Land Defense

EXPERIENCE. INNOVATION. PARTNERSHIP.

A Rolls-Royce solution

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GTK Boxer
mtu 8V 199 TE20, 530 kW (721 hp)

1

2

We have extensive experience in the defense application, supplying solutions for more than

50

ARMIES WORLDWIDE.

3

POWER TO PROTECT. POWER TO PERFORM.

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 most modern yachts, the strongest tugboats 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.

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1 **IFV Puma**
MT 892 Ka-501, 800 kW (1.088 hp)

2 **Leopard 2 A7**
MB 873 Ka-501, 1,103 kW (1,500 hp)

3 **IFV Ajax**
8V 199 TE 21, 600 kW (816 hp)

Core competences

WE SUPPLY FAR MORE THAN JUST BEST-IN-CLASS PROPULSION SYSTEMS.

02

Whether for defense and protection, combat, or support, military vehicles fulfill many mission-critical functions and tasks. Our engines and propulsion systems are designed for peak performance. With over 60 years of experience in designing and developing propulsion systems for virtually all types of military vehicles, our systems are trusted and proven – all over the world.

Technology experts
We are a leader in cutting-edge technological development with our engine and propulsion systems. Maximizing power density is just one of our many core competencies and areas of innovation.

Engineering specialists
Engineering is our passion. We spend every day working closely with our customers to deliver best-in-class propulsion solutions – from standard and simple to customized and complex.

Reliable partners
Defense partnerships are special. Close collaborations with our clients paired with our in-depth understanding for the specific demands of diverse military applications enable us to develop solutions that best suit every individual need.

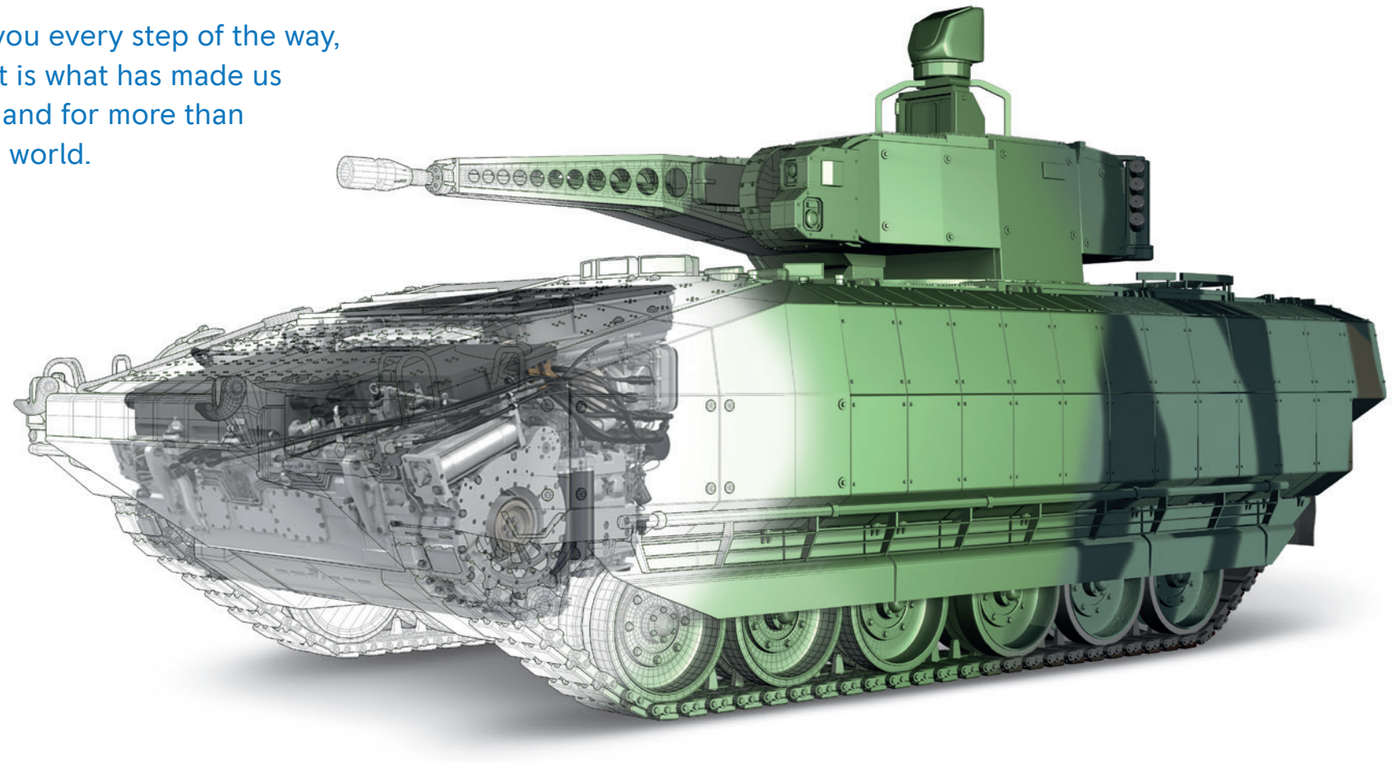
System suppliers
Whether for light 4×4 wheeled vehicles or heavy main battle tanks, for highly customized solutions or retrofit integration on existing vehicles, we deliver complete propulsion systems that fully meet your expectations.

System overview

A LIFETIME OF STRONG SUPPORT.

03

We are committed to fully assisting you every step of the way, over the entire product lifetime. That is what has made us a strong partner for over 60 years – and for more than 50 military organizations around the world.



