

Test Cell Solutions

**What Are Test Cells?**

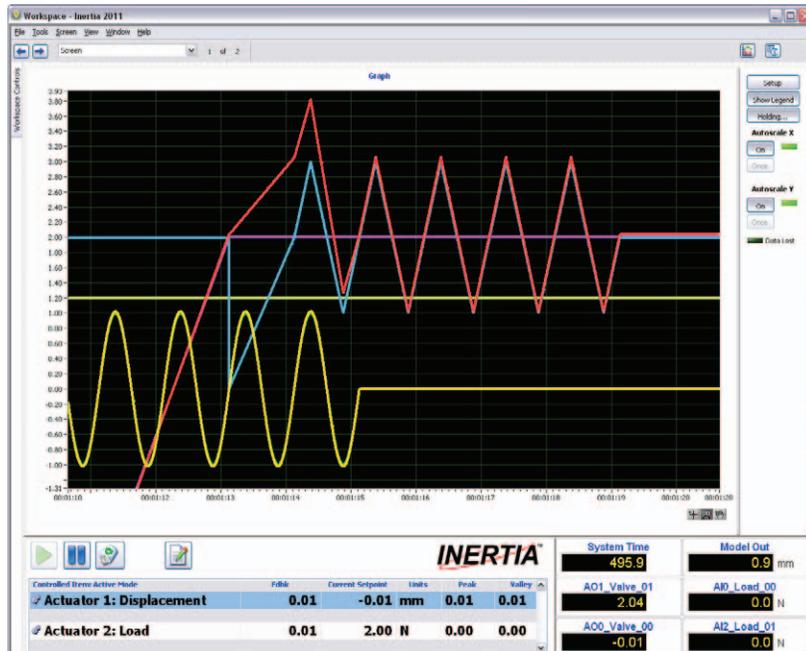
Test cells combine industrial machinery with precision control and laboratory-quality measurements to mechanically simulate real-world conditions for components and systems being tested. Many applications use dynamometer and/or servo-hydraulic actuators to subject components to various forces that represent real-world and extreme conditions. National Instruments provides an industry-leading hardware library that includes both industrial- and instrument-grade I/O as well as FPGA interfaces, and these interfaces are tightly integrated with NI software to create an open, extensible, real-time testing platform. NI uses unique technologies to provide a wide range of tools that enable customers to create their own applications. These tools can also be integrated in advance and delivered to you as a turnkey system for high-performance test cell control and monitoring. Learn more about NI tools for test cell applications at ni.com/testcell.

Test Cell Applications

- Engine dynamometer
- Transmission dynamometer
- Chassis dynamometer
- Hydraulic component tester
- Flow test cell
- Turbine engine test cell
- Electric motor tester
- Environmental chambers
- Fatigue and durability test systems
- Integrated dynamometer and servo-hydraulic test cell

About *INERTIA*

INERTIA is a powerful add-on for NI VeriStand, a software environment for configuring real-time testing applications. Created by NI Alliance Partner Wineman Technology, the *INERTIA* add-on is a complementary software tool that enhances the capabilities of the NI VeriStand Real-Time Engine, System Explorer, Workspace, and Stimulus Profile Editor to provide an integrated control and monitoring solution for test cell applications such as dynamometer and servo-hydraulic-based test systems. Add *INERTIA* to NI VeriStand to get your test cell up and running more quickly.



Software Specifications

INERTIA consists of a prepackaged set of control-specific features for NI VeriStand that includes the following:

- Ready-to-use closed-loop controllers with multi-axis synchronization and amplitude control
- Multimode control support with bumpless transfer between modes
- Tightly integrated test editor with control procedure commands and model execution
- Application-specific tools and UI objects for the NI VeriStand Workspace
- Integrated PID control loop tuning utility

“I’ve been working in the field of data acquisition and control for over 25 years. *INERTIA* is the only control package that offers this level of customization. The straightforward programming methodology, combined with the ability to completely customize your control application, makes *INERTIA* a perfect fit for the research environment.”

—Edward A. Tomlinson,
Engineering Research, Lehigh University



Dynacar

Dynacar is a road vehicle model that you can use throughout the powertrain design process for rapid prototyping, implementation, and real-time testing of electronic control units. Additionally, you can test powertrain components in realistic conditions in dynamometers or other test benches.

