With some 100 years of experience in the art of building engines, MTU is one of the world’s leading manufacturers of propulsion and power generating systems used in heavy vehicle, marine and railcar applications.

MTU is a trusted partner of the shipping world in particular. MTU engines are in service on all the Seven Seas and in all fields of marine application: As main and auxiliary propulsion units or genset engines for generating power on-board.

These engines are backed up by tailor-made regulating, control and monitoring systems which are home-grown – i.e. developed and manufactured by MTU.

The integration of modern electronic systems – predominantly the top MTU products MCS-5 Type 2 and RCS-5 – provides perfect comprehensive solutions ensuring safety, efficiency and reliability.

As a general contractor, MTU can offer you competent system solutions across the board.

Be it inland, navy or civil authority vessel, yacht or ferry: MTU can deliver the complete system and comprehensive service customised to meet the requirements of your ship – first hand.
Your first hand
for sophisticated solutions.

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MTU’s system technology isn’t just what your ship deserves.

The latest MTU ship automation systems represent a completely new product generation incorporating large-scale integrated components.

Their modular design allows these systems to be individually tailored to meet the requirements of all applications and all ships. Later extensions or modifications present no problem.

Electronic systems are present throughout the entire ship when you install an MTU automation system. They monitor and control propulsion, power generation and general ship area processes harmonising them as and when required.

Take the integral monitoring, alarm and control system MCS-5 Type 2 for example. MCS-5 acquires and processes measured data from all areas of the ship - quickly, precisely and with optimum interfacing.

Apart from improving the efficiency of these processes, this particularly contributes to safety on-board.

The Remote Control System RCS-5 is the propulsion 'specialist'. RCS-5 automatically controls the propulsion plant in accordance with operator settings making a major contribution to optimising the performance and handling of your ship.

Professional integration of these and other systems and components realises a comprehensive MTU ship automation system offering a whole range of advantages – for everyone involved in dealing with the whole system.

So you see:
MTU systems offer advantages across the board: Everyone benefits one way or another.

Ship owner:
- Optimum solutions for his ship
- Reduced personnel costs and a high degree of safety thanks to efficient, high-performance technology

Shipbuilding engineer:
- Optimised system, no problems with interfacing
- Compact system, easy to install and service

Shipyard team
- Straightforward installation of system technology

Commanding officer and crew:
- User-friendly
- Reliability
- Convenience
- Safety
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MCS-5 Type 2 is always divided into two levels regardless of the application concerned: The peripheral and field automation level and the operating and management level.

The picture illustrates the architecture of the system with a sample configuration.

Peripheral and automation level

- All ship's data monitored by MCS-5 are acquired, transferred, processed and monitored on the peripheral and field automation level.
- Data are exchanged between the individual elements bidirectionally on a data bus.

MCS-5 Monitors and Controls Systematically.

A name that stands for its own good qualities:

Peripheral and automation level

- PMIs (Peripheral Interface Modules)
- Interfacing with peripheral equipment (sensors, actuators)
- Propulsion plant field bus (redundant CAN bus)
- Field bus
- PPS (Programmable Process Station)
- Prozess bus (redundant CAN bus)
- GMU (Gear Monitoring Unit)
- PMU (Propeller Monitoring Unit)

Operating and management level

- The operating level represents the interface between the operator and the automation system.
- The operating level software and hardware prepare all the relevant information, take orders and keep the operator posted about what’s going on.

- MCU (Management Computer Unit)
- Colour monitor(s)
- Trackball
- Analogue instruments
- Function panel
- Printer

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PIMs (Peripheral Interface Modules) interfacing with peripheral equipment (sensors, actuators)

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Trackball

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Function panel

Printer
MCS-5: Configured for precision, convenience and safety.

A sample configuration illustrates the operating principle and clean-cut design of MCS-5 Type 2.

Operating and management level

Tasks/features:
- Process visualisation and process control via colour monitor(s) and function panels
- Visual and audible alarm signalling for all monitored areas
- Process parameter display
- Data storage (archiving)
- Printer management and control
- Communication with other systems
- Online help
- System administration

Peripheral and field automation level

Tasks/features:
- Local date acquisition via PIMs
- Data output
- Data processing and process control in PPS
- Execution of commands received from the superordinate level
- Execution of defined logic operations (e.g. automatic pump start/stop)
- Data management and exchange between the levels
- Data interface between MCS-5 and other on-board systems (e.g. EPMS)
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Doing the groundwork:
**MTU hardware and software for data acquisition and processing.**

The PIMs take the lead in the first stage of process automation. These small, intelligent components which are available in two sizes for the various applications can be configured as desired thanks to the modular system.

