Functional Testing & Analysis

For over 25 years, we've been at the forefront of providing comprehensive solutions for functional testing, from valve assessments to seat slide exercises. Our systems are equipped with the right sensors, cables, controllers, and data collection software needed for 100% inspection and traceability.

Integrated Solutions for End of Line Testing

The quality of assembled products is crucial for a manufacturer's success. AGT (Absolute Gauge Technology) specializes in offering diverse solutions for "End of Line" testing, crucial for verifying product functionality by measuring various physical characteristics. Performing these measurements at the final stage of assembly guarantees that products are correctly assembled, undergo thorough quality checks, and prevent defective items from reaching customers. Assessing the effort to move a hood hinge arm, the current required by a motor to move a component, or the torque needed to adjust a lever, provides insight into the assembled product's fit and functionality.

Gathering data on the assembly process and the final product's quality and functionality involves measuring various assembly characteristics. For instance, the torque needed to move an arm reveals the integrity and tightness of a rivet, while the smoothness with which rollers run through a seat rail track indicates the quality of an extruded roll-formed seat rail. These measurements not only ensure the final product's functionality but also offer valuable feedback for improving upstream processes.

AGT employs a wide range of sensors and instruments tailored for functional testing. Our extensive sensor selection enables us to choose the most suitable sensor for specific measurements. Knowledge of sensor theory and application principles aids in the optimal selection of sensors, like load cells. Multi-function sensors, such as the Burster 8661 with an integrated quadrature encoder, allow for simultaneous torque and angle measurements. Non-contact displacement sensors, like laser sensors, measure motion without affecting the component under test.

Crucially, functional testing aims to replicate real-world conditions as closely as possible. Selecting sensors capable of withstanding harsh environments and extreme temperatures is vital for accurate testing.

Our diverse instrumentation facilitates testing at various complexity levels, depending on the test's intricacy and the type of data required. Functional testers are invaluable tools in product design, development, and ongoing improvement, enabling manufacturers to maintain high-quality standards and innovate continuously.

Burster Digiforce 9307

The Burster Digiforce 9307 stands out as a comprehensive analysis system, advancing beyond conventional X vs. Y signature analysis by incorporating tolerance bands and windows for more detailed evaluation.

What makes it stand out?

The Burster Digiforce 9307 distinguishes itself as a multifaceted instrument capable of handling multiple inputs simultaneously. It supports a vast array of sensor types and excels in presenting graphical data, including torque vs. angle, load vs. travel, current vs. load, and vibration vs. time. With its extensive range of evaluation techniques like windowing, tolerance bands, and cross-data calculations, it offers versatility in testing. The ability to run and swiftly switch between multiple programs positions it as an exemplary end-of-line tester, providing instant feedback on product functionality. It facilitates data serialization and storage for SPC analysis or future reference. AGT has successfully integrated this system into various end-of-line testing scenarios, supplying sensors, cables, and commissioning support.

Inputs:

- Voltage, Strain gauge, Potentiometer, Encoder, Piezo, Milliohm

Evaluation:

- The 9307 introduces numerous evaluation techniques, including cross-channel calculations and sophisticated windowing. Options include Standard Windows, Trapezoids, Thresholds, and Envelopes.

Reporting:

- Offers comprehensive data collection and control capabilities via USB, Ethernet, Profibus, Ethernet IP, Ethercat.

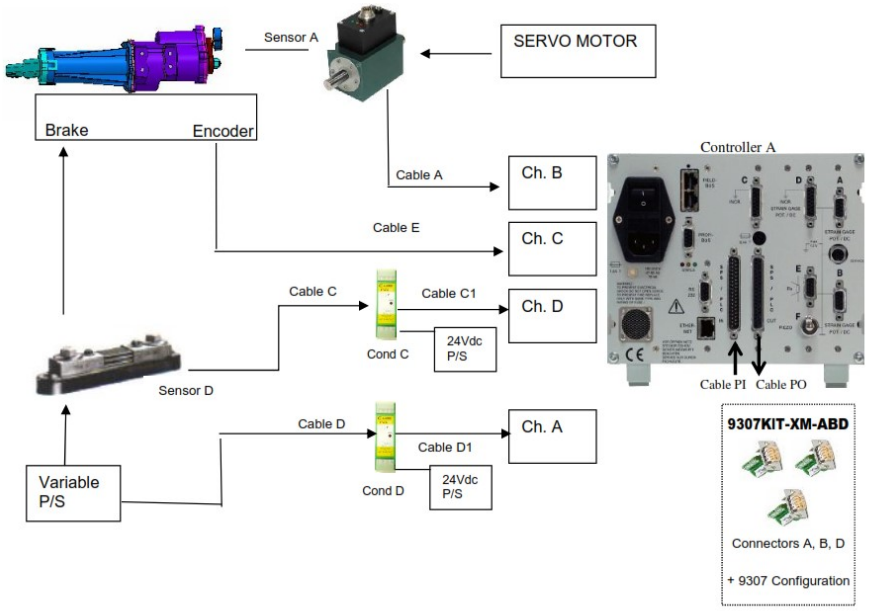
Fast and Powerful:

- Achieves up to 10,000 samples per second, stores 10,000 data points, and supports up to 128 programs, ensuring lightning-fast evaluation.

Burster Solutions: Elevating Automotive Testing to New Heights

Discover how a Burster 9307 system, enhanced with Ethernet IP, revolutionized an End of Line testing scenario. This setup utilized the precision of the Burster 8661 torque transducer and a current shunt to accurately measure the torque and current emanating from an automotive component. The comprehensive data capture extended to encoder pulses, the timing of actuation, and voltage, ensuring a detailed analysis of component functionality.

Equipment Diagram

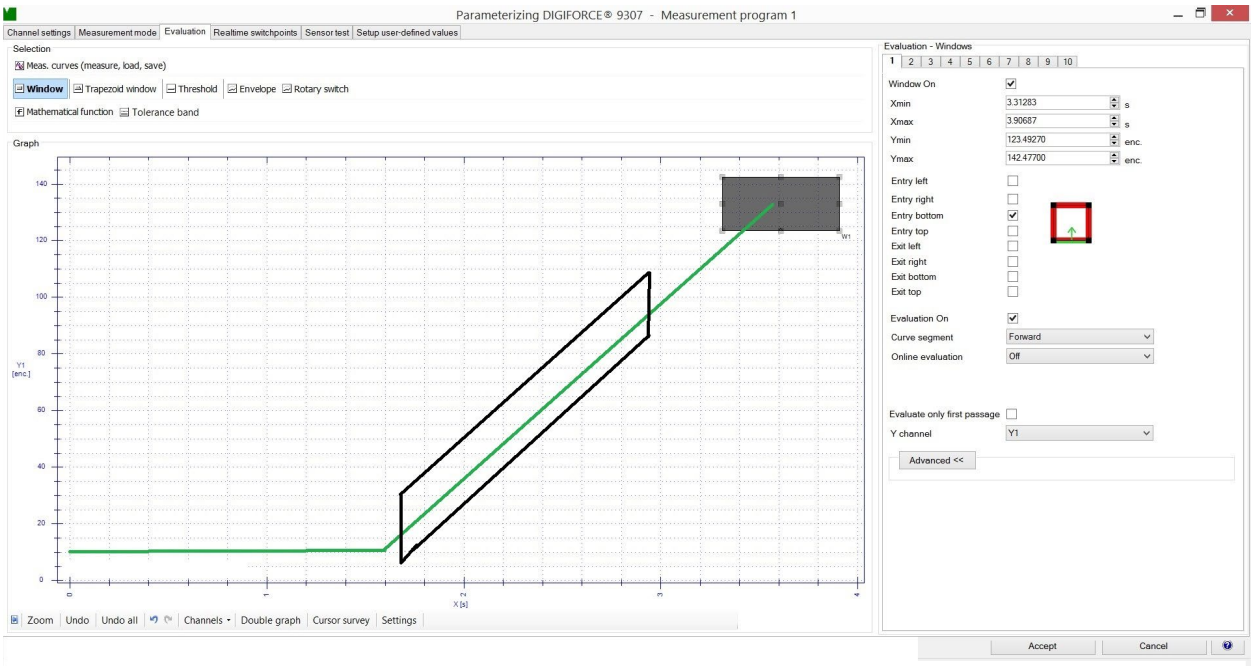


The tested unit, a motor/gearbox/brake assembly, is a cornerstone in automotive actuation, facilitating door movement with seamless efficiency. The brake's dual role as both a stopper and safety mechanism underscores the system's intricate design, which includes an encoder for exact position monitoring.

Central to this testing framework, the Burster 9307 meticulously monitored all critical parameters across various test sequences, proving indispensable in the determination of the component's pass or fail status. The testing protocol, incorporating six specialized programs for different configurations, showcased the system's agility in switching tests rapidly. Moreover, the integration with Burster DigiControl software enabled a thorough review and analysis of collected data. Through Ethernet IP, this approach not only facilitated the aggregation of specific test outcomes but also seamlessly merged this data with other serialized information, illustrating the Burster 9307's key role in advancing automotive testing and quality assurance.

