



Land Defense

EXPERIENCE. INNOVATION.
PARTNERSHIP.



A Rolls-Royce
solution



CONTENTS

01 Sustainable Power that matters	04 - 05	Drive systems for medium and heavy vehicles Powerful and flexible.	18 - 19
02 Core competencies We supply far more than just best-in-class drive systems.	06 - 07	Drive systems for heavy vehicles Powerful and agile. Tried-and-tested	20 - 21 22 - 23
03 System overview A lifetime of strong support.	08 - 09	06 PowerPack Compact, highly integrated, and extremely flexible.	24 - 25
04 Application overview Covering the complete land defense spectrum.	10 - 11	07 Advanced technologies Hybrid competence.	26 - 27
05 Drive systems overview The full power range.	12 - 15	08 Service Solutions	28 - 31
Drive systems for light and medium vehicles Powerful and robust.	16 - 17		



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.

A passionate and reliable partner

We at Rolls-Royce spend every day working together with our customers, to deliver engines, systems and complete lifecycle 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.

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.

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

50

ARMIES WORLDWIDE.



1 IFV Puma
MT 892 Ka-501, 800 kW (1,088 hp)

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

2 Leopard 2 A7
MB 873 Ka-501, 1,100 kW (1,500 hp)



Core competencies

WE SUPPLY FAR MORE THAN JUST BEST-IN-CLASS DRIVE SYSTEMS

02

Whether for defense and protection, combat, or support, military vehicles fulfill many mission-critical functions and tasks. Our engines and drive systems are designed for peak performance. With over 60 years of experience in designing and developing drive 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 drive 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 drive 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 4x4 wheeled vehicles or heavy main battle tanks, for highly customized solutions or retrofit integration on existing vehicles, we deliver complete drive 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 drive system experience, qualifications, and capabilities. From day one, our application engineering team can provide comprehensive project support for:

- Endurance and drive system tests, cold starts, forging, and slope tests on our specialized test benches
- Full vehicle integration
- Reducing design costs

Every drive system is:

- Subjected to rigorous testing at our testing facilities
- ISO 9001:2008 certified

Military specifications

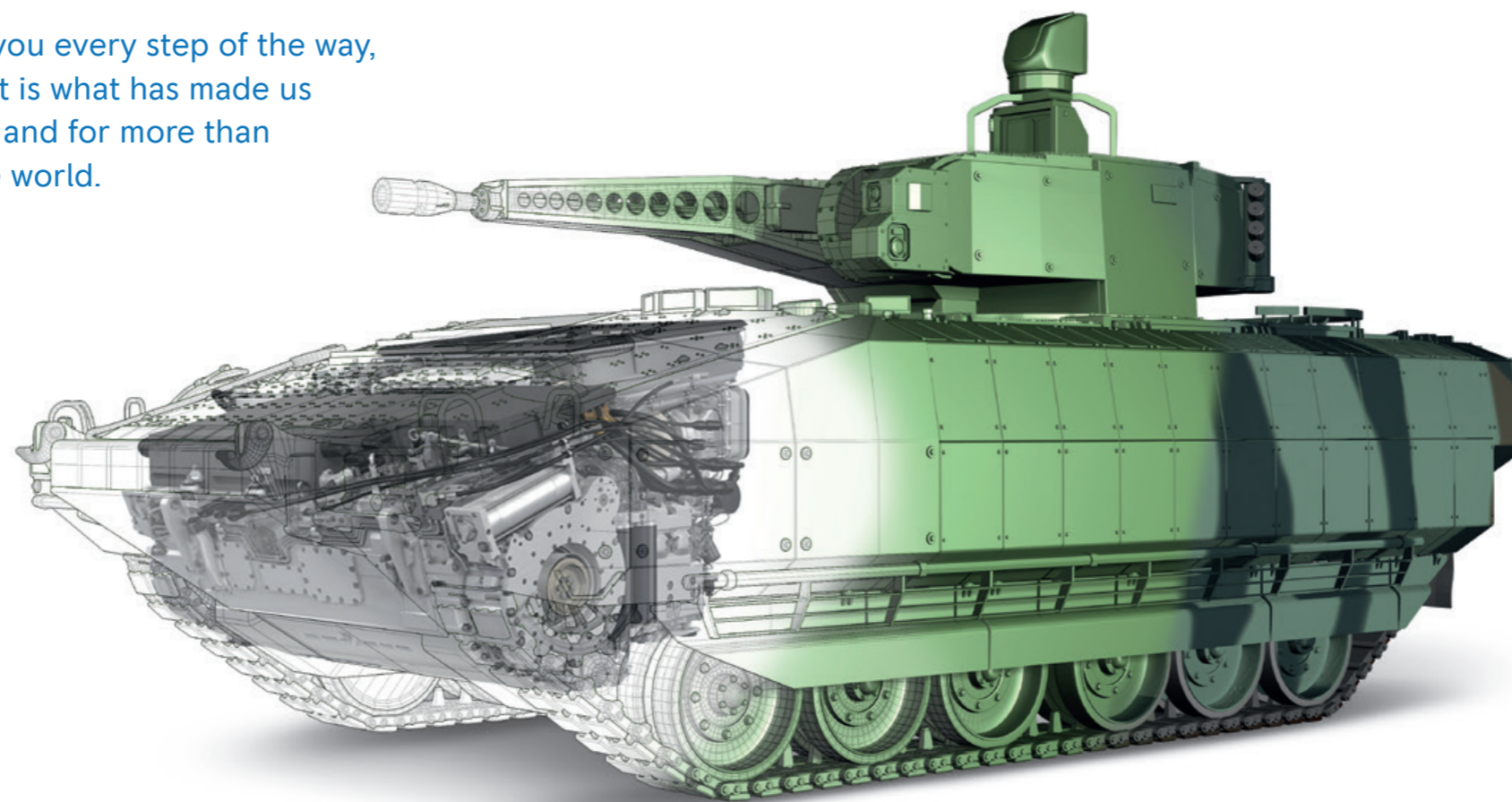
Whatever the specific military requirements call for, we fulfill them with excellence:

