Expanded vehicle testing portfolio at FEV

**Fig. 1: Low fuel quality**

**Fig. 2: FEV Robustness Tool**

New markets, increasingly stringent exhaust gas regulations and a steady increase in the number of vehicle derivatives has led to the need for prolonged vehicle endurance testing. Despite the existence of intelligent concepts for reducing testing distances that are driven, FEV’s vehicle testing team has increased its competence regarding the countries it services as well as the technological issues we can solve. Aside from our well-established endurance testing procedures in Europe, the U.S. and China, we now offer vehicle endurance testing in India, Russia, Brazil, Turkey and Dubai. Moreover, on the technological side, we have added new procedures regarding complete vehicle issues, such as rough road testing. The endurance test programs are either defined by our client or, alternatively, FEV can utilize its own programs and routes. These are characterized by insufficient testing of boundary conditions for reducing the distances driven, while maintaining a high degree of field correlation. The quality demands of new markets on established automotive manufacturers are rigorous. For example, insufficient testing of boundary conditions, such as a variety fuel quality within a target country, can lead to a market failure that can irreparably damage the brand’s image. Our team has been supporting OEMs for many years in the execution of vehicle endurance testing of passenger and commercial vehicles. This testing includes the powertrain (emissions, diagnostics and mechanics) and aspects of the complete vehicle (body structure, passenger compartment and chassis), thus providing a complete investigation of the product. The testing team in the target country is controlled by a specialized project management group in Aachen, Germany which ensures a reliable interface to the client. Data acquisition from all countries is carried out by FEV’s own data loggers or by the client’s applications. Data analysis may be performed by either the respective technical department at FEV or by the client. The technical department always works closely with the testing team at the specific location.

The use of a new OBD tool is described in the following text as an example for the continuous improvement of our testing procedures and tools. A robustness tool for OBD applications is being used at many OEMs, which displays all diagnostic and ECU data collected during the entire run in an overview. At a glance, it can be recognized “online” whether individual parameters approach their respective threshold values, facilitating the need for early intervention by the calibration engineers. This analysis also considers – aside from geographical and environmental conditions – driving behavior and yields a full verification of our clients’ desired target values.

FEV’s professional team has over 40 million testing kilometers (24.85 million miles) under its belt and is ready to face new challenges.

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**Expanded vehicle testing portfolio at FEV**

**Optimized exhaust aftertreatment systems for commercial and industrial engines**

**Fig. 1: Emission Regulation On-/Off-Road / Locomotive / Marine**

The latest emission regulations in key markets around the world require increasingly complex exhaust aftertreatment systems, in addition to improved internal engine measures. Consideration must also be given to fuel consumption, CO2-emissions, costs, as well as the durability and packaging aspects, in addition to the demands concerning exhaust emissions. Therefore, in the future, a holistic approach toward the engine and aftertreatment system will be indispensable to achieve a fully optimized system.

The layout tasks for exhaust aftertreatment systems as well as their calibration and validation have become increasingly more complex, to the point that the systematic introduction of modern development and calibration tools has become necessary. FEV uses model-based approaches which are used, for example, in efficient SCR system calibration and off-line calibration of DPF loading models.

Special focus is required to achieve an overall optimization of the complete system including the future engine and aftertreatment systems. This optimization needs to be considered holistically with regard to hardware layout, calibration of operation modes (such as normal mode and SCR heating mode), as well as operating strategies (such as switching between different operation modes). FEV offers an innovative approach utilizing a combination of global DoEs and simulation of the exhaust aftertreatment system using an FEV developed Simulink-based simulation tool (FEV SimEx) that results in very short calculation times. This approach also enables an efficient variant calibration for development time and costs, which is very important in the industrial engine area where a huge number of variants concerning engine specifications and customer-specific applications are commonly considered.

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