PIMs are located **decentrally** all over the ship and manage data input and output directly in-situ by converting sensor and actuator signals. The PIMs are coupled to the superordinate PPS process assemblies via powerful **field buses**.

PPS are capable of processing huge volumes of data. They control numerous different PIMs, are also located decentrally in the ship and simultaneously establish the link to the operating level via the **redundant process bus**.

MCS-5 Type 2 combines all functions in the ship relevant to control and monitoring via this data path. These functions can then be accessed from any control station.

---

**Features:**
- Standard and individual system solutions
- Process data processing with low space requirements
- Large choice of plug-in modules
- Optimum safety thanks to decentralised operation
- Programming/program modification possible in the installed state
- Optimum network management
- Reduced cabling
- Service-friendly
- Top-hat rail mounting

**Data processing PPS**

**Data acquisition PIM** Size 1 and Size 2

For data acquiring and transmission different PCBs (printed circuit boards) are available, e.g.:

**Standard PCB for all PIMs:**
- MPU Processor assembly

**Standard PCBs for data acquisition and data input/output:**
- AIB Analogue input
- BIB Binary input
- BOB Binary output
- INB Instrument output
- EGB Thermocouple input
- IIB Binary input/instrument output
- MFIB Multiple functions
- SCB Serial interface usw.
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The operating level is the **brain** of the ship. The standard 19” MCU Management Computer Units used here exchange data bidirectionally with all the PPS, i.e. they receive and transmit data. Monitored processes are visualised on **colour monitors** – MCS-5 really is very user-friendly.

**MTU ship automation: Management technology**

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**Various instruments, e.g.** to indicate engine and shaft speed, propeller pitch etc.

**Colour monitor to visualise all monitored processes.**

**RCS-5 control lever**

**Redundant data bus connection**

**MCU**

**Trackball**

**Printer**

**Electronics of MTU at the interface between man and machine.**
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RCS-5 control lever
The perfect man-machine interpreter: MTU visualisation software.

The volume of data processed on-board ship is constantly on the increase. It is therefore vital to prepare this enormous volume of data optimally for presentation to the operator. The MCS-5 philosophy is therefore: User-friendly visualisation with unambiguous user guidance and without any tricky command inputs.

The overview page displays the general structure of the on-screen pages. This structure basically remains unchanged regardless of the process currently displayed on-screen.

Vital information at your fingertips – for your security and support. The visualisation system with its sub-directories is tailored to meet your requirements and suit the installations on any type of ship.
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Vital information at your fingertips – for your security and support. The visualisation system with its sub-directories is tailored to meet your requirements and suit the installations on any type of ship.
The overview showing all the parts of the ship connected to MCS-5 provides orientation. Detailed information can be called-up on-screen as required from this initial starting point.

On receiving messages from the system, you can pinpoint the source of an alarm on the overview and are prompted to take action directly by visual and audible signals.

MCS-5 also includes additional standard software packages (e.g. alarm protocol files, log files, on-line help features, fault analyses, dialog features).

Where several workstations are installed, each and every operator can have access to all information without exception – or just selected information with password protection.

MCS-5 hardware and software is of modular design allowing it to be easily adapted for special applications.

MCS-5 Type 2 comes with a choice of languages for the texts on the PAN panel and the graphic and alphanumerical pages on the colour monitor. You can choose between five standard languages (English, German, French, Spanish, Italian). Other languages are available from MTU on request.

Propulsion plant

The propulsion plant of the ship is represented clearly and simply regardless of the complexity of the actual system. Additional buttons are provided on the "propulsion" overview page which the operator can select on-screen. Details such as temperatures, pressures and states are displayed and monitored on the on-screen pages which subsequently appear.

Ship area

Visualisation in detail. Monitoring and control at the workstation. You really “know” your ship – on-screen graphics leave no question unanswered. Clearly presented information and direct command input at the object ensure the safety of the ship. Interactive graphics facilitate navigation even through complex functional sequences.