- 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

**mtu Service Solutions**

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

- Enjoy peace of mind with maximizing asset performance and reducing operational risks
- Extending equipment life and reducing costs while protecting the environment
- Expert service from a reliable partner to keep operations running smoothly

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

Integration

Customizing drive 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
- Offset and license production agreements needed to fulfill specific requirements for technology/knowledge transfer for local production

Application overview

COVERING THE COMPLETE LAND DEFENSE SPECTRUM

04

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

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 waterbodies and ravines.

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

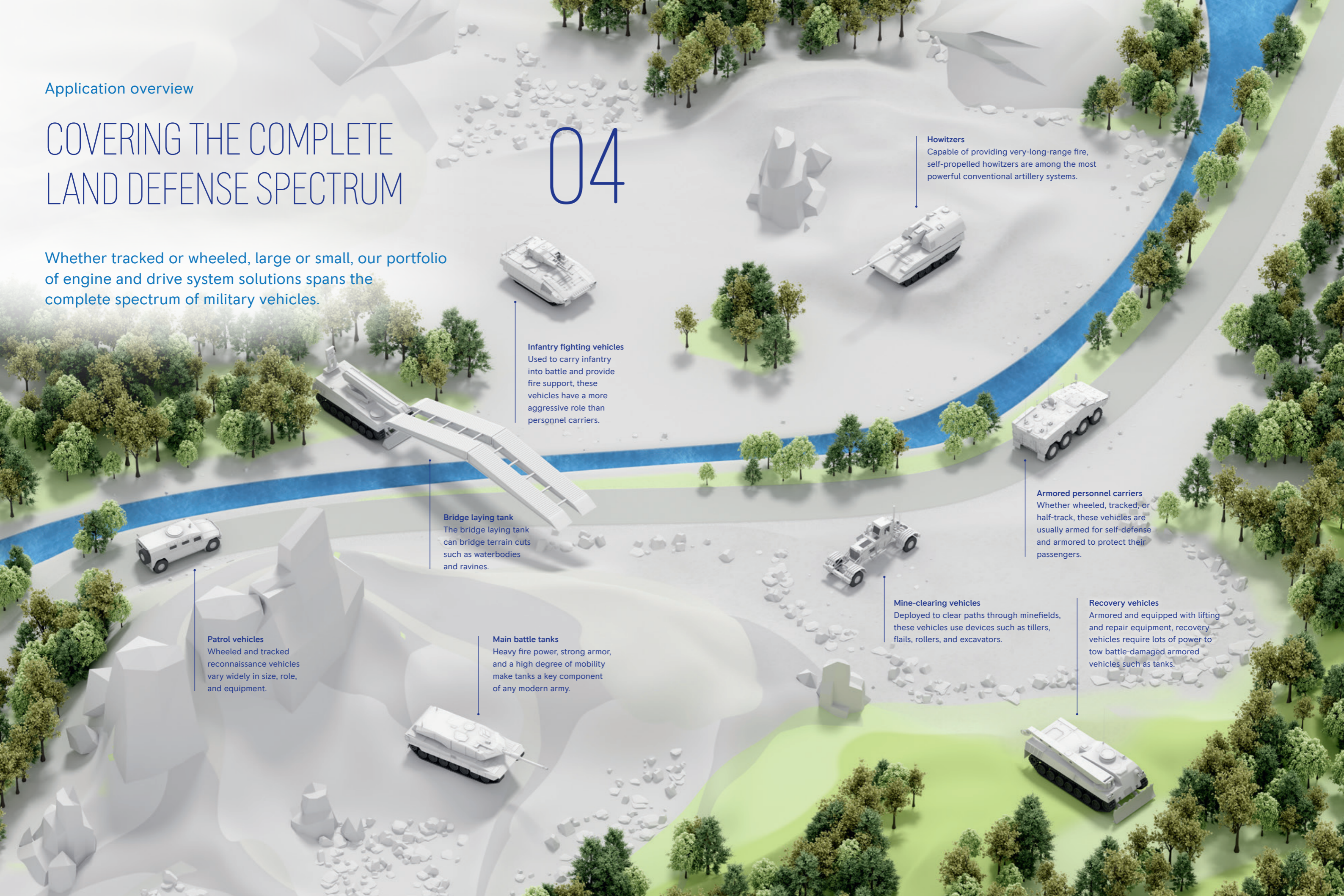
Main battle tanks
Heavy fire power, strong armor, and a high degree of mobility make tanks a key component of any modern army.

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

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

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.



