Algorithm Development for Diesel Engines
Mechatronic Powertrain Systems
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Confidence that pays
We can provide you with project solutions from the idea to the start of production using proven, specialized and efficient processes. From nearly 20 years of experience in developing and calibrating engine control units, we have the confidence to fulfill your most challenging project assignments to production level. Doing so, you and we can draw on the largest pool of experts the market has to offer.

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From the idea to the start of production

- Analysis and concept
- Design
- Specification
- Software
- Testing
- Production
Integral Component of Powertrain Development

In powertrain engineering, realizing innovations for implementation in mass production is supported or sometimes only made possible through new functionalities on the engine control unit.

This is where we see algorithm development as an integral part of powertrain development that works hand in hand with all of the engineering disciplines involved. This produces the following benefits:

- Processes can be handled on a modular basis and therefore more efficiently.
- Interfaces and interrelated sub-processes are mutually coordinated.
- You can choose whether to take advantage of the entire service spectrum or opt for the appropriate module.

Ensuring a high level of efficiency, IAV’s unique portfolio provides you with expertise in all areas of engine control.
Advanced Rapid Controller Prototyping methodology

- **Model adaptation** to the target system (engine, vehicle) regardless of system with scalable I/O modules, e.g. Fi2RE with EtherCAT connection.

- **Model-based development** of new algorithms using MATLAB®/SIMULINK®.

- **Algorithm realization and calibration** on the target system (single cylinder, multiple cylinder, vehicle) using standard calibration software, e.g. CANoe, INCA, CALDESK.

- **Data management, measurement data evaluation and documentation** using standard software as in production calibration, e.g. CalGuide.

- **Automatic code generation and ASAM-MCD2 generation**.
Our Concepts and Tools

- IAV Model-Based Controlled SCR - IAV-SCR Control
- Model-Based Controlled Air Path - IAV-MBCAP
- Hydraulic Wave Compensation Software - IAV-HyWaCoS
- Modular Prototyping Engine Controller - IAV-MPEC®
- Advanced Closed-Loop Combustion Control Software - IAV-AC3
Mechatronic system - diesel engine
References and Tools

**IAV-MPEC®** This concept provides a start-to-finish Rapid Prototyping tool chain. It consists of an algorithm development environment for an engine control unit and the associated software. Using IAV's FI2RE injection and ignition control unit, numerous degrees of freedom are provided for optimizing engine development.

**IAV-AC3** is a cylinder-pressure-based engine management system combining control of the main center of energy release, the energy release rate, in-cylinder pressure as well as indicated torque. This system is the ideal tool for developing and calibrating alternative combustion processes.

**IAV-MBCAP** MBCAP is a model-based control concept for regulating and pre-controlling the air-path. For example, the high-pressure exhaust-gas turbocharger can be continuously activated and deactivated for a two-stage supercharged diesel engine without significant losses in boost pressure.

**IAV-HyWaCoS** HyWaCoS provides a correction function that reliably compensates for fluctuations in the injected fuel quantity in a CR injection system. Its model-based character makes it universally applicable while minimizing calibration work input.

**IAV-SCR-Control** Developed in-house by IAV, this software provides the capability of operating different SCR systems. Modular in structure, the software can be adapted to different SCR system types through its model-based character on the one hand and an open source code on the other. This permits the fast and efficient implementation and validation of new SCR metering strategies.

Temperature spectrum in a regenerating DPF
Our Software Tools

- IAV - CalGuide
- IAV - CALIAV
- IAV - Themos, TR-Sim
- ATI - Vision, No-Hooks
- dSPACE - CalDesk, Controldesk
- ETAS – INCA/ASCET/Intecrio
- Imagine LMS® – AMESim
- MATLAB® – SIMULINK®, RT Workshop
- Vector - CANalyzer, CANoe, CANape
- Gamma Technologies – GT-Power
- HiL simulations: dSpace, IAV, customer

Our Seals of Quality

- Certified under DIN EN ISO 9001
- Systems in conformity with AUTOSAR
- Programming in conformity with MAAB
- Software handling in line with SPICE