Design and planning
We have extensive military propulsion system experience, qualifications, and capabilities. From day one, our application engineering team can provide comprehensive project support for:

- Endurance and propulsion system tests, cold starts, forging, and slope test benches
- Full vehicle integration
- Reducing design costs

Every propulsion system is:
- Subjected to rigorous testing at our testing facilities
- ISO 9001:2008 certified

Military specifications
Whatever the specific military requirements call for, we fulfill them with excellence:

- Nuclear hardening, EMI, shock/vibration, ambient conditions, multiple-fuel capabilities, and more
- Compact, highly reliable, outstanding power-to-volume/weight ratios, low heat rejection, small charge air coolers, hot condition and high-altitude compensations, limp home functions, and more

Government standards
We have decades of experience with military and government standards around the world, enabling us to provide:

- Full government quality assurance and support over the entire project lifetime
- Internal quality gates during development, procurement, assembly, and testing
- Best industry practice development and production processes
- Full compliance with earned value management (EVM) and military quality assurance criteria and guidelines

Integration
Customizing propulsion systems and optimally integrating engines, transmissions, cooling, electrical power, and air filtration systems, electronics, and software requires extensive experience and know-how. We have highly trained technicians for military customers around the world that provide support for:

- Comprehensive engineering, technical, and project management
- Physical and functional integration
- Vehicle and PowerPack internal interfaces and system test coordination
- Development of subsystem components to maximize performance
- Offsets and license production agreements needed to fulfill specific requirements for technology/knowledge transfer for local production

ValueCare
Every client is different. Our comprehensive ***mtu*** ValueCare service solutions portfolio allows us to tailor offerings for each individual customer aimed at maximizing performance, uptime, and lasting value – at every step:

- Complete support and service solutions encompassing spare parts, on-site support, technical documentation and customized support solutions

Integrated Logistics Support
We also offer customized packages of Integrated Logistics Support (ILS) with a wide range of products and services, including:

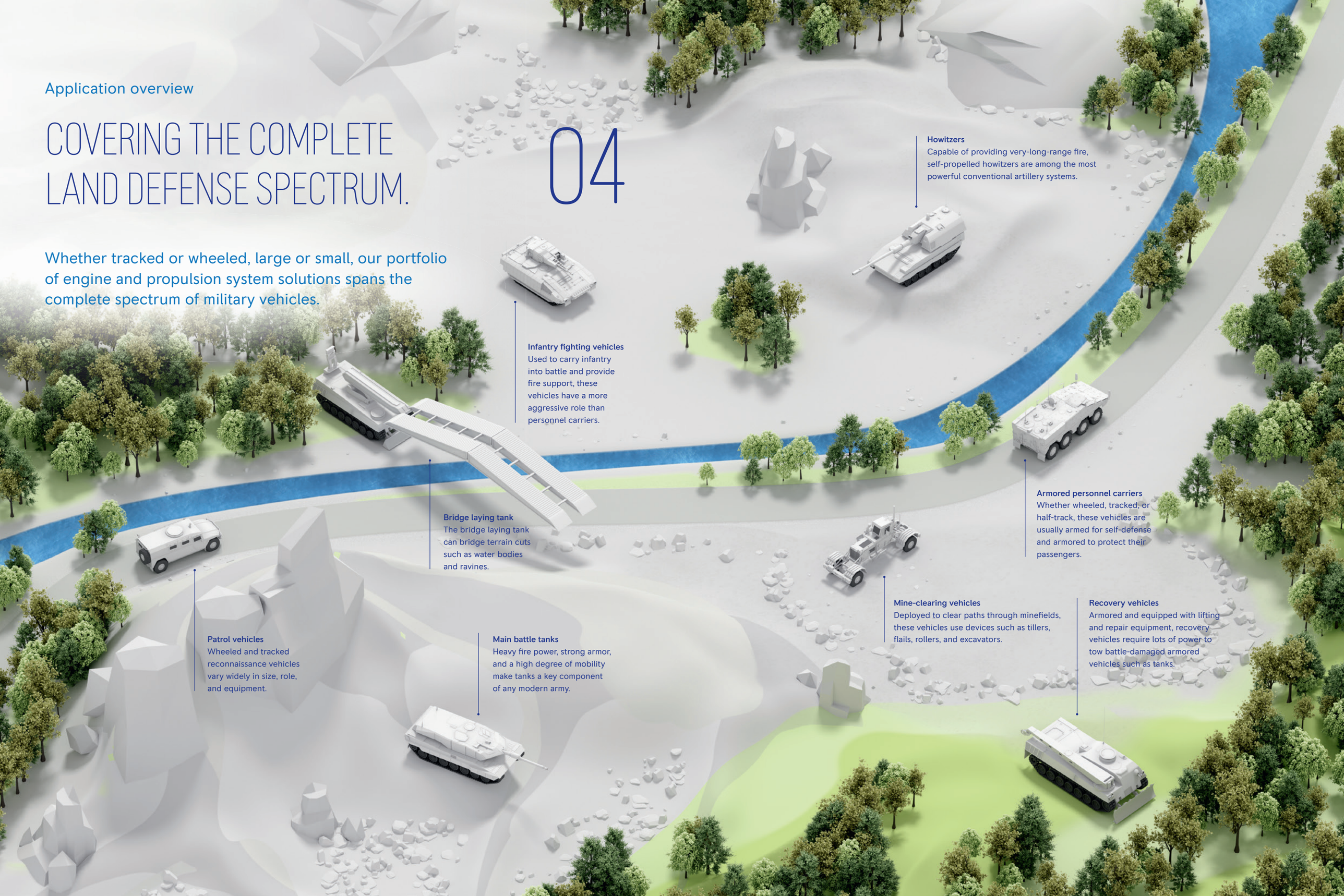
- System analysis, maintenance kits definition, training, technical documentation and more
- We guarantee fast reaction times worldwide for on-site field support, preventive and corrective maintenance, repair and overhaul, RAMS and LCC, configuration management, upgrade solutions, and much more

Application overview

COVERING THE COMPLETE LAND DEFENSE SPECTRUM.

04

Whether tracked or wheeled, large or small, our portfolio of engine and propulsion system solutions spans the complete spectrum of military vehicles.



Howitzers
Capable of providing very-long-range fire, self-propelled howitzers are among the most powerful conventional artillery systems.

Infantry fighting vehicles
Used to carry infantry into battle and provide fire support, these vehicles have a more aggressive role than personnel carriers.

Bridge laying tank
The bridge laying tank can bridge terrain cuts such as water bodies and ravines.

Armored personnel carriers
Whether wheeled, tracked, or half-track, these vehicles are usually armed for self-defense and armored to protect their passengers.

Patrol vehicles
Wheeled and tracked reconnaissance vehicles vary widely in size, role, and equipment.