Drive systems overview

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

05





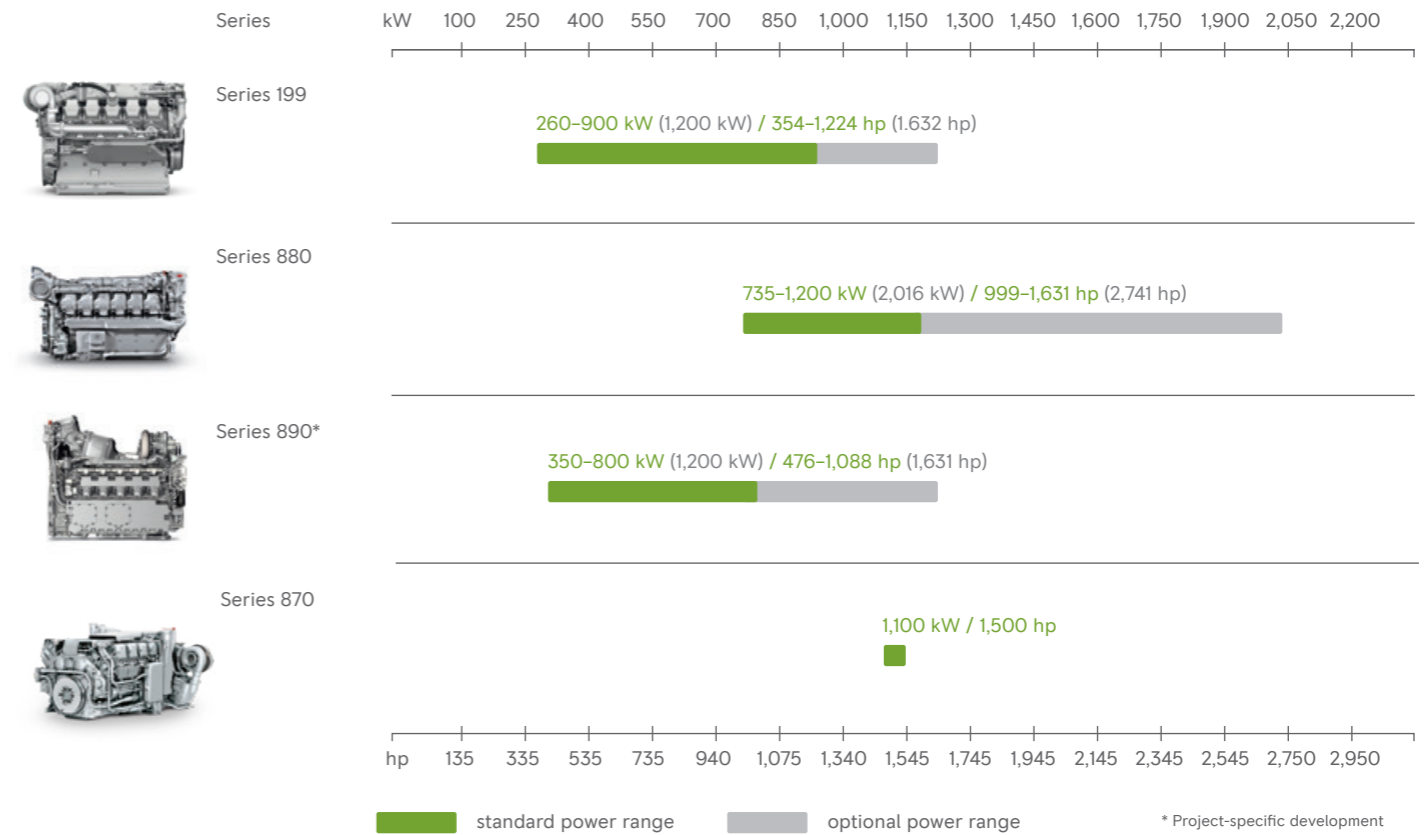
mtu systems deliver proven performance for diverse land defense vehicles – more than **20,000** AND COUNTING.



Drive systems 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 260 to 2,016 kW (354–2,741 hp).



