

NATIONAL INSTRUMENTS

# Aerospace and Defense






# Deliver Mission-Readiness with National Instruments

Since Kelly Air Force Base in San Antonio became the first National Instruments customer, we have been providing innovative solutions to aerospace and defense organizations. As a leader in computer-based instrumentation and automation since 1976, NI has focused on developing modular platforms that deliver the most advanced commercial off-the-shelf (COTS) test technologies, so you can design and implement critical test, measurement, and control systems.

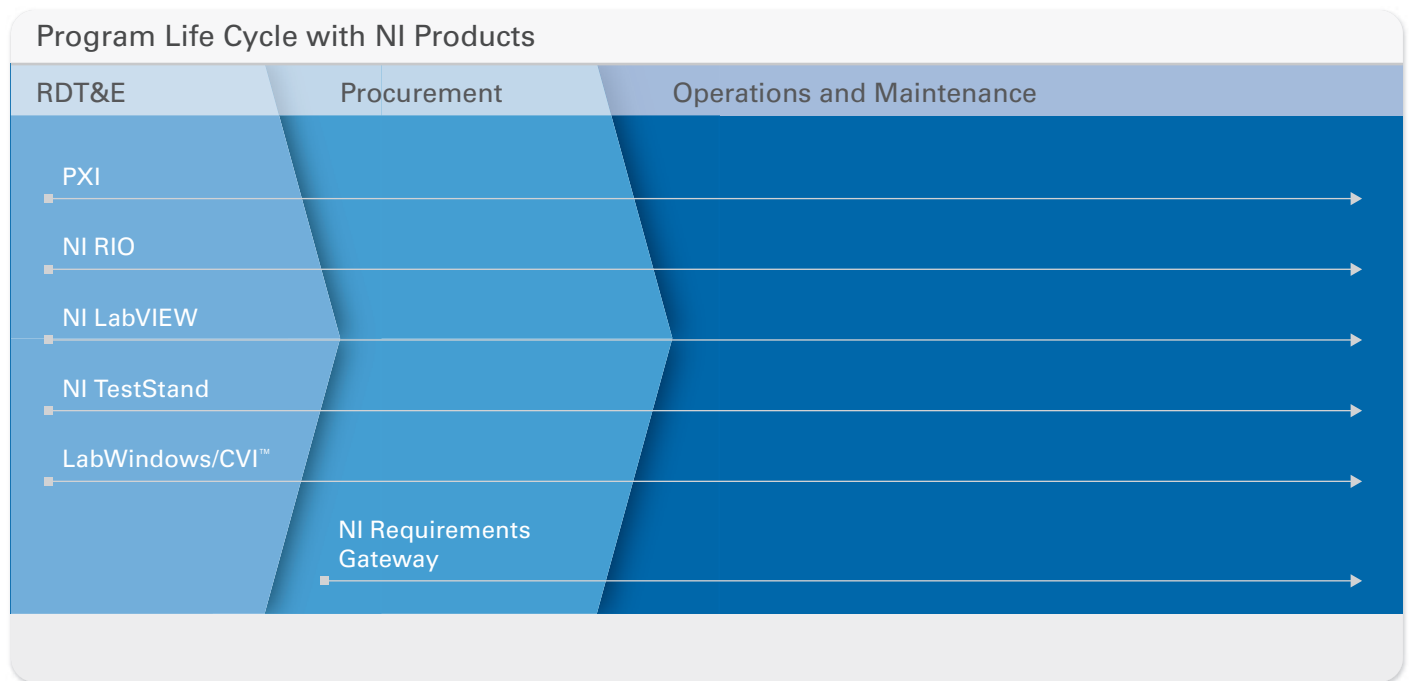
From factory to field, high-performance, modular NI products help you meet the requirements for these mission-critical systems. Across the entire system life cycle, the graphical system design approach of architecting systems with modular software and hardware platforms redefines the way you create solutions. With NI COTS hardware and software, you can integrate throughout the project life cycle from hardware-in-the-loop test during design to diagnostic and maintenance test of deployed systems.