Main battle tanks
Heavy fire power, strong armor, and a high degree of mobility make tanks a key component of any modern army.

Mine-clearing vehicles
Deployed to clear paths through minefields, these vehicles use devices such as tillers, flails, rollers, and excavators.

Recovery vehicles
Armored and equipped with lifting and repair equipment, recovery vehicles require lots of power to tow battle-damaged armored vehicles such as tanks.

Propulsion overview

A FULL RANGE OF POWER – ROBUST, FLEXIBLE, AND AGILE.

05

1

2

mtu systems deliver proven performance for diverse land defense vehicles – more than

20,000

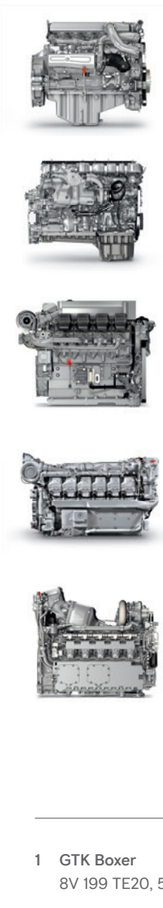
AND COUNTING.

3

Propulsion overview

THE FULL POWER RANGE.

Whether for light, medium or heavy military vehicles, wheeled or tracked, we deliver the full range of engines and systems from 90 to 1,200 kW (122–1,631 hp).



1 **GTK Boxer**
8V 199 TE20, 530 kW (721 hp)

2 **Leopard 2 A7**
MB 873 Ka-501, 1,103 kW (1,500 hp)

3 **PzH 2000**
mtu 881 Ka-500, 736 kW (1,001 hp)

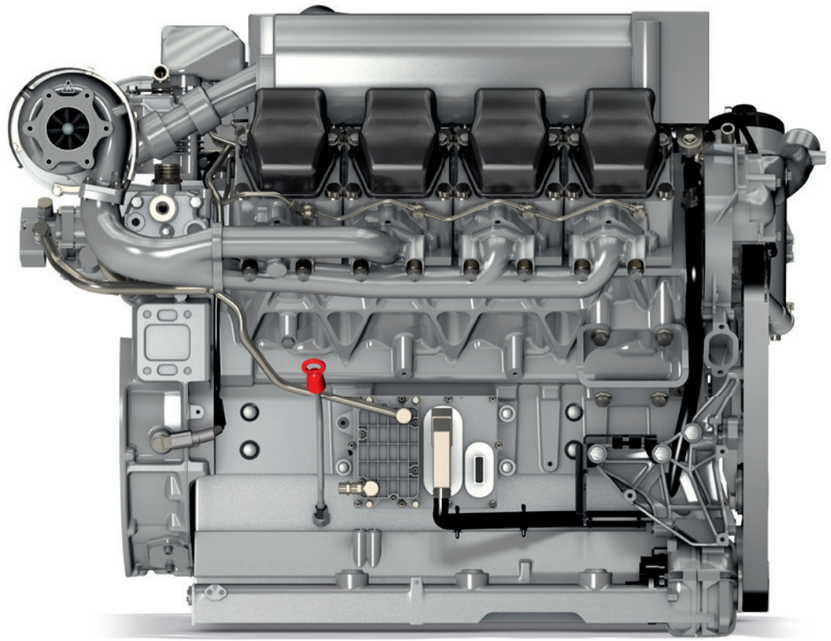
Propulsion systems for light and medium vehicles

POWERFUL AND ROBUST.

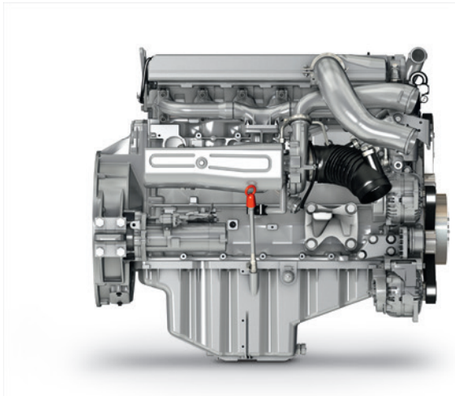
Proven military-grade performance
We offer a range of robust, powerful, and compact diesel engines that are used in many types of armored vehicles, including combat, reconnaissance, and patrol vehicles as well as personnel carriers. Proven propulsion systems like the Series 199 uniquely combine cutting-edge technologies with economic benefits such as high fuel efficiency, low operating costs, and easy maintenance.

Standout features
- Available in different power ranges
- Low fuel consumption
- Compact dimensions and a high power-to-weight ratio to reduce volume and weight
- Maximum vehicle maneuverability, acceleration, and mobility
- Highly reliable, robust, and proven technology

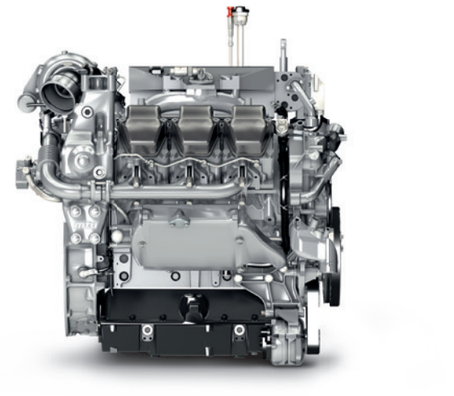
Series		106		199					1500
Engine model		4R 106 TD21	6R 106 TD21	6V 199 TE20	6V 199 TE21	6V 199 TE22	8V 199 TE20	8V 199 TE21	6R 1500
Cylinders		4R	6R	6V	6V	6V	8V	8V	6R
Power output	kW	163	240	335	430/460	480	530	600/735	480
	hp	222	326	455	584/625	653	721	816/1,000	653
Speed	rpm	2,200	2,200	1,800	2,200	2,100	2,300	2,100/2,300	1,700



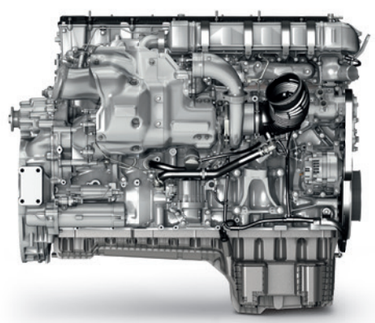
8V 199



6R 106
Highly compact and highly reliable are just some of the outstanding qualities of this six-cylinder inline configuration.



