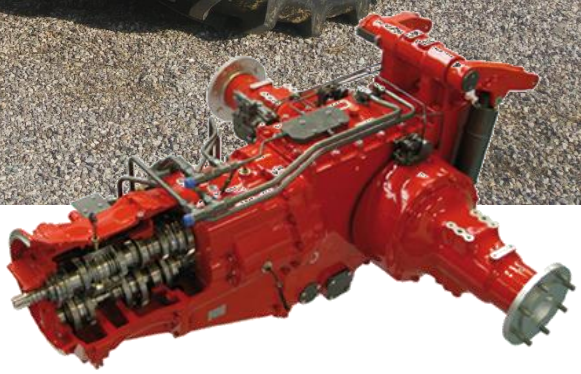
imc
imc-Italy

Axle and gearbox testing on farm vehicles

CARRARO GROUP uses imc solutions



CARRARO

Carraro is an international leader in off-road vehicle transmission systems and specialized tractors.
Utilizing a key competitive leverage in research and innovation, the Carraro Group is established worldwide in these areas.

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R&D tests for product optimization

Carraro is constantly investing in research and development and has developed robust and efficient testing methods to continuously improve the quality and reliability of its products.
In many tests on mechanical components and agricultural vehicles, both in the laboratory and in the field, Carraro's R & D team uses imc systems for measurement, data acquisition and analysis.

Data acquisition systems

For their testing on different vehicles, Carraro has chosen the following test and measurement solutions from imc:

- **imc C-SERIES** – portable, compact and versatile system with 8 analog measurement channels;
- **imc CRONOS*compact*** – modular and portable system with 32 to 128 analog channels;
- **imc CRONOS*flex*** – universal system, distributable and expandable with hundreds of analog channels.

In addition to the acquisition of analog channels, imc devices also support the acquisition of various **digital data** (*event lines, on/off signals, tachometer signals, incremental encoders*), vehicle parameters extracted from different bus types and **GPS positioning** information.

imc devices can operate in stand-alone mode with real-time processing of acquired data via **imc Online FAMOS** to obtain derived parameters. Storing of both raw and processed data is done on internal storage media or on removable CF cards.
All of these imc tools can also be connected to PCs for graphical and numerical viewing of all test parameters online.

Sensors and measurement signals

Specific or universal conditioning and acquisition modules from imc allow for the connection of a wide range of measurement sensors normally used by Carraro technicians during the different experiments:

- Temperature probes, RTD and thermocouples
- Load cells
- Torque transducers for torque measurements
- Pressure transducers
- Strain gauge/Wheatstone bridge transducers with mV/V output
- ICP/IEPE accelerometers
- Current and voltage signals

The imc CRONOS*compact* and imc CRONOS*flex* modular acquisition systems can be configured with different types of acquisition modules.
With the imc CRONOS*compact*, different modules are installed into a single housing; with the imc CRONOS*flex*, the modules can be attached using a simple click-mechanism.
This way the user can quickly create the configuration that best suits each specific testing task – even with a high number of measurement channels.

On-board testing

All of the imc systems used by Carraro have **CAN bus interfaces** that allow acquisition of parameters from the various ECUs in a completely synchronous manner with all other signals.
A .dbc file format containing the description of all the parameters, their position and identification within the messages and their calibration (zero, full scale and EU) allows automatic configuration on the bus.
The .dbc file is normally provided by the controller manufacturer – often directly from Carraro's electronics department.

Specific modules available for imc CRONOS*compact* and imc CRONOS*flex* allow data acquisition via **Ethernet LAN** or CAN bus synchronously with all other parameters acquired directly from a **multi-component wheel force transducer** on the test vehicle.
These are special transducers that accurately measure the **forces and torques** acting on the wheels of the vehicle (*X, Y and Z*).
Carraro uses wheel force transducers interfaced via Ethernet LAN that allow for detection of the following main parameters:

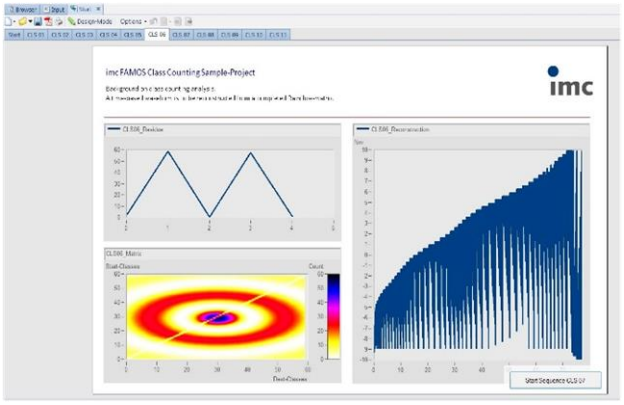
- 3 force measurements on the X, Y and Z axes
- 3 torque measurements on the X, Y and Z axes
- Wheel angle measurement
- Angular velocity measurement
- Temperature measurement

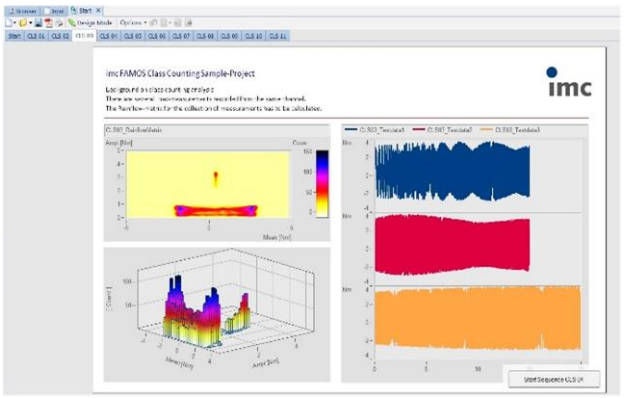
Thanks to this solution, Carraro can perform tests that produce results that simultaneously characterize the entire experimental context: vehicle parameters, torque moments and forces acting on the wheels in reference to position / track location / testing site.

All this greatly increases the efficiency and productivity of the testing.

Post-analysis of acquired data

The **imc FAMOS** standard software enables Carraro to post-process all the data acquired during the tests.
Carraro's technicians can easily define specific analysis algorithms and organize them into automatic processing sequences – all the way up to the layout of reports, graphics and texts.





Conclusion

Even in this type of application where the environmental and mechanical conditions are often times particularly severe, imc data acquisition and analysis, combining great reliability with excellent versatility, have proven to be more than adequate to meet the needs of Carraro's R & D department.

Additional information

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For over 25 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 turn-key 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 physical quantities, such as pressure, force, speed, vibration, noise, temperature, voltage or current. channel with most popular sensors for measuring

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, specializing in the distribution and local support of its solutions.

imc-Italy is represented by
Instrumentation Devices Srl.
Founded in 1991, has acted as the Italian partner company to imc Meßsysteme since 1993.
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