



Rail

MAKE FASTER, CLEANER
PROGRESS. WITH THE **mtu**
HYBRID POWERPACK.



A Rolls-Royce
solution

mtu Hybrid PowerPackMAKE FASTER, CLEANER PROGRESS.
WITH THE **mtu** HYBRID POWERPACK.**Saving fuel through braking energy recovery**

With hybrid drives, braking energy is converted into electrical energy and stored in the battery. This energy can then be reused later as a boost on gradients or to accelerate.

As a result, up to 25 percent of the diesel fuel can be saved. Hybrid technology is especially efficient for use on local lines where braking and acceleration in stop-go mode is frequent, and much of the braking energy can be recovered. In this case, the hybrid drive is amortised after just a few years.

Significantly reduced emissions through load point optimization

If during periods of low load factors the diesel engine is operated at a more favorable energetic operating point or switched off entirely, emissions can be reduced substantially: per kilometer, up to 230 grams less CO₂ and up to 0.92 grams less NOx compared with conventional systems.

Optimizing travel times with the Boost Mode

With a combined diesel and electric drive, the train accelerates even better. When it comes to keeping tightly calculated schedules or catching up on delays, the electric motor provides additional torque. This means that the railcar can travel uphill faster or reach the target speed quicker. For example, the time for a 72-kilometer-long route can be shortened by more than five minutes.

Significant noise reduction

The electric motor can be used as the main drive when rail vehicles need to be operated as quietly as possible: For example, during travel

through residential areas and tunnels or while stopped at a railway station. The noise level when stationary can be reduced by up to 21 decibels.

Flexible vehicle deployment and simple retrofitting

Naturally, rail vehicles with hybrid drive can also be powered exclusively by the diesel engine. This also means great flexibility for the operator: The trains can be deployed on both electrified and non-electrified rail routes. In addition, upgrading to a trimodal* power system – with an additional pantograph – is easy because the system is already equipped with an electric motor. This gives the operator considerable freedom with regard to deployment of the vehicles – it's a big plus when they can respond flexibly in the future to every route requirement or tender invitation.

