Efficiency for ECU calibration

The next generation of Etas’ measurement and calibration products will provide a data throughput 20 times higher than current systems. At Embedded World, the company showed an ECU plug-on device and an ECU and bus interface module.

STARTING IN THE SECOND QUARTER OF 2015, with the release of the FETK (ECU plug-on device) and ES891 (ECU and bus interface module), Etas offers a high-performance solution for measuring and calibrating powertrain ECUs. The launch of Inca V 7.2 at the end of 2015 will complete the solution, which can be applied in vehicles, test beds, or virtual environments. This system will provide a data throughput 20 times higher than current systems with hardly any effect on ECU runtime. Depending on the ECU setup, the products will be able to handle more than 40,000 labels, mastering up to two ECU connections within one ES891. CAN, CAN FD, Flexray, and LIN signals, as well as digital and analog I/O signals can be handled with an accurate time synchronization of less than 1 microsecond. Moreover, the system can be expanded by combining more than one ES891 or further devices from the ES800 family by stacking the devices on top of each other without any additional cabling.

With vehicle control functions becoming more complex, the current approach to calibration has to change. If it doesn’t, the effort and means needed to conduct calibration projects will likely escalate to non-sustainable levels. New emissions legislations, a higher number of vehicle variants, more complex electromechanical systems, networked functions across domains, and electrification of the powertrain – these are the main drivers behind this increase in complexity. Etas estimates that the effort put into calibration (measured in terms of engineering capacity) will double from 2013 to 2020, unless significant changes are made to the methods and tools.

One of the main ways to counteract this trend is to reduce the time needed to perform calibration in the vehicle. After test drives have been conducted, calibration engineers often cannot find the root cause of an issue because information is missing from the recorded measurement data. Due to system performance limitations, only a subset of all ECU signals get recorded, and this subset often turns out to be insufficient for analysis. Engineers are forced to reproduce the issue in an additional drive cycle, repeating the effort required to set up the vehicle system and adjust the recording configuration. The next generation of Etas measurement and calibration products addresses this lack of efficiency, enabling engineers to measure all signals during the calibration of a powertrain ECU. This results in fewer test drives, less time to finish the calibration tasks, and fewer vehicle prototypes.

To feed this amount of data into the Inca measurement and calibration software, the ES891 connects to the PC with a Gigabit Ethernet connection. Open standards such as XCP-on-Ethernet for ECU access and IEEE1588 for time synchronization enable FETK/ES891 to be integrated with third-party hardware and software tools.

The solution ensures compatibility with the company’s existing software and hardware products. It will be the first in a family of products designed to meet the future needs of powertrain engineers. In 2016, the German company will add two additional solutions to its portfolio: The first is a data logging solution (based on the ES820 module), able to measure all ECU signals over an entire working day, which will facilitate continuous in-vehicle test operation. The second release will be a rapid prototyping solution that can reach roundtrip times of less than 100 microseconds. With these solutions, the company supports all use cases for powertrain ECU development within one hardware system.