6V 199
Highly compact and adapted especially to the demands placed on military vehicles (with a dry sump lubrication system, for example).



6R 1500
This six-cylinder inline model is the latest truck engine technology.

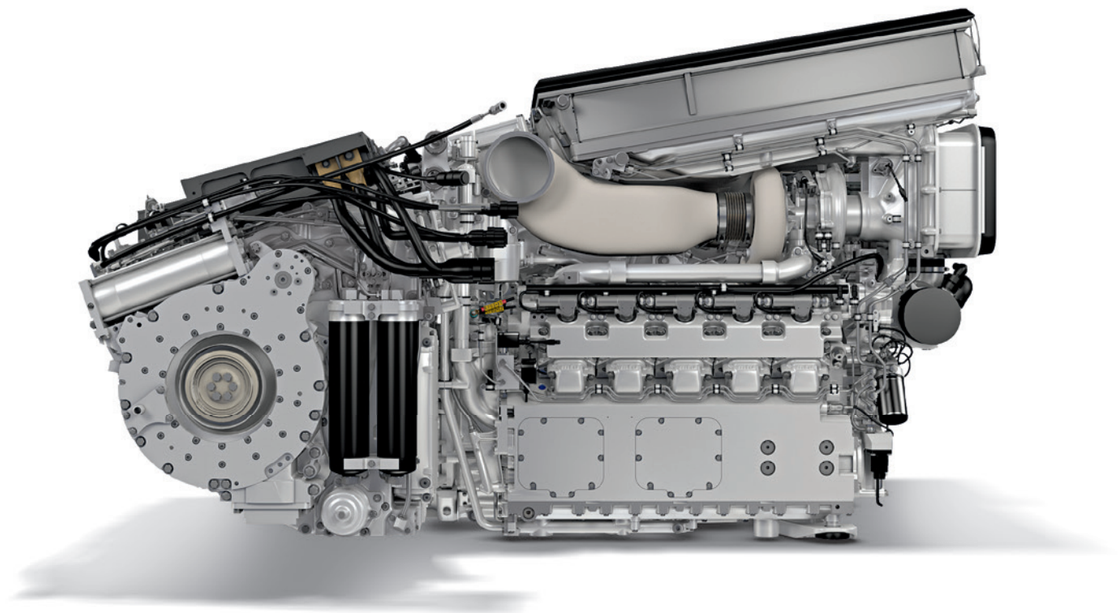
Propulsion systems for medium and heavy vehicles

POWERFUL AND FLEXIBLE.

Benchmark technology
With their fully integrated, extremely light, and compact design, propulsion systems of the Series 890 set the benchmark for powering medium-sized military vehicles. Delivering 400–1,000 kW (544–1,360 hp) for electric and 365–800 kW (496–1,088 hp) for mechanical drives, they are particularly well-suited for tracked vehicles such as infantry fighting vehicles or troop carriers.

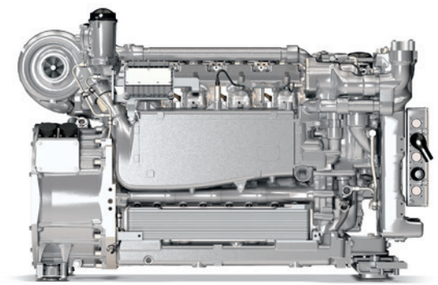
Standout features
- Low fuel consumption through common-rail injection system
- Compact dimensions and a high power-to-weight ratio to reduce volume and weight
- Maximum vehicle maneuverability, acceleration, and mobility
- Highly reliable, robust, and proven technology

Series		890			
Engine model		4R 890	5R 890	6R 890	10V 890
Cylinders		4R	5R	6R	10V
Power output	kW	400	500	600	800
	hp	544	680	816	1,088
Speed	rpm	3,800 diesel-mechanic / 4,250 diesel-electric			

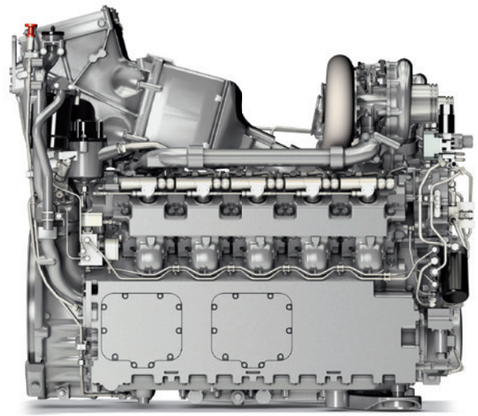


NO.1
in power-to-weight and power-to-volume ratio.

mtu **PowerPack® based on a Series 890 engine.**
The most compact PowerPack in the world.



4R 890
This highly compact and extremely light four-cylinder version offers a maximum power output of 400 kW (544 hp).



10V 890
The most compact engine in his powerrange, the 10V 890 features integrated starter/generator technology to drive its electrical cooling fans.

Propulsion systems for heavy vehicles

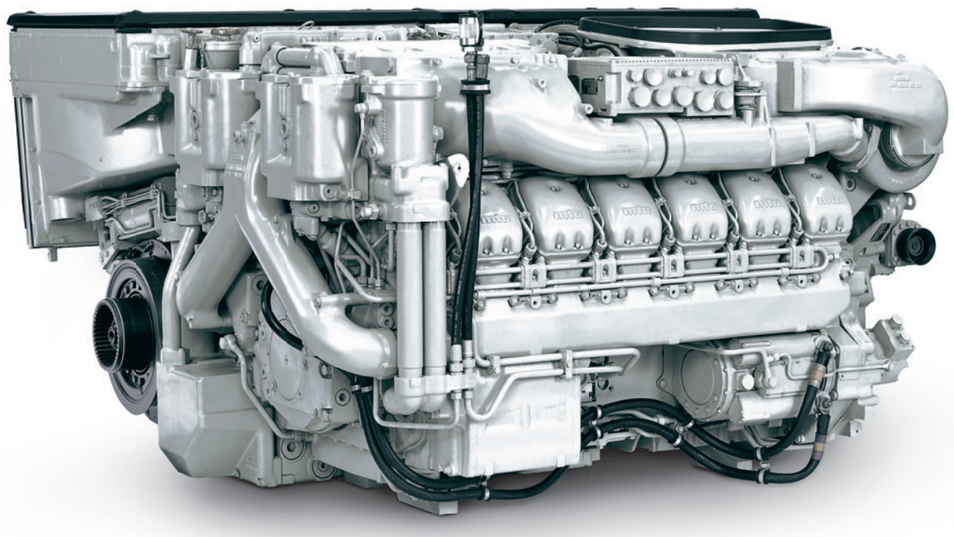
POWERFUL AND AGILE.