NI is a trusted, global source for test hardware and software that ensure the readiness of your platforms from start to finish.



# Modular Integrated Tools for Aerospace and Defense

Integrating a graphical system design approach with systems architected using modular software and hardware platforms simplifies system development from research and development through operations and maintenance. This integrated, start-to-finish solution decreases program costs while producing reliable, precise results.



Productive software and flexible, reconfigurable hardware tools from NI help you create high-performance, mission-ready systems. Incorporating new technology to address emerging needs and maintain compatibility with established requirements is more affordable with modular NI platforms such as PXI hardware, reconfigurable I/O (RIO) hardware, NI TestStand test management software, and NI LabVIEW system design software. NI test platform products deliver productivity and performance for aerospace and defense system development and support, particularly in application domains including the following:

- Automatic test systems
- Avionics
- Military communications
- Radar and E/W
- Space programs
- Structural test

# Avionics

Successful missions rely on dependable, accurate electronic systems. From navigation and guidance systems to the sensors and actuators that deliver critical condition and control data to the control and display systems, each component and subsystem must be validated and tested to ensure safety and mission success. NI integrated hardware and software platforms cover the entire system life cycle to ensure the precise operation of avionics systems during the validation and verification stages of development through diagnostic and repair activities of deployed systems.

*“Through rapid controller prototyping with the National Instruments LabVIEW FPGA Module, we could test and further develop on real hardware even before we started FPGA design.”*

– Brian Mann, Systems Engineer, *Selex Sensors and Airborne Systems*



PXI, coupled with NI VeriStand, NI Developer Suite, and NI TestStand, forms a powerful, integrated toolset from system simulation through device functional test. Keep your deployed avionics systems mission-ready with NI TestStand and PXI modular instrumentation.

# Military Communications

Situational awareness through the timely, secure exchange of voice, visual, and remote sensor information is critical to the success of a mission. From flexible, high-performance software-defined radio (SDR) communication to SATCOM transmissions that offer fast and secure coordination, this equipment requires equally flexible, high-performance test instrumentation. NI high-performance COTS instruments and software give you the tools for ensuring the accuracy and reliability of your communications equipment.



*“In our military business, performance and reliability are literally a matter of life and death. The National Instruments platform gave us the ability to significantly scale our production test throughput by 400 percent with ROI of 185 percent while rigidly maintaining the quality and performance standards that our military radios are known for.”*

*– Joseph Nakoski, Engineering Director, RF Communications Division, Harris Corporation*

You can quickly integrate the superior measurement and analysis capabilities of high-performance PXI vector signal analyzers (VSAs), vector network analyzers (VNAs), vector signal generators (VSGs), RF switches, and NI FlexRIO field-programmable gate array (FPGA) modules using the development startup support of toolkits such as the NI Modulation Toolkit or NI GPS Simulation Toolkit for LabVIEW.



# Radar and Electronic Warfare

Critical to homeland defense and security, radar and electronic warfare technologies must quickly adapt to the latest challenges of surveillance, detection, targeting, and countermeasure deployment. NI modular instrument platforms and productivity-enhancing software give you the power to design and deploy systems with the crucial flexibility you need to deliver mission-ready capability and adaptability for evolving requirements.

*“PXI Express provides the data throughput and control signals required to support the increased bandwidth necessary for RF and microwave applications. By using NI FPGA-based hardware and LabVIEW, we have been able to quickly develop multiple high-performance measurement modes for several applications.”*

