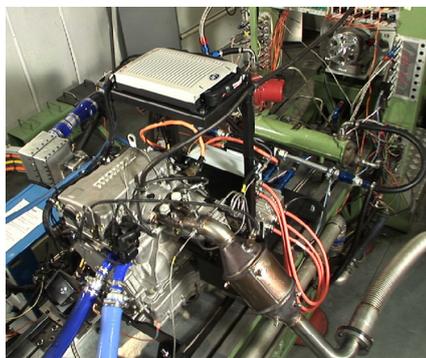




Test Capabilities



Exhaust manifold analysis model



Range extender engine on dyno

Extensive instrumentation capability

MAHLE Powertrain has an extensive range of facilities to develop IC and electric powertrains. The engine test cells are multi-fuel capable (for gasoline, diesel, bio-fuel and CNG, highly configurable with up to 700kW absorption available and can operate on a 5 day, 3-shift basis.

Capabilities

- Fully climatic & altitude capable 4WD chassis dyno
 - › Temperature range from -40°C to +50°C
 - › Altitude capable up to 5000m
 - › Euro 6c & SULEV certified
 - › Rated up to 450 kW per axle
- Capable of running Euro, US, Japanese and Chinese vehicle test cycles
- Aids in developing & validating RDE compliant vehicles
- E-machine / range extender test cell

- 12 Performance & Economy (P&E) engine test cells in total, each cell containing:
 - › Horiba MEXA gaseous emissions measurement
 - › AVL combustion pressure measurement
 - › AVL fuel flow measurement
 - › 5°C chilled fluid cooling loop
 - › Automated DoE capability
- 4x rapid pallet change cells
- Combustion air temperature / humidity control
- Particulate emissions using Combustion DMS500's / AVL CPC's
- 48 V / 800 V power supply / absorption



12 test cells and 5 test rigs
3 vehicle tests

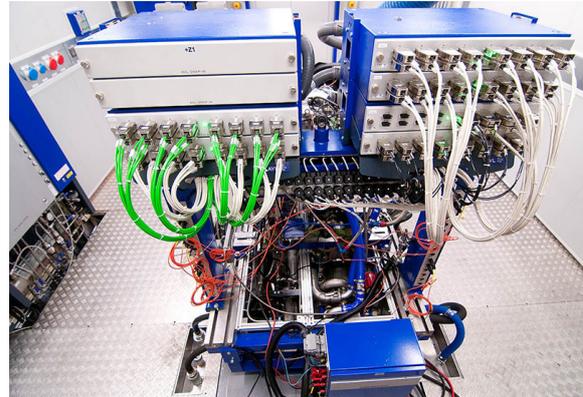
Engine & Rig Testing

- Dedicated pre-rigging area / hot test cell
- Other equipment for mechanical systems development
 - › Oil aeration & analysis
 - › High speed camera
 - › Real time piston temperature
- Dedicated test rigs for:
 - › Friction measurement
 - › Engine tilt for lubrication / breather system development

Vehicle PEMS Testing

PEMS testing forms part of the new RDE (real driving emissions) gaseous and particulate number (PN) legislation requirements for EU type approval. It also provides a more accurate measurement of fuel consumption / CO₂ emissions during 'real world' driving conditions.

- Routes start / stop from Northampton site
- 2 x Horiba OBS-ONE PEMS (Inc. PN) systems
- In vehicle equipment packaging



Intake gas flow simulation

	4WD #1	2WD #1	2WD #2
Temp	-40/+50°C	25°C	-40/+50°C
Altitude	5000m	-	-
Emission standard	Euro 6c / SULEV	Euro 6b	Euro 5

Chassis dyno specifications



4WD chassis dyno with altitude capability