# Automated functional testing

An advanced software tool easily combines individual vibration tests of identical or different test modes in any complexity of nested loops

The increasing complexity of modern vehicles and their components, as well as ever evolving standards, poses new challenges in reliability testing and analysis. Lithium-ion batteries, for example, have to meet a multitude of requirements for durability, electrical and mechanical safety. In order to thoroughly test mechanical safety, electrodynamic shakers are used to conduct vibration testing using different kinds of excitation signals such as sine, classical shock and random, which simulates the operating conditions of these components. Climatic chambers can also be used in conjunction with electrodynamic shakers to simulate driving over a curb in low temperatures, for example.

Careful implementation and analysis of these tests requires a great deal of time and manpower. The m+p Advanced VibUtil software module supports engineers in performing these tests. It is an extension of the proven m+p VibControl vibration control software, enabling creation of test sequences and the use of digital channels to communicate with external hardware such as the climatic chamber. With these test sequences, it is possible to combine different excitation types into a single test run and perform them automatically, while the system is left unattended. In this scenario, m+p VibUtil assumes
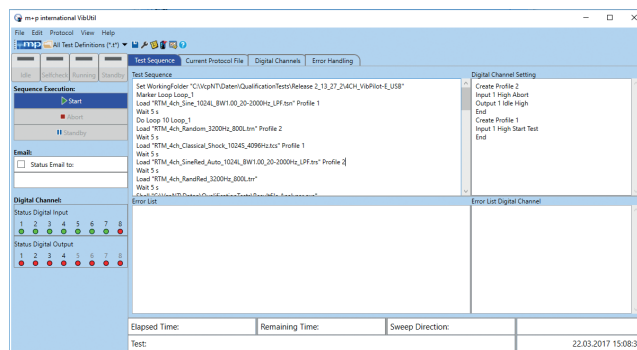
TOP: Combined climatic and vibration testing (Photo: ACS Group)

ABOVE: A test sequence with digital channel setting

operator can interrupt at any time to make changes to specifications or to analyze the results, if required. Furthermore, the operator can carry out other tasks such as preparing another device for the next test. At the end of the sequence, or if discontinuing the sequence, m+p VibUtil will automatically report this event to the operator via email, including the current test protocol.

In addition to creating test sequences, m+p Advanced VibUtil supports the use of digital input and output channels. These channels provide several options – for example, the digital output channels can be used to control the power amplifier remotely, which allows the user to define a digital channel profile, which ramps up the power amplifier at the beginning of the test sequence and ramps down the amplifier at the end or at any interruption of the test sequence, reducing energy costs.

In addition, the use of digital channels enables automatic communication with, for example, climatic chambers. Digital channels in the climatic chamber can be used to start the vibration test once the correct temperature has been reached. Furthermore, via the digital output channels in the m+p measurement hardware, successful completion of the vibration test can be signaled in order to change the temperature level of the climate chamber.

communication with the m+p VibControl software, ensuring smooth execution of the test sequence and documenting of the test run. During execution of the test sequences, the