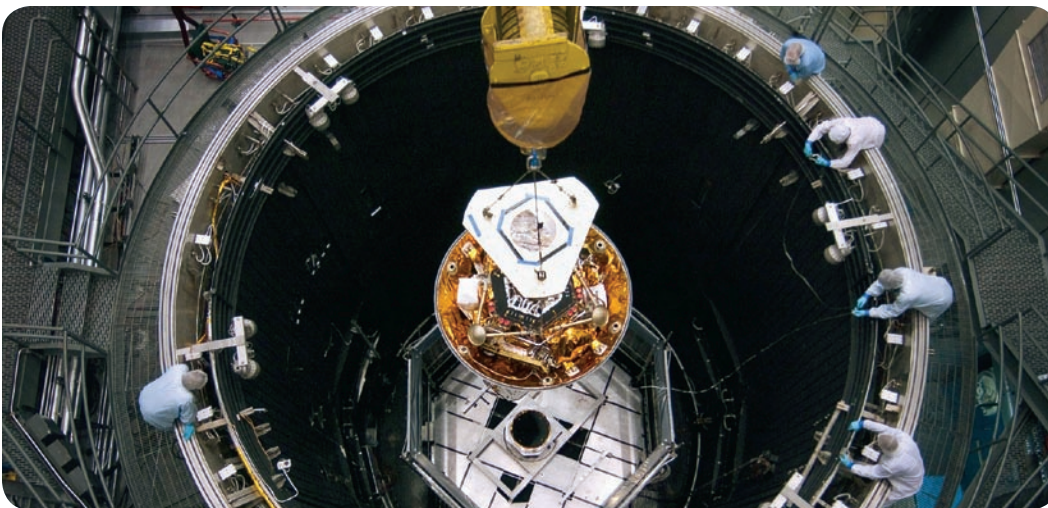
*– Wade Lowdermilk, Engineering Fellow, BAE Systems*



Phase-coherent multiple-channel RF acquisition and generation, with frequency coverage up to 26.5 GHz, and open FPGA-based processing combined with comprehensive NI signal processing libraries offer a COTS platform for prototyping, testing, and deploying Radar and signal intelligence systems.

# Space Programs

Space programs require extensive engineering and operation activities throughout the system life cycle of design, simulation, and verification and validation of space and ground segments. Electrical ground support equipment (EGSE) and spacecraft checkout equipment (SCOE) support the assembly, integration, and validation activities of spacecraft development. From model-in-the-loop simulation and testing to high-channel-count data capture systems, tightly integrated NI hardware and software solutions produce the information you need to complete successful missions.



*“LabVIEW and PXI improved our SAS design options when testing our satellite power systems. We now easily simulate operation modes, such as orbital simulation and spacecraft tumble, which we previously had difficulty implementing. In addition, the ability to have personnel, who are spread over great distances, control our systems remotely and accurately is not only a reality but the norm.”*

*– Bill Brandenburg, Associate Engineer, Johns Hopkins University Applied Physics Laboratory*

The broad range of NI PXI and RIO hardware and real-time test and test management software products covers the spectrum from design verification and validation systems to high-channel-count acquisition systems to capture and manage the data necessary to prove system functionality