You can navigate and activate the control fields on all on-screen pages using the trackball-controlled cursor or the optional keyboard.
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**Peripheral level**
- All propulsion data are acquired, transferred, processed and monitored on the peripheral level.
- Data is exchanged bidirectionally between the individual elements.

**Operating and management level**
- The operating level also represents the interface between the system and the operator here.
- The operating level software and hardware prepare all the relevant information for the operator and take orders.

**System Components**
- Control lever as operating station(s)
- Mode function panel (arrangement depends on application)
- Instruments, e.g. propeller pitch

**System Elements**
- Propulsion plant field bus (redundant CAN bus)
- GCU (Gear Control Unit)
- PCU (Propeller Control Unit)
- LOP for propeller (depending on propulsion system)

**Everything under control:**
The integral propulsion control system RCS-5.
This and other MTU ship automation systems (e.g., ECS-5) have been designed and developed to make a perfect match ensuring optimum interfacing and functionality.

Reliability is paramount, which is why the electronics in every RCS-5 control station are of 100% redundant design: System A switches over to system B automatically as necessary.

The RCS-5 control station is connected to the redundant propulsion plant field bus (CAN bus). Data are exchanged between the propulsion system and the remote control stations via two field bus connections:

> One field bus for exchanging data between the individual shafts. This also makes it possible to control all propulsion lines with just one control lever,
> one redundant bidirectional field bus for exchanging data with the propulsion plant.

**Features:**

> Command transfer
> Control of engine speed, gear (clutch), propeller pitch and other functions
> Single control lever mode (SCL)
> Load compensation between engines, e.g., on combined plants
> Fully-automatic control taking account of all parameters
> Optimised propulsion

Regardless of the type of propulsion system: RCS-5 affords fully-automatic, perfect control of any propulsion plant.
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By automatically controlling the propulsion plant in harmony, the RCS-5 software always establishes the ideal state thus optimising the entire propulsion system.

Only MTU can offer you this kind of synergy. On the one hand, the interface to the engine is the fruit of MTU’s profound engine know-how. On the other hand, MTU was also one of the first manufacturers to develop the microprocessor-controlled ECS (Engine Control System) for fast-running high-performance diesel engines – and thus has years of experience to look back on.

The bottom line? A combination which benefits the technology itself – and the people who use it.
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**RCS-5**

- **FPP**: Fixed Pitch Propeller
- **CPP**: Controlable Pitch Propeller
- **WJ**: Waterjet
- **VSP**: Voith Schneider Propeller

**RCS-5 Types**

- **RCS-5 DAD/CPP**: Combined diesel and diesel propulsion plant driving controlable pitch propellers
- **RCS-5 DOG/CPP**: Combined diesel or gas turbine propulsion plant driving controlable pitch propellers
- **RCS-5 DAG/CPP**: Combined diesel and gas turbine propulsion plant driving controll-able pitch propellers

**RCS-5 Variants**

- **DOG/CPP**: Combined diesel or gas turbine propulsion plant driving controllable pitch propellers
- **CODOG/CPP**: Combined diesel or gas turbine propulsion plant driving controlable pitch propellers
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MCS-5 – the intelligent system:
Always ready for more ...

Electrical Power Management System (EPMS)

With its open structure, MCS-5 can be extended to incorporate other systems such as the EPMS.

The Electrical Power Management System EPMS monitors and controls all the diesel-powered gensets used for on-board power generation and features:

- Automatic start/stop
- Dynamic synchronisation
- Load-dependent start/stop
- Automatic load distribution

The EPMS has a bidirectional data link to MCS-5 allowing on-screen visualisation and remote control.

The on-screen pages visualising EPMS processes are a product of MTU. The layout is designed to suit the actual configuration on-board ship.

Fire detection and alarm system

With its expertise and years of experience, MTU can also integrate third-party systems such as the fire detection and alarm system into the overall automation system. The fire detection and alarm system has its own bus system and dedicated signalling units at the control station in accordance with regulations.

Linking up to MCS-5 via a unidirectional data line actually supports the third-party system by facilitating the location of a fire on-board ship for example.
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Additional systems can be integrated into the overall automation system to meet individual requirements – e.g.:

- UPS – uninterrupted power supply system
- Tank measuring systems
- Loading and ballast monitoring systems
- Navigation systems
- Starter boxes
- Communication systems
No outfit is complete without the matching accessories.

