



Flexible ECU (MFE)



MAHLE Flexible ECU

Small Volume Production

At MAHLE Powertrain we wanted to develop our own controls and the ability to fully integrate these controls into a vehicle. We started with engines and the challenge of implementing full torque structure into the MAHLE Flexible ECU (MFE). Subsequently we successfully developed a wide range of powertrain and related applications, including various new/novel engine technologies, all engine types, hybrid vehicle controls, motor controls, thermal controls and battery management and we have these systems integrated and running in vehicles.

MFE is a family of ECU platforms from different suppliers which run our software. Different applications have different requirements and we can select hardware for simple or complex applications, from 1-off concepts to low volume production and from off-the-shelf solutions to bespoke hardware.

Achieving rapid prototype control is not just about the speed of the software development but also the speed that the system can be calibrated. MAHLE has developed approaches and techniques to speed up the calibration process, applying closed loop combustion control and software in the loop (SIL) cosimulation within MFE.



Full system integration
Rapid prototyping

Our Tools, Facilities and Services

- MFE controllers provides cost effective, integrated, controls solutions for wide variety of applications
- New concepts or prototypes
- Small production or development fleets
- 'Turn-key' MFE solutions with fully functioning controls
- Initial configuration & calibration support
- Function developments on OEM specified prototype & production systems are supported
- Related in-vehicle display & data logger solutions



MAHLE downsizing engine

MFE Software

- Optimised complexity for development tasks
- Integration with automated testbed controls via ASAP3
- Interfaces for automated mapping & closed loop combustion control
- Semi-automated, assisted & manual operation modes
- Interfaces to in-vehicle displays & data logging
- Executable code is auto-generated from Simulink / TargetLink models
- Enables rapid debugging



MAHLE range extender demonstrator

Engine Application Examples

- Small volume production application (2020)
- Full control for MAHLE Range Extender engine
- Development of new customer engine family
- Benchmarking & optimisation of OEM engines
- Single cylinder research engines (gasoline and diesel)
- Diesel aftertreatment research (DPF, SCR, LNT)
- Control of Stirling engine for power generation

Key Features

- Range of MFE specs
- Rapid prototype controllers
- Small volume production
- Easily configured
- Model based function development

**Customer intellectual property is protected*