Mining

Designed for the future. Built for your success.

Power. Passion. Partnership.

Contents

1 **Technological leader**
As a supplier of high-quality, performance drive solutions, MTU stands for the highest level of technological expertise.

2 **Passion**
MTU is passionate about fulfilling the needs of its customers with the utmost professionalism and precision.

3 **Partnership**
MTU is a reliable and trend-setting partner which acts with foresight in a results-oriented manner.

A customer-oriented technological leader.

MTU supplies its customers with technologically-advanced products that are proven in the field. MTU's range of products and services for off-highway applications is extensive and includes both standard and customized solutions.

MTU is the core brand of Rolls-Royce Power Systems AG, which is a world-leading provider of high- and medium-speed diesel and gas engines, complete drive systems, distributed energy systems and fuel injection systems for the most demanding requirements.

The product range of MTU is one of the widest and most modern in the sector. We offer comprehensive, powerful and reliable engine solutions for yachts, commercial ships and naval vessels, construction and industrial vehicles, agricultural machinery, mining, rail and military vehicles as well as for the oil and gas industry. We also provide a full line of service products to help you maximize uptime and performance.

For over 100 years, MTU has been known for cutting-edge innovation and technological leadership. That same spirit of innovation inspires our sustainability efforts. Today and in the future, our focus is on developing and implementing system solutions to maximize efficiency and meet emissions standards.

An expert in technology
MTU has always set standards in technological expertise for customized product and system solutions. To deliver you maximum power density, we concentrate our innovation on the continuous advancement of our core competencies: fuel injection, turbo charging, exhaust aftertreatment and electronics.

A passionate engine specialist
We spend every day working together with you, our customers, to deliver engines and systems that best fit your needs. Whether a standard system or a customized solution – we are passionate about the art of engine creation.

A reliable partner
We understand the specific demands for diverse applications. In collaboration with you, we look for the solutions which are best suited to your individual requirements. Every step of the way – from the start of project planning, during the design of your integrated system solution, at the point of delivery and commissioning and continuing through the care of your product – we are there with you for the entire lifecycle.

Photo: Sandvik

Power for Mining

The power to take you forward.

Mining has its own laws and challenges. Huge stretches, immense masses, extreme temperatures, unimaginable tasks: Whoever wants to prove themselves in these situations – whether human or machine – must be strong, hard, tough, and persevering. A challenge that only a few master. We are amongst them.

Fully tried and tested
Our engines have a long history of proving themselves in mining applications around the globe. Day in and day out, under extreme conditions, in hard continuous operation.

As leaders in quality and tested in practice a thousand times over, our engines first of all feature impressive reliability and availability. Furthermore, low life cycle costs due to effective operation, low fuel consumption, long TBO intervals characterize MTU engines, just as much as environmentally friendly operation.

Keep going
Our commitment to mining customers extends beyond the sale of our engines and systems. Through MTU **Value**Care we offer a full line of products and services designed to ensure maximum performance, uptime and value. And our global service network is available to provide expert support wherever you are.

Everyday heroes tackle the toughest challenges.

No job is too heavy
Heights at which the air is perceptibly thin. Shimmering heat by day, icy cold at night. Constantly swirling dust, moisture that penetrates everything, steep hillsides on which heavy loads need to be moved. The conditions that dump trucks with MTU engines brave on a daily basis are beyond doubt the toughest in the world.

In an environment that places the highest demands on technology, vehicles run around the clock with minimal downtime – continually at full capacity.

Benchmark technology
The combination of a rugged engine enhanced by a second-generation common-rail fuel system, refined engine management and a practical arrangement of the air and exhaust system makes our dump-truck engines a benchmark for these extreme applications. The most important advantages are built in: high torque at low engine speeds yields tremendous engine power.

The robust, individually adapted technology of MTU engines assures the highest availability of these vehicles which play an integral role in working the mine. Furthermore long maintenance intervals, maintenance-friendly designs, and low specific fuel consumption values keep life cycle costs low.

Our comprehensive, worldwide service network ensures the highest reliability, availability and optimal maintenance.

Engines for Dump Trucks 200 – 400 t

Going the distance with the heavyweights.

Ready for the challenge
Dump trucks are becoming bigger and faster. Nowadays, they have to transport payloads up to 500 tonnes – an extreme challenge for the engines in these ”heavy-weights.”
But it is a task that our super heavy-duty diesels cope with convincingly every day. Their mountains of power make sure that the vehicles they drive can carry larger loads and handle steeper terrain than the competition. With the end result that they deliver higher productivity.

Technology makes the difference
The fact that our engines remain comparatively ”agile” throughout the entire performance map, despite their enormous power, is a tribute to the technological genius of our designers and developers.
The same can be said of their advanced combustion technology: it makes our engines cheaper to operate, cleaner and quieter than most others. Three benefits that make a difference – economically and ecologically.

Carrying it all away.

Non-stop performance
They transport valuable raw materials such as coal, iron, and copper ore. They move massive amounts of dirt. And they transport almost unimaginable amounts of material to the places where it is processed. In short: Contemporary mining would not be possible without the tremendous power of wheel loaders, dozers and excavators.

The powerful machines driven by our engines work with top reliability – and high productivity. Power packs like our brawny Series 4000 can run at their limit with practically no breaks. For loaders and dozers this means that they can work continuously at full power, and excavators can achieve the fastest load cycles – even with maximum loads. Despite continuous operation the running costs remain low.

As tough as you are
MTU engines are known as some of the lowest-consumption engines in the world. Furthermore, maintenance is so uncomplicated that your vehicles are fully operational again in record time.

Robust, stable, and cost-effective: These are the attributes that make our engines your best choice. In a vehicle fleet that demands as much as it delivers. And in a competitive field as tough as the environment in which the vehicles work.

Support to keep you going
To help ensure maximum performance and uptime, MTU specialists are ready to provide expert support wherever and whenever you need it.

Engines for Drilling Rigs and Drilling Equipment

Because only the strongest prevail.

Reliable groundwork
Drilling is necessary in every mine – it is a task that should not be underestimated. Regardless of whether you are searching for natural resources or drilling blast holes, we supply engines that allow your drilling equipment to work reliably at high power.

Machines that are subject to extreme burdens over long periods of operation must be able to provide extraordinary power. Our engines make that possible, reliably and without restrictions. With their power, long service lives and cost-effectiveness, they have set standards against which other high-performance diesels have to measure themselves.

Strength and sensibility
Electronic engine management ensures that our engines, with all of their strength, are finely tuned to their tasks. It protects the engine, optimizes performance and simplifies diagnostics and maintenance. Strength and sensibility are combined into the ideal combination that asserts itself everywhere – even under the harshest conditions.

Photo: Sandvik

Photo: Sandvik

Engines for Underground Mining Machinery

The harsher the environment, the stronger we are.

One of the hardest jobs in the world
Underground mining is challenging for both people and machines. Massive drilling equipment is driven through rock while vehicles and machines with heavy loads move around the clock at high temperatures in dust and moisture. Our engines are ideal for these situations.

The excellent power-to-weight ratio is only one of many factors. Reliability, high availability, and the long service life of the engines are also crucial for effective operation. Maintenance-friendly engine designs keep unproductive downtime to a minimum, long TBO intervals and low fuel consumption keep the life cycle costs low – for maximum effectiveness.

Our engines meet the stringent safety criteria of underground mining without restriction.

Power with responsibility
The emissions levels of our engines meet the especially important demands of underground mining. We are leaders in this aspect as well: Modern injection technologies and continually optimized combustion processes make our engines as environmentally friendly as possible. So they comply with EPA Tier 4 final/EU Stage IV emissions regulations.

Worldwide support. Above and below ground.
The performance of your MTU engines and systems is crucial for your success and competitiveness. No matter where you operate, even underground, MTU specialists are available through our global service network to provide expert support.

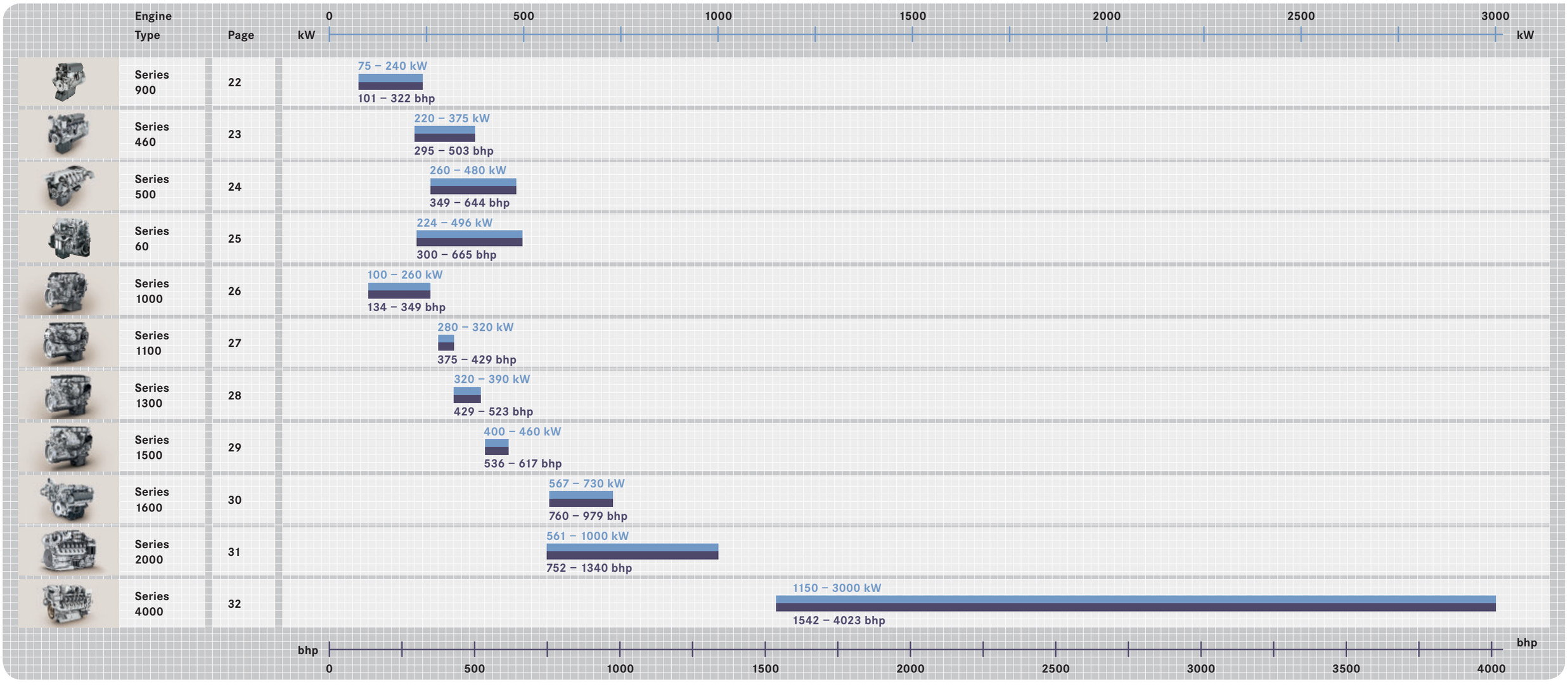
Designed for the future. Built for your success.

