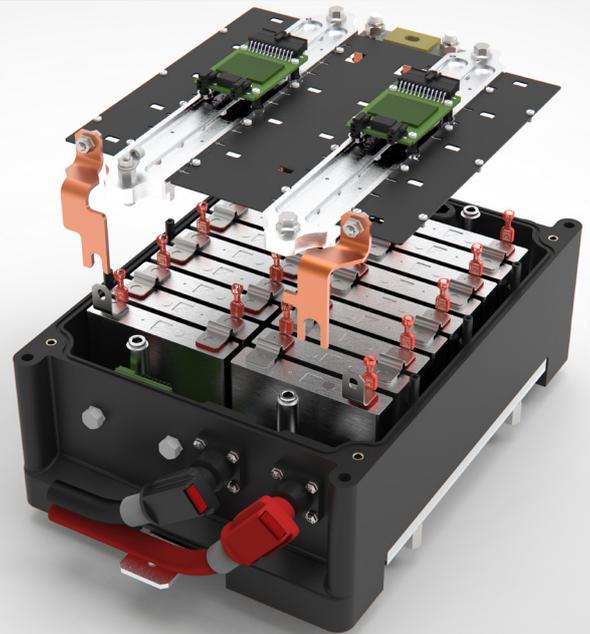


MAHLE Powertrain High Charge Rate 48 V Battery Pack



20 kW peak charging capability

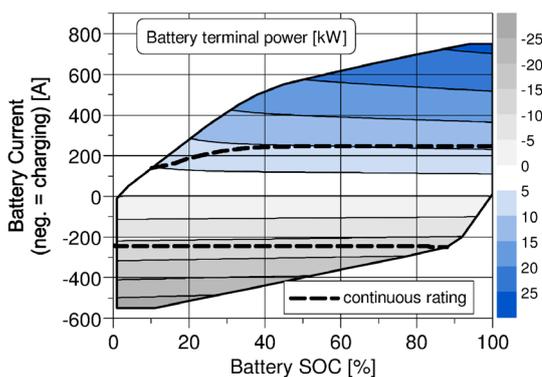
High efficiency cooling system

0.5 kWh capacity

48 V mild hybridisation has become an attractive and commercially viable option due to significant savings in weight, package space and cost compared to high voltage alternatives. The safety considerations for vehicle maintenance are also a key factor in the adoption of 48 V architectures.

For maximum benefits, high power capability is required for maximised recuperation during deceleration events in order to maximise capture of the braking energy available. The cost and installation package can be reduced by minimizing the storage capacity of the 48 V battery. These conflicting requirements lead to a small battery pack capable of repeated high-power charge and discharge events.

Analysis for a typical C-segment vehicle suggests that a charging capability of 20 kW enables the majority of available braking energy to be recovered. Power deployment at the next acceleration event following a recuperation cycle is an effective control strategy; therefore only a modest electrical storage capacity is required.



Charging and discharging power map targets

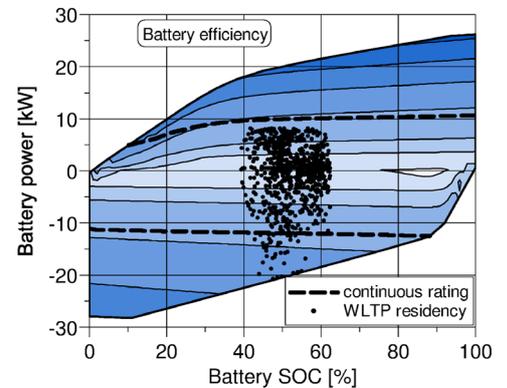
MAHLE Powertrain 48 V Battery Pack

A new 0.5 kWh, 48 V battery pack has been designed to address these challenges. Utilization of high power cells enables very high charge and discharge rates. Furthermore the chemistry avoids the danger of thermal runaway and features a high cycle life of more than 20,000 cycles until the capacity falls below 80% of its initial value.

The cooling system is designed to keep the battery cells below 55°C with minimal complexity. Special consideration was given to the bus bar design to avoid additional heat input into the cell terminals.

Capable of 10 kW continuous discharging and charging power and a peak performance of 20 kW, this pack opens up significant opportunities for 48 V mild hybridisation and is capable of powering any MHEV architecture, from P0 to P4.

An optimized strategy keeps the operating points of the battery in highly efficient areas during the WLTP test. Fuel economy benefits of up to 15% are then possible in a C-segment vehicle with a P4 hybrid configuration.



Operating strategy ensures good control of SOC during WLTP

Specifications

Voltage level:	48 V
Voltage range:	36 - 52 V
Capacity:	0.5 kWh
Continuous charge/discharge power:	10 kW
Peak charge/discharge power:	20 kW
Dimensions:	Length - 420 mm Width - 270 mm Height - 237 mm
Temperature Range:	-20°C to +55°C

48 V Battery



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