1 Leopard 2
MB 873 Ka-501, 1,100 kW (1,500 hp)

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

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

Drive systems for light and medium vehicles

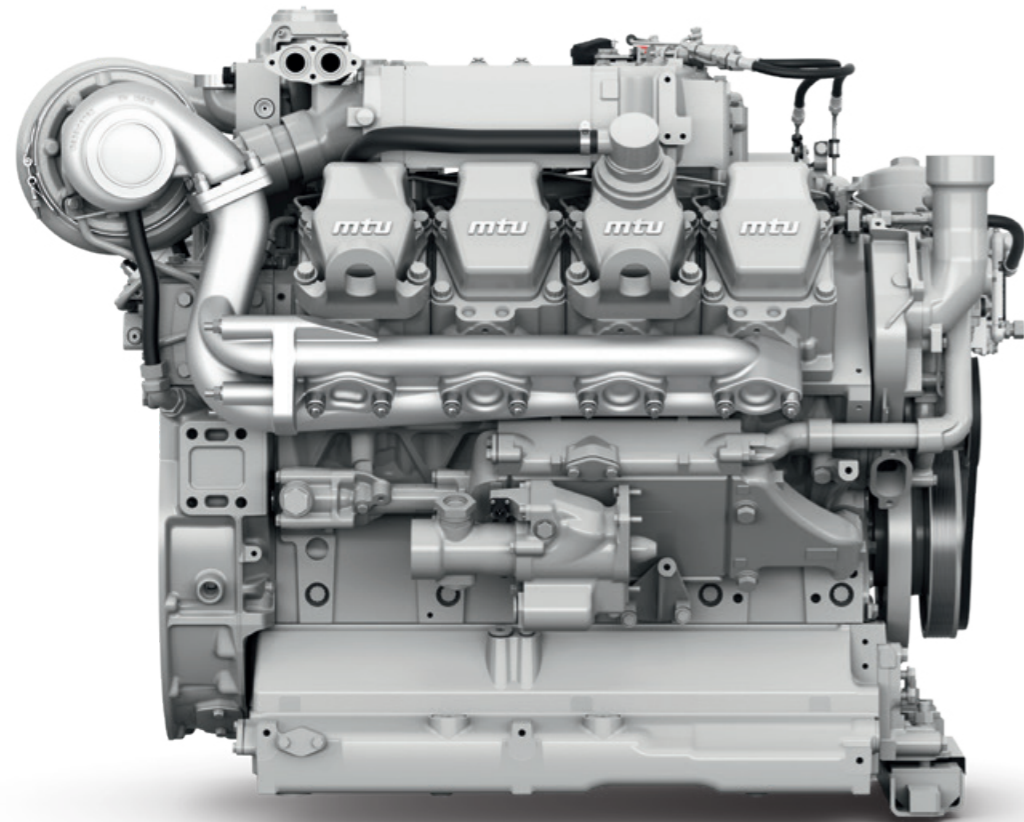
POWERFUL AND ROBUST

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 drive 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

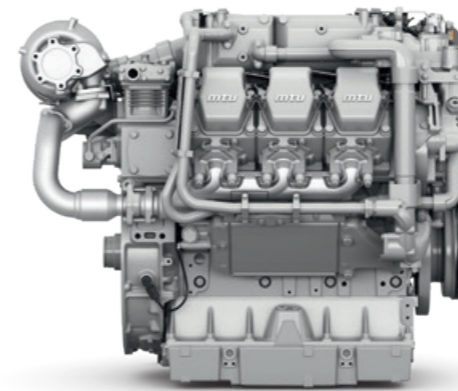
- Available in several power ranges
- Low fuel consumption
- Compact dimensions and a high power-to-weight ratio to reduce volume and weight
- Maximum vehicle maneuverability, acceleration, and mobility
- Highly reliable, robust, and proven technology



mtu 8V 199

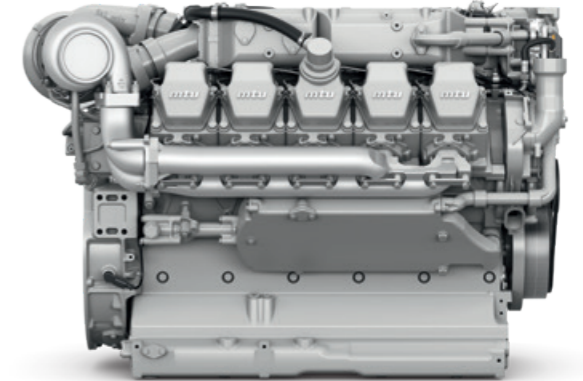
Series		199						
Engine model		6V 199 TE20	6V 199 TE21	6V 199 TE22	8V 199 TE20	8V 199 TE21/22	8V 199 TE23	10V 199 D04
Cylinders		6V	6V	6V	8V	8V	8V	10V
Power output	kW	260/335	430	460/480	530	530/600	800	900/1,200*
	hp	354/455	584	625/653	721	721/816	1,090	1,224/1,632*
Speed	rpm	1,800/2,100	2,200	2,100	2,300	2,100/2,300	2,300	2,300/2,600

* Potential power output



mtu 6V 199

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



mtu 10V 199

The most powerful engine in this power range.

Drive systems for medium and heavy vehicles

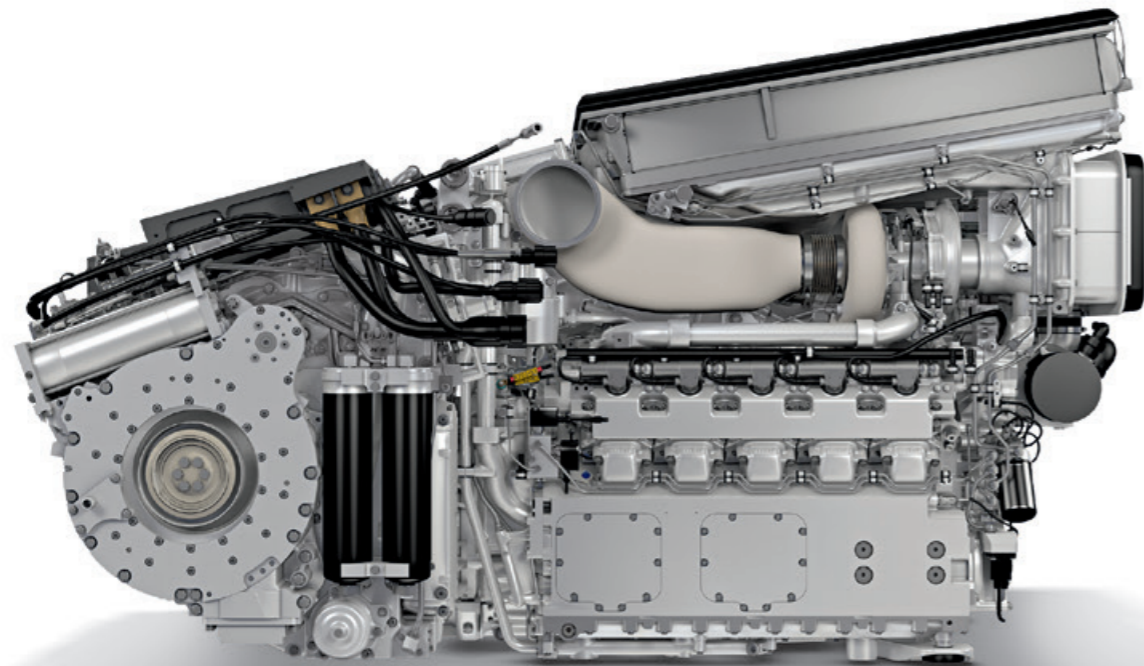
POWERFUL AND FLEXIBLE

Benchmark technology

With their fully integrated, extremely light, and compact design, drive 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

