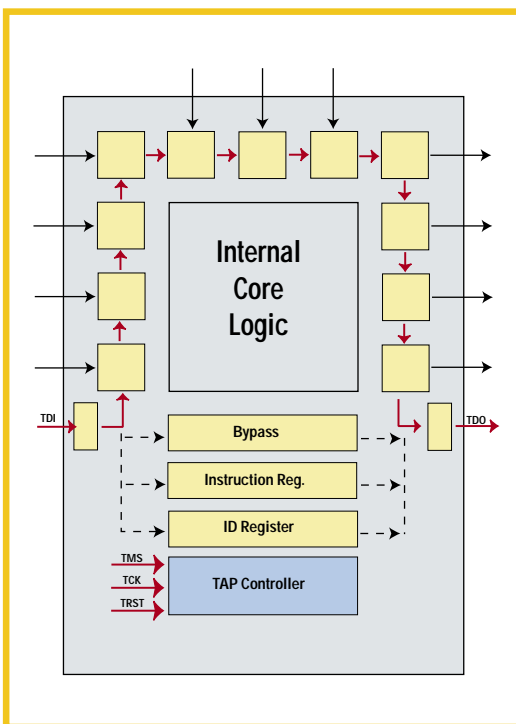


Boundary-Scan Integrates Seamlessly with NI Platforms

The IEEE 1149.1, standard for test access port and boundary-scan architecture, is rapidly replacing traditional in-circuit test (ICT) systems as products become more complex and the ability to place probes actually on the unit under test (UUT) becomes more difficult.

National Instruments, as an open system provider, is working with many boundary-scan organizations to deliver flexible platforms that can recognize and integrate boundary-scan controllers and software into the PXI platform. This integration delivers complex solutions that can combine functional, automated optical inspection (AOI) and boundary-scan tests into a universal test platform, which operate with National Instruments TestStand test management software and LabVIEW graphical development environment.

JTAG Technologies and other NI Alliance partners deliver boundary-scan controller products in PXI and PCI formats. JTAG Technologies also delivers advanced test system integration with new TestStand steps, which reduce the implementation of tests to simple configuration dialogues.



Many ICs have boundary scan built in, enabling greater coverage than traditional ICT.

Unifying Test System Platform

By unifying the test system platform, you can gain many advantages over implementing the components separately. For instance, because the solution is modular it is easy to modify and expand the test capability of any test cell, whether you need to add extra functional test capabilities or alternatively integrate boundary-scan into an existing system. With this modularity, you can minimize initial capital expenditure, which is ideal for preproduction manufacturing. You can then integrate extra components just prior to scaled-up production.

Implementing this test architecture also substantially reduces the cost of ownership of test systems, as unifying connectivity and minimizing spare parts directly affect the operating expenses.

What Is Boundary-Scan?

The Joint Test Action Group (JTAG) a group of more than 200 semiconductor, test, and systems integrator companies, originally developed in the mid-1980s. This specification was formally accepted as an industry standard in 1990 as IEEE 1149.1.

Many of these organizations predicted that electronic devices were going to become exponentially complex and, ultimately, that the test access to the device would become limited. This limitation occurred in three major ways. First, the silicon chips themselves became increasingly complex, meaning the number of connections increased and the width of the legs diminished. This trend was aggravated by the introduction of the ball gate array (BGA), which moved the connection to the underside of the chip. Second, as devices such as mobile phones miniaturized, the amount of space available for test pads eroded. This trend meant fewer connections to even more complex devices. The third major limitation was electrical, rather than physical. As organization developed devices to carry information at ever-higher bandwidths, the test

pads themselves became minitransmitters and receivers of RF energy, disrupting the device and making them become even less popular with product developers. The solution was to move the implementation of traditional ICT tests, such as open-circuit and short-circuit tests, inside the silicon chips and provide a path or boundary to clock or scan digital information – resulting in boundary-scan.

Boundary scan provides an excellent alternative to in-circuit test for electrical connectivity testing.

Testing with Boundary-Scan

There are two requirements for testing with boundary-scan. Some of the integrated circuits on the board must be boundary-scan compliant. To test a board, you use a set of test vectors to command the individual register to perform the required test. In addition, the product designers have to include a scan path between integrated circuits (ICs) that loops from the test access port through the ICs and then back to the access port to pull off the data.

Boundary-scan provides an excellent alternative to in-circuit test for electrical connectivity testing. It offers testing at a low cost, and as devices continue to become increasingly integrated and miniaturized, the trend will continue towards boundary-scan. In addition to board testing, boundary-scan is also a very effective means of in-system programming Flash memory and PLD. You can also interface these functions into the functional test environment.

The integration between functional test, AOI, and boundary-scan also offers real benefits as you deliver single test systems capable of testing any attribute of the product, while reducing the cost of system ownership.■

For more information on boundary-scan, visit ni.com/info and enter nsi2115.

ni.com/alliance

Remotely Control Your Instruments with NI-VISA™ Software

As standard computer technology becomes more popular in the test and measurement world, we can expect instrumentation systems to include devices that connect to buses such as GPIB, serial, Ethernet, USB, and FireWire (IEEE 1394). Instrument I/O software is the technology that provides a common architecture to easily combine these buses into one system. With industry standards for I/O software, such as the virtual instrument software architecture (VISA), you can seamlessly integrate these instruments into your system.