Dynacar can be used with NI VeriStand and the *INERTIA* add-on to quickly generate a vehicle by specifying model parameters to match your specific system. You can also import vehicle subsystems from other simulation environments for additional functionality.

Hardware Bundles

Wineman Technology test cell solutions are built on a proven software platform and PXI modular hardware systems. These systems come ready to configure and use with full development licenses of NI VeriStand real-time testing software and the *INERTIA* add-on for test cell control. Select from a variety of real-time processor options as well as rack-mounted or chassis-only options to meet your performance and form-factor requirements. You also can choose connectivity options and processing capacity, adjust channel counts, and request on-site commissioning and training.



Test cell control systems come ready to use and can also be customized to meet your specific application needs.

Dynamometer Control and Data Acquisition System

This full-featured dynamometer control system is capable of controlling four drives with multiple feedback channels and bumpless control mode switching. The base system includes inputs for frequency and temperature measurements as well as 24 V digital inputs and outputs for system monitoring and control.

OUTPUTS

- Analog (± 10 V or 4 to 20 mA): 4
- Digital (24 V logic): 32

INPUTS

- Strain/load: 8
- Analog (± 10 V or ± 20 mA): 30 single-ended or 14 differential
- Digital (24 V logic): 32
- Frequency: 2
- Encoder: 2
- Thermocouple: 32

Servo-Hydraulic Control and Data Acquisition System

This high-performance servo-hydraulic test control and monitoring system supports up to four control loops with multiple feedback channels and bumpless control mode switching. It has a high-accuracy bridge and LVDT inputs for precision control with the ability to execute control loops at 4 kHz and greater.

OUTPUTS

- Analog (± 100 mA): 4
- Digital (24 V logic): 32

INPUTS

- Strain/load: 8
- AC LVDT: 4
- Analog (± 10 V or ± 20 mA): 8
- Thermocouple: 4
- Digital inputs (24 V logic): 32



Ford Deploys Fuel Cell Test System Using NI VeriStand and the *INERTIA* Add-On:

Wineman Technology to develop a software solution that provides the underlying control, data acquisition, and monitoring system architecture. Wineman Technology chose NI VeriStand and the *INERTIA* real-time control add-on for development and deployment because they provided an easy-to-use test software environment.

About Wineman Technology

Wineman Technology Inc. is an award-winning, high-tech engineering firm focused on developing world-class automated test equipment using commercial off-the-shelf (COTS) hardware with scalable and open software architectures. Having been in business for over 20 years, Wineman Technology is recognized as an industry leader in the design and building of custom test equipment and specialty machines for component, subsystem, and system-level products in all aspects of manufacturing, production test, and research and development. Wineman Technology systems are deployed throughout the Americas, as well as Europe and Asia, to a broad industry base including aerospace/defense, transportation, education/government, medical, commercial, consumer, alternative energy, industrial, and commercial.

Wineman Technology provides specialty machines, test cell integration, complete systems integration, automated test systems, machinery and controls modernization, and software application development (extensive expertise in all versions of LabVIEW, including the LabVIEW Real-Time and LabVIEW FPGA modules, and embedded NI VeriStand, NI TestStand, and NI DAAdem). The company's industry experience includes hardware-in-the-loop (HIL) and model-in-the-loop (MIL) systems, servo-hydraulic control and data acquisition systems, dynamometer control and data acquisition systems, real-time control and data acquisition systems, and engine (turbine, diesel, and gas) and component test cells.

“Wineman gets things done right and they get them done on time. They take responsibility for their actions and work closely with Freightliner to give us the best service possible.”

–Freightliner

Customer List

- Argonne National Labs
- Brose
- Continental Teledyne
- Delphi
- Detroit Diesel
- Eaton Corporation
- Ford
- General Atomic
- General Dynamics
- General Motors
- GKN
- Jacobs Technology
- Kubota
- Lear Corporation
- Lehigh University
- Michigan Tech
- Parker Hannifin
- Pirelli Tire
- Refractory Composites
- Sauer Danfoss
- Wright Patterson AFB



The NI Alliance Partner Network includes more than 600 companies worldwide who provide solutions based on the NI approach to graphical system design. As a Gold Alliance Partner, **Wineman Technology**, holds a distinguished membership level, requiring extensive expertise in meeting a wide range of application challenges.

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