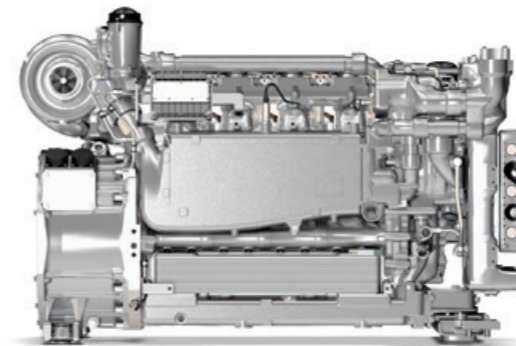
- Low fuel consumption through common-rail injection system
- Compact dimensions and a high power-to-weight ratio to reduce volume and weight
- Maximum vehicle maneuverability, acceleration, and mobility
- Highly reliable, robust, and proven technology



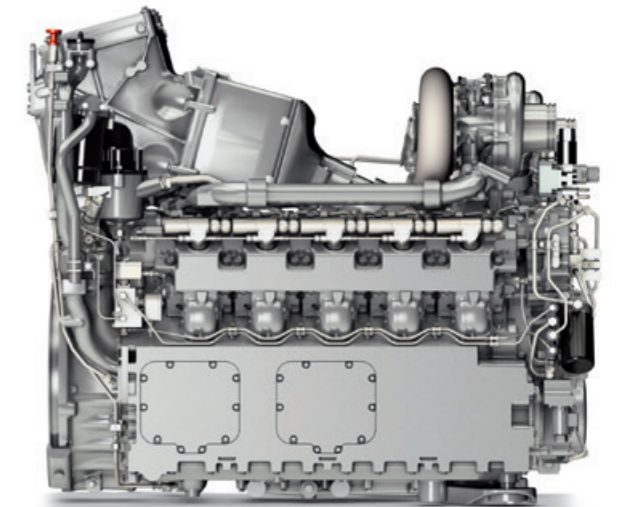
NO.1
in power-to-weight
and power-to-
volume ratio.

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

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			



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



mtu 10V 890
The most compact engine in this power range, the 10V 890 features integrated starter/generator technology to drive its electrical cooling fans.

Drive 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 drive systems that are both powerful and compact.

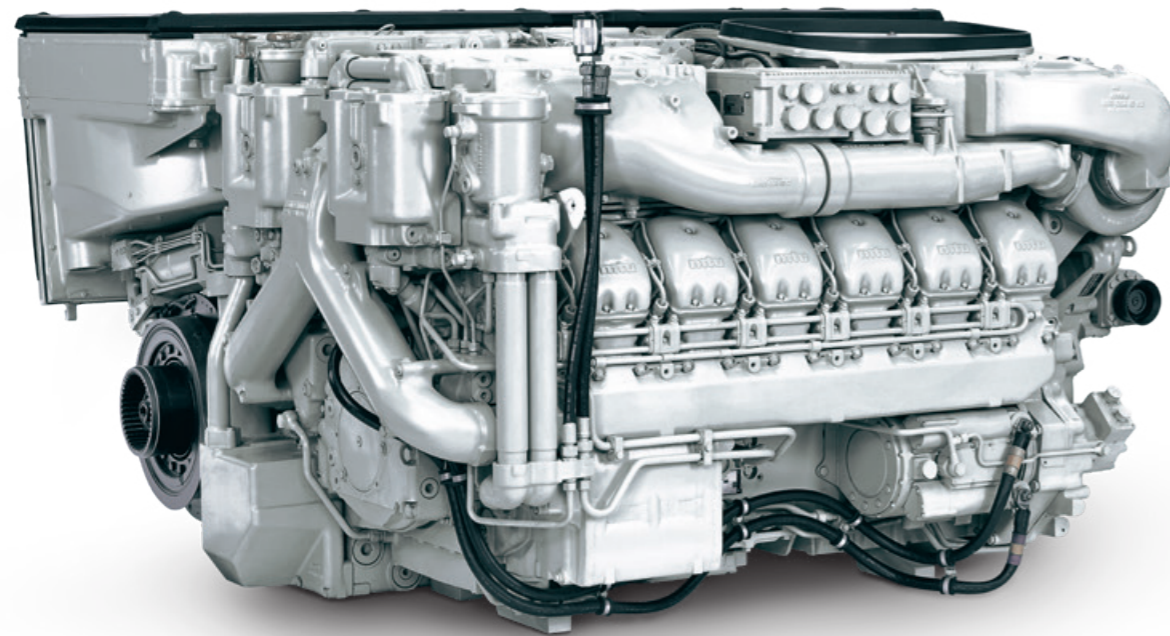
Our Series 880 engines fulfill these requirements in impressive fashion. They have an excellent reputation worldwide for mobility, power density, and reliability.

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.

