

Topic Preview MTZextra Test benches and simulation for drives 2023

ELEKTROMOBILITY

Real-time test bench for testing drive shafts for the mobility of the future

GKN has developed a real-time test bench for testing drive shafts for electric drives, which simulates the entire load-time curve based on measurement data provided by the OEM. This makes it possible to simulate loads that occur during driving and to test cases such as full-load acceleration or misuse events. Events such as driving uphill with a trailer load or crossing railway tracks under acceleration can also be tested. In the future, tribology, i.e. friction, lubrication and efficiency, will also be evaluated during real-time test bench tests. *GKN Automotive*

Inverter test systems for function tests in remote and unmanned operation

The trend towards electromobility means that at least one inverter is part of the drive system in every vehicle. Software is a crucial component for the function of the inverter in vehicles and significantly determines the vehicle behaviour. In order to shorten development times, an efficient software release process is essential. At Mercedes-Benz AG, a large part of the tests are carried out on an inverter test system that emulates the characteristics of the electric motor. *Mercedes-Benz, AVL Set*

INTERVIEW

Ergin Cansiz, Horiba: "Simulations complement the portfolio, but will never replace the test.."

The upcoming Euro 7 standard takes into account non-engine emissions for the first time, in addition to a further tightening of exhaust gas limits. Ergin Cansiz, Managing Director of the Mechatronics Test Technology Division at Horiba, discusses the resulting steps with MTZextra.

METROLOGY

Mapping as a method for evaluating the optimal test procedure

All OEMs are faced with the question of which test method is best suited for leak testing traction batteries. Mapping, an empirical investigation to determine the optimal test method, helps to find the answer. The Uni500 mapping device from JW Froehlich masters three different test methods, each of which previously required a separate device. *JW Froehlich Maschinenfabrik*

From the battery to Big Data in electromobility

Data acquisition systems in modern test benches can also be seen as Big Data management systems. With them, it is possible to process data streams from different measurement applications, such as static measurements with low sampling rates and dynamic measurements with high-frequency sampling rates, in a time-synchronised manner. In the process, very large amounts of data are generated for a short time, which quickly bring storage media to their limit. Gantner Instruments shows how the challenge of large data volumes can be mastered through intelligent data management. *Gantner Instruments*

BATTERYTECHNOLOGY

Increase battery safety with abuse tests

In so-called Abuse Tests, batteries are subjected to the harshest influences outside the actual operating window. They are deliberately overcharged, overheated or damaged in order to examine their behaviour and guarantee that they are safe and reliable. These tests under extreme conditions require particularly high standards of testing equipment. Weiss Technik is presenting a newly designed test chamber that can be used to carry out tests at cell and module level. *Weiss Technik*

POWERTRAIN

Comparison of driver models for powertrain test benches

With detailed vehicle, driver and environmental models in a real-time environment, it is possible to perform semi-virtual and highly realistic tests and applications. As a result, validation of the powertrain can be carried out more cost-effectively and at an earlier stage under defined, reproducible boundary conditions. Porsche analyses the development of driver models for the powertrain test bench. The paper examines both approaches from classical control engineering and an AI-based approach using reinforcement learning. A comparison of the different approaches with regard to the accuracy of the models, the required computing power as well as the setup time and complexity shows the possible applications on the powertrain test bench. *Porsche*

Bearing test bench for tests under high-speed and high-load conditions

In the case of the electric powertrain, the focus is increasingly on its lubrication system and bearings. Because of the high speed requirements in combination with new oil types and oil additives, the entire lubrication system is becoming a challenge, which requires new techniques and methods for bearing testing. With the new test rig developed by FEV, up to two bearings can be tested in parallel under high-speed and high-load conditions. Tests with variable axial and radial bearing forces are possible, combined with different lubrication concepts such as immersion or pressure lubrication. *FEV*

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ALTERNATIVE FUELS

Simulation model for pilot injection of future fuels in dual-fuel engines

In order to optimise the performance of engines that can run on renewable fuels and efficient combustion mechanisms, predictive three-dimensional CFD simulations of the phenomena in the combustion chamber are used. This allows the properties of the spray formation, the mixture and the ignition/combustion processes to be determined. Combustion and Flow Solutions presents a model implemented in a commercial CFD code to model ignition and combustion in dual-fuel engines with pilot injection, considering diesel and ammonia. *Combustion and Flow Solutions*

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