Press Release

FEV to address validation needs: XiL simulation saves time and money

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Aachen, November 2020 - Simulation techniques are necessary for affordable and timely design as well as for the manufacturing of today's complex vehicle concepts. FEV, a leading global engineering provider, supports these technology solutions with proprietary software for virtual experimentation and calibration via Hardware-in-the-Loop (HiL) co-simulation systems.

The need to be nimble and quickly adapt to changing environments has never been more prevalent. Due to the current global pandemic, companies are limiting global travel, thus creating challenges for climate and other real life testing of prototype vehicles. When adding the evolving complexity of powertrains and increased test matrices for vehicle derivatives, the incorporation of real-time co-simulation systems for calibration and validation purposes is an obvious solution.

"FEV's modular X-in-the-Loop (XiL) test benches are valuable tools in deploying virtual calibration. Engineers perform standard bench testing on an actual component, such as an engine, paired with virtual versions of other related vehicle components. This allows for virtual validation and calibration in the early stages of vehicle development," said Prof. Stefan Pischinger, president and CEO, FEV Group. "Also, it enables validation of critical scenarios that are not safe to test on roads and removes the inconsistent behaviors of various human test drivers, providing a high degree of reproducibility."

Additional customer benefits include:

- Identifying early-stage hardware needs before building first prototype components or entire vehicles
- Decreasing the number of prototype vehicles required in early development stages
- Reducing the development timeline by up to 30 percent
- Immediate cost reduction

In FEV's various XiL test benches (e.g. Engine-, Transmission-, Powertrain- or Battery-in-the-Loop), the real and virtual worlds meet. For example, during Engine-in-the-Loop testing, the engine is tested on a modular and highly dynamic engine test bench while the response from the transmission and vehicle are simulated through respective models.

To facilitate communication between these two worlds, FEV utilizes xMOD™, its propriety real-time software for co-simulation and virtual experimentation:

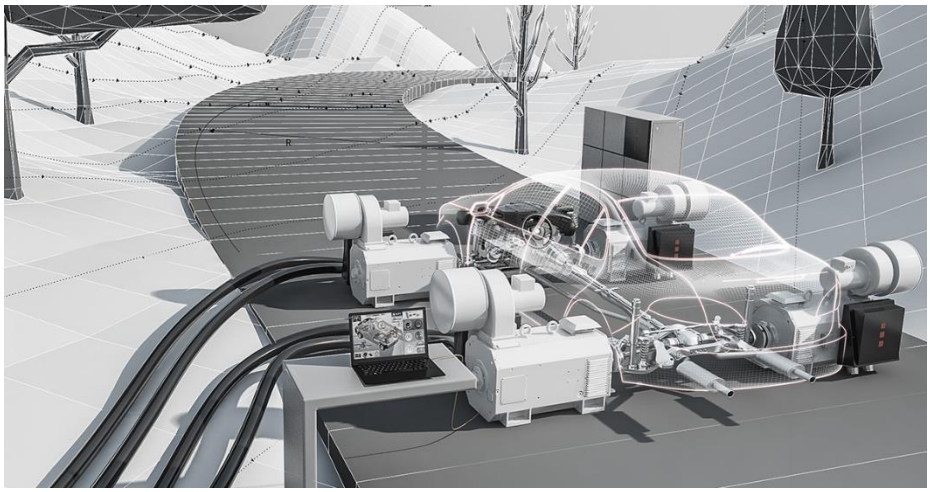
- The automation system sends torque measurements to xMOD™
- To control the engine on the bench, xMOD™ sends pedal and speed instructions based on the feedback from the appropriated simulation models
- FEV's modular XiL co-simulation interface synchronizes information from the simulation with the physical testing to ensure precise execution

In addition to providing a means of communication, xMOD™ has the capacity to run simulation models 10 to 40 times faster than other available systems. This allows for the management of highly complex bench models in real-time without information losses.

FEV developed the required real-time models based on more than 40 years of technical knowledge about vehicle powertrains and the relevance of the required model structures and scopes. These models can be iteratively adapted to project scopes, if required. Furthermore, the FEV in-house models can be linked with customer-specific or third-party models and jointly executed in xMOD™. Thus, FEV's procedure ensures proper mechanical and informal information exchange at the highest quality level.

"As the automotive industry evolves, its vehicles and technologies become increasingly complex. Hence, our ways we test components needs to evolve, too," said Prof. Pischinger. "Our modular XiL test benches are what our customers need and expect from FEV. And with applications in other industries, our XiL solutions are examples of how FEV expertise can extend beyond automotive."

In addition to automotive applications, XiL can be applied to other industries featuring complex products. For example, XiL is a viable option when testing safety components of aircraft systems. The high cost of building and testing prototype aircrafts is prohibitive, so having the ability to test components virtually is a tremendous cost saving factor.



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Source: FEV Group

About FEV

FEV is a leading independent international service provider of vehicle and powertrain development for hardware and software. The range of competencies includes the development and testing of innovative solutions up to series production and all related consulting services. The range of services for vehicle development includes the design of body and chassis, including the fine tuning of overall vehicle attributes such as driving behavior and NVH. FEV also develops innovative lighting systems and solutions for autonomous driving and connectivity. The electrification activities of powertrains cover powerful battery systems, e-machines and inverters. Additionally, FEV develops highly efficient gasoline and diesel engines, transmissions, EDUs as well as fuel cell systems and facilitates their integration into vehicles suitable for homologation. Alternative fuels are a further area of development.

The service portfolio is completed by tailor-made test benches and measurement technology, as well as software solutions that allow efficient transfer of the essential development steps of the above-mentioned developments, from the road to the test bench or simulation.

The FEV Group is growing continuously and currently employs 6700 highly qualified specialists in customer-oriented development centers at more than 40 locations on five continents.