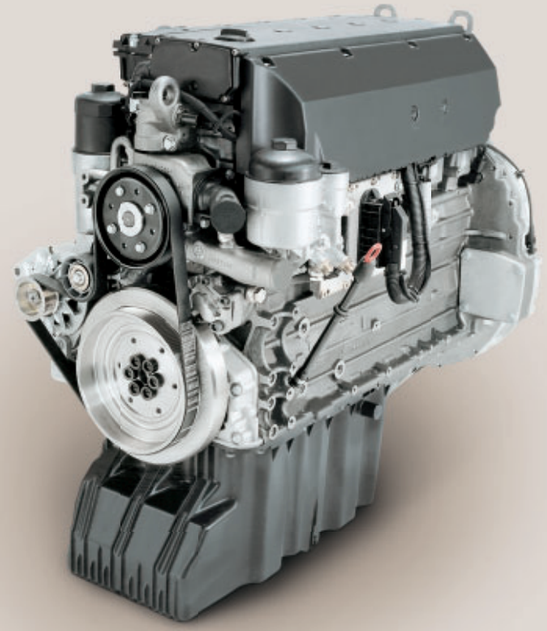
The higher the requirements and tougher the conditions, the more the need for an MTU engine. That’s because we develop the optimum drive solutions for all individual tasks. The large range of MTU mining engines contains the right answer for every application – a solution including the highest performance, greatest reliability, safety, environmental friendliness and operating efficiency.

MTU Diesel Engines

All engines at a glance.

MTU is your global full-line partner offering solutions for all emissions requirements as well as the full power range from 75 to 3,000kW (101 to 4,023bhp). Our engines set the benchmark for what diesel engines must deliver in mining applications above and below ground. Their uncompromising operational availability ensures that mining operations run with absolute reliability, while their exceptional efficiency is a key factor in the economic success of mining operators.





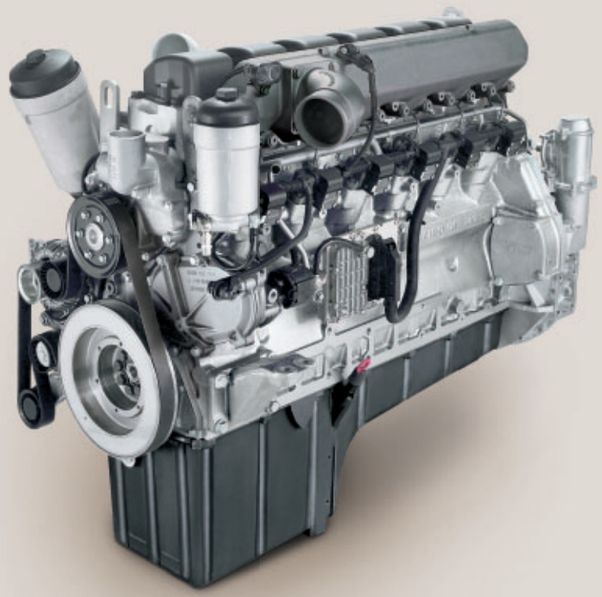
Series 900

For Underground Mining

Series		900				900	
Engine model		904 C01	906 C01	924 C01	926 C01	904 C	906 C
		4R	6R	4R	6R	4R	6R
Power Output	kW	75 – 129	130 – 205	145	220 – 240	75 – 130	150 – 205
	(bhp)	(101 – 173)	(174 – 275)	(194)	(295 – 322)	(101 – 174)	(201 – 275)
Peak Torque	Nm	400 – 675	675 – 1100	750	1200 – 1300	400 – 675	750 – 1100
Speed	rpm	2200	2200	2200	2200	2200	2200
Emissions qualification		EU 97/68 EC Stage IIIA compliant and/or EPA 40 CFR 89 Tier 3 compliant, China offroad certificate GB20891-2007/China Tier 2				MSHA	

Series		900 with SCR technology	
Engine model		924 C02	926 C02
		4R	6R
Power Output	kW	95 – 150	175 – 240
	(bhp)	(127 – 201)	(235 – 322)
Peak Torque	Nm	500 – 800	850 – 1300
Speed	rpm	2200	2200
Emissions qualification		EU 97/68 EC Stage IIIB and/ or EPA 40 CFR 1039 Tier 4i, China offroad certificate GB20891-2007/China Tier 2	

Mercedes-Benz Engineering Excellence

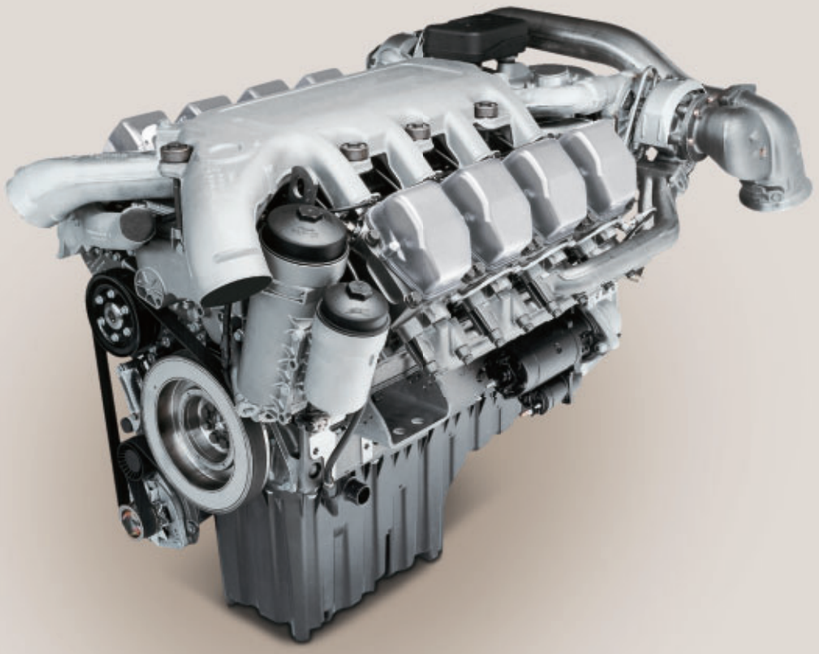


Series 460

Series		460
Engine model		460 C01
		6R
Power Output	kW	220 – 375
	(bhp)	(295 – 503)
Peak Torque	Nm	1300 – 2200
Speed	rpm	1800
Emissions qualification		EU 97/68 EC Stage IIIA compl. and/or EPA 40 CFR 89 Tier 3 compliant, China onroad certificate GB17691-2005/China III and/or China offroad certificate GB20891-2007/China Tier 2

Series		460 with SCR technology
Engine model		460 C02
		6R
Power Output	kW	265 – 375
	(bhp)	(355 – 503)
Peak Torque	Nm	1750 – 2200
Speed	rpm	1800
Emissions qualification		EU 97/68 EC Stage IIIB and/ or EPA 40 CFR 1039 Tier 4i, China onroad certificate GB17691-2005/China V

Mercedes-Benz Engineering Excellence

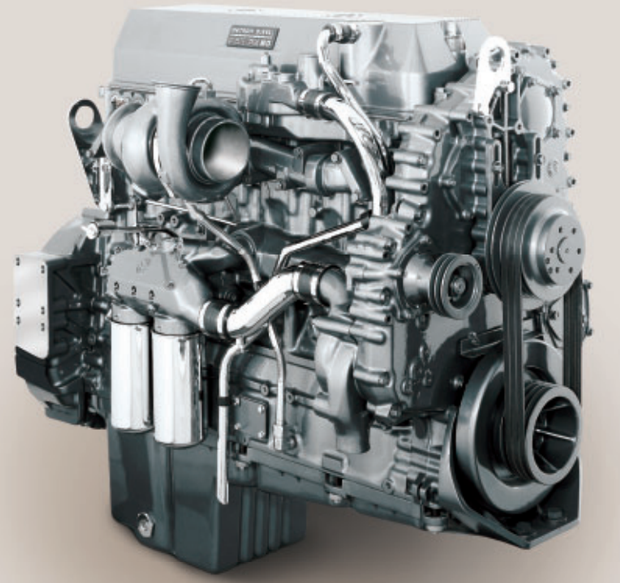


Series 500

Series		500	
Engine model		501 C01	502 C01
		6V	8V
Power Output	kW	260 – 315	330 – 480
	(bhp)	(349 – 422)	(443 – 644)
Peak Torque	Nm	1730 – 2000	2150 – 2800
Speed	rpm	1800	1800
Emissions qualification		EU 97/68 EC Stage IIIA compliant and/or EPA 40 CFR 89 Tier 3 compliant, China onroad certificate GB17691-2005/China III and/or China offroad certificate GB20891-2007/China Tier 2	

Series		500 with SCR technology	
Engine model		501 C02	502 C02
		6V	8V
Power Output	kW	265 – 350	375 – 480
	(bhp)	(355 – 469)	(503 – 644)
Peak Torque	Nm	1850 – 2300	2400 – 3000
Speed	rpm	1800	1800
Emissions qualification		EU 97/68 EC Stage IIIB and/ or EPA 40 CFR 1039 Tier 4i, China onroad certificate GB17691-2005/ China V	

Mercedes-Benz Engineering Excellence



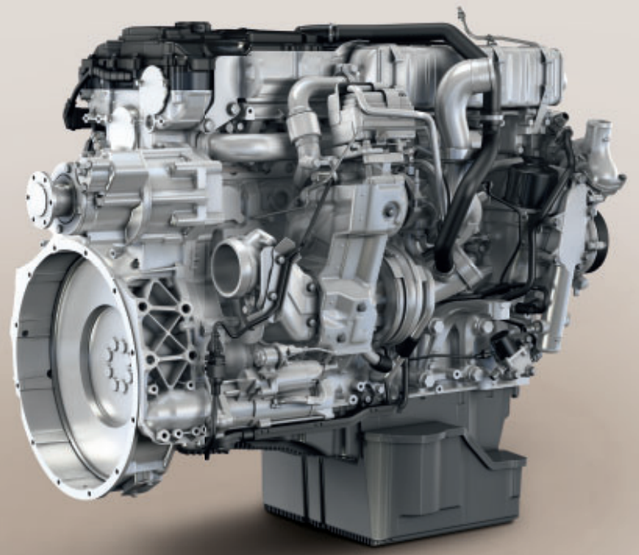
Series 60

Series		60	
Engine model		12.7 l	14 l
Power Output	kW	242 – 375	336 – 496
	(bhp)	(325 – 500)	(450 – 665)
Peak Torque	Nm	1424 – 2237	2237 – 2576
Speed	rpm	2100 – 2300	
Emissions qualification		EU 97/68 EC Stage II compliant and/or EPA 40 CFR 89 Tier 2 compliant	