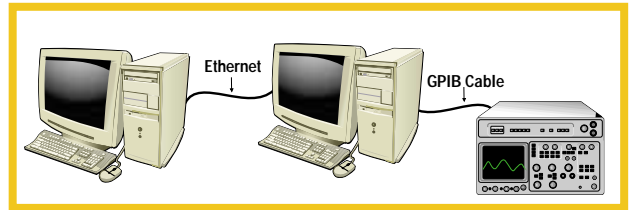
We recently released our latest version of the NI-VISA software, version 2.6. The new version includes a remote VISA capability, which consists of a server and a client component. With the remote VISA client on your machine, you can remotely control instruments connected to another machine that is running the remote VISA server. You can control instruments connected through

any of the standard buses that NI-VISA handles, including GPIB, serial, VXI, and PXI.

The new version also adds compatibility to the newly approved specification for a Microsoft component object model (COM) interface and programming interface to the VISA software. This specification benefits users of the Visual Basic development environment, in which COM is the standard method for using components.

Standardization Update

In addition to approving the VISA COM specification, the VXIplug&play Systems Alliance – the standards body that defines and maintains the VISA specification – also approved a proposal to merge the organization into the IVI Foundation.



With NI-VISA software, you can control instruments remotely.

VXIplug&play is represented as a subcommittee in the IVI Foundation, and its active working groups will continue their efforts to promote and enhance their existing specifications.■

For more information on NI-VISA, visit ni.com/info and enter nsi2116.

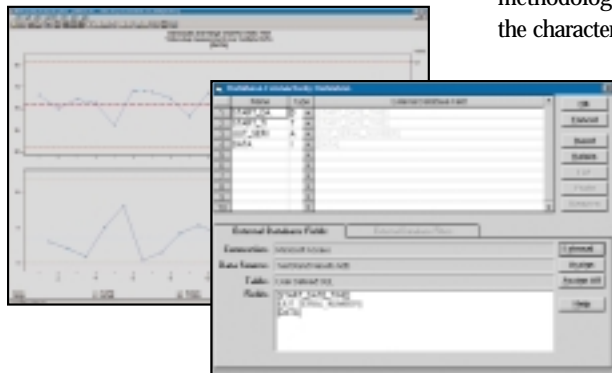
ni.com/visa

Improve Quality Using TestStand and Quality Analyst Software

By combining the best features of test management and statistical quality analysis software, you can now close the loop on process data and deliver flexible factory management systems that maximize test coverage and throughput and reduce your cost to test.

Ready-to-Run TestStand

NI TestStand is a ready-to-run test management environment for organizing, controlling, and executing automated



TestStand easily shares data with software from Northwest Analytical.

prototype, validation, or manufacturing test systems. Test management software is the core of the modern test platform. It defines the test sequence, efficiently controls instruments, makes complex decisions, and ultimately delivers a product from manufacturing that promotes a high level of customer confidence.

SQC for Measuring and Tracking

Statistical quality control (SQC) is the industry-standard set of statistical analysis methodologies for measuring and tracking the characteristics of manufacturing processes.

With SQC, you can analyze product failures and detect defect trends to improve product quality. SQC programs, such as Quality Analyst software from Northwest Analytical, can monitor and report both time-based parametric and attribute (pass/fail) data from any ODBC-compliant database or ASCII files.

Improved Efficiency and Quality

The powerful combination of these two commercial, off-the-shelf software packages from NI and Northwest Analytical deliver efficiency and improved quality to your system.

With these integrated systems, you can build intelligent test systems capable of adaptive testing to test the conditions of your manufacturing line. Throughout the testing cycle, the system creates a history of each product and tracks which parts of a product are prone to errors and need testing each time.

With test management and statistical analysis integrated into your manufacturing system, you can target problem components and process in less time with more accuracy, reducing the cost of manufacturing quality products.■

To read a detailed white paper about how to improve product quality and reduce your cost to test, visit ni.com/info and enter nsi2117.

ni.com/alliance

Wireless GPIB Instantly with the GPIB-ENET/100

The National Instruments GPIB-ENET/100 expands options for size, distance, environmental conditions, integration of test systems, and instrumentation location in your PC-controlled test applications. Communication with your instrumentation systems across a wireless connection gives you more versatile placement for your GPIB system and a mobile GPIB instrumentation system. The NI GPIB-ENET/100 easily converts your existing instrumentation system into a wireless test system throughput with off-the-shelf wireless routers and access points.

Using the GPIB-ENET/100 for Wireless Instrument Control

The NI GPIB-ENET/100 is designed to communicate across any Ethernet-based TCP/IP network. Combining the GPIB-ENET/100 with any commercially available wireless router, your Ethernet control system instantly transforms into a wireless instrument control system. You can easily install and set up most wireless routers. For most wireless routers,

you can install by connecting the router to a computer or existing Ethernet LAN. Then, using a specified IP address, you configure the settings for the router – network type (*ad hoc* or infrastructure), encryption mode, password, number of users, etc. Depending on your network and computer configuration, you may need a network administrator to help configure the wireless network.