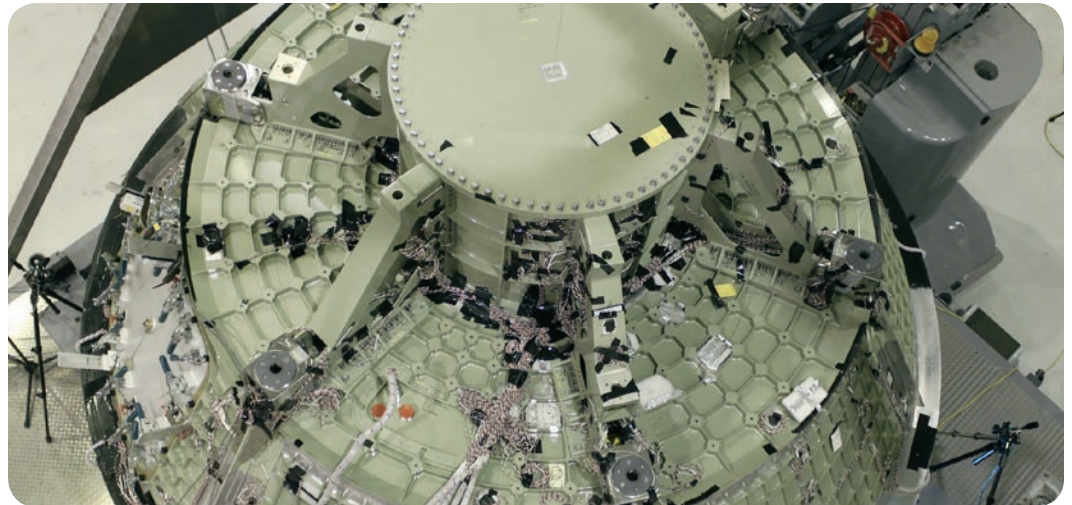


# Structural Test and Monitoring

Structural tests ensure platform capabilities and service readiness throughout the structure's life cycle. From researching new materials for operational prototypes to the monitoring, inspection, and maintenance activities in a platform's life, structural test and monitoring lead to better materials, greater maintenance efficiency, and reduced operations costs. NI test platforms combine modular, rugged instrumentation with easy-to-use software for powerful, economical solutions.

*“LabVIEW and PXI-based high-speed SC Express strain modules minimize noise and increase sensitivity for structural measurements while cutting costs in half and reducing the physical footprint by 10X, compared to previous solutions.”*

– Matta Rizkallah, Owner,  
Manufacturing Automation  
Systems, LLC



NI platforms range from small, portable USB systems to high-end measurement systems with more than 1,000 synchronized channels. NI signal processing inherently takes advantage of multicore PC technology, resulting in industry-leading test times.

# Automatic Test Systems

From factory to field, COTS technology delivers vital test system and system control solutions to provide continued innovation and operation of aerospace and defense systems. Maintaining test program set (TPS) investment and simultaneously meeting emerging requirements throughout a program's life cycle is more easily achieved using an open, modular test system architecture. Automatic test systems (ATSs) built using this approach ensure your success now and throughout the program.



*“We successfully standardized on the National Instruments test platform with NI TestStand, NI LabVIEW, and PXI to reduce our production test costs by 74 percent and save millions of dollars this year and for years to come.”*