The best heavy armored vehicles today are extremely mobile, designed to deliver optimal performance. To do so, they require propulsion systems that are both powerful and compact.

Our Series 880 engines fulfill these requirements in impressive fashion. They have an excellent reputation worldwide for mobility, power density, and reliability.

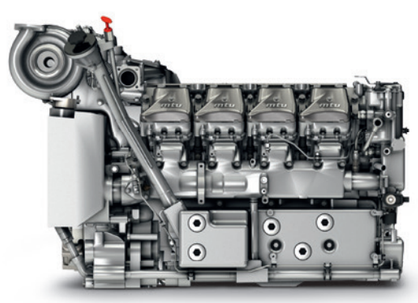
High power density in a compact design
A special position among ***mtu*** PowerPacks® is held by the ***mtu*** EuroPowerPack based on a Series 880 engine (MT 883) with a nominal power from 1,100 kW (1,496 hp) to 1,200 kW (1,631 hp) – a drive system developed for the third generation of main battle tanks (MBTs) over 60 tons.

Standout features
- The most compact drive unit in its power class for MBT applications due to the integration of the components into one system, thereby also minimizing the weight
- The ***mtu*** EuroPowerPack® combines an MT 883 engine with a Renk HSWL 295 TM transmission and is designed principally as a rear-drive unit
- Power is transmitted to the gearbox by way of a transfer gearbox mounted parallel to the engine, thus greatly reducing the overall length
- Designed for harsh environmental conditions and proven in thousands of operating hours
- Most popular PowerPack for next-generation MBTs

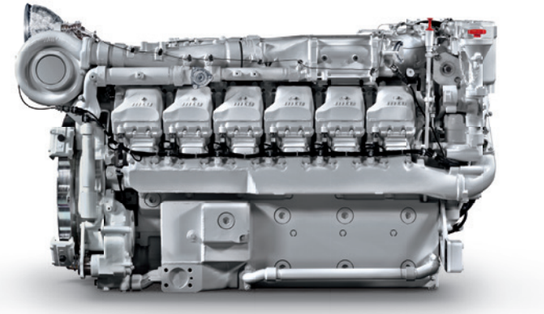


mtu **PowerPack® based on a Series 880 engine.**
The most powerful PowerPack for heavy vehicles.

Series		880				
Engine model		MT 881 Ka-500	MT 881 Ka-501[1]	MT 883 Ka-500	MT 883 Ka-501	MT 883 Ka-524*
Cylinders		8	8	12	12	12
Power output	kW	735	800	1,100	1,200	2,016
	hp	1,000	1,088	1,496	1,631	2,741
Speed	rpm	2,700/3,000	2,700/3,000	2,700/3,000	2,700/3,000	3,300



8V 881
Combining high performance (735 kW / 1,000 hp and higher) with extreme power density, Series 881 engines are ideally suited for heavy vehicles.



12V 883
Rated up to 1,200 kW (1,631 hp), Series 883 engines take compact and reliable engine performance for heavy vehicles to a new level.