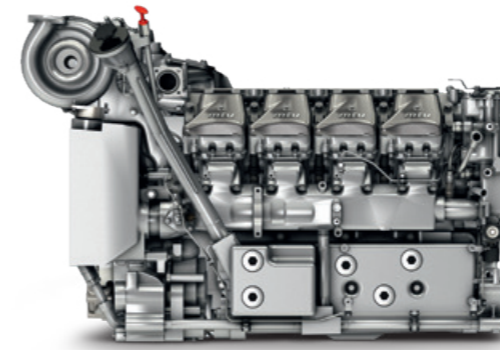
Standout features

- 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



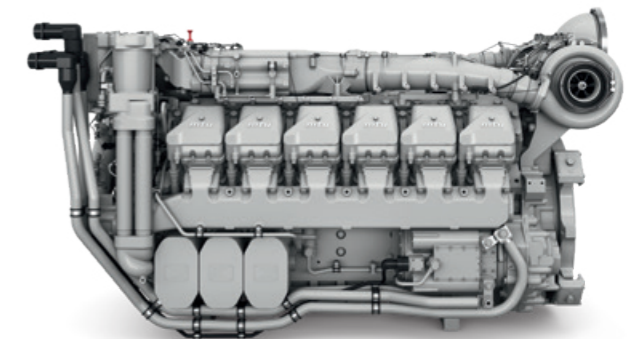
mtu PowerPack based on a Series 880 engine.
The most powerful PowerPack for heavy vehicles.

Series	880						
Engine model	MT 881 Ka-500	MT 881 Ka-501 ¹	MT 881 Ka-502	MT 883 Ka-500	MT 883 Ka-501	MT 883 Ka-524*	
Cylinders	8	8	8	12	12	12	
Power output	kW	735	800	880	1,100	1,200	2,016
	hp	1,000	1,088	1,196	1,496	1,631	2,741
Speed	rpm	2,700/3,000	2,700/3,000	2,700/3,000	2,700/3,000	2,700/3,000	3,300



mtu 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.



mtu 12V 883

Rated up to 2,016 kW (2,741 hp), Series 883 engines take compact and reliable engine performance for heavy vehicles to a new level.

¹Common rail
* For amphibious vehicles

Drive systems for heavy vehicles

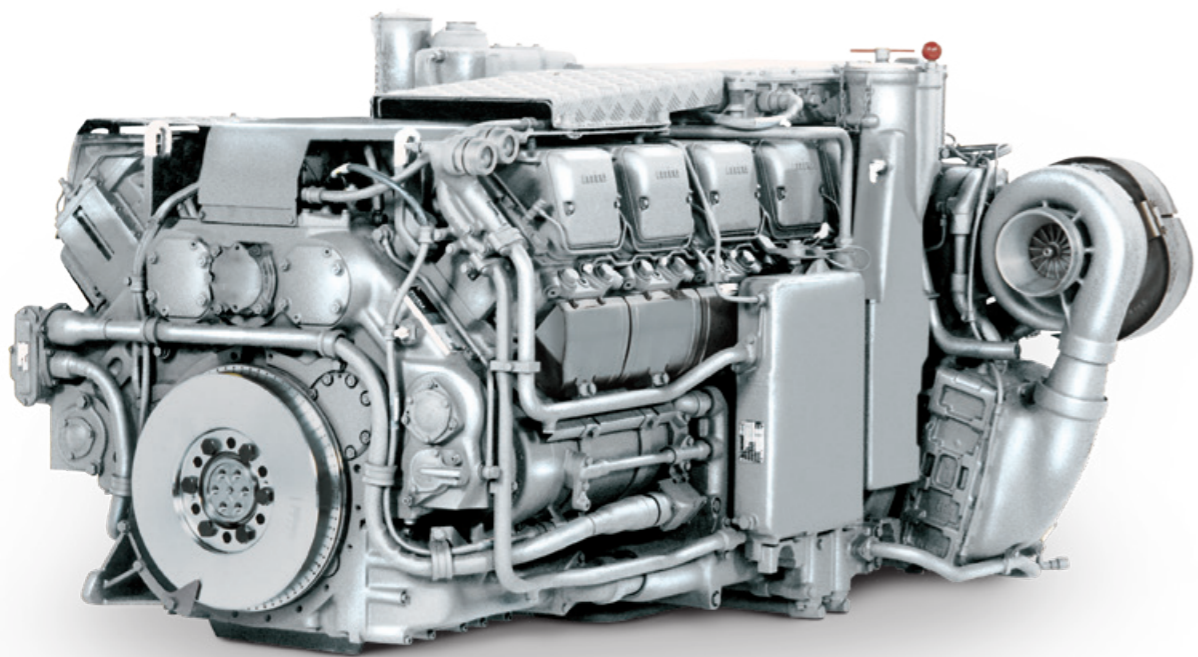
TRIED-AND-TESTED

Proven military-grade performance

In order to produce compact, extremely mobile, and sufficiently armored heavy vehicles, drive systems must be used that are both powerful and compact. The **mtu** Series 870 engines meet these requirements in an impressive way. These engines have earned a worldwide reputation for mobility, power density and reliability in vehicles such as the Leopard 2.