MTU console construction for ship automation

Console construction rounds off MTU’s range of services – indeed it has been one of our specialities for over 30 years.

Serving as a “housing” for sophisticated electronic systems, a ship’s console must fulfil a long list of requirements: Material weight, ergonomics and electromagnetic compatibility to name but a few.

MTU designs and delivers tailor-made consoles for any ship and any automation system – full service included from CAD design to test bay.

MTU data recorder ODR

The Operating Data Recorder ODR acquires and stores the values measured on the propulsion plant and evaluates them using various methods.

This fully-automatic device is capable of recording data from up to four propulsion plants simultaneously.

The ODR hardware is of modular design (based on MCS-5 technology) and is easily integrated into a complex ship automation system.

Machinery Telegraph System MTS-5

The MTS machinery telegraph is an autonomous system which transmits commands relevant to the propulsion plant, e.g. to the machinery control room or engine room.

MTS-5 is a completely independent auxiliary communication system. Its main features are:

- Microprocessor-control
- Data transmission via data bus
- Common hardware for master and slave panels
- Operation via membrane keypad
- Combined display system (excellent legibility even under extremely unfavourable lighting conditions)

Volumeter® – Consumption measurement for diesel engines

Efficient operation of diesel engine driven plants can be constantly checked by monitoring the energy released from the fuel – with Volumeter®.

Volumeter® in conjunction with flow management unit and pulse sensors provides a complete system for measuring consumption, ensures reliable, precise and stable flow measuring under tough operating conditions, measures over a large range regardless of viscosity and temperature.
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No empty promises:
Signed and sealed classification certificates.

MTU is certified to DIN EN ISO 9001 (proven consistently applied quality management system). All MTU electronic products carry the CE mark of approval.

MTU subjects all devices and assemblies to an FMEA (Failure Mode and Effect Analysis).

MTU conducts acceptance testing including type tests according to the rules and regulations of all the relevant classification societies (e.g. for ABS, BV, CCS, DNV, GL, KRS, LR, NKK, RINA).

Technical information

All MTU plants operate on a 24 V DC voltage in accordance with international standards.

MTU fulfils all requirements laid down in international standards and the relevant ambient conditions, regulations and certifications for criteria such as:

- Ambient temperature
- Degree of protection IP (International Protection)
- EMC electromagnetic compatibility conditions
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Your kind of partner:
You set the task. We do the rest.

At MTU we don’t just think of ourselves as a general contractor with regard to our products. Full product and customer support during the planning, construction and utilisation phase are a standard feature of any MTU product.

And as you can imagine, a company like MTU has a customer service network which spans the globe. MTU specialists are available for consultation, contact and service in more than 350 branches in over 100 countries around the world.

MTU’s enormous potential is your advantage – not only in terms of “availability” but also in terms of “longevity”. MTU develops its own products ensuring long-term logistic support. So you can enjoy our full support for many years to come.

Project management
- Co-ordination of project and order handling from the first analysis with proposals through order specification right up to handover

Product support
- Technical consultancy
- Maintenance
- Logistics

Customer support
- Training
- Technical documentation

Project engineering
- Installation analysis
- Provision of individual solutions to meet customer requirements
- Development of hardware and software
- Project planning
- Equipment
- Installation consultancy
- Measuring and trial runs
- Commissioning and integration testing
- Harbour and sea acceptance testing
- Determination of suitability under simulated working conditions
- Plant handover
Your kind of partner:
You set the task. We do the rest.

At MTU we don’t just think of ourselves as a general contractor with regard to our products.

Full product and customer support during the planning, construction and utilisation phase are a standard feature of any MTU product.

And as you can imagine, a company like MTU has a customer service network which spans the globe. MTU specialists are available for consultation, contact and service in more than 350 branches in over 100 countries around the world.

MTU’s enormous potential is your advantage – not only in terms of “availability” but also in terms of “longevity”. MTU develops its own products ensuring long-term logistic support. So you can enjoy our full support for many years to come.

Project management
- Co-ordination of project and order handling from the first analysis with proposals through order specification right up to handover

Product support
- Technical consultancy
- Logistics

Customer support
- Training
- Technical documentation

Project engineering
- Installation analysis
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