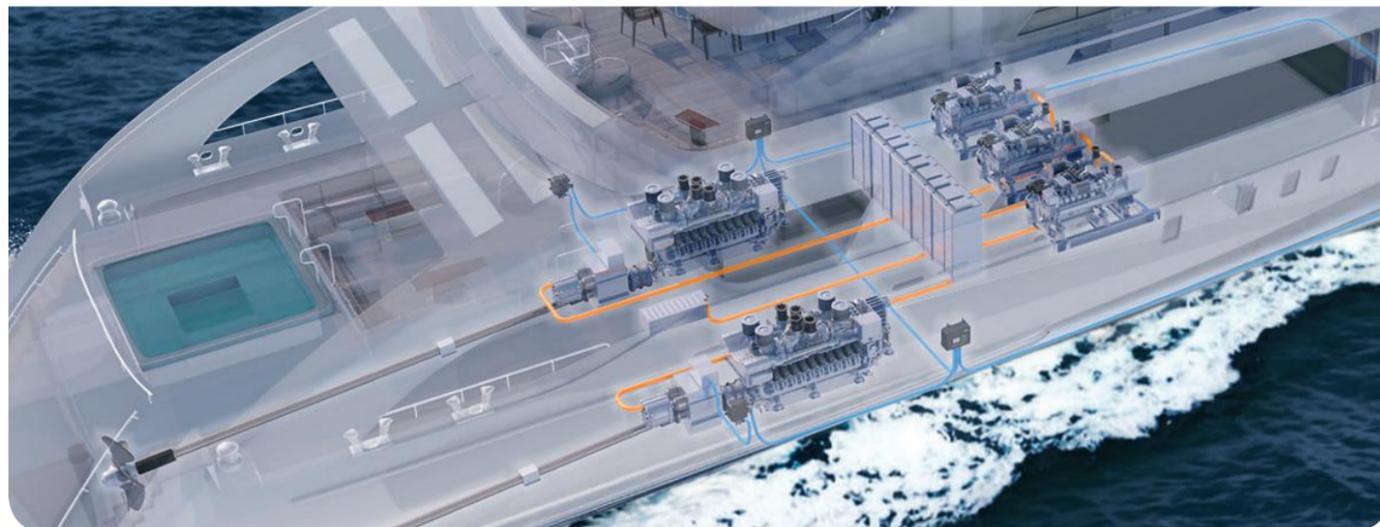
While E-Drive propulsion systems require a higher initial investment than standard diesel-mechanic propulsion systems, they offer a number of advantages that provide an overwhelming return on investment.

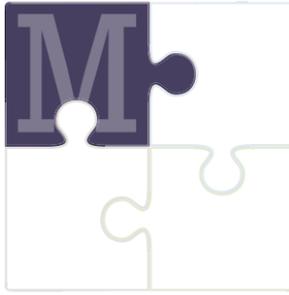
Benefits for Commercial Marine Applications:

- Lower emissions (due to electric mode, with fewer transient cycles)
- Lower operating costs (through more cost-effective operation of propulsion engines and gensets as well as reduced operating hours at main propulsion engines)
- Safer operation (due to system redundancy)

Additional Benefits for Yacht Applications:

- Enhanced drive dynamics (faster acceleration, with optimum torque available at the propulsor by combining the load characteristics of diesel engines and electric motors)
- Low environmental impact thanks to green technology
- Improved comfort (e.g. hotel load at night supplied by batteries – no need to run gensets)





Mechanical.

- Space Requirements
- Energy Transmission
- Vibrations
- Environment

Space Requirements:

Different installation conditions require different solutions – we have earned our reputation for delivering solutions with high power-to-volume ratios by skilfully integrating all mechanical components to fit and function in even the most challenging space requirements.

Energy Transmission:

MTU helps you maximize power while keeping your number of interfaces to a minimum. Our focus on the full system ensures that everything – mechanical power transmission, shaft interfaces, shaft sizing and flange interfaces – fits together perfectly.

We guarantee silent cruising and maximum boost power when it counts by precisely matching the engine to the engine mounting and gearbox arrangement.

