

## Electrification Build & Test



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Climatic battery test chamber

### Electrification Technologies

MAHLE Powertrain has significant experience in a broad spectrum of electrification technologies from the detailed simulation of total system energy flow and thermal energy management to the design of high performance eMotors, eDrive systems, battery packs and EV cooling systems.

We provide extensive support for the development of low and high voltage electrical system architecture and proven capabilities in the design and optimisation of integrated systems and whole vehicle control systems.

- Battery pack design, build & test
- eMotor design, development & test
- Control strategy development
- Control hardware (prototype & production)
- Whole vehicle system integration



A critical question in the early design stages of an electrified vehicle is the selection of appropriate system architecture best suited to the vehicle application. Consideration must be given to the target parameters for performance, fuel economy and emissions, package constraints, cost and weight as well as specific requirements for the vehicle usage and the market or region where the vehicle will be sold.



Battery Pack Assembly & Testing  
eMotor Testing & Characterisation

### Benefits

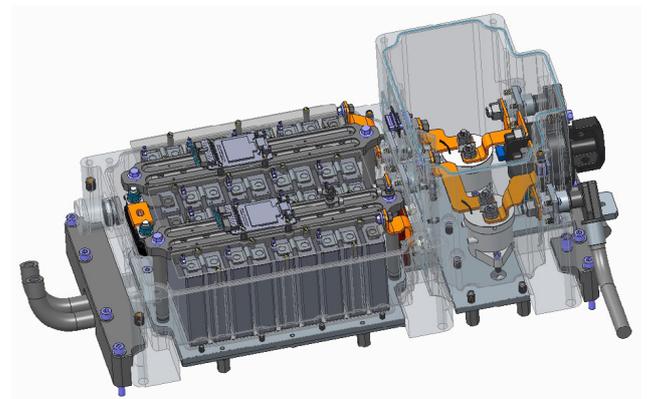
- New in-house facilities for development testing of electrification systems
- Testing of battery cells & modules
  - › Can be characterised in a dedicated chamber incorporating all necessary measurement, data gathering & safety systems
- Strip, measure & instrumentation of prototype eMotors & generators
- Dynamic testing on a bespoke rig
  - › Results can be evaluated against an extensive characterisation database

### Projects

- 2007 Hybrid vehicle energy management analysis
- 2009 Bespoke range extender engine (30 kW)
- 2010 Hybrid vehicle cooling system analysis
- 2011 Hybrid vehicle control unit (HVCU)
- 2012 Range extended demonstrator vehicle
- 2014 Parallel hybrid demo vehicle using wheel motors
- 2016 48V eSupercharged MHEV demonstrator vehicle
- 2017 eAxe Electric Drive Unit (EDU) concept
- 2018 Production EV high voltage battery pack design
- 2018 High power / high charge rate 48V battery pack
- 2019 Fully integrated PHEV drive unit



High performance eMotor



Internal detail of battery pack

### Summary

MAHLE Powertrain offers expert knowledge on electrification technologies and battery pack assembly and testing. We provide a range of eMotor test and development capabilities, including characterisation and mechanical / electrical integration. The thermal performance of prototype eMotors can also be evaluated on our dedicated test rig.