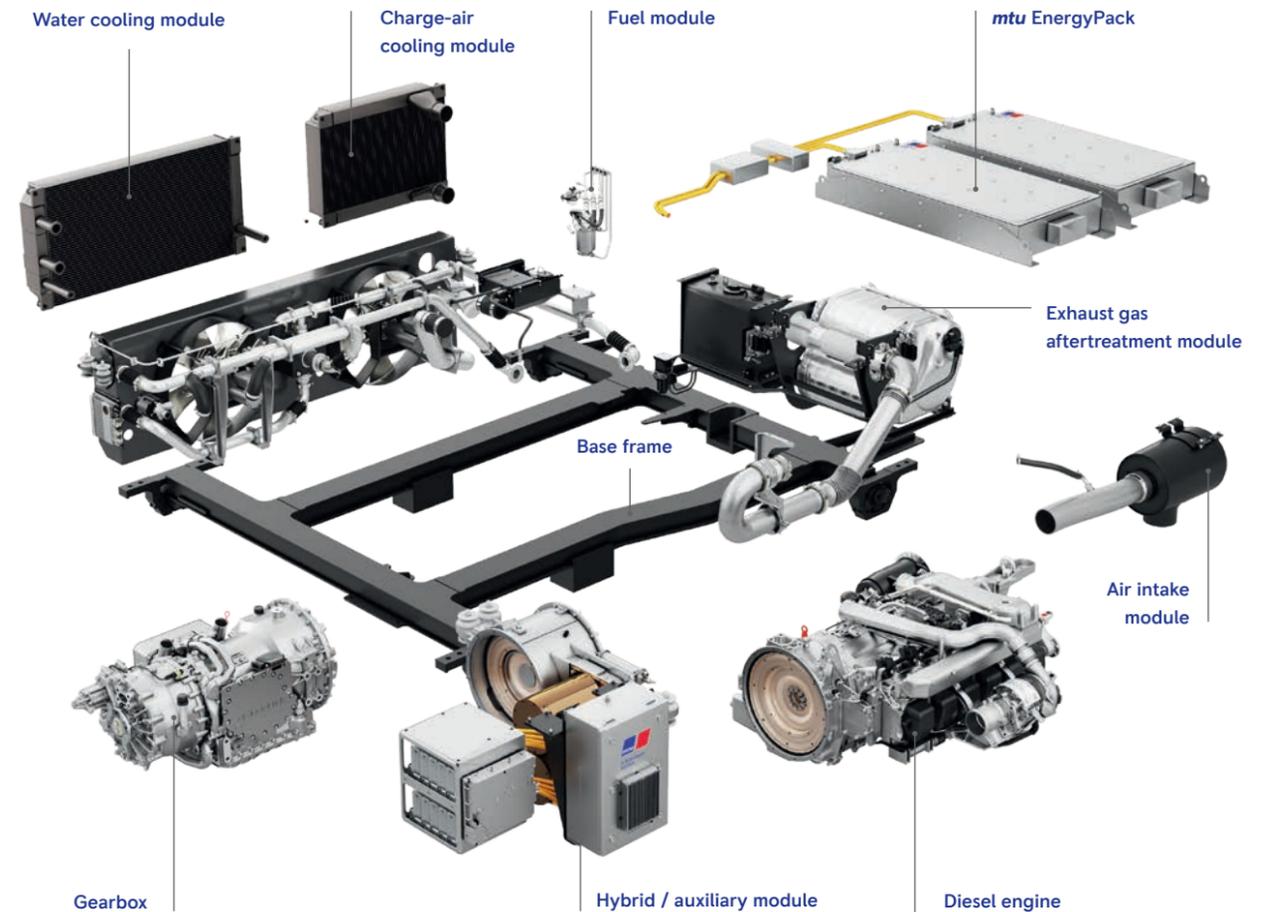
* diesel + battery + catenary

Marketable technology – tailored solutions

Extensive test runs in a Siemens Desiro Classic Railcar (DB Series 642) have proven the reliability of the **mtu** Hybrid PowerPack. The projections of the simulation have also been confirmed. As a result, **mtu** can make reliable statements to customers with regard to efficiency as well as the reduction of noise pollution and exhaust emissions, and offer them tailored hybrid solutions that in every case will generate the greatest possible benefits for the application.

Hybrid PowerPack with Series 1800
Optimal integration of all drive components in a slim and trim design to enable easy underfloor installation. 315 - 470 kW (422 - 523 bhp)

Flexible integration of the **mtu** EnergyPack whether for roof or underfloor installation

**Plug & play ready**

Quick, easy installation and removal for maintenance

Cost savings

Return on investment already begins with the installation

Compact design & low weight

Decades of experience in optimizing weight and design

Engine monitoring

All functions are monitored by an electronic engine-management and automation system

System flexibility

Optimum solution for every requirement - for both hardware and automation

Eco-friendly

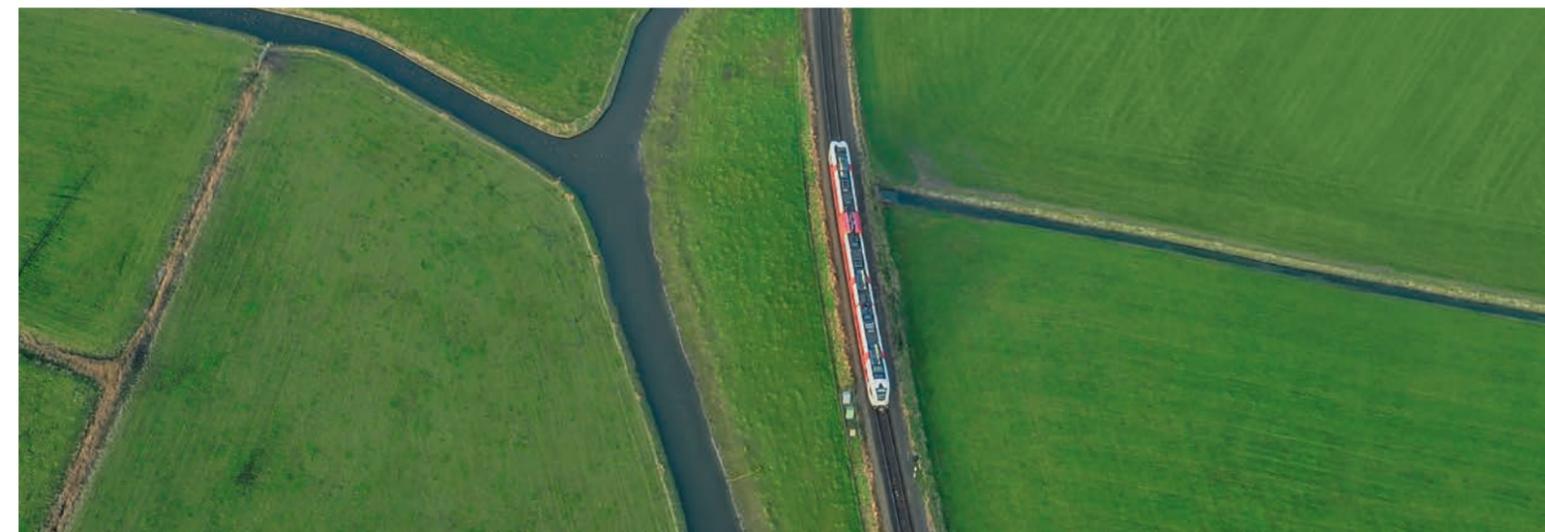
Internal combustion technologies as well as aftertreatment solutions for lower emissions

Standards compliant

Meets US EPA Tier 3, 4i, EU Stage IIIA, IIIB and V standards

All from one source

From project kick-off over the entire lifecycle, we are your reliable partner





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



Rolls-Royce Group
www.mtu-solutions.com/rail

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