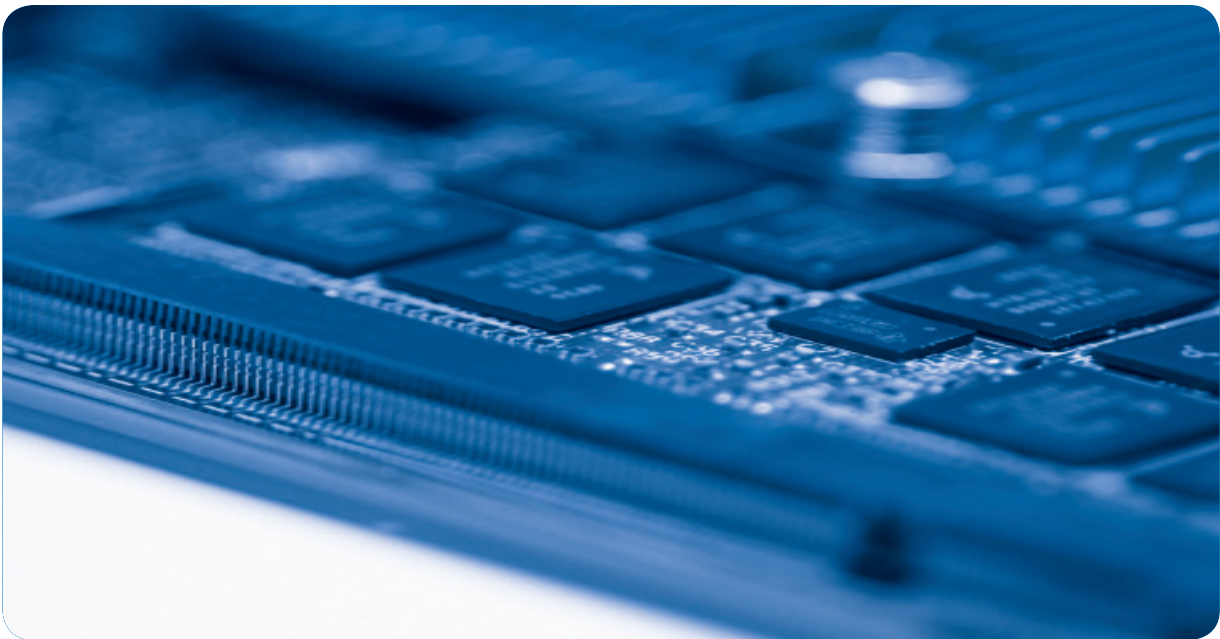


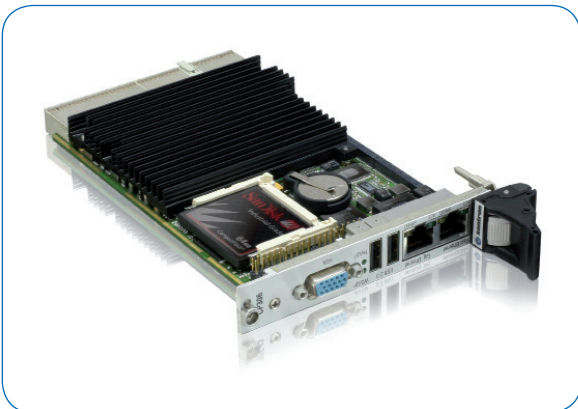
» Application Story «

CompactPCI® in Transportation



Surviving in Death Valley

Mobile Automotive Testing System Performs Calculations Using CompactPCI® CPU Boards From Kontron



Before a vehicle reaches the mass production stage, countless measurements need to be made to coordinate all components optimally. Mobile measuring systems specialist Suchy Data Systems GmbH, based in Maisacher, Germany, has developed a new compact measuring system to meet the requirements of field tests. This system can analyze up to 600 measurement channels. A CompactPCI® CPU board with rear I/O support specially customized by Kontron for Suchy is used as the subsystem for visualization, data logging, and communications.

All the leading car manufacturers perform countless tests on their vehicles for component development, QA, and certification. Some measurements can be made as point measurements using small devices, or simulated.



