

Monitoring agricultural equipment field trials from the office

Application area: mechanical engineering > mobile > remote testing



In the area of in-field testing of agricultural equipment, imc has developed a stand-alone measurement solution with automatic remote monitoring. This significantly reduces the time required for development and product approval, provides higher quality data and reduces travel and personnel expenses.

The situation to date

Normally, test vehicles are often equipped with measurement solutions which consist of several sub-components, such as a data acquisition device, CAN bus logger, GPS tracking and, when needed, a video camera system. Synchronization problems, different operating concepts and foreign data formats made the operation and evaluation difficult.

The systems would only run in unison with a PC and the data had to be read on site. This only delayed the test evaluation and increased the amount of personnel required.

What vehicle developers desired

In addition to reliability and user-friendly operation, what test engineers and developers wanted can be quickly summarized:

- The test driver or technician should only see, or notice, the system when it is being installed or must be maintained or updated.
- The system should be autonomous and have the capability to start and stop the measurement automatically.
- The measured data are stored in a buffer memory on the device and an automatic, regular transfer of the data is performed. During unstable or inconsistent transmission, safe, continuous, real-time monitoring of the field testing should also be guaranteed.
- The solution should be completely unified in one system. That is, all relevant measurement variables should be synchronously acquired together.

Variances in voltage

The voltage supply from the onboard electronics poses challenges that should be handled by imc systems: the measurement system shouldn't drain the test vehicle's battery down; it must be able to support both 12 and 24 volt systems; and it must be able to handle strong voltage fluctuations and even outages, e.g., when starting the motor.

As a solution, the measurement system has the capability to enter a sleep-mode when it is not

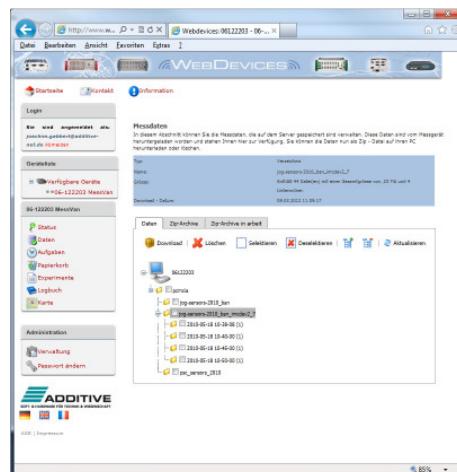
being used. It also has the ability to reboot in a matter of milliseconds.

The intelligent voltage supply of the device operates within the range of 10-36 V and can handle momentary voltage drops from startup. It monitors the voltage of the electrical system and, depending on the presence of an ignition, works completely autonomously and automatically, including a "hidden" installation.

When the vehicle is started, the device is woken up from sleep mode and immediately starts the measurement. Momentary voltage breaks are buffered. If the voltage remains permanently off, e.g., when turning off the vehicle, the measurement will terminate. All files are closed and the system will return back into the sleep mode.

Mobile and automatic

To conserve personnel resources, imc systems ensure that data are automatically delivered to the user. The data are transferred from the measuring system via Ethernet to a UMTS router, then using a virtual private mobile network, to the internet, finally arriving on the internet measurement platform imc WEBDEVICES.



Internet measurement platform imc WEBDEVICES

imc WEBDEVICES automatically loads the data from the measurement system, checks for completeness and then deletes the data from the device memory so that it does not overflow. The platform then makes the data available for all authorized personnel.

The solution is reliable and works across different countries and borders. This allows the data from all field trials in Europe to be centrally collected.

Condition-controlled data

The amount of vehicle data needed by users or developers – such as temperature, pressure, strain and acceleration, as well as CAN bus and GPS data – would normally exceed the available transfer bandwidth.

To reduce the necessary amount of data, the measurement data are stored and transmitted only condition-dependent. For this purpose, the system performs real-time analysis with imc Online FAMOS, which is carried out on the device's internal DSP. When the conditions are determined using imc Online FAMOS, the associated measurement data are temporarily stored and transmitted at the earliest opportunity to imc WEBDEVICES. The conditions to which the system responds can also be freely determined. Thus, the user will only receive the relevant data and can ideally respond to any potential problems in real time.

Conclusion

The combination of standard measurement technology with intelligent power supply, real-time analysis, condition-controlled data storage and wireless data transmission speeds up the field trial process of agricultural machinery during development and production. It saves costs, while at the same time, produces higher quality and more selectively collected data for a more efficient analysis during post-processing.

This solution is maintenance free, can be easily adapted to your application and offers more economical advantages when purchased in larger quantities.

Technical Realization

- Design and development by imc
- imc BUSDAQ data logger or imc C-SERIES with integrated DSP "imc Online FAMOS" for real-time analysis
- UMTS router with SIM card in a private mobile network with EU flat rate
- imc WEBDEVICES internet platform

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For over 20 years, imc Meßsysteme GmbH has been developing, manufacturing and selling hardware and software solutions worldwide in the field of physical measurement technology. Whether in a vehicle, on a test bench or monitoring plants and machinery – data acquisition with imc systems is considered productive, user-friendly and profitable. So whether needed in research, development, testing or commissioning, imc offers complete turnkey solutions, as well as standardized measurement devices and software products.

imc measurement systems work in mechanical and mechatronic applications offering up to 100 kHz per channel with most popular sensors for measuring physical quantities, such as pressure, force, speed, vibration, noise, temperature, voltage or current. The spectrum of imc measurement products and services ranges from simple data recording via integrated real-time calculations, to the integration of models and complete automation of test benches.

Founded in 1988 and headquartered in Berlin, imc Meßsysteme GmbH employs around 160 employees who are continuously working hard to further develop the product portfolio. Internationally, imc products are distributed and sold through our 25 partner companies.

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imc Test & Measurement GmbH is a system house that offers products and services for measurement applications. Our team of about 40 proven experts, having mainly backgrounds in engineering or science, work to realize customer-oriented and application-specific solutions on the subject of "electrical measurement of physical quantities."

imc Test & Measurement GmbH markets the recognizably innovative and powerful hardware and software products from their strategic partner, imc Meßsysteme GmbH, Berlin. We complement these products with our comprehensive engineering services. These range from design, consulting and sales, with pre-and after-sales service, as well as customer and application-specific extensions, system integration, commissioning, training, rental of measuring systems, personnel contracting and much more.