*– Kenneth Parfitt, Engineering Manager, RF Communications, Harris Corporation*

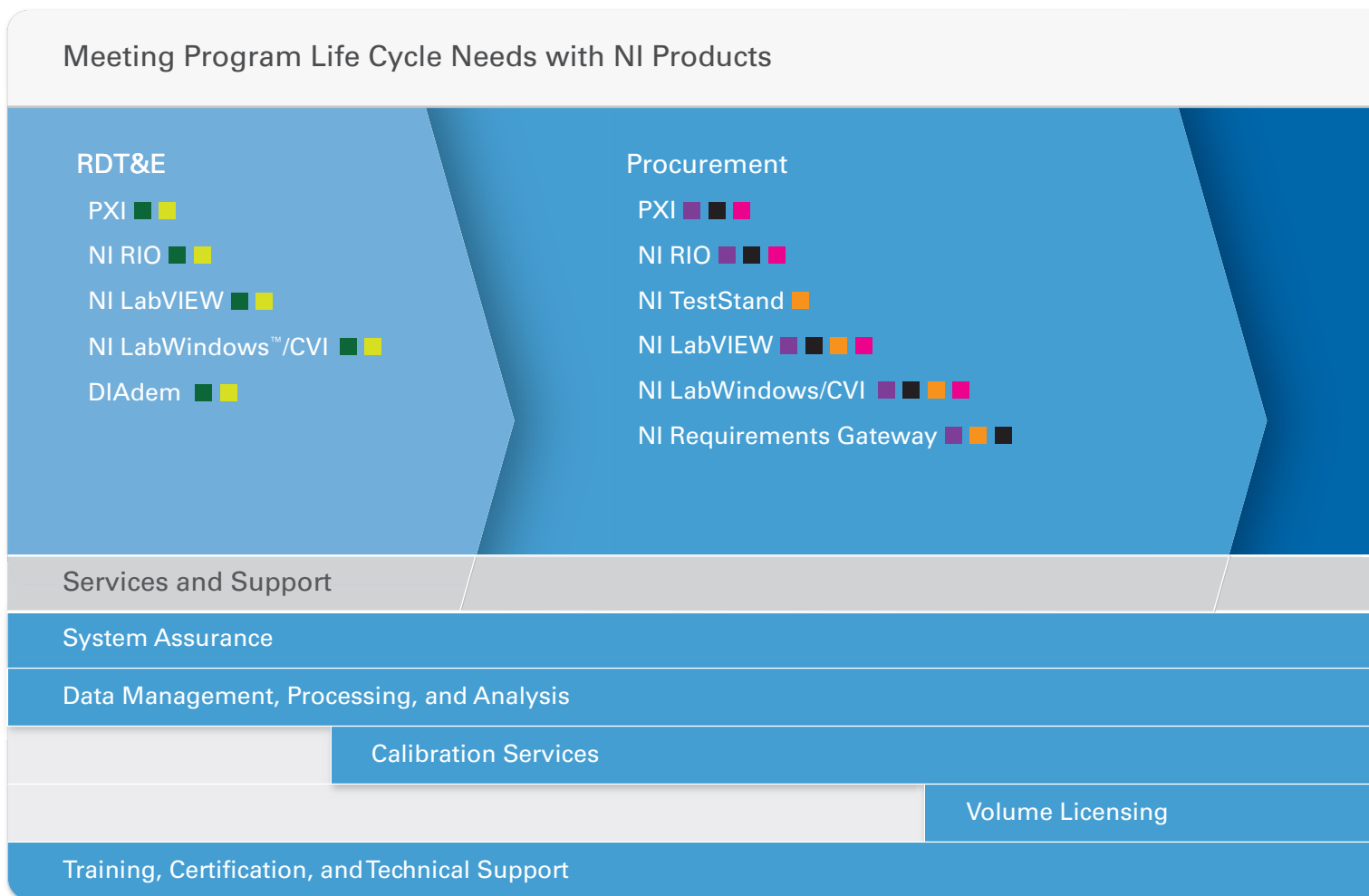
For ATS applications, high-performance PXI instruments coupled with open test management software and powerful test development software make it possible to design flexible, cost-effective systems that meet the requirements of high-mix testing. Small-footprint, rugged PXI and NI CompactRIO hardware is ideal for remote and portable systems that must stand up to the rigorous requirements of field and flight-line applications.



# Program Life Cycle

When designed with an open, modular architecture, systems are more affordable and adaptable over the long term than systems developed for a singular purpose. In long-lived programs, for which the devices under test and even the test systems outlive the instrumentation, this design approach enables cost-effective, incremental technology additions that address the need for compatibility with existing tests and for system modernization.

System implementation using modular hardware and software components is critical for producing a flexible, long-lasting architecture. Decoupling hardware layer components from the software layers through the use of hardware and software abstractions increases system longevity, resilience, and flexibility to expand the updating options for your system.