For Underground Mining

Series		60	
Engine model		12.7 l	14 l
Power Output	kW	224 – 354	392 – 429
	(bhp)	(300 – 475)	(525 – 575)
Peak Torque	Nm	1424 – 2102	2373
Speed	rpm	2100	
Emissions qualification		MSHA	

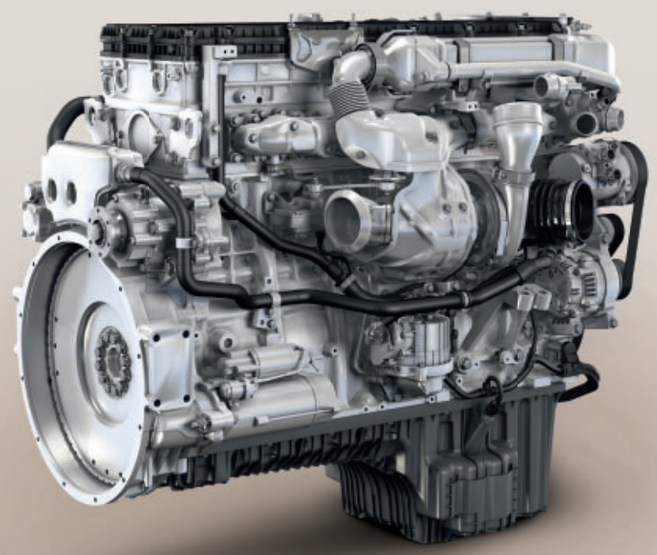
Series		60
Engine model		14 l
Power Output	kW	242 – 496
	(bhp)	(325 – 665)
Peak Torque	Nm	1424 – 2576
Speed	rpm	2000 – 2300
Emissions qualification		EU 97/68 EC Stage IIIA compliant and/or EPA 40 CFR 89 Tier 3 compliant, China offroad certificate GB20891-2007/ China Tier 2



Picture 6R

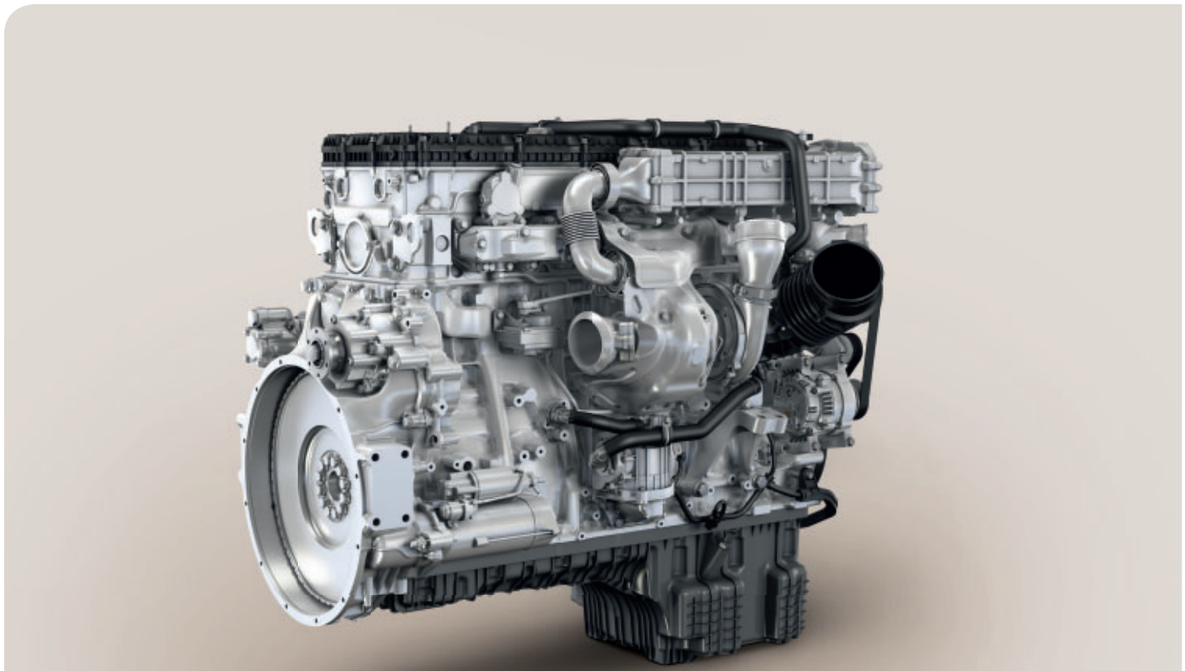
Series 1000

Series		1000 with EGR and SCR technology	
Engine model		1000 C00	
		4R	6R
Power Output	kW	100 – 170	180 – 260
	(bhp)	(134 – 228)	(241 – 349)
Peak Torque	Nm	600 – 900	1000 – 1400
Speed	rpm	2200	2200
Emissions qualification		EU 97/68 EC Stage IV / EPA 40 CFR 89 Tier 4 final	



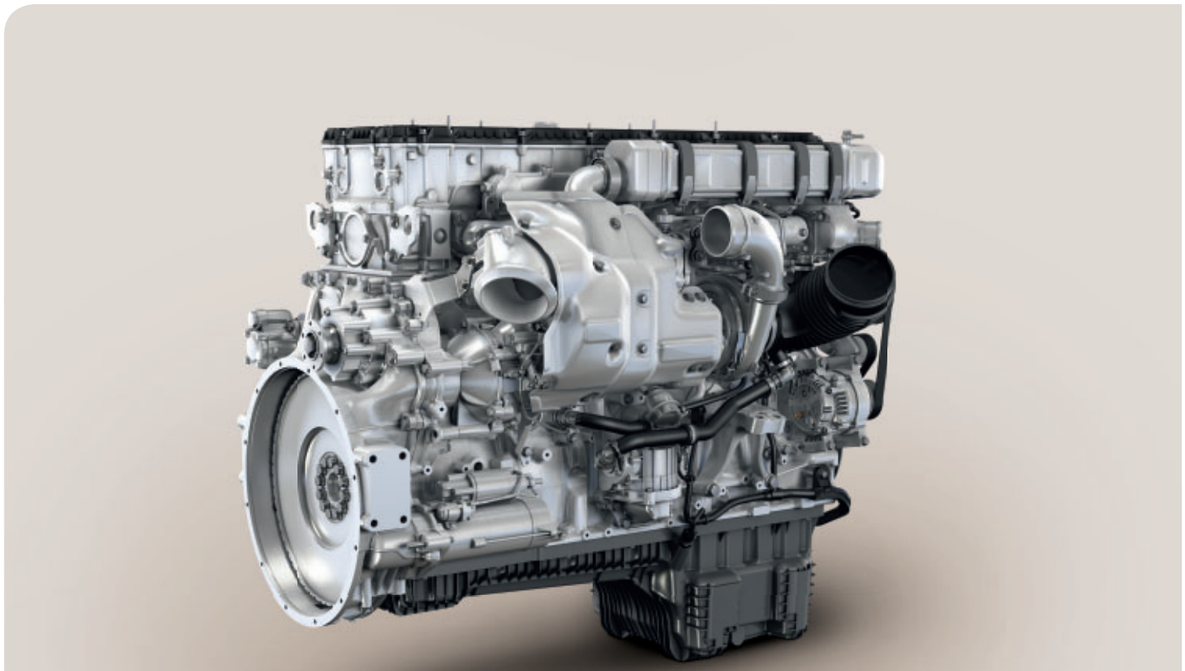
Series 1100

Series		1100 with EGR and SCR technology
Engine model		1100 C00
		6R
Power Output	kW	280 – 320
	(bhp)	(375 – 429)
Peak Torque	Nm	1900 – 2100
Speed	rpm	1700
Emissions qualification		EU 97/68 EC Stage IV / EPA 40 CFR 89 Tier 4 final



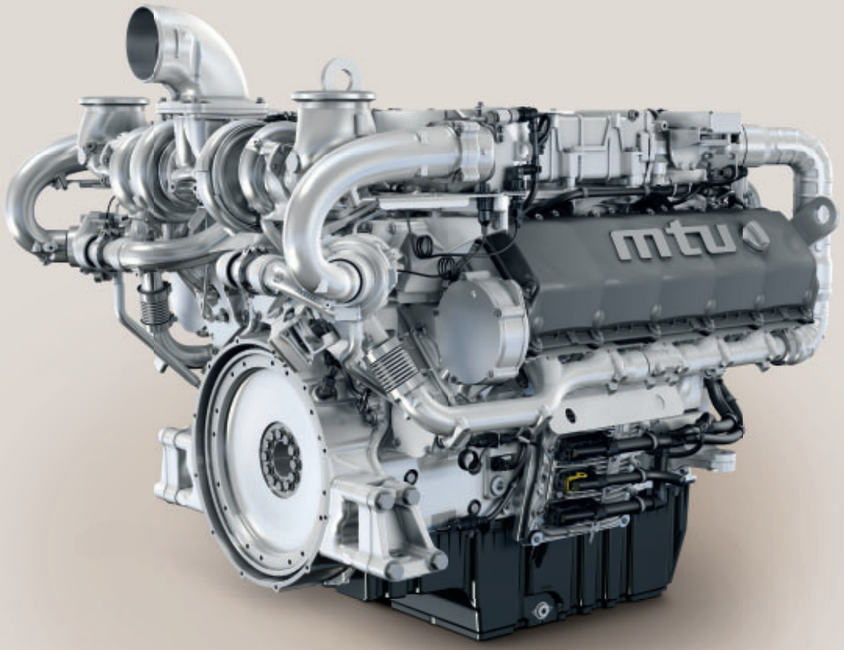
Series 1300

Series		1300 with EGR and SCR technology
Engine model		1300 C00
		6R
Power Output	kW	320 – 390
	(bhp)	(429 – 523)
Peak Torque	Nm	2100 – 2450
Speed	rpm	1700
Emissions qualification		EU 97/68 EC Stage IV / EPA 40 CFR 89 Tier 4 final