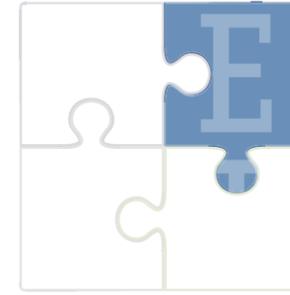
Vibrations:

Integrating components that interact within different operating modes takes in-depth engineering and design capabilities – especially with regard to general drive train and torsional vibration. And that’s exactly why you need MTU.

MTU offers standardized resilient mounting systems – from basic to high-end solutions – to meet even the most demanding vibrational and noise requirements.

Environment:

Quiet, efficient and environmentally friendly – these are the markers of a competitive drive train, today and in the future. To ensure your success, MTU’s predesigned drive trains can be easily adapted to fit your requirements.



Electrical.

- Stability
- Availability
- Space & Thermal Requirements
- Electromagnetic Compatibility (EMC)

Stability:

As the number of high-power electrical components on board increases, so does the importance of maintaining network stability. Sophisticated electrical AC/DC layout and well-defined electrical interfaces provide network stability across all operation modes.

Availability:

MTU fine-tunes your system design for maximum availability by utilizing sophisticated simulation tools, which enable numerous potential failure scenarios to be investigated in advance.

Space & Thermal Requirements:

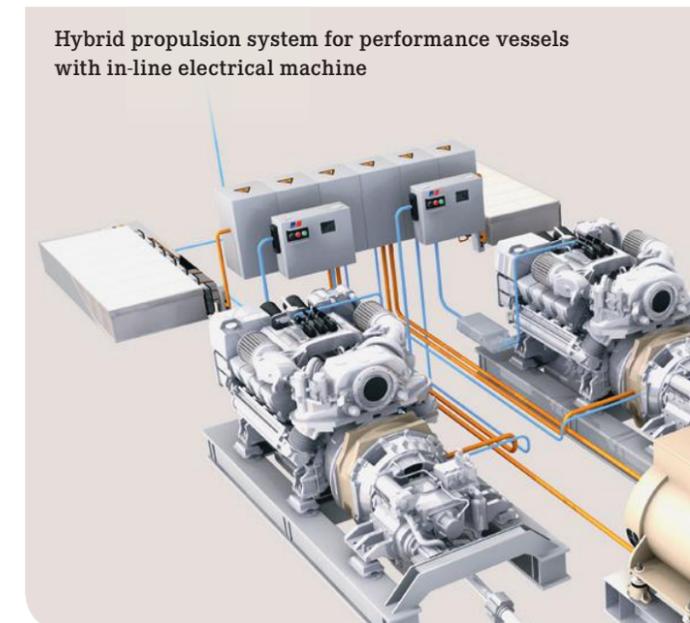
Thermally matched components allow compact switchboard design, helping minimize the footprint of your system.

Electromagnetic Compatibility (EMC):

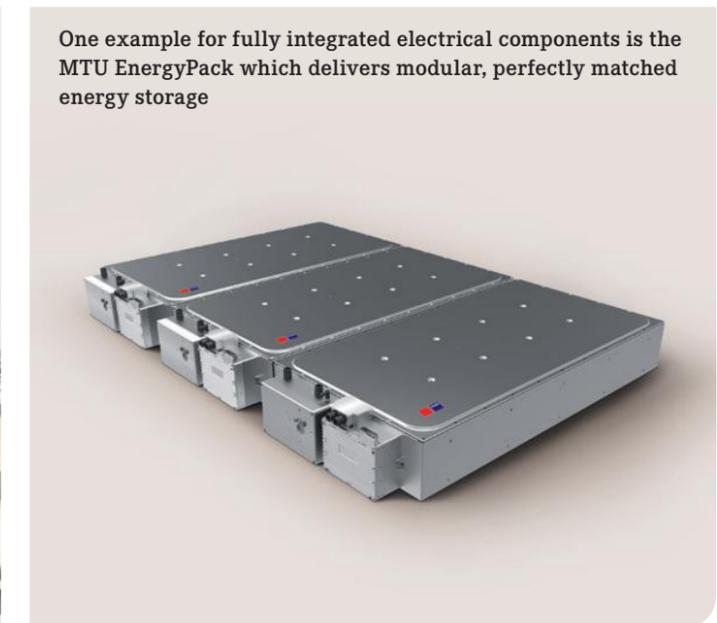
Proper electrical design and the use of simulation tools ensure EMC while high power/high voltage components are integrated into the propulsion system.