[1] Common rail
* For amphibious vehicles

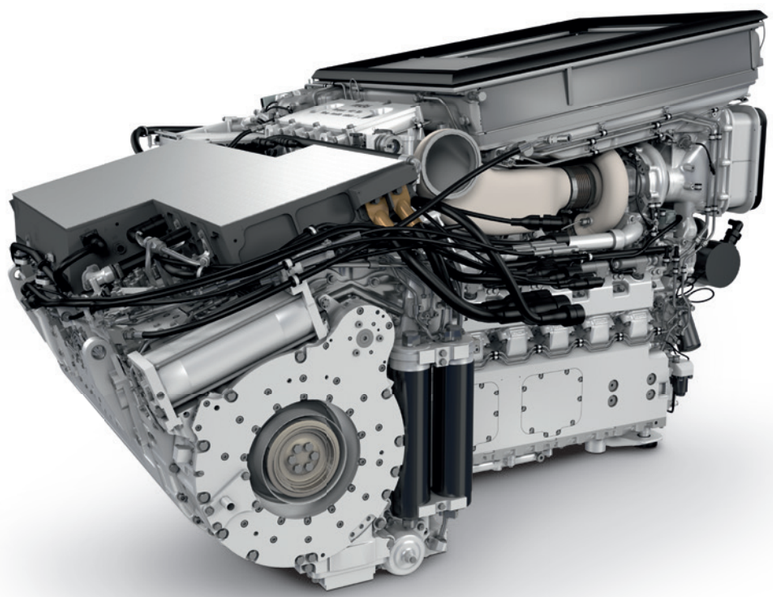
mtu PowerPack®

COMPACT, HIGHLY INTEGRATED, AND EXTREMELY FLEXIBLE. 06

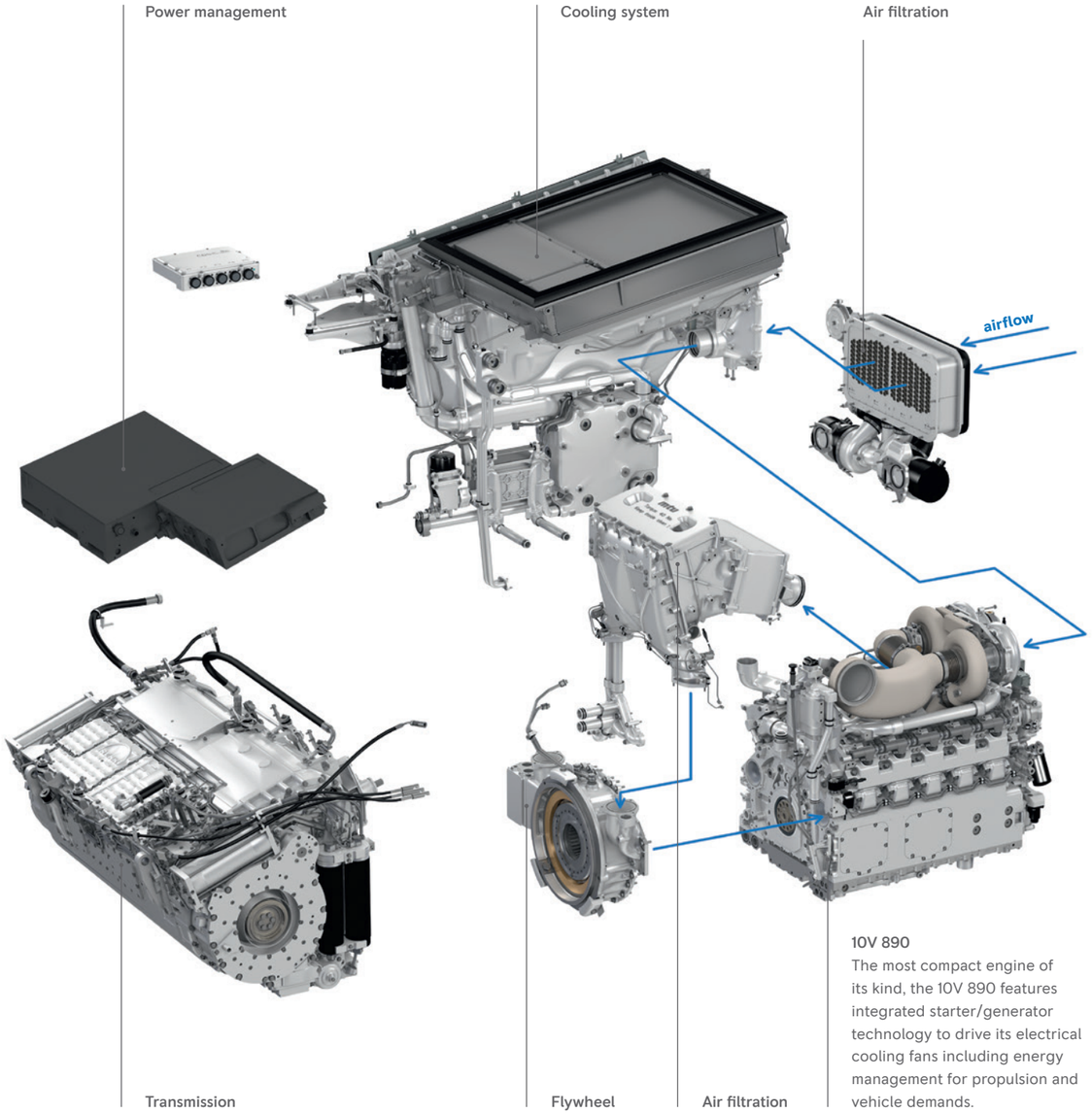
Decades of experience gained from numerous projects carried out around the world have led to extraordinary drive systems: the ***mtu*** PowerPacks®, consisting of engine, transmission, cooling system, air filtration, energy system, preheating equipment, power management, and vehicle integrated features. Compact, highly integrated, and extremely flexible, this drive solution can be precisely tailored to the respective vehicle and mission profile.

Key features

- All drive system designs and components come from a single source, ensuring that each component is perfectly integrated for reliability and optimal performance
- We collaborate with vehicle manufacturers to perfectly integrate subsystems during the ***mtu*** PowerPack® development phase
- Consideration of specific customer requirements, including reliable operation in extreme conditions, occurs from the beginning
- Interfaces are reduced thanks to the optimal system integration of the ***mtu*** PowerPack®
- Every ***mtu*** PowerPack® is delivered ready to be installed into the vehicle, thanks to quick and easy plug-and-play technology.
- Self-locking mountings are a key advantage of the ***mtu*** PowerPack®
- The systems are subjected to rigorous testing by us under simulated environmental conditions before shipment.
- For testing purposes, entire ***mtu*** PowerPack® systems can be operated outside of the vehicle even under load
- From the project start, we are the single contact and partner for logistics and service
- ***mtu*** PowerPacks® may also be efficiently used to retrofit existing vehicles in addition to powering new ones
- Replacement of the original drive system with an ***mtu*** PowerPack® prolongs the service life of a weapons system and increases combat efficiency
- Integrated starter generator (ISG)



mtu PowerPack®
based on a Series 890 engine.
The most compact PowerPack in the world.



10V 890
The most compact engine of its kind, the 10V 890 features integrated starter/generator technology to drive its electrical cooling fans including energy management for propulsion and vehicle demands.