Key features

- Highest power concentration with regard to weight and volume
- Fulfills MIL standards including nuclear hardening and electromagnetic shielding
- Uses state-of-the-art technology such as starter generators and CAN bus communication
- Low fuel and oil consumption due to use of modern engine management and injection systems
- Diesel and single fuel JP capability
- Engines can be equipped with Integrated Starter Generator (ISG)



Series	870	
Engine model	12V 873	
Cylinders	12V	
Power output	kW	1,100
	hp	1,500
Speed	rpm	2,600

mtu 12V 873

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



mtu PowerPack

COMPACT, HIGHLY INTEGRATED, AND EXTREMELY FLEXIBLE

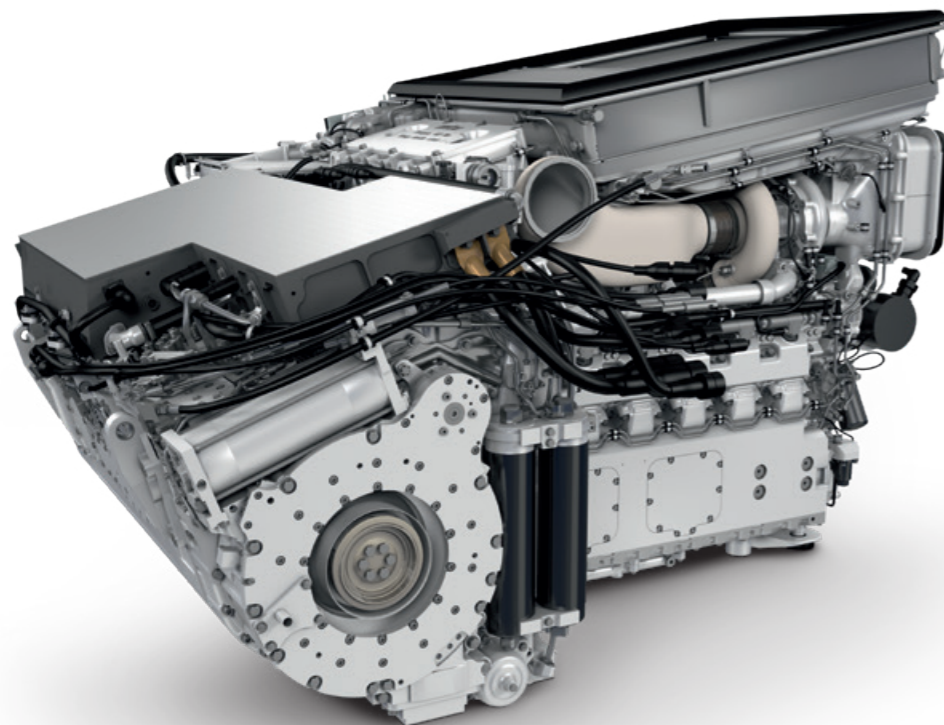
06

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.

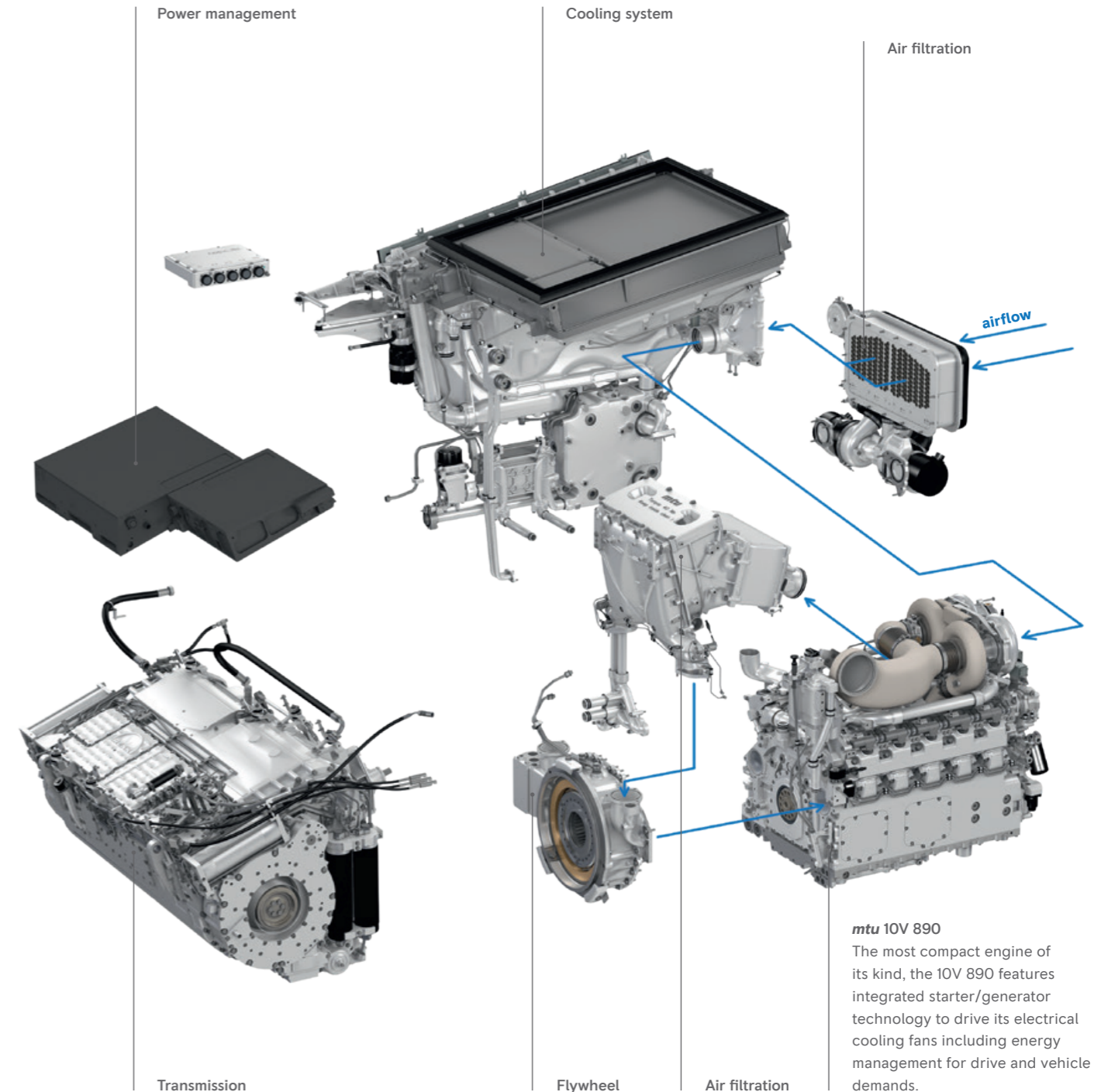
Key features

- 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
- Replacing the original drive system with an **mtu PowerPack** extends vehicle life and increases combat effectiveness
- Integrated starter generator (ISG)



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



mtu 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 drive and vehicle demands.