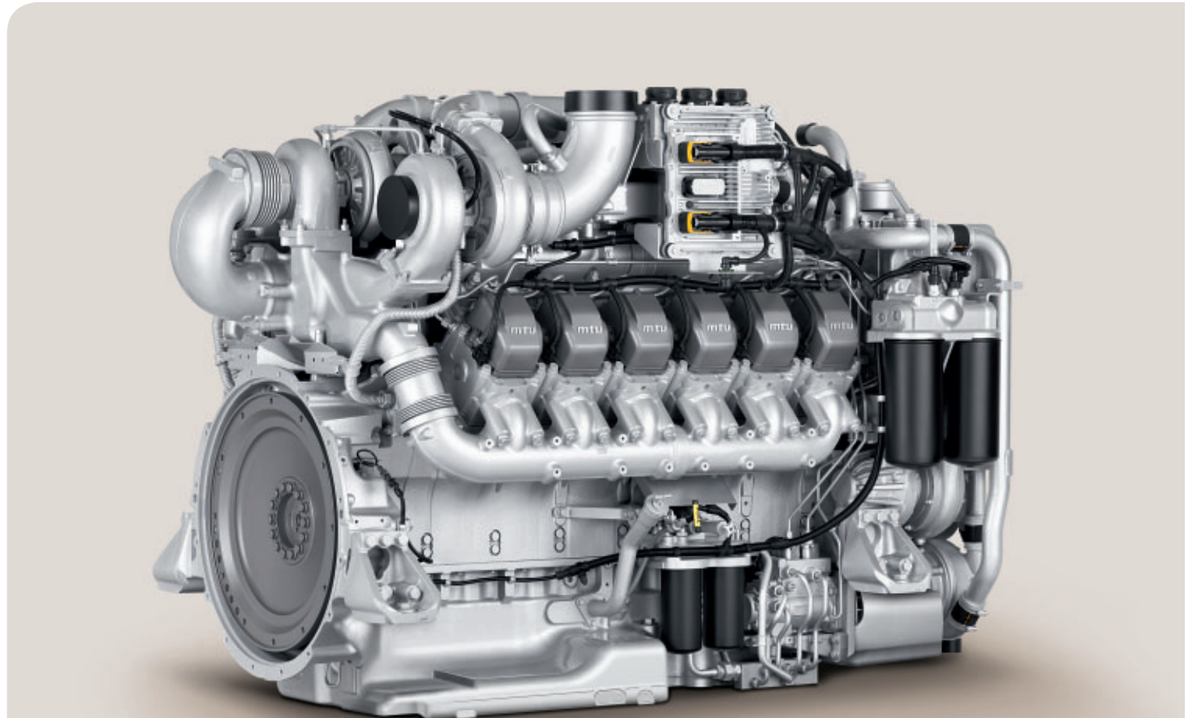
Series 1500

Series		1500 with EGR and SCR technology
Engine model		1500 C00
		6R
Power Output	kW	400 – 460
	(bhp)	(536 – 617)
Peak Torque	Nm	2600 – 2900
Speed	rpm	1700
Emissions qualification		EU 97/68 EC Stage IV / EPA 40 CFR 89 Tier 4 final



Series 1600

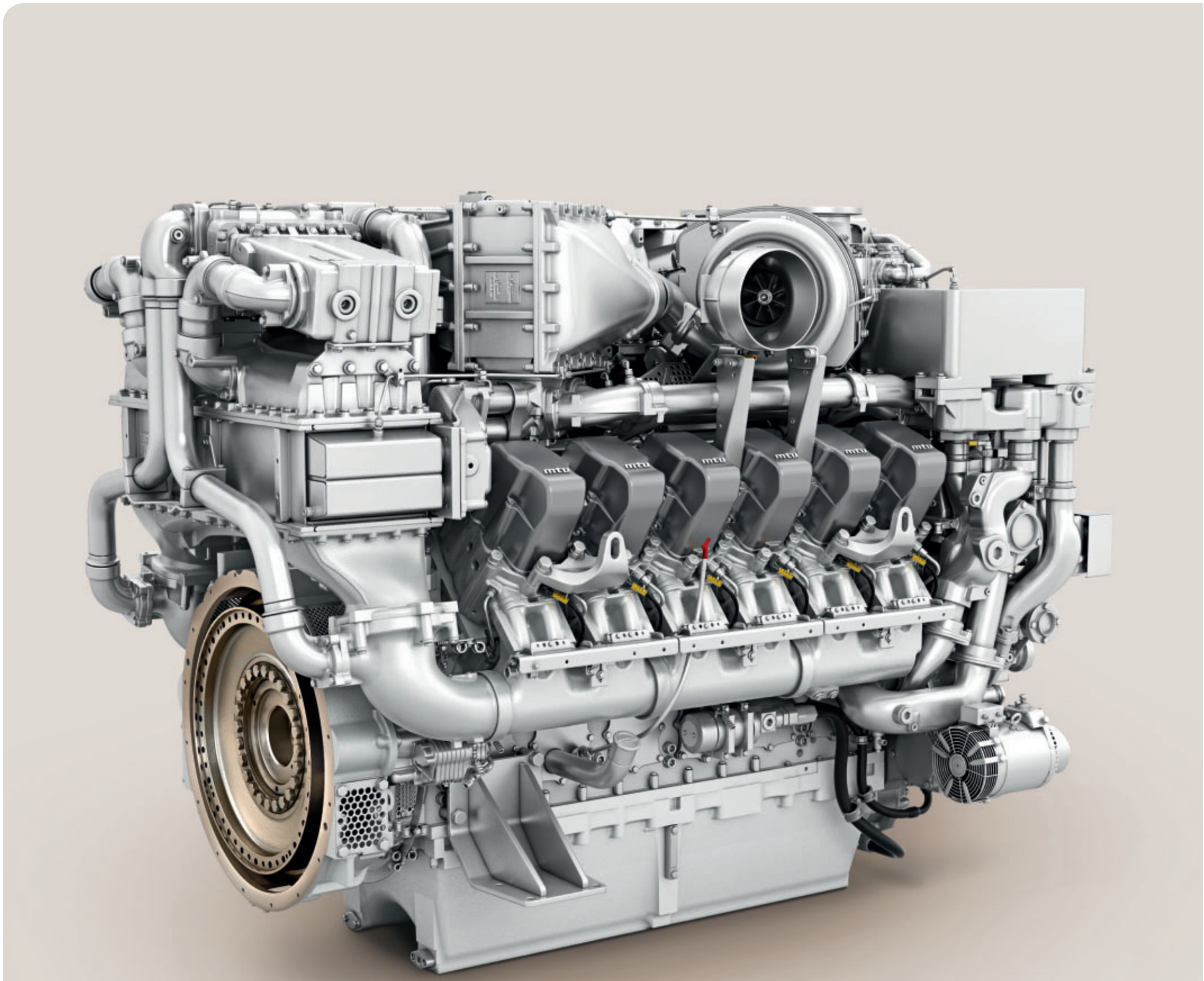
Series		1600 with EGR technology	
Engine model		1600 C00	
		10V	12V
Power Output	kW	567 – 610	630 – 730
	(bhp)	(760 – 818)	(845 – 979)
Peak Torque	Nm	3385 – 3520	4020 – 4220
Speed	rpm	1900/2100	1900/2100
Emissions qualification		EPA 40 CFR 1039 Tier 4 final/ Emission optimized without certificate	



Series 2000

Series		2000	
Engine model		2000 C02	
		12V	16V
Power Output	kW	567 – 750	783 – 1000
	(bhp)	(760 – 1005)	(1050 – 1340)
Peak Torque	Nm	3300 – 4200	4450 – 5250
Speed	rpm	2100	1800/2100
Emissions qualification		EPA 40 CFR 89 Tier 2 compliant	

Series		2000 with EGR technology			
Engine model		2000 C06		2000 C07	
		12V	16V	12V	16V
Power Output	kW	783	970	561 – 783	970
	(bhp)	(1050)	(1300)	(752 – 1050)	1301
Peak Torque	Nm	4635	5285	4635	5285
Speed	rpm	1800/2100	2100	1800/2100	2100
Emissions qualification		EPA 40 CFR 1039 Tier 4i/Emission optimized without certificate		EPA 40 CFR 1039 Tier 4 final	



Series 4000

Series		4000
Engine model		4000 C00
		16V
Power Output	kW	1715 – 2125
	(bhp)	(2300 – 2850)
Peak Torque	Nm	9315 – 11145
Speed	rpm	1900
Emissions qualification		Fuel consumption optimized

Series		4000		
Engine model		4000 C01		4000 C02
		12V	16V	20V
Power Output	kW	1193 – 1510	1492 – 2013	2720
	(bhp)	(1600 – 2025)	(2000 – 2700)	(3650)
Peak Torque	Nm	6985 – 8200	9315 – 10935	15160
Speed	rpm	1900	1800/1900	1800
Emissions qualification		EPA 40 CFR 89 Tier 1 compliant		

Series		4000		
Engine model		4000 C03		
		12V	16V	20V
Power Output	kW	1193 – 1680	1492 – 2240	2375 – 3000
	(bhp)	(1600 – 2250)	(2000 – 3000)	(3185 – 4023)
Peak Torque	Nm	7595 – 9435	9520 – 12565	15120 – 16850
Speed	rpm	1800/1900	1800/1900	1800
Emissions qualification		EPA 40 CFR 89 Tier 2 compliant or fuel consumption optimized		

Series		4000 with EGR technology
Engine model		4000 C04
		12V
Power Output	kW	1864
	(bhp)	(2500)
Peak Torque	Nm	9375
Speed	rpm	1900
Emissions qualification		EPA 40 CFR 1039 Tier 4i

Series		4000 with EGR technology		
Engine model		4000 C05		
		12V	16V	20V
Power Output	kW	1150 – 1864	2000 – 2400	2800 – 3000
	(bhp)	(1542 – 2500)	(2682 – 3218)	(3755 – 4023)
Peak Torque	Nm	7350 – 10410	10580 – 13405	15365 – 16755
Speed	rpm	1800/1900	1800/1900	1800
Emissions qualification		EPA 40 CFR 1039 Tier 4 final		

Low emissions. High performance.

MTU has long established itself as a leader in the development of solutions for emissions reduction. This challenge involves key technologies which we carry out in-house.

In mining the aim is to collect natural resources while generating profit. One basic condition for efficient operations is to comply with emissions regulations. We care for the technology you need.

In order to achieve advanced emissions reductions, we have invested our comprehensive expertise in core technologies: common-rail-fuel-injection, turbocharging, cooled exhaust gas recirculation, electronic engine controls for optimizing engine processes and preventing soot formation, as well as external optimization.

Advanced emissions regulations like EU Stage IV/EPA Tier 4 final demand further significant reduction in the pollutants emitted. Our engines and systems meet current legislative requirements with proven technologies.

We care for the optimal solution for the special demands of each application and power range by choosing the ideal technology.

Aftertreatment technology below 560kW (750bhp)
Beside our emissions reduction technologies like EGR, common-rail-fuel-injection and charge-air-cooling our engines below 560kW (750bhp) are equipped with SCR aftertreatment technology.