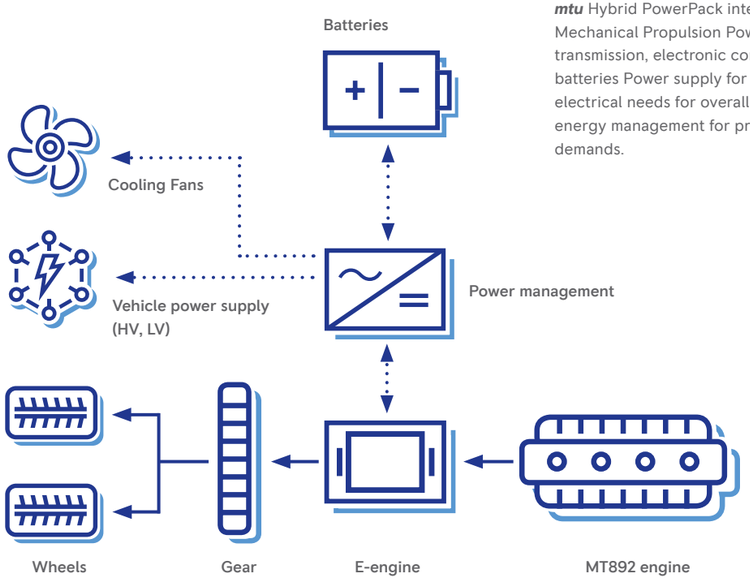
Advanced technologies

HYBRID COMPENTENCE

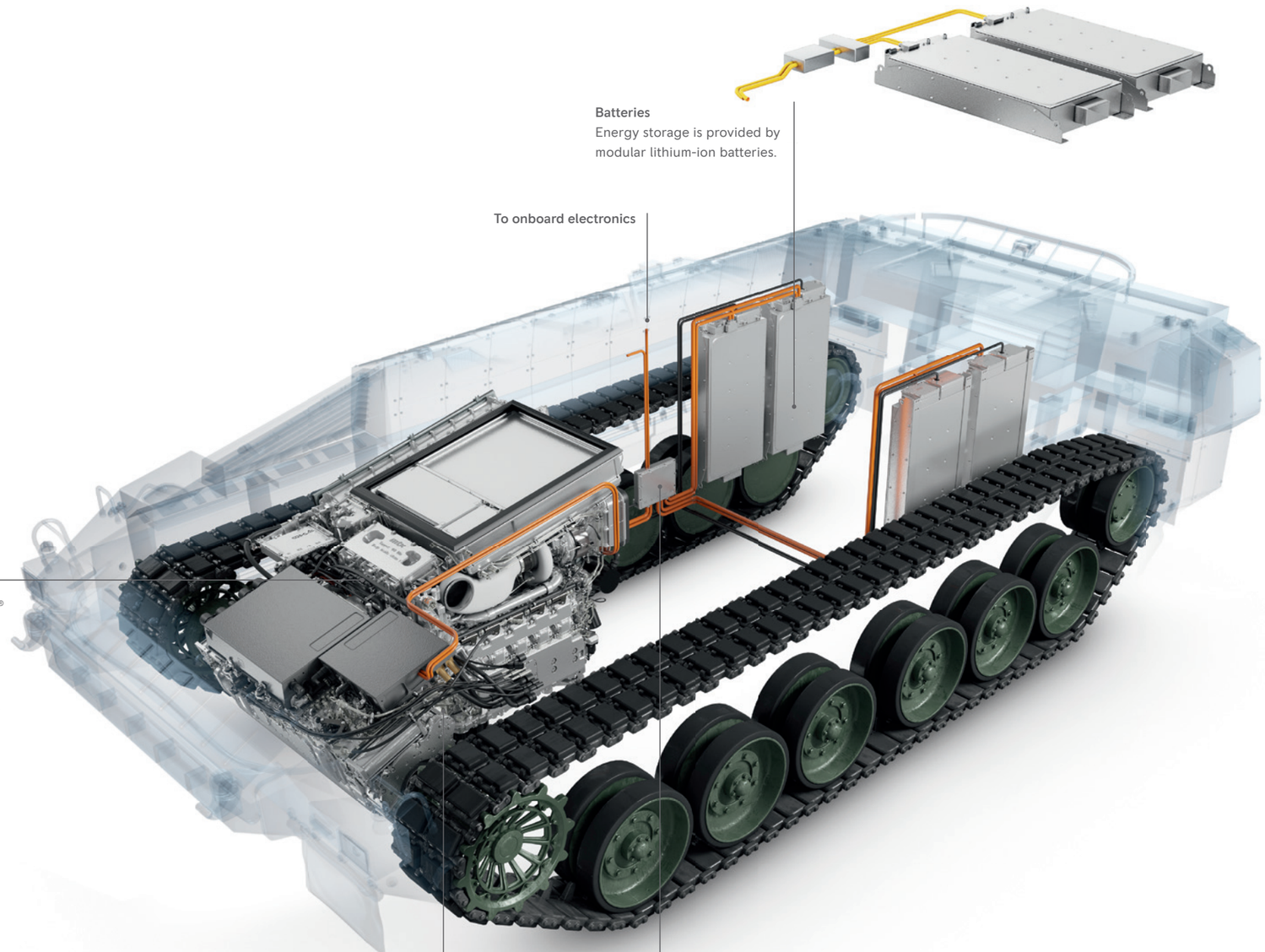
We have extensive experience in the hybridization of land defense vehicles. We offer a complete portfolio of highly integrated hybrid propulsion system solutions specifically designed for military vehicles.

Advantages of hybrid solutions in military applications
- Silent operation modes (e.g. silent move and silent watch) offer tactical advantages
- Lower fuel consumption: peak power is supported by electric supply, enabling recuperation of energy during driving and braking
- Higher volumetric efficiency of mobility and energy systems
- Redundancy of mobility systems (diesel and electric motor)
- Improved lifecycle costs through better energy management
- High integration flexibility

Example for serial hybrid system architecture



Power generation system ***mtu*** Hybrid PowerPack® based on a MT892 engine, 6-speed transmission, HV starter/generator, power electronics, AC/DC converter, and electric fan drive – the ***mtu*** Hybrid PowerPack integrates it all into one: Mechanical Propulsion Power, Cooling of engine, transmission, electronic components and batteries Power supply for mechanical and electrical needs for overall vehicle including energy management for propulsion and vehicle demands.



Lifecycle solutions

OUR MISSION: OPTIMIZE YOUR FLEET AVAILABILITY AND UPTIME.

08

Integrated Logistics Support
Designed to meet the unique challenges of military operations, Integrated Logistics Support (ILS) offers customers a customized package that includes analysis, spare parts, training, technical documentation and more. ILS is our tool to keep your ***mtu*** equipment up and running at the highest level of availability and reliability.

Integrated Logistics Support includes:
- RAM / LCC analysis
- Tailored maintenance parts kits
- Training on all engines and ***mtu*** PowerPacks®
- Technical documentation
- Workshop and test bench solutions
- Service units
- Highly trained and flexible technicians

Customized Support Solutions
When you have a mission to fulfill, a powerful partner committed to helping you is important. Customized support solutions make it easy to optimize reliability, maximize uptime and devote more time and resources to focus on your core operations.