Encoder Test

The encoder test is designed to verify the accurate functioning of the internal encoder. Utilizing the Burster 9307's dedicated encoder input channel, this test directly measures the encoder's performance.



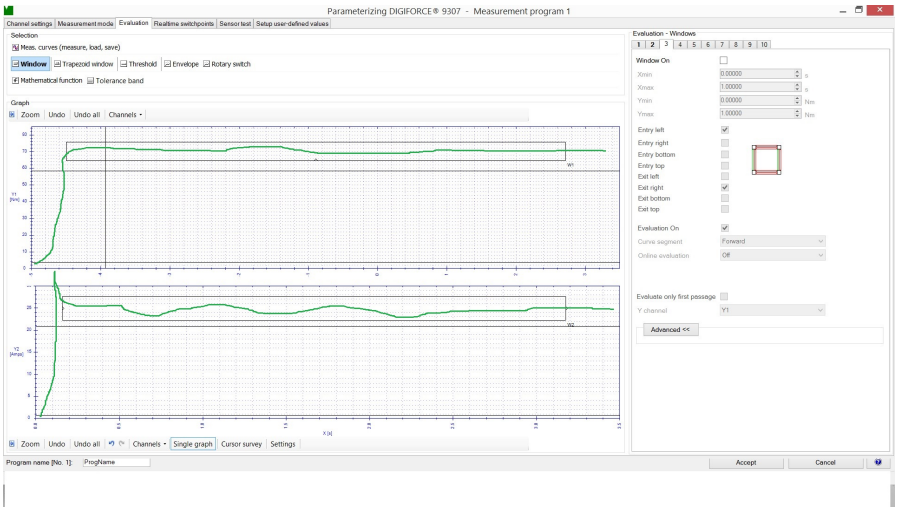
Encoder Test : *X - Time Y1 - Encoder*

By collecting data against a time base, it facilitates an analysis of travel versus time, ensuring:

1. Encoder counts move in the correct direction and reach the exact number of counts within 4.000 seconds.
2. The output remains stable, fitting within a predefined trapezoid shape.
3. Signals on Phase A and B are present; otherwise, the counts will be inaccurate.
4. The correct phase shift is maintained to ensure the direction is not reversed.

Actuator and Motor Testing

This segment assesses the proper functionality of the motor under load conditions. A servomotor introduces a resistive load to the motor/gearbox assembly for this purpose. The Burster 9307's ability to measure two Y-axis data points concurrently is pivotal here. The first channel measures torque versus position, while the second channel keeps tabs on Current versus position, confirming:



Motor Test : *X - Displacement Y1 - Torque Y2 - Current*

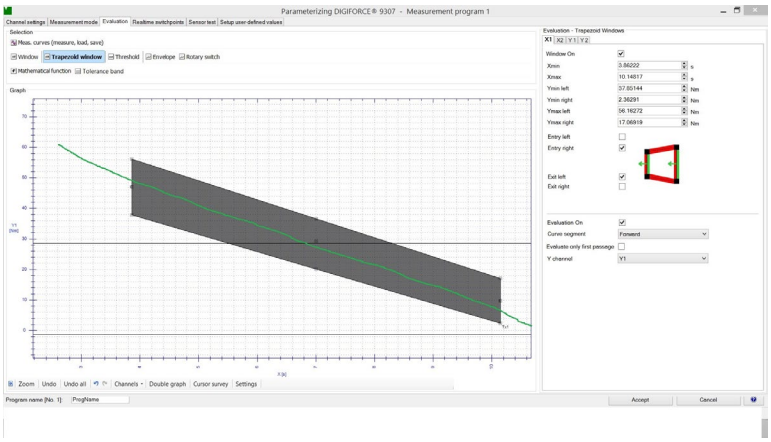
Linear Electric Actuator

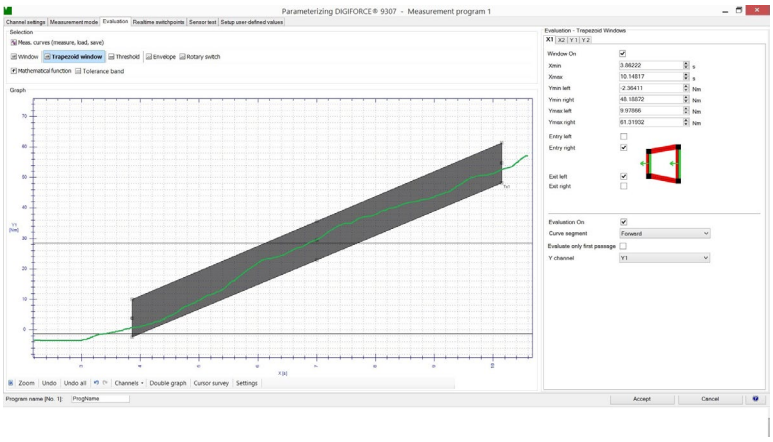
1. Torque remains within the predefined window.
2. Current levels stay within acceptable tolerance.
3. Speed, derived as a function of distance traveled, is assessed before the test concludes at 3 seconds.
4. Torque values are measured and graphically represented.

Accelerator, Brake, and Clutch Pedal Testing

Focusing on a variable brake system, which adjusts braking intensity through variable voltage, this test leverages a torque sensor along with voltage and current sensors. The aim is to monitor Torque versus Input voltage and Current versus Input voltage, offering a nuanced view of how the brake responds to changes in applied voltage, providing critical insights into the functionality and responsiveness of the braking system.

Clutch Pedal





Motor Test : *X - Brake Volts Y1 - Torque T2 - Current*

The Burster 9307 system stands as a cost-effective testing platform, enabling intricate testing without resorting to custom programming or complex data acquisition setups.

Rapid “End of Line” Test Systems

Leveraging over 30 years of industry insights from integrators and end-users, our **Universal Test System Platform** is engineered to meet the evolving demands of applications. At the core of these systems lies an integrated hardware and software platform, enriched with essential components for successful application execution. These components include Deterministic Measurements, Digital Communication, Real Time Signal Processing, Closed Loop Control, an Integrated Graphical User Interface, alongside advanced Data Computation/Analysis and Data Reporting capabilities.

The system's Closed Loop Control feature integrates Digital and Analog Outputs with Data Commands through various field buses like CANbus, LINbus, RS232/485, Ethernet-IP, Ethernet-UDP, and Ethernet-TCP/IP, ensuring a versatile and comprehensive control environment.

Moreover, the system is designed to accommodate a broad spectrum of additional testing functionalities such as Leak Testing, Weighing, Torque to Turn, and Assembly Force. Its flexible architecture allows for seamless integration with Barcode Scanners, Vision Systems, and other peripherals, offering an extensive range of tools for enhancing testing and data collection processes. This robust platform facilitates rapid

and efficient "End of Line" testing, ensuring products meet the highest standards of quality and performance.

HVAC Graphical Display shown, up to 6 Servo currents, Blower current, Sound & Vibration.

imc C-SERIES: Revolutionizing Functional Test Equipment

The imc data acquisition and control systems redefine functional testing by not only measuring and gathering data but also controlling the test using feedback from the test parameters themselves. This integration of control and data acquisition streamlines the testing process, making it more efficient and accurate.

The imc C-SERIES stands out for its exceptional flexibility and capability to handle multiple sensor inputs, scalable to channel counts reaching into the thousands. Its onboard processor is capable of executing complex data processing tasks, including FFT and Spectrum analysis, in real time. This high-speed processing power facilitates immediate calculations and outputs, enabling dynamic feedback and control over the testing procedure. The system's versatility is further enhanced through its ability to send commands via CANBus messages or analog PID circuits, all while collecting and analyzing data within a single, expandable framework.

Designed with user convenience in mind, the accompanying software package is straightforward, making test setup and execution both easy and adaptable. The imc C-SERIES excels in test scenarios requiring intricate control or analysis, as well as in situations where multiple parts are tested simultaneously. AGT has successfully deployed the imc data acquisition and control system across a wide range of “end of line” scenarios, in addition to its application in compliance testing, simulation, and endurance testing within the aerospace, power generation, and research sectors.