However, once development has nearly reached the mass production stage, the prototypes have to prove their worth in real conditions – often in extreme conditions such as those found in Death Valley in the US or inside the Arctic Circle in Sweden in Winter. Measurements are made, for example, to coordinate acceleration, elasticity, and braking characteristics, aerodynamics, and temperature development in the engine area and vehicle interior. Consumption data is validated, instruments calibrated, and compliance with legal



Figure 1: Manfred Suchy with testing system and driver display: The PC unit with the measurement electronics is located in a separate robust housing – all components are shock- and vibration-proof. The additional driver display consists of a large text display showing the most important measurement data and simultaneously serving as a menu navigator. In the background to the left: Sunlight-resistant monitor, which can be attached to the windshield via suction cups to give the driver a perfect view of it.

regulations recorded in reports. Cable harnesses as thick as an arm are laid throughout the vehicle for performing complex measurements, since today's most complex tests can have more than 300 measurement points. These test systems used to fill up an entire trunk because the processors that existed in the past did not have very high performance capabilities and the If it's Embedded, it's Kontron. modules could not be manufactured in very compact formfactors. Measurements are increasing in complexity as demands on vehicles, for example with respect to consumption, increase.

Product development cycles are also getting shorter, with combined measurements saving time. In vehicle manufacturing, the increasingly sophisticated tasks are performed by non-specialist test engineers and drivers, who can only perform their tasks efficiently if the test equipment they use meets these demanding requirements:

- » The devices must be very compact because they are employed in constantly changing locations, which vary from vehicle to vehicle.
- » Despite having space-saving designs, they must have all of the interfaces needed in practice in a single system.
- » They have to be designed to withstand extreme environmental conditions such as those found in Death Valley or the Arctic Circle.
- » They have to have user-friendly test projection and job list generation for the test driver as well as visualization and documentation in a single system to enable rapid implementation of the necessary test scenarios without the need for in-depth understanding of the dedicated electronics. Real parameters such as acceleration, consumption, temperature, etc. – not the frequency of a channel – are decisive here.
- » To enable complex test scenarios with high sampling rates to be analyzed and visualized in real time in a responsive and meaningful way, the test equipment must also have high-performance visualization capabilities.

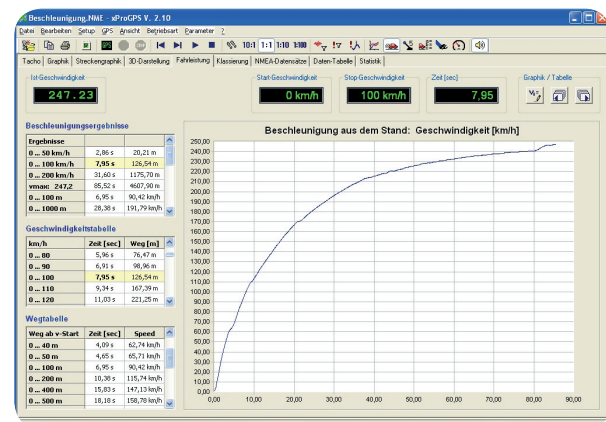


Figure 2: Comfortable projection: Fully automated acquisition and analysis routines are available for standard repetitive tasks. This guarantees maximum working speed and helps to avoid application errors, for example, in measurement of acceleration from zero with the GPS speed sensor.

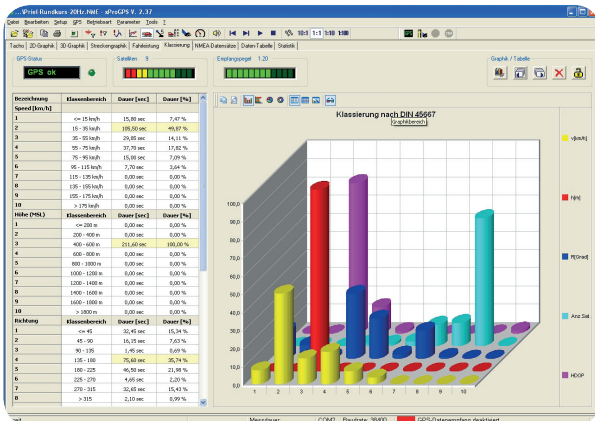


Figure 3: There are numerous graphics, special tables, and complex analysis sheets available for evaluation of driving performance. The development engineer gets a complete test report practically with the push of a button – with a perfect layout and in desktoppublishing quality, for example, for dwell time classification according to DIN 45667.

A test system capable of meeting all of these requirements is now available on the market for the first time ever. Car manufacturers in Europe, the US, and Asia have been ordering it since March 2006, and it is already being used in 15 models currently under development. This system was developed by Suchy Data Systems and is delivered as a turnkey system complete with high-quality color monitor, driver display, cable set, and transportation case. Integrating up to 600 measurement channels on a single system, it has sufficient capacity to handle more complex measurement tasks than today's standard equipment and thereby ensures its long-term sustainability. Still, it is particularly compact and manageable, with dimensions of only 260 x 320 x 110 mm (ca. 10 x 13 x 4 in). In terms of physical interfaces for connection of the sensors and actuators, the Suchy system provides everything a measurement technician's heart could desire and hence everything that might possibly be used outside of the automotive sector:

- » 16 analog inputs with 16-bit resolution and max. sampling rate of 200 kHz



Figure 4: The Suchy testing system can process up to 600 dedicated measurement channels; the standard version provides 8 to 88 thermocouple inputs (yellow).