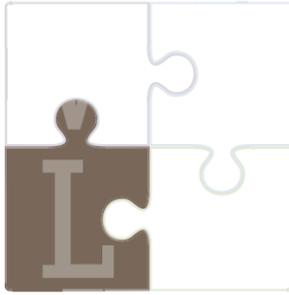
- 1 Double Resilient Mounting System
- 2 Advanced Coupling Concept



Hybrid propulsion system for performance vessels with in-line electrical machine

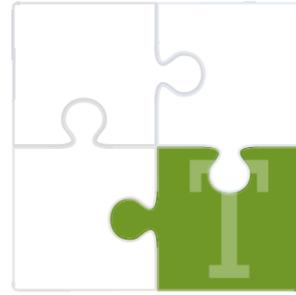


One example for fully integrated electrical components is the MTU EnergyPack which delivers modular, perfectly matched energy storage



Logical.

- Power- and Energy Management
- System Architecture
- Safety
- Homologation



Thermal.

- Efficiency and Durability
- Complexity/Pinch Points

Possible design for MTU E-Drive Systems.

Power- and Energy Management:

Powered by gensets, batteries, shore connections and more, your vessel supports multiple consumers including motors, hotel load and energy storage in connection with several operation modes. Intelligent power- and energy-management systems from MTU link it all together and put you in control.

System Architecture:

We utilize a modular approach with clean interface design to ensure reliable function.

Safety:

With multiple electrical and mechanical components interacting within several operation modes, a clean safety design is vital. Whether its shaft speed, temperature, pressure, voltage or current, MTU's control system ensures safe operation.

Homologation:

From the beginning we work together with classification societies to ensure a smooth homologation process.

Efficiency and Durability:

Electrical components require a continuous, low temperature cooling source for optimal performance and longevity. MTU ensures proper cooling design and optimal thermal management so your electronic equipment lasts.

Complexity/Pinch Points:

Many components require unique cooling temperatures and flow rates, which necessitate a variety of cooling interfaces. The MTU E-Drive system provides ease of management by integrating cooling circuits internally and keeping cooling interfaces to a minimum.

