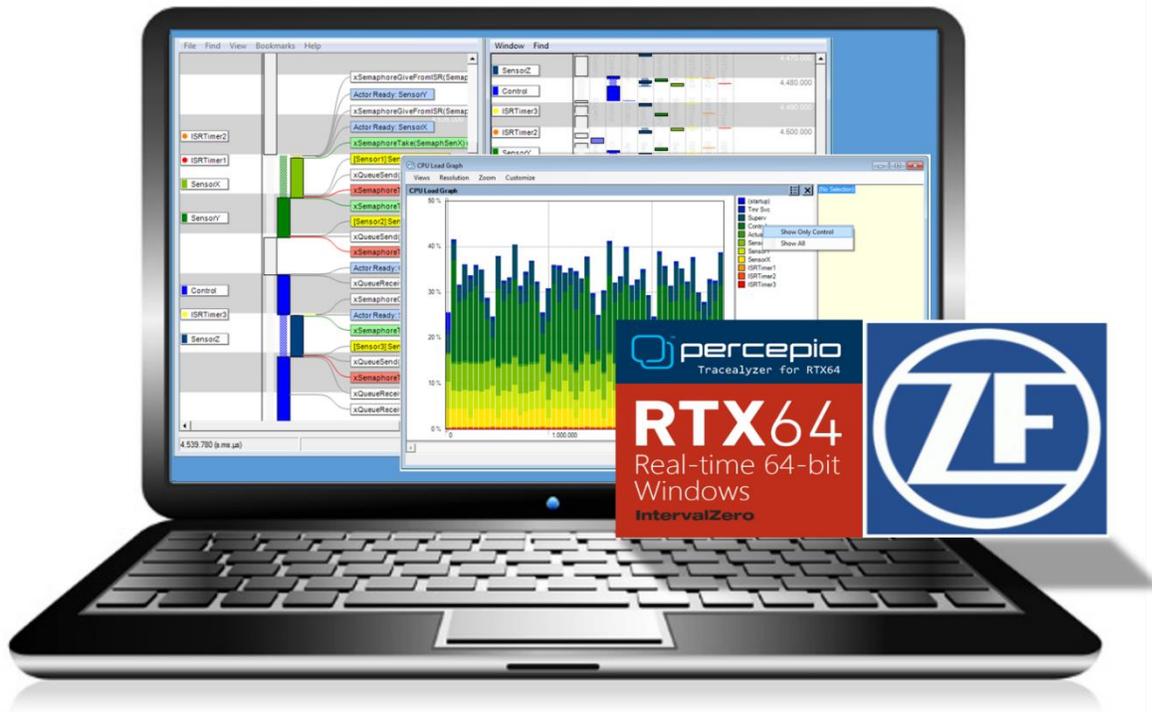


Real-World Solutions to Testing Real-Time Systems

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The continued electrification of automotive drivetrains and subsystems means the number of electronic control units (ECUs) in cars, trucks and mass transport vehicles is rising rapidly. In this safety-critical environment, delivering reliability is paramount, particularly as trends such as ADAS (Advanced Driver Assist Systems) move us ever closer to the autonomous vehicle paradigm. This is something that ZF, a global leader in driveline and chassis technology, and active and passive safety technology, understands fully.

ZF develops a range of solutions for the automotive market and is at the forefront of bringing sensors, steering systems and mechatronic actuators together to make vehicles safer, more comfortable and more efficient. ZF chooses only the best technologies in its products and is a long-time customer of IntervalZero, the company behind RTX64, a technology that turns the Windows operating system into a real-time operating system (RTOS).

Real-time applications running on a Windows platform using RTX64 (the multi-core version of RTX) are made possible thanks to the system architecture of IntervalZero's RTOS platform, which takes a system with a timer resolution of 1ms (standard Windows) and turns it into a system with a timer resolution of 1µs. This 1000x improvement in resolution is the key to enabling real-time performance in a Windows environment.

Visibility into real-time systems is essential during the development, debug and optimization stages of product design. For OEMs this can be a challenge, one that ZF has, in the past, addressed by adding additional hardware to enable the system to interface to an oscilloscope and logic analyzer. This was cumbersome but necessary in a development environment, but even more difficult (and just as necessary) in the field. As well as the cost of the test equipment, the engineering effort required was significant. In addition, analyzing data that had been captured in the field back in the lab incurred further effort.

Evaluating the reliability of a system requires the right tools for the task. An oscilloscope and logic analyzer may not represent the best solution to ZF's needs, but it had been the only option until the integration of Percepio's Tracealyzer technology into IntervalZero's RTX64 Hard Real-Time SDK. Support for Tracealyzer is now integrated

directly into RTX64, making it easy to view the software's execution on the target hardware in real-time, using one of [Tracealyzer's 25+ graphical views](#).

During the migration of their applications to RTX64, ZF found that Tracealyzer could be used to replace the legacy approach of using an oscilloscope and logic analyzer. In addition to giving visibility into the software's execution on the development bench, it allows engineers to analyze systems in the field without the need for large and costly test equipment. Furthermore, all data gathered in the field can be easily analyzed in the lab.

Adopting Tracealyzer with the latest version of RTX64 has also allowed ZF engineers to expedite the migration of its legacy software to new hardware platforms and save many engineering hours in the field. Overall, the addition of Tracealyzer to ZF's systems saved the organization considerable time and money across its machine automation operations.