- » Programmable input filter
- » 8 to max. 88 thermocouple inputs (additional via extension modules)
- » 8 general-purpose counter inputs with 1 MHz counting rate
- » 1 programmable frequency synthesizer
- » 1 programmable switching contact
- » 2 analog outputs with 16-bit resolution
- » Several trigger inputs
- » 3 independent CAN buses
- » Diverse special channels for specific automotive applications

All measurement inputs are galvanically isolated. Special attention was thereby paid to consistent filtering and nondestructiveness. A CompactPCI® CPU board with rear I/O support specially customized by Kontron for Suchy is used as the subsystem for visualization, data logging, and communications. Suchy chose a module designed for long-term availability because the existing rear I/O interface has been established for linking measurement modules for many years and also corresponds to the official PICMG 2.x standard. "Kontron is additionally known for its excellent CompactPCI® board designs, which have a failure rate of zero during operation in our systems," commented Dipl.-Ing. Manfred Suchy, CEO of Suchy Data Systems. This is of particular importance for the measurement system because complex measurement runs cost a lot of money, and no car manufacturer can afford to have the system break down in Death Valley. For Suchy, the longterm availability is also important, not really due to the danger of failure but rather due to the huge investments made by the company in each new generation of its complex test systems. "We sell each of our test system generations for a period of at least 5 years. If the components were to be discontinued before this time, we would lose a not insignificant amount of revenue for our investments in subsequent generations." Hence, cooperation with a partner who has been established on the market for many years is also important for Suchy. The fact that Kontron is now one of the world's top three companies in the embedded computer technology industry provides additional investment security. Suchy chose the standard CP306 as the system's ideal basic component, which provides the maximum performance per watt thanks to powersaving Intel® Pentium® M technology and ultimately enables use of a particularly space-saving power supply. It is also extremely stable thanks to the soldered processor and lack of active cooling. In addition, the rechargeable battery backup and energy management had to be adapted. With the additionally implemented ACPI interface, the operating system is now essentially responsible for energy management. Compared with the APM (Advanced Power Management) system used previously, the ACPI eases the load on the BIOS and makes energy management more comprehensive and comfortable, which is extremely important for mobile applications such as Suchy's.

CP306 Details

The CP306 features high-performance Intel® Pentium® M processors with a clock speed of up to 2 GHz, a 400-MHz front-side bus, max. 1 GB of 333-MHz DDR-SDRAM with ECC (Error Correction Code), and extensive onboard communications interfaces: 1x Gigabit Ethernet, 1x Fast Ethernet, 4x USB 2.0, up to 4 COM interfaces, Compact Flash socket, and a dual ATA/100 interface. The 855GME chipset's integrated graphics controller provides highperformance 2D, 3D, and video capabilities. The CPU is available in 1-slot (4HP) and 2-slot (8HP) versions. The 8HP CPU offers CP306 legacy support and a 2.5" HDD. Designed to withstand extremely harsh conditions, the CP306 is used not only in mobile data acquisition systems such as Suchy's but also in other industrial testing and measurement environments as well as industrial robots, airplane cockpits, and train conductors' rooms.



The Ideal Test Equipment for Vehicles

Various mobile testing systems are used for vehicle development. Diverse miniature measurement boxes are used for small measurement tasks, whereas complex testing systems such as Suchy's system are essential for vehicle optimization in real environmental conditions. Thanks to their complex yet compact designs, they are universally applicable and particularly cost-saving: The system can perform all necessary measurements. The engineer does not need to become familiar with any other user interface. In addition, the system is extremely manageable and, weighing only 5 kg (11 pounds), easy to transport.

About Kontron

Kontron is a global leader in embedded computing technology. With more than 40% of its employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms. Kontron's product longevity, local engineering and support, and value-added services, helps create a sustainable and viable embedded solution for OEMs and system integrators.

Kontron works closely with its customers on their embedded application-ready platforms and custom solutions, enabling them to focus on their core competencies. The result is an accelerated time-to-market, reduced total-cost-of-ownership and an improved overall application with leading-edge, highly-reliable embedded technology.

Kontron is listed on the German TecDAX stock exchanges under the symbol "KBC". For more information, please visit: www.kontron.com

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