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Quality Assurance for Measurement Data and Simulation Environments

For a number of reasons, virtual development environments have become an increasingly important feature of the powertrain development process. Among other things, they offer the opportunity to gain an understanding of complex powertrain systems at an early stage of development and to reduce the amount of time and money needed for the development process, given the wide variety of powertrain types and variants currently available.

However, creating the necessary models and simulation environments is time-consuming and not always productive. In many cases, this is because the virtual development environment does not accurately represent the real powertrain. What are the reasons for this? On the one hand, the process of defining or implementing the requirements specification for the models and simulations may not be complete, while, on the other hand, models are often used later in application areas that the developers were not aware of when the models were created. Often only a small quantity of measurement data from the test bench is available that, in addition, does not always match the application area. How accurate is the measurement data? Is the simulation or the data faulty? Why is there no quality documentation for measurement data and simulation environments?

In my view, if we are to answer these questions and overcome these challenges, it is essential for us to integrate a standardized, well-functioning quality assurance process into the creation of models and simulation environments. This should

include establishing the plausibility of the measurement data and verifying and validating the simulation. Characteristic features of this process include a consistent approach to scoping the tasks, individual responsibility, standardized documentation concerning the area of application, the quality of the measurement data and the simulation environments, plus detailed communication between the people involved. This is only way of achieving extremely accurate simulations and therefore a high level of acceptance among the users. It goes without saying that staff, time, discipline and funding are needed to develop and apply the quality assurance process for measurement data and simulation environments. But this will lead to a shorter development period, lower costs and high-quality results.

This new hybrid development environment calls for a coordinated, balanced approach to teaching on the part of the universities. The activities of the test engineers and the simulation developers and the way in which they cooperate during the development process must be reflected in the university courses. It is important for the students to gain experience on the test rigs and to subject the measurement data to a critical analysis to determine their accuracy. These virtual subjects involve the students learning how to manage the system requirements, design the system architecture, create the models and develop the simulation environments, which are then verified and validated. For this purpose, they can use their own measurement data which they have subjected to a plausibility check in advance.