Advantages
The advantages of SCR in our engines:
– Low fuel consumption
– Uncompromising engine availability and operational safety
– Substantial reduction in nitrogen oxide and greenhouse gas emissions
– No DPF and no DOC required

The perfect interplay of different technologies facilitates optimal results and the most important aim is achieved – a decrease in harmful emissions, along with a reduction in fuel consumption. A win-win situation for your earnings and the environment.

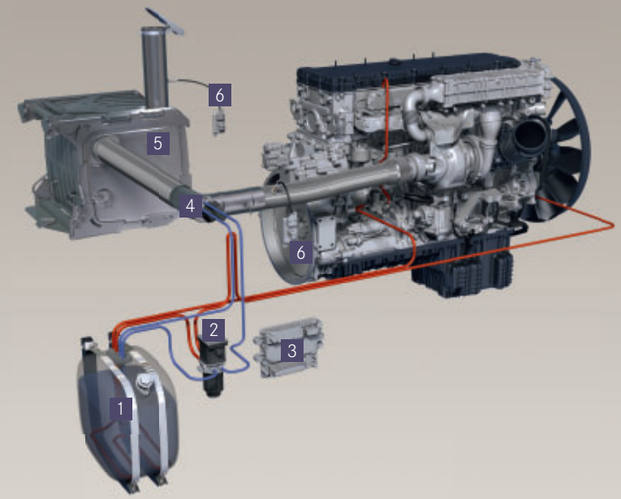
No aftertreatment above 560kw (750bhp)
Our engines above 560 kW (750bhp) don‘t use any exhaust aftertreatment technology. Instead our latest engines are equipped with state of the art EGR technology combined with our core technologies. In combination those technologies enanble engine compliance with the most stringent emission regulations such as EPA Tier 4 final. That means optimum engine characteristics and cost-efficient operation while meeting emissions standards.

Depending on the engine operating point, a certain quantity of exhaust gas is conveyed to the EGR cooler. As it passes through the cooler, the hot exhaust gas is cooled and then mixed with charge air. Mixing the exhaust gas with charge air results in a significant reduction in combustion temperature by comparison with engines that are not using EGR. In return, much lower raw emissions levels of nitrogen oxide are generated inside the engine. The highly efficient EGR combustion process developed by MTU ensures compliance with EPA Tier 4 final emissions legislation without the need for aftertreatment.

Advantages
The combination of MTU core technologies like EGR offers many advantages:
– Low fuel consumption
– Wide engine performance map – full torque curve
– Exceptionally high torque at low speeds
– Excellent transient behaviour (load acceptance/speed jumps)
– Full power output available even at high altitudes
– Full power output available even at high ambient temperatures

No need for exhaust aftertreatment also means no need for additional operating fluids such as DEF, nor for DPF or DOC, nor for hydrocarbon dosing.

Aftertreatment Technology below 560kW (750bhp)



Aftertreatment Technology below 560kW (750bhp) – example Series 1300 EU Stage IV/EPA Tier 4 final

1 **Urea Tank**
with urea fluid

2 **DEF Urea Supply Unit (pump)**
pumps liquid urea from the tank to the dosing unit

3 **Aftertreatment Control Module (ACM)**
controls and regulates functions of the aftertreatment system

4 **Dosing unit with Urea Nozzle**
prepares correct urea quantity in relation to untreated engine emissions and provides for optimal spraying of urea/air mixture into exhaust line

5 **SCR-Catalyst**
converts nitrogen oxids in exhaust gas into harmless air components

6 **NOx-Sensors**
measure respective engine emissions in exhaust system

We will be available as a partner to help design your optimal SCR system.

No Aftertreatment Technology above 560kW (750bhp) – example Series 4000 EPA Tier 4 final

1 **Two-stage controlled turbocharging**
assures low fuel consumption across wide speed range, exceptionally high torque at low speeds, and clean combustion

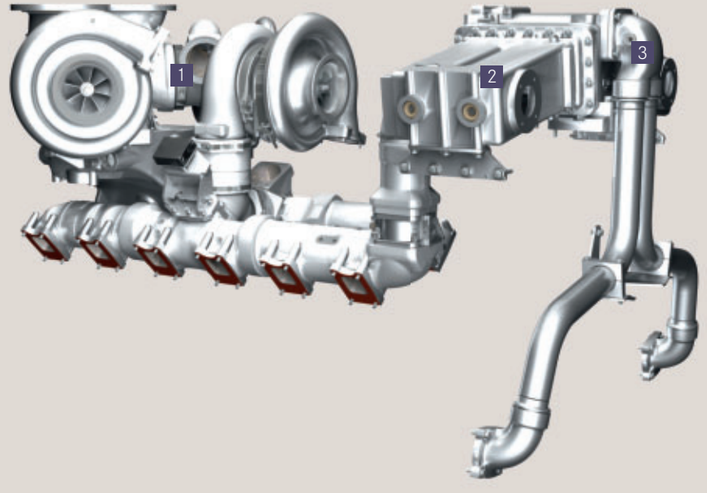
2 **EGR coolers**
bring about a lowering of the combustion temperature (and subsequently of nitrogen oxides generated in-engine) and are integrated into the high-temperature cooling circuit so that less heat is introduced, which in turn permits lower cooler dimensions

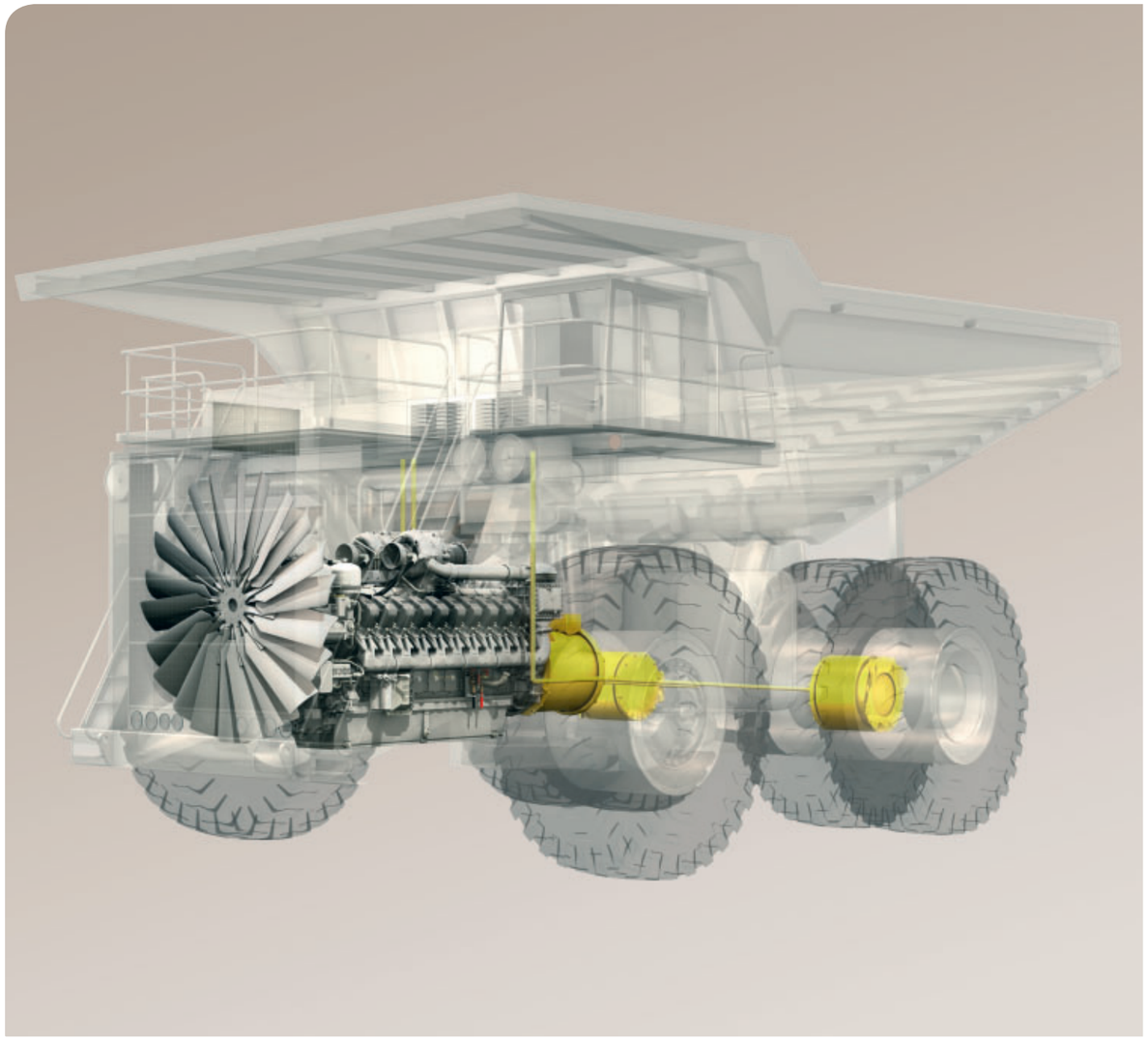
3 **EGR rate**
EGR valve regulates recirculated exhaust gas quantities. EGR rate is optimized for all operating modes

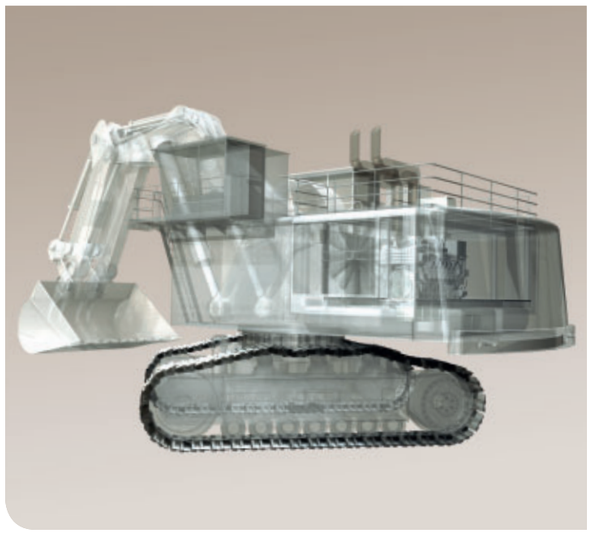
4 **Common-Rail-Fuel-Injection***
with common rail fuel injection, the combustion process can be optimized to achieve low pollutant levels combined with lower fuel consumption. Fuel is injected into the combustion chamber from a common rail under high pressure.

*not displayed in the grafic below

No Aftertreatment Technology above 560kW (750bhp)







Time is money
Due to intelligent engineering and efficient processes we repower you quickly. The duration for the complete engine replacement up to final testing will be approximately one week only.

MTU Repowering Solutions

More Profit. More Power. More Productivity.

