

Simulation Solution for xEV Powertrain Specification and Integration

AVL supports the model-based development of xEV powertrain concept analysis, which includes benchmarking, layout, optimization, and integration. Drivelines, electrical networks, cooling and heating systems as well as control functions are represented as digital twins within the entire vehicle model, allowing investigations under real-world driving conditions.

THE CHALLENGE

Mastering the increasing speed and complexity of the xEV development process requires simulation-based methods with a high level of integration with test systems:

- Combining virtual and real worlds to gain a deeper understanding of the overall system and to support the integration of all major components
- Considering the strong interaction between the different subsystems (mechanical, electrical, thermal and controls) to take into account all cross-effects
- Optimizing 50,000+ calibration parameters for several power units and more than 50 vehicle configurations

THE AVL SOLUTION

AVL's unique workflow covers the entire development process. This results in a number of benefits for the engineer:

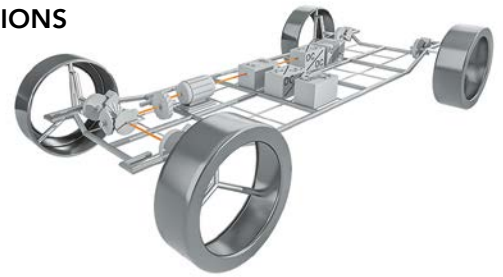
- Predictable performance and efficiency early in the concept phase
- Different physical domain models, including mechanical, electric, thermodynamics, chemical, thermal and signal
- High-fidelity physical models of key components for the detailed investigation of influencing parameters on major powertrain parts
- Plant models to support all major subsystem test applications, such as engine, battery, fuel cell and e-motor testbeds
- Frontload control unit development and calibration, starting in the virtual environment

THE ADDED VALUE

- Fast Models allow reuse of models from concept to XiL to save cost, time and need for additional software
- Tailored model setup and vertical connection to detailed CFD models with the help of parameterization wizards
- Automated derivation from 3D to 1D for fast and automatic component data input
- Easy access to testbed with the support of guided workflows for testbed integration

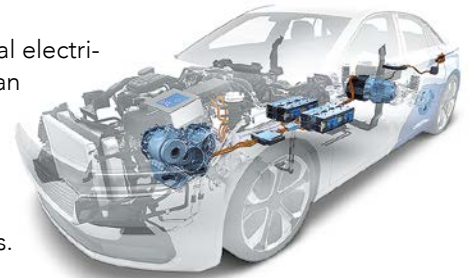
FACILITATING CONCEPT DECISIONS

To assess the implications of a certain powertrain technology and architecture, it is vital to focus on performance, drivability and energy consumption at the same time.



FOCUS ON E-NETWORK

The detailed modeling of the individual electrical networks and their coupling plays an important role in the xEV powertrain development process. This includes sizing and controlling the DC/DC components as well as analyzing and interconnecting the electrical networks.



INTEGRATED DEVELOPMENT PROCESS

System simulation models from the design phase can be re-used for control function development and virtual integration. Here the different components and subsystems are put together and checked whether they work properly under the individual cross influences.



PAVING THE WAY TO VIRTUAL TESTING

Powertrain component testing under realistic operating conditions requires digital twins of the remaining components. Such plant models are easily extracted from the overall system models. The usage of expensive test facilities can be reduced.



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FIND OUT MORE

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