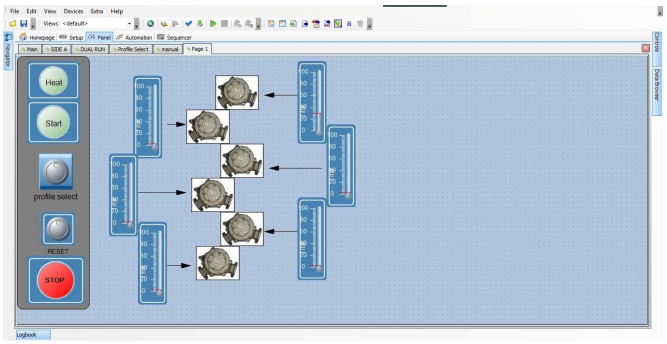
Thanks to its advanced processing capabilities and flexible I/O configurations, the imc system is not just for measuring various parameters in functional tests; it's also adept at controlling the test based on preset functionalities and real-time feedback from the test parameters. This dual capability ensures a highly precise and controlled testing environment, setting a new standard in functional testing technology.

imc Solution Delivered

In a recent application, the imc C-SERIES system was utilized to control and monitor a multi-part test fixture, focusing on the durability and functionality of bearings within an automotive component. This setup subjected the components to a series of life cycle and endurance tests under varied run conditions such as different speeds, accelerations, decelerations, and environmental stresses. The objective was to simulate real-world conditions, accelerating the components to their life cycle limits to assess their endurance.

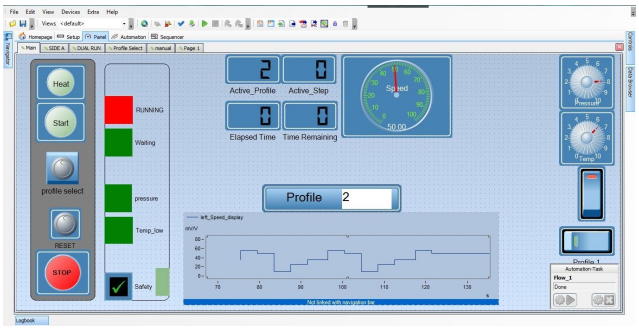
The choice of the imc C-SERIES was driven by its capability not only to measure all necessary physical parameters but also to control the test execution according to a specific profile. This dual functionality allowed for a comprehensive analysis and control of the test process.

Controlling and Monitoring:



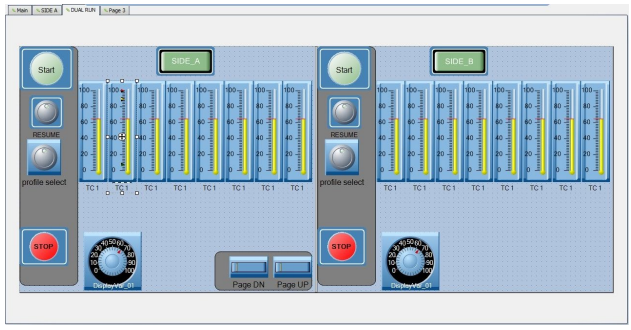
The system utilized CanBus communication to operate a servo motor, which moved the components through a serpentine belt. Speed and acceleration control were precisely managed by the imc system, ensuring that each component was tested under consistent and repeatable conditions. Temperature monitoring of the bearings detected any alarm conditions early, while force measurement on a belt tensioner contributed to a PID loop for dynamic tension control.

Profile Execution and Temperature Monitoring:



The processor within the imc system orchestrated a detailed profile of various speeds, tensions, and temperatures. Continuous temperature monitoring ensured that any bearings heating excessively were quickly identified, allowing for immediate corrective action.

Responsive Testing and Visualization:

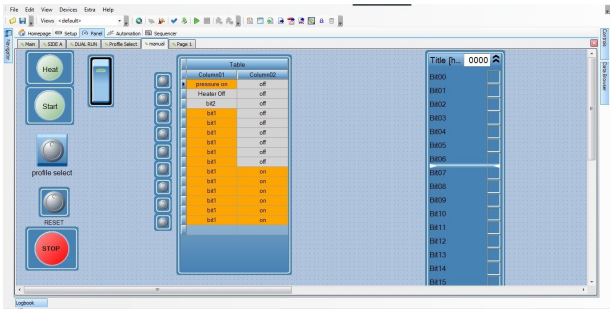


The system was designed to trigger different responses based on the test conditions, from increasing sampling rates and notifying operators to shutting down the system if necessary. A comprehensive visualization package provided clear, graphical displays and touchscreen

functionality, simplifying the monitoring and control process.

Ease of Configuration and Operation:

A significant advantage of the imc C-SERIES system is its user-friendly configuration. The system employs a visual-based configuration technique for quick page setup and includes a variety of graphical displays. The Studio software facilitates easy configuration of the test steps, allowing the system to adapt to changing conditions effortlessly.



The imc C-SERIES system stands as a flexible and versatile solution, adept for every testing scenario, from end of line testers to development and endurance testing applications.