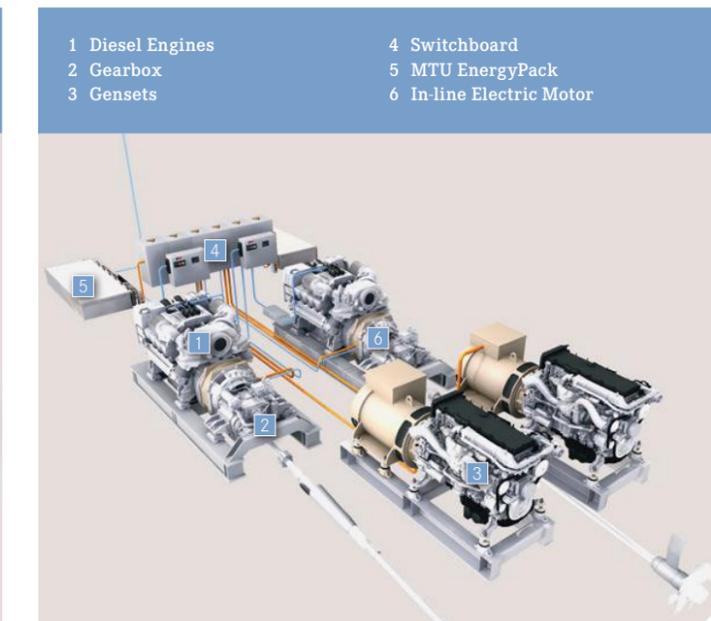
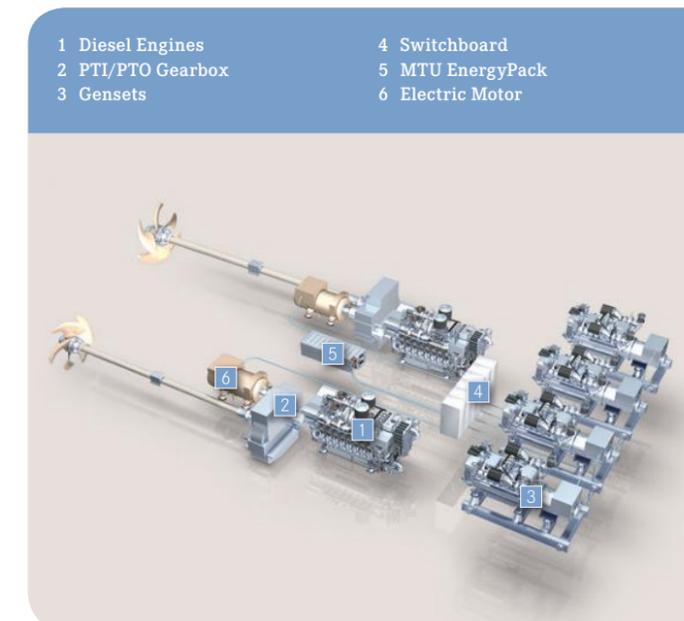
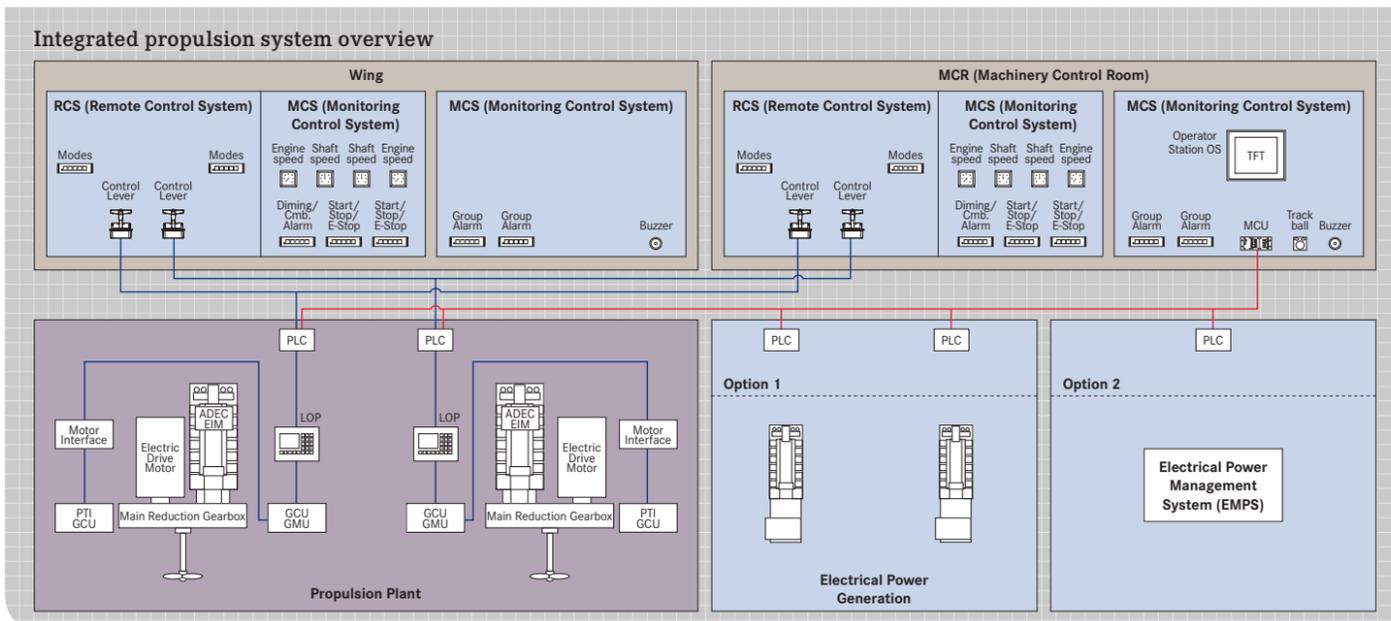
Customized Hybrid Propulsion Systems:

In order to serve customer demands, MTU is engineering hybrid drive trains integrating project specific components including:

- Electric motors
- Batteries
- Electrical equipment (such as converters, cabinets, etc.)
- Intelligent power- and energy-management control systems

Modularised Hybrid Propulsion Systems:

MTU is extending its range of modular hybrid system components to offer its customers scalable, pre-engineered and fully integrated systems for various requirements.



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