A proven solution
MTU stands alone as the premier engine supplier to many of the world's most productive mine operations. Engineered and built specifically for mining, the Series 4000 is widely regarded as the industry's ideal engine for high-horsepower applications, due to its superior durability, fuel economy and low total cost of ownership. More than 800 mining vehicles have already been repowered with Series 4000.

Series 4000 engines provide up to 6% better fuel economy and up to 3% higher availability than the engines they have replaced. It is therefore no surprise that the Series 4000 engines have been installed in most truck models in place of all non-captive brands.

Many equipment operators have saved enough in fuel, maintenance and repair costs to return their repower investment before the first overhaul. Installation detail and cost saving projections are available from any authorized MTU distributor.

Pre-engineered repower kits are available for the most popular mining equipment models. The efficiency of MTU's repower process results in typical equipment outage of one week or less.

Much more than a new engine
We produce system designs and provide complete individual solutions for every possible requirement and any application.

The heart of the system is always the engine as the main component of a mining-vehicle powertrain. It is supplemented by a wide range of auxiliary equipment that can be adapted to suit the basic engine in every particular and which of course is manufactured to the same high quality standards.

The auxiliary systems include:
– Electronic engine management: for safety, reliability, versatility and data recording
– Transmission/generator: the complete solution – from a single source
– Baseframe: for secure and permanent attachment/support of system components
– Acoustic enclosure/exhaust silencers: for consistently low noise emissions
– Cooling system: modern systems with intelligent management
– Mountings: for maximum safety and comfort

To keep the system easy to manage despite its technological complexity, the number of interfaces between the engine and peripheral systems is deliberately limited. The entire powertrain module can be quickly installed and commissioned using Plug&Play connections. This is an advantage for repowering projects and particularly when replacing engines. Availability and economy are substantially improved, thus downtimes are minimized.

A powerful advantage
– Higher reliability: increased uptime achieved through improved engine reliability and ease of maintenance due to simplicity of engine configuration
– Higher availability: robust engine is time proven in mining
– Enhance operator productivity: lower engine noise level reduces operator fatigue
– Lowest total cost of ownership:
  · Best fuel efficiency in the industry
  · Increased time between overhaul (TBO) & highly consistent overhaul intervals
  · Multiple rebuilds of original engine core throughout the engine life
  · Lower operation costs
– Emission and application specific engines:
  · High altitude specification engines
  · Emission qualified
  · Fuel consumption optimized

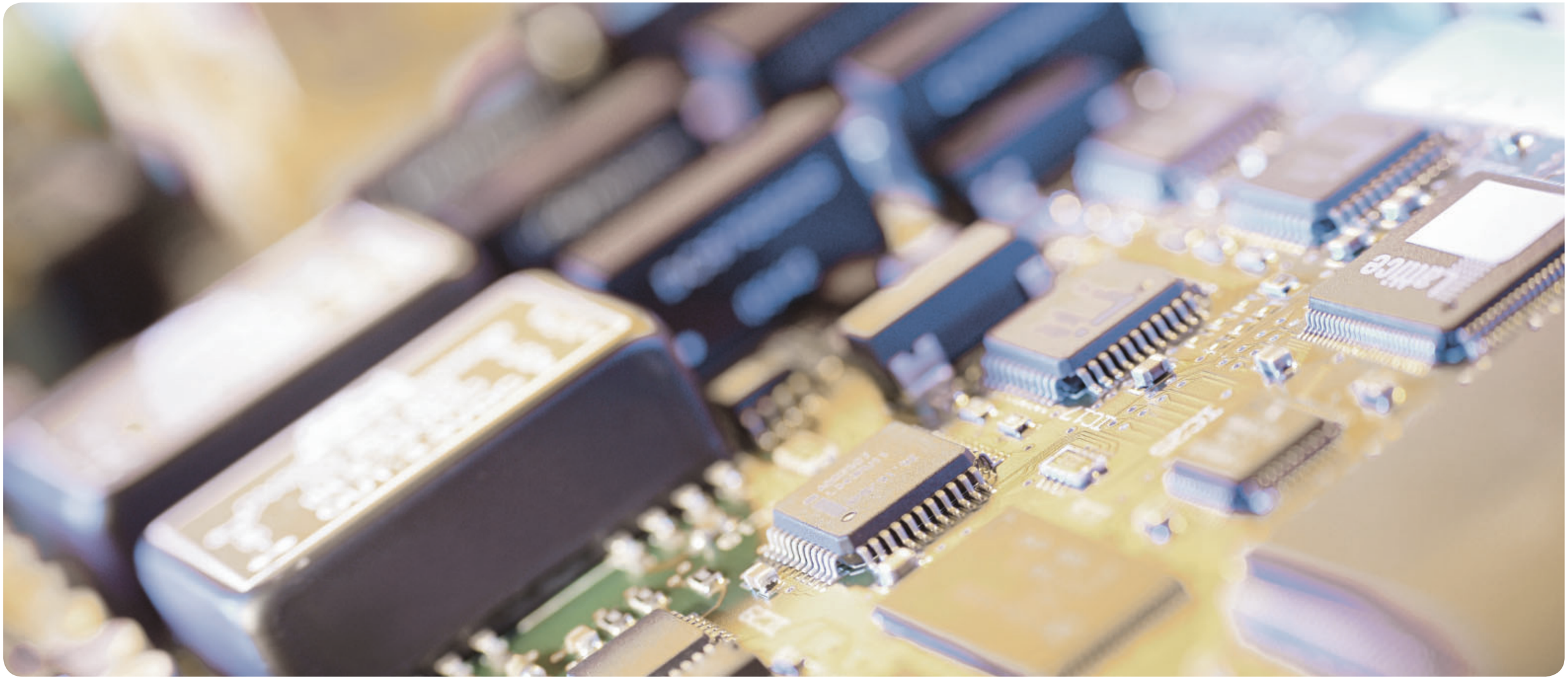
We can help manage your projects right from the initial planning. We provide helpful, expert advice from the concept phase to production use. In this way, you benefit from our experience very early on and develop a drive design that is just right for your specific equipment and application.

Automation Systems

Controlling the power with intelligent electronics.

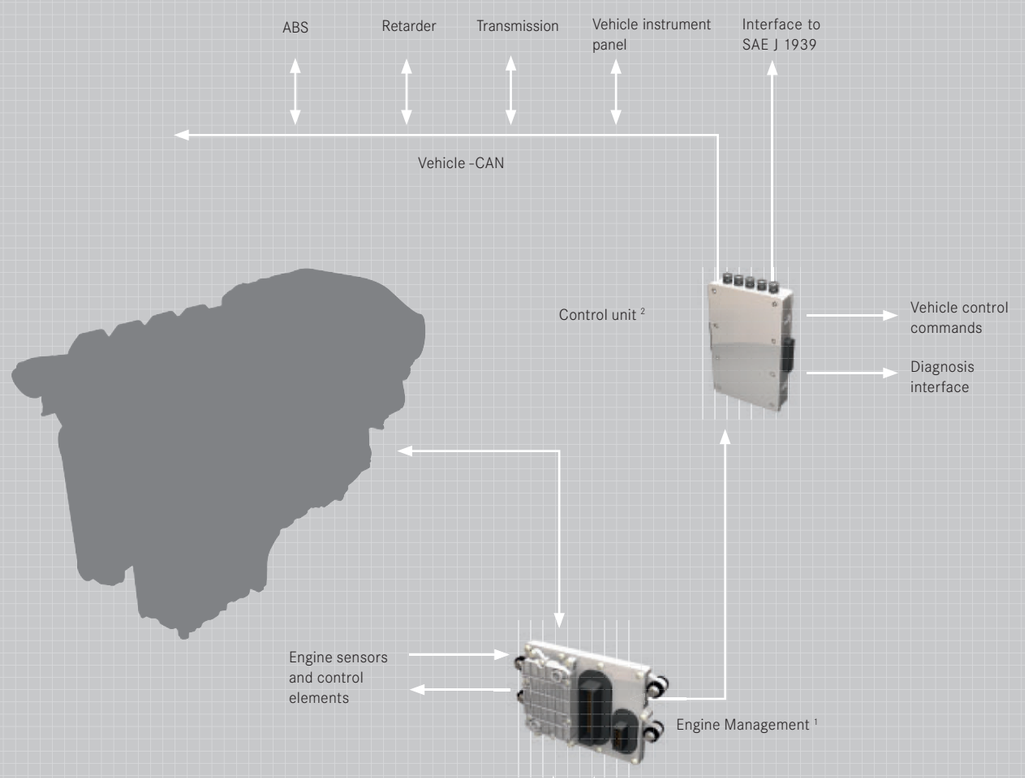
Our engines are powerful and technologically advanced. But in order to offer the best efficiency, reliability, safety and environmental friendliness, they need more than just power – they need intelligent electronic management. Modern engine management systems handle the control and monitoring of the hardware and enable perfection of performance. The combination of power and precision.

V



Scope of supply for current engine series with emissions regulations EU Stage III A/EPA Tier 3

Engine management system
– Typical configuration Series 460, 500, 900 –



Additional components for current engine series with emissions regulations EU Stage III B/EPA Tier 4i

Engine management system with integrated SCR system
– Typical configuration –

1 Engine mounted
2 Vehicle mounted

Engine Management Systems for Series 460, Series 500 and Series 900

We manage everything for you.

All our engines are equipped with electronic engine controls. Intelligent electronics ensure that performance and efficient operation are achieved under all operating conditions. Innovative, high-end technology takes over the control, regulation and monitoring of the drive system. The systems are modular in order to be able to adapt the diesel engine to the complex optimal operating conditions of the equipment. In addition, operating conditions that could lead to damage are detected in time.

For engines equipped with SCR systems, we are your expert technology partner. The latest electronics integrate the necessary SCR components for the reduction of emissions intelligently into the overall system. This ensures optimal tuning of all engine and emission control functions.

Your benefits:

– Protection of the engine and therefore safety by:
  · Reporting critical operating conditions
  · Temporary reduction in power
  · Automatic shutdown
  · Start inhibitor
  · Over speed regulation
  · Self-diagnosis and regulation for the system
– Standard interfaces for external system connections, such as CAN data bus and SAE J 1939
  · Easy integration with the vehicle
  · Flexible adjustment to the vehicle or vehicle components and project specific needs
  · Interface for engine diagnosis
– High availability and fail-safe operation
– High power efficiency
– Low fuel consumption
– Minimal exhaust emissions that fully meet all legal requirements

MTU **motiv***line* – Automation System

The management technology for mining applications with Series 4000.

