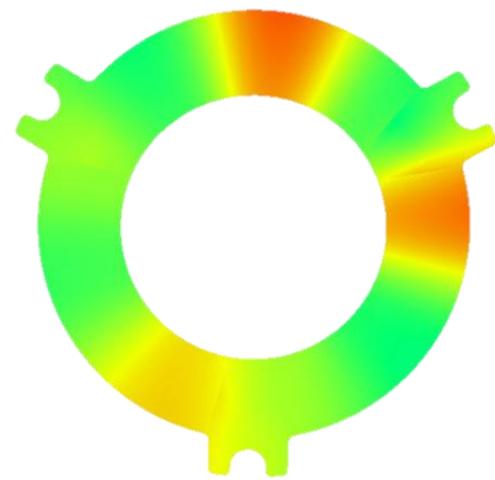
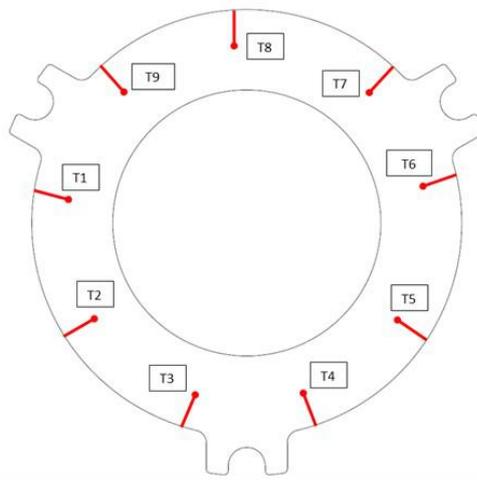


Case Study



A System to Measure Temperature Distribution on Brake Discs

Carlisle Brake & Friction

Challenges

- ◆ To measure temperature distribution on brake discs during the insertion phase
- ◆ To cross temperature measurements with brake bench sensors measurements
- ◆ Lightweight, robust and portable stationing
- ◆ An easy and intuitive application
- ◆ Quick sensors setup and recovery of saved configurations

Solutions

- ◆ Insertion of various thermocouples circumferentially and along the thickness of the disc
- ◆ The thermocouples are connected to a CompactDAQ
- ◆ The CompactDAQ is connected to a laptop on which iDaq and its add-on 3D Sensor Mapping are installed

The goals

Carlisle Brake & Friction is a worldwide company leader in designing and producing brake, clutch and transmission solutions.

R&D department needs to perform braking tests on the discs they produce. These tests have to :

- Reproduce customer practical conditions;
- Measure temperature distribution on the disc during the insertion phase;
- Cross measurements of temperature with brake bench sensors measurements (torque, pressure, velocity, etc.).

Tests are executed with dynamometric benches inside test chambers that are closed due to the presence of coolant oil, therefore the use of infrared cameras isn't possible. For this reason, a way to monitor disc temperature circumferentially and along the thickness is required.

Having more than one braking bench in the laboratory imply having also a lightweight, robust and portable stationing.

The solution has to be easy and intuitive. Moreover, the application has to permit a quick sensor set-up and recovery of saved configurations to optimize time.

Resources

- ◆ iDaq
- ◆ 3D Sensor Mapping
- ◆ CompactDAQ
- ◆ Laptop



Carlisle Brake & Friction is a worldwide company leader in designing and producing brake, clutch and transmission solutions. It serves world class OEM and aftermarket customers in the mining, construction, military, agricultural, motorsports, industrial and aerospace markets and businesses. Carlisle Brake & Friction seeks to provide its customers with full system solutions, "from the pedal to the wheel."

More than 80 years of work experience and the worldwide presence ensure the customers of the best performances and reliability.

www.carlislecbf.com

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The solution

The solution consists of the insertion of various thermocouples into small gaps allocated circumferentially and along the thickness of the disc. The thermocouples are connected to a CompactDAQ, a National Instruments electronic equipment. **CompactDAQ** is a portable, rugged data acquisition platform that integrates connectivity and signal conditioning into modular I/O for directly interfacing to any sensor or signal.

The CompactDAQ is connected to a laptop on which iDaq and its **add-on 3D Sensor Mapping** are installed. iDaq is a T4SM software which can automatically set up the acquisition system.

Thanks to its features and used in combination with **CompactDAQ**, **iDaq** is a great solution for technicians and researchers who want to maximize productivity without having to learn all the details about sensor configurations. 3D Sensor Mapping for iDaq is an easy and quick tool that allows to load and display a 3D CAD model and place sensors on the model itself. Real-time sensor values are directly mapped on the model so the object surface is colored according to the sensor values.

Thanks to iDaq features, 3D Sensor mapping receives data from different National Instruments acquisition boards, both local and remote. The application allows the exportation of the 3D mapped view in image format or the creation of a sequence of images acquired at a constant rate.





TOOLS for SMART MINDS (T4SM) is a system integrator that develops software solutions for manufacturing companies.

T4SM is Alliance Partner of National Instruments and the development team consists of Certified LabVIEW Architects (CLA) who have long experience in LV Real-Time Programming and LV-FPGA.

T4SM designs from scratch to high-quality solutions easily integrable with third-party products, which help customers to shorten time-to-market of their systems.

T4SM uses the AGILE methodology for the development of software projects and the co-design of applications with immediate benefits for customers, helping them to gain a competitive advantage over competitors.

For technical support and product information:

www.toolsforsmartminds.com

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Benefits and results

T4SM solution satisfies all the demands of Carlisle R&D department. The main benefits are in particular:

- More efficiency of their analysis software for data collection;
- Easy and quick visualization of disc temperature through a 3D picture;
- One click measurement system setup;
- The use of a modular solution which allows expanding data collection system with new sensor types;
- A viewer for data post-processing is included in 3D Sensor Mapping;
- Effortless system shifting from a brake bench to another.

“The service offered by T4SM is absolutely positive. Their greatest strengths are competence, flexibility, and speed in providing a solution. The product provided fully satisfy our demand, the software is very user-friendly, complete and allowed us to have better knowledge of the phenomena involved during the test.”

Eng. Simone Bertoli - Application Engineer

Eng. Alessandro Gamba - R&D Manager

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