



## Verification Capabilities



### System Development Testing Experience

A complete service for powertrain mechanical development and validation, MAHLE Powertrain's experienced Mechanical Systems team have a wealth of experience in the field of functional testing, durability testing and problem solving. Playing a key role within the design process, our work starts with helping to identify potential failure modes and how they may be avoided before the design leaves the CAD screen. We are then able to derive and deliver an optimised Design Validation Plan, utilising our own or our client's test procedures, to validate the powertrain and peripheral systems on the test bed and in vehicle to ensure that they meet customer reliability demands.

When a failure occurs, we utilise an industry standard 8D approach to carry out in-depth investigations. Drawing on our expertise, we are able to provide insights and understanding into complex system interactions, utilising advanced instrumentation, visualisation techniques, novel test procedures and in-house manufactured rigs, to facilitate the development of design solutions.



Valve fitted with thermal sensors



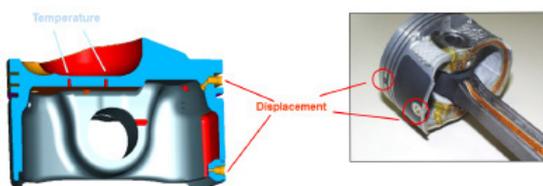
DVP derivation for new & unique systems  
Bespoke rig manufacture & operation

## Benefits

- Prototype & concept vehicle production
  - › Allows customers to experience new powertrain configurations at an early stage of development
  - › Can perform straight forward engine modifications & substitutions
- Allows installation of complete hybrid powertrains
- With representative drivability characteristics to enable assessment at the highest level

## Testing Specifications

Climatic / Altitude	
Temp range, °C	-40 /+60
Temp constancy, K	+/- 1.2
Humidity, g/kg air	5.5/12.2 +/- 5%
Pressure range, mbar	540/1050
Max altitude simulation, m	5,000
Test Specifications	
Emissions	Euro 6c, US SULEV, China National 6
Max speed, km/h	250
Max force, N	6,400 (12,500) <sup>1</sup>
Max power, kW per axle	230/230 (400/400) <sup>1</sup>



MAHLE Modular Hybrid Powertrain (MHP)

## What We Offer

- Design validation plan derivation & management
- Dynamometer & vehicle testing
- Bespoke rig design, manufacture & test delivery
- Design improvement recommendations based on functional test results
- 8D failure investigation & problem resolution
- Durability & validation tests with measured build
- Specialists in cooling & lubrication system validation & development
- Crankcase ventilation system assessment & development
- Engine friction measurement
- Prototype vehicle manufacture & testing, utilising the MAHLE Flexible ECU to enable full integration with existing vehicle systems (ICE & hybrid powertrains)
- High speed video capture
- Valvetrain testing
- Structural deformation measurement
- In-house instrumentation capabilities
- Front End Ancillary Drive (FEAD) assessment