The **motiv***line* automation system is an innovative highend technology developed by MTU for mining vehicles. **motiv***line* performs the control and monitoring functions for the entire engine plant. The modular system guarantees optimum adaptation of the diesel engine to the diversity of operating conditions in mining.

motiv*line* supports:
- flexible adaptation to the vehicle and/or its components and project-specific requirements
- automatic power output adjustment or optional engine shutdown by the integrated safety system and all other necessary monitoring and safety functions
- Interface – MTU telemetric device for GSM* – for MTU **Value**Care Product Remote Services (optional with user agreement), which provides direct access to the data of your MTU engine
- Easy adaptation by means of MTU interface module **SAM**

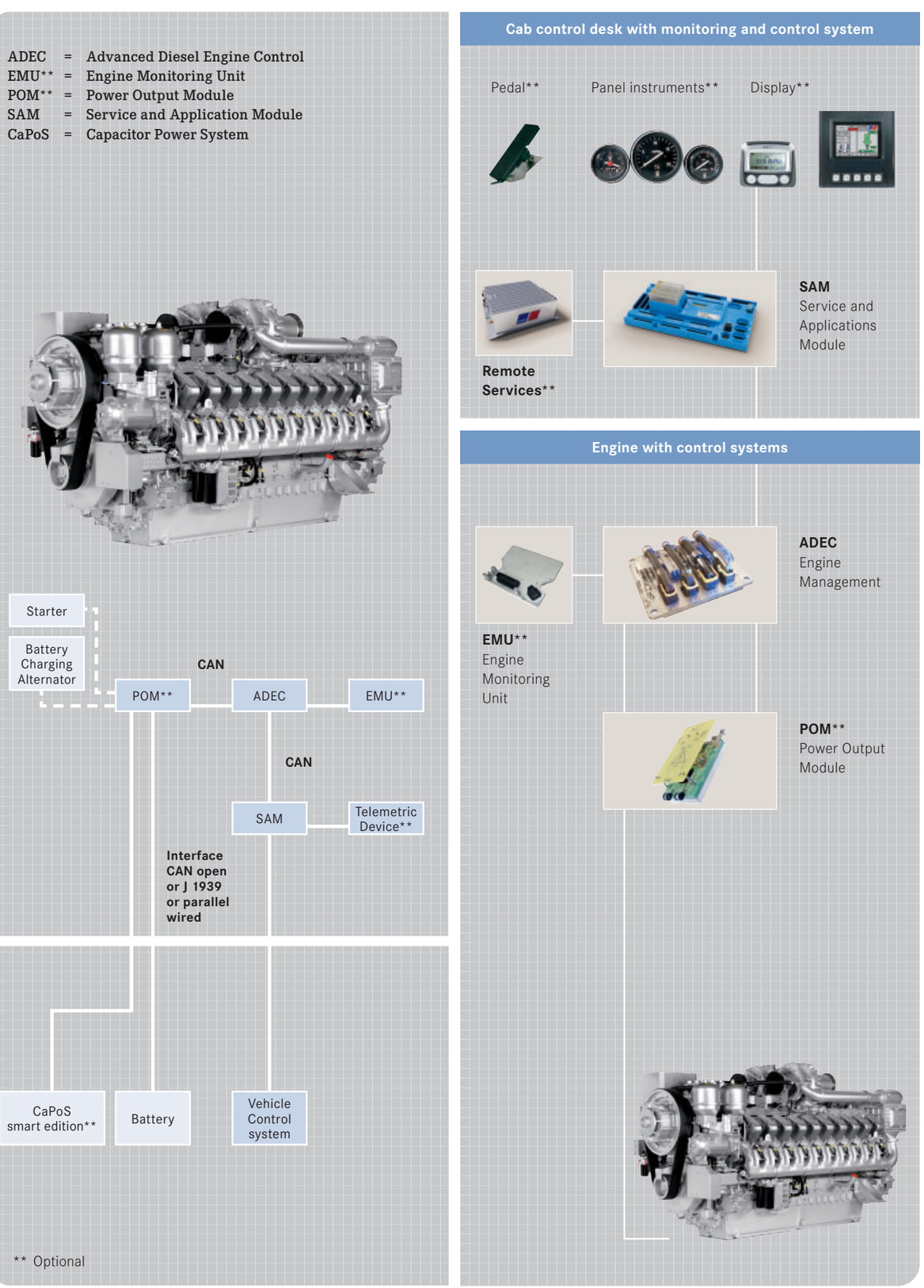
motiv*line* harmonizes the engine integration into the vehicle. Because of that optimized conditions generates:
- **high power-efficiency**
- **low fuel consumption**
- **minimal exhaust emissions that are substantially below the legal limits**

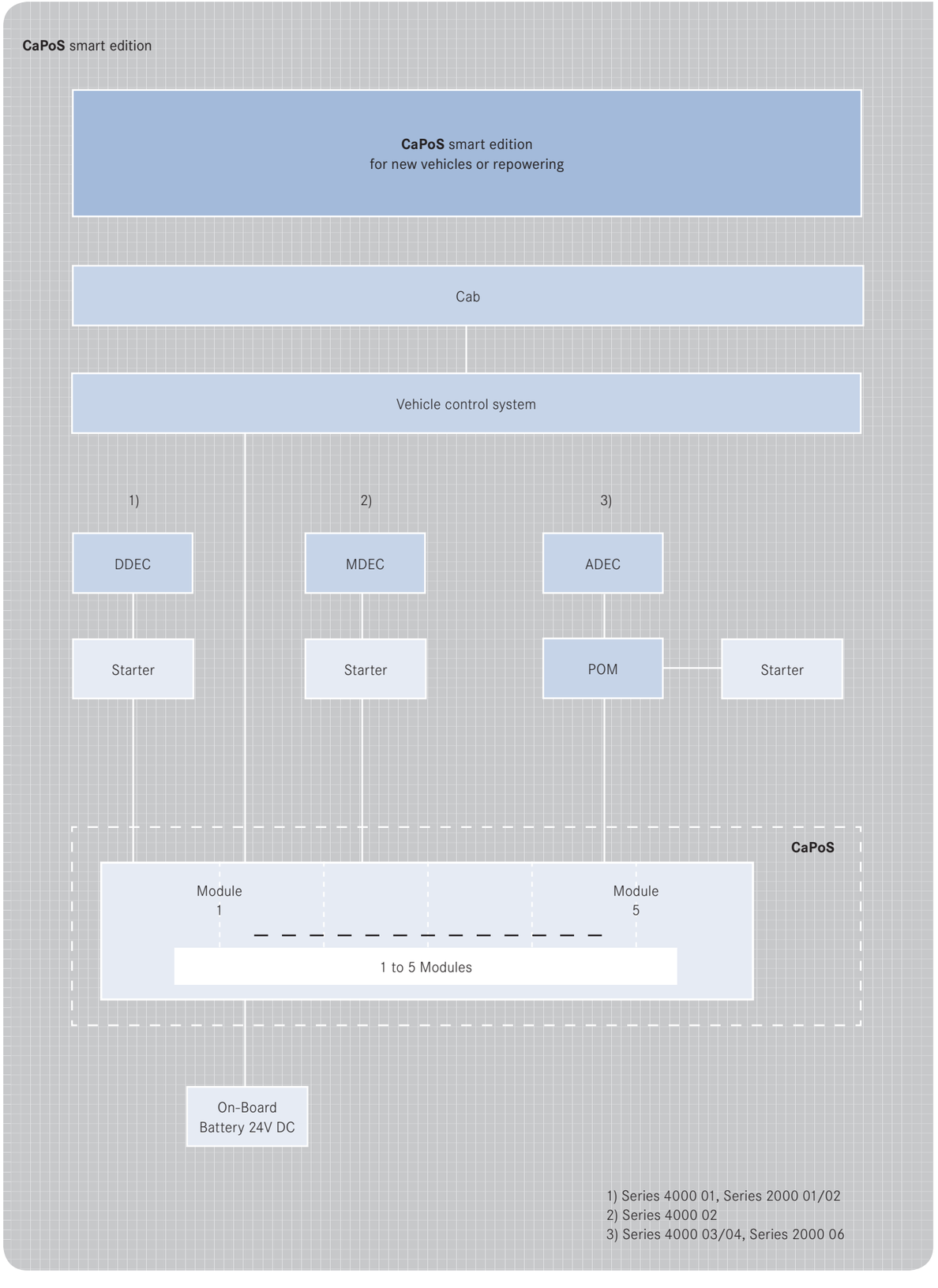
For the **Series 4000 engines**, a new engine management system **ADEC** has been developed, whilst there is also an extensive range of standardized solutions available – with options for flexible interfaces. The Engine Monitoring Unit **EMU** provides further enhanced availability by means of additional monitoring and diagnostic options for the engine. Complementing the **SAM** interface module, **POM** optimizes the start process and simplifies cabling to the starter and alternator. The complete **Plug&Play** system makes installation of the engine in the vehicle considerably simpler and faster.

* Global System for Mobile Communications

System highlights and benefits:
- Complete system supplied from a single source
- Modular design
- Minimal wiring on engine
- Improved diagnostic functions
- Intelligent bus technology
- Plug&Play equipment

That means:
- Low costs for logistics and training
- Low risk
- Rapid project processing and short fitting times
- Trouble free integration





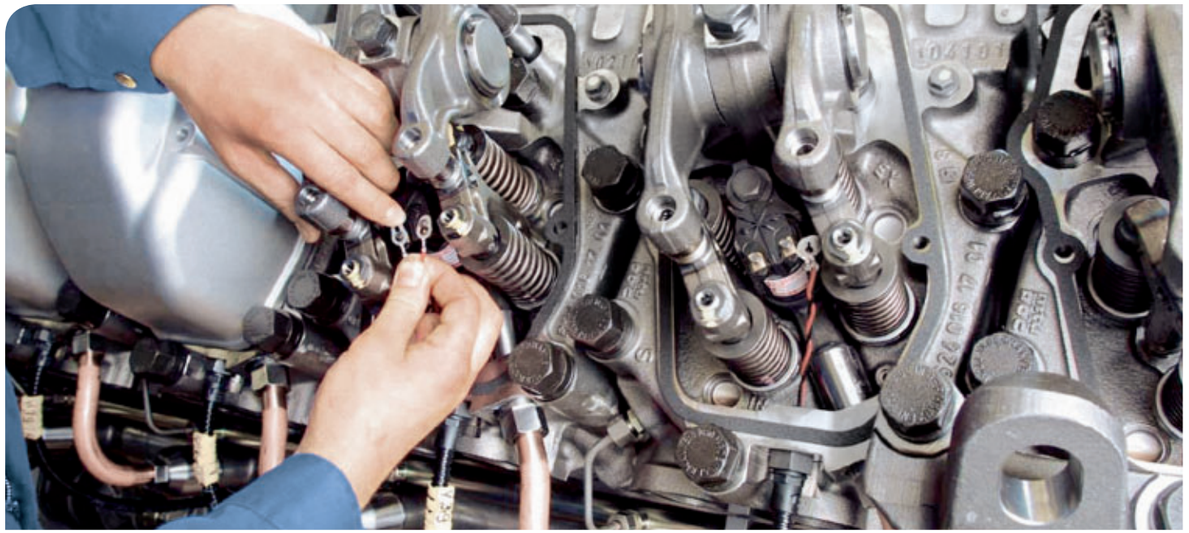
CaPoS smart edition – **Ca**pacitor **Po**wer **S**ystem for Series 2000, 4000

Reliable power right from the start.