Designed to fit your unique needs, these tailored solutions help you to:

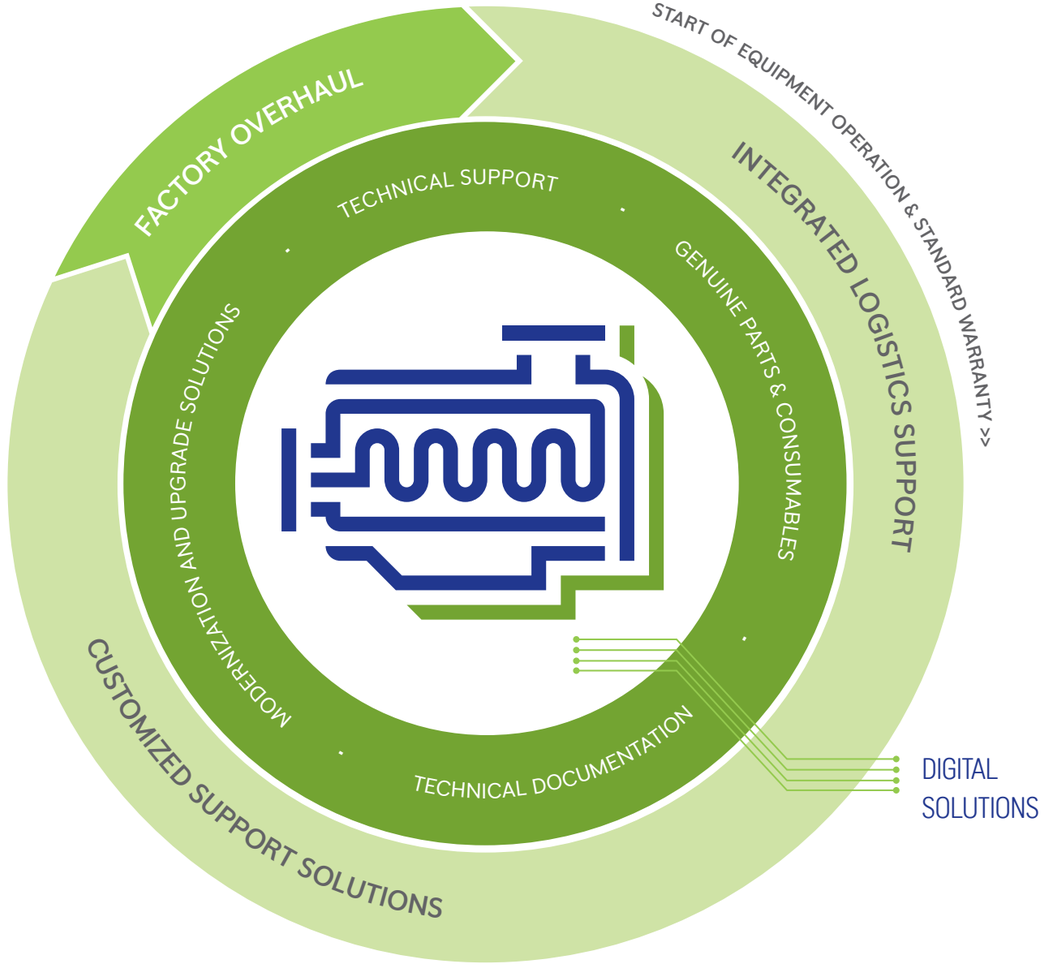
- Increase availability, reliability and operational uptime
- Guarantee parts availability, and service quality
- Long-term budget estimate up to several years
- Optimize maintenance planning
- Be connected, 24/7 support

Factory overhaul
mtu engines are built to last thanks to our high engineering standards and unwavering commitment to service and support. After a long and productive life, our factory overhaul can further extend it. Provided by the same experts who built the original engine, a factory overhaul restores it to like-new condition – delivering the same high standards of performance, service, life and quality as comparable new products.

- Full factory warranty of the overhauled engine up to 12/18 months
- Fixed pricing options available or on time and material basis
- Complete reworking of all components by original manufacturer/ specialist department – e.g. crankshaft by OEM
- New design and model-related updates incorporated
- Comprehensive packages for complete systems, including gearbox, coupling, etc.
- Rigorous dynamometer testing under simulated customer-specific operating conditions

On-site support
mtu sets the standard for comprehensive product and customer support. Wherever you are, we are there to support you with tailor-made solutions on your site. Be it...

- Facility planning
- Workshop solutions
- Test bench solutions
- Service Units (mobile, flexible usage at site of operation)



Lifecycle solutions

GENUINE SPARE PARTS

Only we can guarantee genuine spare parts that are designed, tested and approved specifically for ***mtu*** & Detroit Diesel 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*** & Detroit Diesel genuine spare parts:

- Engineered to secure high engine reliability and availability
- Value sustainability of your equipment / the only parts that live up to ***mtu*** 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.

TECHNICAL DOCUMENTATION

Our high-quality technical documentation is easy to understand and available at the right time, in the right place and in proper format.

The ***mtu*** technical documentation can be individualized to specific propulsion system configuration in order to support the optimal fleet availability by providing the appropriate technical specifications for seamless operations on board and onshore.

Our scope: Manuals for Operation, Maintenance, Repair and Workshop, Spare Parts Catalogs

- Available in all standard structures and formats
- Fulfills specifications: ASD S1000D, ASD S2000M
- Material number codification in accordance with the customer standards for the entire lifecycle

Configuration Management
Configuration management at ***mtu*** fulfills ISO 10007, STANAG 4159 and JSP886 in terms of content. Monitoring of design status and obsolescence to ensure supply availability and increase system availability with annual reports and updates of technical documentation. Logistic processes are ensured.

Scope of supply:
Configuration management plan, obsolescence management plan, change memos if required, yearly reports and updates of technical documentation.

Interactive 3D Technology
New 3D visualization technology for systems, engines and components is available and fully interactive offering support for trainings with state-of-the-art technology for greater efficiency and clarity.

3D animated Maintenance Tasks
Animated step-by-step support for execution of maintenance and repair tasks.
Format: HTML

Augmented Reality
AR for maintenance task descriptions with supportive functions and information.

NOTES

NOTES

Subject to change. | 1612001 4 | Edition 01/23 | BMC 2023-08 | Printed in Germany on chlorine-free bleached paper.

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