Advanced technologies

HYBRID COMPETENCE

We have extensive experience in the hybridization of land defense vehicles. We offer a complete portfolio of highly integrated hybrid drive system solutions specifically designed for military vehicles. Our hybrid concept is applicable for all our land defense engines.

Advantages of hybrid solutions in military applications

- Silent operation modes (e.g. silent move and silent watch) offers tactical advantages
- Peak power is supported by electric supply
- 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

HV/LV Batteries

EPMS:
Electronic Power
Management System

Power electronics

Fan

Silencer
for silent move

Service

mtu SERVICE SOLUTIONS – A LIFETIME OF VALUE

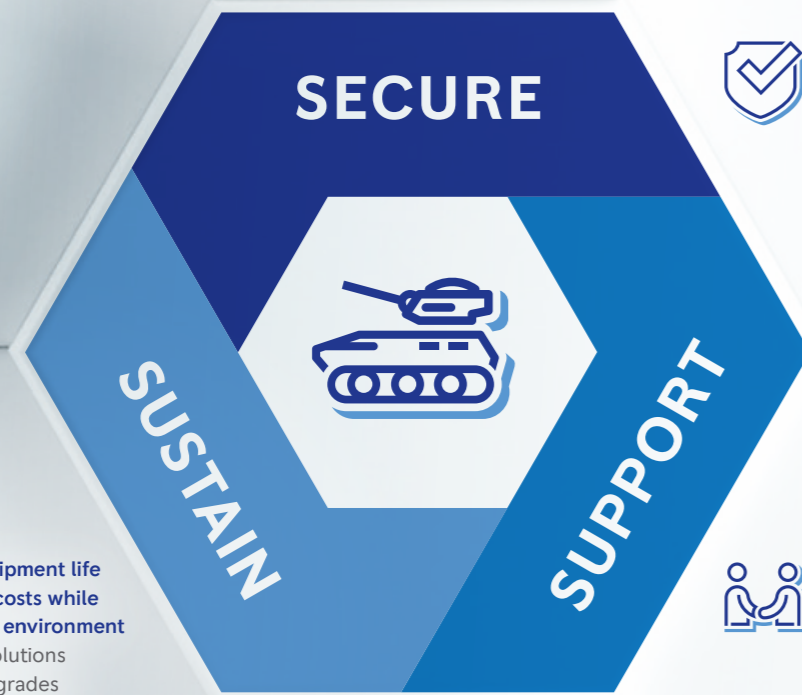
08

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



Extending equipment life and reducing costs while protecting the environment

- Overhaul Solutions
- Lifetime Upgrades
- New Exchange Engine



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

- Integrated Logistics Support



Expert service from a reliable partner to keep operations running smoothly

- Support services
- Genuine Spare Parts & Consumables
- Training
- Maintenance & Repair
- Technical documentation

Secure

INTEGRATED LOGISTICS SUPPORT



Designed to meet the unique challenges of military operations.

Integrated Logistics Support (ILS)

We focus on meeting your unique challenges and ensuring your equipment performs smoothly every step of the way. A customized ILS package of products and services for your specific needs will help you secure uptime and reduce costs.

Our support includes:

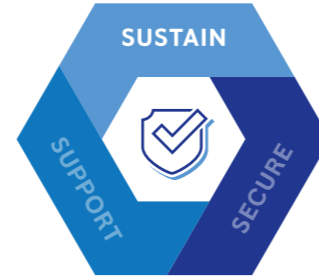
- RAM / LCC analysis
- NATO-Codification
- Technical documentation
- Configuration management
- ASD S3000L, S2000M and S1000D
- Obsolescence management
- Training
- Interactive 3D technology
- Genuine spare parts and consumables
- Augmented reality



Sustain

OVERHAUL SOLUTIONS

For your long-term success: overhaul solutions save time and resources. Our experts restore your original equipment to like-new condition, with the same high standards of performance, durability and quality as the original new product.

**Turn back the clock**

Factory overhauls are provided by the same experts who built your original equipment, using the same rigorous standards as our factory remanufacturing process. As a result, your complete system, including gearboxes, loose parts (oil coolers, etc.) will be fully restored.

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



Support

CUSTOMIZED SUPPORT SOLUTIONS



When you have a mission to fulfill, it is important to have a powerful partner committed by your side. Customized support solutions make it easy to optimize reliability, maximize uptime, and free up time and resources to focus on your core operations.

For your *mtu* equipment, we set the standard for comprehensive product and customer support. Wherever you are, we are there to support you with tailor-made solutions.

Our support offers you:

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



Stay posted with more powerful information
and follow **mtusolutions** under:



Rolls-Royce Group
www.mtu-solutions.com

The Rolls-Royce name, Rolls-Royce badge and Rolls-Royce monogram logos are registered Trade Marks of Rolls-Royce plc