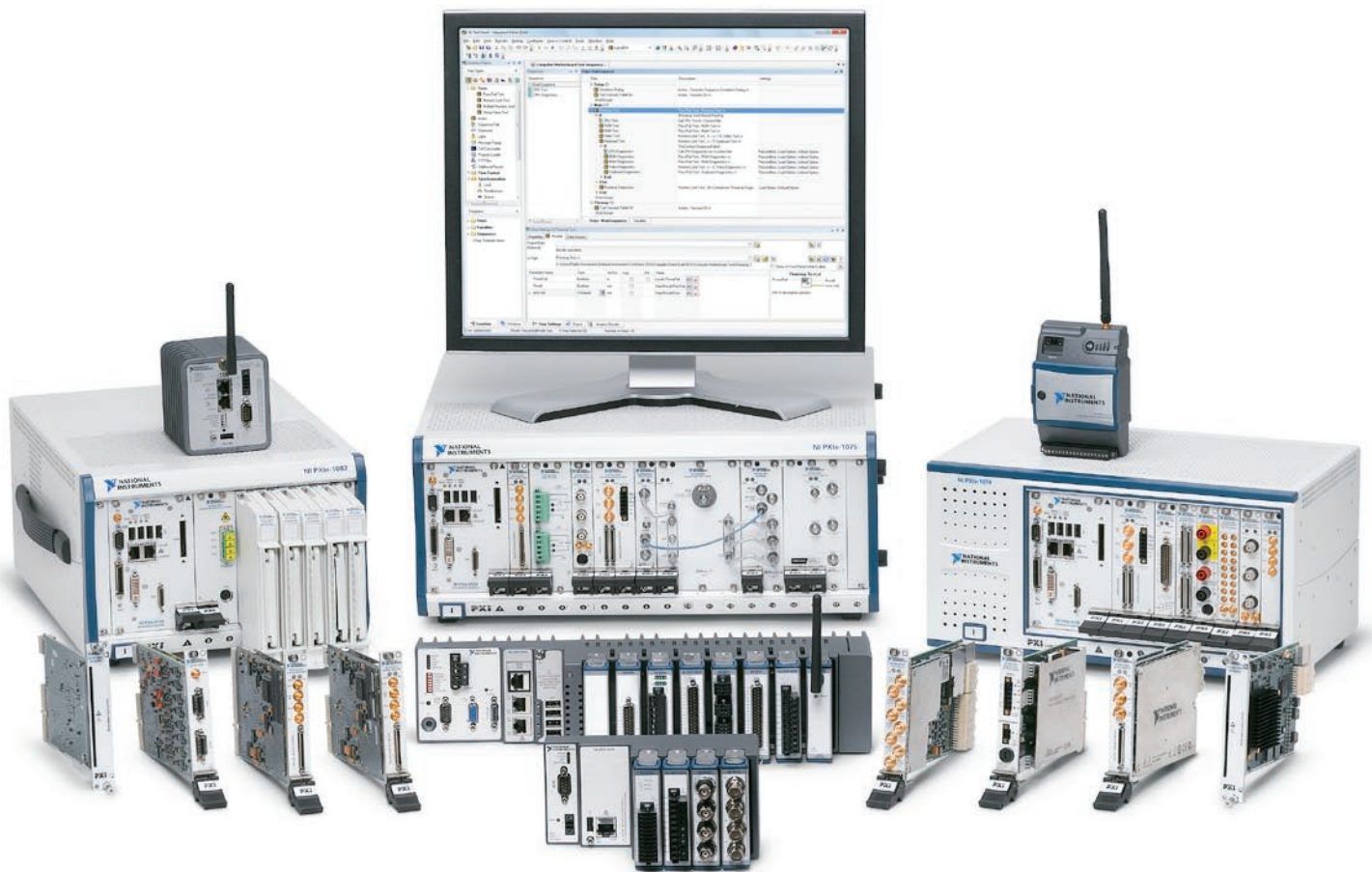




# National Instruments Products

For more than four decades, test engineers in charge of aerospace and defense systems have used flexible, high-performance NI products to create reliable, COTS-based systems. By combining NI open software and modular hardware, engineers have reduced system development time and lowered research, development, and operational costs. The modular architecture of these systems produces affordable, supportable, and updatable field assets that can be incrementally evolved with the latest technology.

Whether your application requires a high-volume or a high-mix tester, a rugged field tester with stringent SWaP requirements, a high-speed communications test/monitoring system, or a critical high-channel-count structural test system, NI hardware and software can help you create the systems that ensure your mission-readiness.



*“It is critical for us to complete high-quality designs within budget and on schedule to continue to win business and ensure customer value. We have developed a productive partnership with NI that helps us meet these challenges, leveraging its test technology platforms and best practice knowledge in enterprise-level test execution.”*

– Glen Parker, Vice President, Thales Communications

## PXI

PXI is the industry's highest bandwidth and lowest latency standard architecture with more than a decade of market acceptance. Among the more than 1,500 products from over 70 vendors, NI is the premier source for I/O modules from high-resolution DC to 26.5 GHz RF. Find out more at [ni.com/pxi](http://ni.com/pxi).