CaPoS smart edition was especially developed for heavy duty applications and provides the high energy required by the 24V DC starters during the starting sequence.

CaPoS smart edition uses capacitor technology to optimize startup behavior. The number of modules to be used depends on the type of engine involved and its breakaway torque. CaPoS smart edition may be used autonomously or in conjunction with the **motiv***line* automation system.

The most important features at a glance:
– Autonomous and modular construction
– Maintenance-free system
– Significant reductions in weight and volume compared with conventional starter batteries
– Optimized cold-starting capabilities
– Low life-cycle costs
– No voltage interruption during start-up
– On-board voltage of 24V DC
– Integrated self-monitoring system with interface to vehicle control system
– Integrated DC-/DC converter for automatical recharging
– IP66 protection



MTU **Value**Care

Keep going.

We have a strong commitment to our mining customers. With MTU **Value**Care, this focus extends beyond the sale of our engines and systems. From maintenance to spare parts to remanufactured products, MTU offers a full range of support to help keep your mining operation productive.

Designed for maximum performance, uptime and value, MTU **Value**Care is a diverse portfolio of products and services that can help you get the most from your equipment.

MTU ValueCare includes three product lines:

– **Value**Service
Extensive global service and support to help you protect your investment

– **Value**Spares
Genuine spare parts and top-quality consumables designed specifically for MTU engines and systems

– **Value**Exchange
Remanufactured engines and service parts engineered with the same high-quality standards as new products

MTU **Value**Care products and services are available anywhere in the world through our extensive network of authorized distributors and service dealers. For more information, please contact your local MTU service center or visit www.mtu-online.com.

MTU **Value**Care

Keep your mining operation productive.

Engines and systems are put to the test at mining sites. Reliability and top performance are essential. Through **Value**Service, **Value**Spares and **Value**Exchange, MTU provides you with comprehensive support, customized to meet your unique needs.

ValueService
Reliable, expert assistance is essential to achieving and maintaining high levels of performance throughout your engine's or system's lifecycle. **Value**Service is a full line of maintenance, repair and service solutions to help you get the most out of your equipment and protect your investment.

MTU provides you with everything you need, with support tailored to your specifications. Customized Care maintenance and repair contracts (MARC) make it easy to plan the cost of maintenance and repairs throughout the lifecycle of your engines, no matter where you operate. Remote Services provides you with direct access to the activity of your MTU engines and systems through a secure Internet connection. Extended Coverage delivers peace of mind by providing coverage of unexpected repairs beyond your standard warranty. Technical Documentation provides complete information for the operation and maintenance of MTU products. And we offer training programs to make your service personnel proficient with MTU engines and systems.

ValueSpares
To keep your equipment running at optimum efficiency, choose from a full line of **Value**Spares genuine parts and consumables. They're designed, tested and approved specifically for MTU engines and systems. Only MTU can guarantee genuine quality, with parts and consumables that are designed to work seamlessly with your product.

ValueSpares products help you get maximum performance and value from your equipment. And putting our parts and consumables to work is easy. Whether it's spare parts or oils, coolants and filters, **Value**Spares products are available worldwide through our MTU service network.

ValueExchange
Whether replacing a single component or an entire engine, quality is essential. **Value**Exchange provides a full range of genuine remanufactured MTU products, engineered to ensure robust, reliable performance. Choose from remanufactured parts, or engines and systems that utilize genuine new and remanufactured MTU parts. A rigorous reconditioning process ensures the same high standards of performance, service life and quality as new products – including design and model-related updates. As a result, **Value**Exchange products feature technological updates similar to new products.

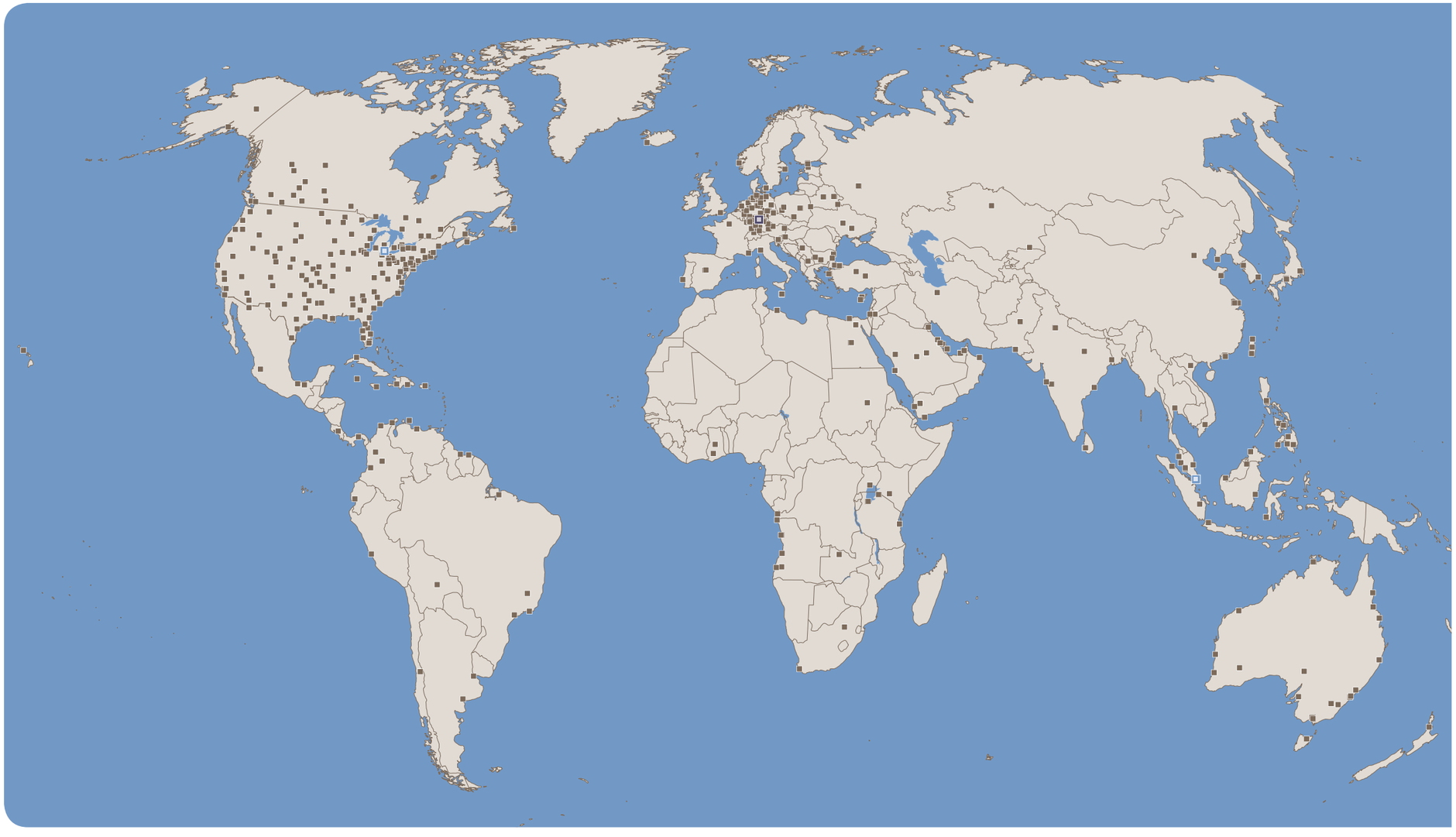
The **Value**Exchange process is designed to save you time and money, while benefiting the environment through the reuse of existing materials. When you choose **Value**Exchange products, you get genuine MTU quality, speed and peace of mind while lowering costs. To help you work more efficiently, **Value**Exchange parts and engines are readily available. And for your convenience, they're offered worldwide from our MTU service network.

Local support. Worldwide.

The reliability and performance of your engines and systems are crucial for your success and competitiveness. We are committed to your support. Our convenient global service network provides you this assurance.

Whenever and wherever you need expert support, MTU specialists are available. This continuous and long-term care ensures high availability, dependability and efficiency throughout the lifecycle of your engines and systems.

To find your local MTU distributor, visit www.mtu-online.com.



Local support. Worldwide.
We ensure that you receive individualized support from our global network of more than 1,200 service centers – anywhere, anytime.

- Global Headquarters
- Regional Headquarters
- Sales and Customer Service Center

Series and Emissions Qualification.

Engine model	EU 97/68 EC Stage II compliant	EU 97/68 EC Stage IIIA compliant	EU 97/68 EC Stage IIIB	MSHA	EPA 40 CFR 89 Tier 2 compliant	EPA 40 CFR 89 Tier 3 compliant	EPA 40 CFR 1039 Tier 4i	China onroad certificate GB17691-2005/ China III	China onroad certificate GB17691-2005/ China V	China offroad certificate GB20891-2007/ China Tier 2
Series 900										
4R 904 C01		■		■		■				■
6R 906 C01		■		■		■				■
4R 924 C01		■				■				
6R 926 C01		■				■				■
4R 924 C02			■				■			
6R 926 C02			■				■			■
Series 460										
6R 460 C01		■				■		■		■
6R 460 C02			■				■		■	
Series 500										
6V 501 C01		■				■		■		■
6V 501 C02			■				■		■	
8V 501 C01		■				■		■		■
8V 501 C02			■				■		■	
Series 60										
12.7 l	■			■	■					■
14 l	■	■		■	■	■				■

Series and Emissions Qualification.

Engine model	EU 97/68 EC Stage II compliant	EU 97/68 EC Stage IIIA compliant	EU 97/68 EC Stage IIIB	EU 97/68 EC Stage IV	MSHA	EPA 40 CFR 89 Tier 1 compliant	EPA 40 CFR 89 Tier 2 compliant	EPA 40 CFR 89 Tier 3 compliant	EPA 40 CFR 1039 Tier 4i	EPA 40 CFR 1039 Tier 4 final
Series 1000										
4R/6R 1000 C00				■						■
Series 1100										
6R 1100 C00				■						■
Series 1300										
6R 1300 C00				■						■
Series 1500										
6R 1500 C00				■						■
Series 1600										
10V/12V 1600 C00										■
Series 2000										
12V/16V 2000 C02							■			
12V/16V 2000 C06									■	
12V/16V 2000 C07										■
Series 4000										
12V/16V 4000 C01						■				
20V 4000 C02						■				
12V/16V/20V 4000 C03							■			
12V 4000 C04									■	
12V/16V/20V 4000 C05										■

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