## RIO

NI RIO technology features an architecture with powerful floating-point processors, reconfigurable FPGAs, and modular I/O. All NI RIO hardware components are programmed with LabVIEW to give engineers the ability to rapidly create custom timing, signal processing, and control for I/O without requiring expertise in low-level hardware description languages or board-level design. Find out more at [ni.com/fpga](http://ni.com/fpga).

## SC Express

The SC Express family of PXI Express DAQ modules with integrated signal conditioning offers increased accuracy, high data throughput, and tight synchronization ideal for scalable sensor measurement systems from low- to high-channel counts. These products integrate with PXI modules such as NI X Series DAQ devices, dynamic signal acquisition (DSA) modules, and other modular instruments. Learn more at [ni.com/sc-express](http://ni.com/sc-express).

## NI TestStand

NI TestStand is high-productivity test management software for developing automated test and validation systems faster. Develop, execute, and deploy test system and test sequence software that integrates code modules written in any test programming language. Learn more at [ni.com/teststand](http://ni.com/teststand).

## LabVIEW

The LabVIEW graphical programming environment accelerates the productivity of systems engineers in developing sophisticated measurement, test, and control systems. It has unrivaled integration with thousands of hardware devices and provides hundreds of built-in libraries for advanced analysis and data visualization. LabVIEW is scalable across multiple hardware deployment targets and OSs. Learn more at [ni.com/labview](http://ni.com/labview).

## LabWindows™/CVI

LabWindows/CVI is a proven ANSI C integrated development environment that offers system and TPS developers the comprehensive programming tools for creating test and control programs. It combines the longevity and reusability of ANSI C with engineering-specific functionality designed for instrument control, data acquisition, and data analysis. Find out more at [ni.com/lwcvl](http://ni.com/lwcvl).

## NI VeriStand

NI VeriStand helps you quickly configure a multicore-ready real-time engine for real-time testing applications such as hardware-in-the-loop simulators and closed-loop control systems, which reduces development time and application maintenance costs. It integrates with NI data acquisition hardware, NI RIO FPGA modules, and vehicle bus interface modules. Learn more at [ni.com/veristand](http://ni.com/veristand).

## DIAdem

DIAdem meets the demands of today's testing environments, so you can quickly locate, visualize, analyze, and create reports using large volumes of scattered measurement data of multiple custom formats so that you can make informed decisions. DIAdem offers efficiency gains and scalability with features that overcome the limitations of traditional postprocessing applications. Find out more at [ni.com/diadem](http://ni.com/diadem).

## Services and Support

With direct operations in more than 40 countries, NI has the services and support to meet the needs of our customers around the globe. Our local representatives are degreed engineers who are ready to partner with customers to find the best solutions for their application needs.

### LOCAL SALES AND SUPPORT

In offices worldwide, NI staff is local to the country so customers have access to field engineers who speak their languages and can discuss their unique needs. NI applications engineers also provide technical assistance worldwide over the phone, via email, or through our website.

*The award-winning NI website at [ni.com/support](http://ni.com/support) provides clear answers to technical questions 24 hours a day, seven days a week. It includes an extensive technical support system, which offers a searchable KnowledgeBase, troubleshooting wizards, and access to an extensive global community of NI customers.*

### PRODUCT AND PROFESSIONAL SERVICES

NI product services ensure that our customers' software and hardware are up-to-date with the latest features and capabilities. With a variety of maintenance services—including extended warranty, software subscription programs, and calibration—we help customers achieve optimal uptime for their diverse applications. Further, our professional services range from basic startup assistance and collaborative development to turnkey systems integration and maintenance.

### PARTNERING FOR SUCCESS

NI has developed global relationships with many industry partners that give our customers a complete spectrum of solutions. With more than 600 National Instruments Alliance Partners, system integrators, and original equipment manufacturers, NI has the expertise needed to help customers achieve their goals.





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