To complete your wireless test system connections, connect your wireless router to the NI GPIB-ENET/100 with a standard twisted-pair Ethernet cable. The GPIB-ENET/100 connects to your instrumentation system with a standard GPIB cable. Then, you can configure your GPIB-ENET/100 on your wireless-enabled computer using the utilities included with the NI-488.2 software. Applications for wireless instrument control include the following:

- Controlling portable racks of instrumentation from a wireless-enabled computer
- Controlling instrumentation in a hazardous environment

- Controlling instrumentation when an Ethernet or physical connection is not available
- Sharing access to GPIB instruments and systems on a wireless network so several users can download test data or conduct tests from several wireless-enabled computer stations

Using off-the-shelf wireless routers and the NI GPIB-ENET/100, you can instantly transform your test system into a portable, wireless system. Configuration and setup of the wireless network is typically hassle-free.■

To read the application note on setting up a wireless test system using the GPIB-ENET/100, visit ni.com/info and enter nsi2118.

For more information on the NI GPIB-ENET/100, visit ni.com/info and enter nsi2119.

ni.com/serial

Enhanced Tool for Developing Instrument Firmware

With NI-Device software, you can write bus-independent firmware for ANSI/IEEE Standard 488.2 devices. NI-Device is one of the first tools in the industry that helps you create IEEE 488.2 instruments while isolating the instrumentation code from bus-specific communication details. Using NI-Device, you can easily write the firmware for your instrument to handle GPIB and TCP/IP I/O communication, while easily updating the firmware to communicate across other buses in the future.

Enhanced and Expanded Functionality

NI-Device software handles most IEEE 488.2 protocol requirements, such as the input/output queues, device triggering and clearing, and status reporting. With the latest release of NI-Device, version 1.3, the software handles the implementation for most of the IEEE 488.2 Message Exchange Protocol (MPP). Instrument designers previously managed the

implementation of this protocol, which was a very time-consuming task. By performing most of this task internally, you can quickly and easily write the instrument communication code and shorten your overall instrument development time. This version of NI-Device also features the added compatibility for a second I/O bus by handling TCP/IP I/O communication through the VXI-11 protocol. Using NI-Device, you can write firmware for your GPIB instrument and seamlessly add an Ethernet interface with minimal effort.

NI-Device 1.3 is now available for Windows 2000/NT/XP/Me operating systems. With this release of NI-Device, you can write firmware for any instruments that run one of these operating systems and that use either a National Instruments PCI-based GPIB interface (PCI-GPIB, PXI-GPIB, or PMC-GPIB) or an Ethernet interface. You can have Ethernet interface compatibility through the NI PCI-8212 or NI PXI-8212 GPIB/Ethernet controllers, or any Ethernet



Easily write bus-independent firmware for your instrument.

interface built into the PC hardware of your instrument.■

For more information on NI-Device, visit ni.com/info and enter nsi2120.

ni.com/measurements

Achieve High-Speed Control with the NI 8176 RT Controller

The new National Instruments NI 8176 RT controller delivers better performance for real-time applications, such as faster signal processing and up to 300 percent increase in loop rates. Similar to the PXI-8156B RT and PXI-8170 RT, the NI 8176 RT controller runs a real-time operating system on a dedicated processor and easily integrates with existing NI software and hardware. Based on the PXI/CompactPCI specifications, the NI 8176 RT includes a 1.2 GHz Intel Pentium III processor, 15 GB hard drive, floppy drive, Ethernet port, and serial port.

With the 1.2 GHz Intel Pentium III processor, you can create real-time applications and execute real-time control loops at up to 40 kHz for a single PID loop. When compared to the performance of the PXI-8156B RT, the

loop rates achieved with the NI 8176 RT were often four times faster.

Complete Real-Time Solutions

The NI 8176 RT controller is a ready-to-run real-time target that provides a faster way of developing, deploying, and maintaining high-performance, real-time systems. The RT controller is preinstalled with LabVIEW Real-Time and the NI-DAQ embedded software engine. You can use the current version of LabVIEW Real-Time 6.1 development software with existing PXI products to create an integrated solution for your real-time applications.

You can connect the controller to a development computer via the built-in Ethernet port, and after establishing a proper IP address, you

can begin developing real-time applications. You can write LabVIEW code on a Windows-based computer and then download it to an NI 8176 RT system using a pull-down menu.

You can combine the real-time PXI controller with a variety of PXI plug-in modules to create integrated real-time solutions with unlimited I/O compatibility. The NI 8176 RT and LabVIEW Real-Time 6.1 handles all modules for data acquisition, SCXI™, dynamic signal acquisition, FlexMotion control, serial, and controller area network (CAN) connectivity.■

For more information on the PXI-8176 RT controller, visit ni.com/info and enter nsi2121.

ni.com/pxi

Transform Your Instrument from GPIB to Ethernet or USB

While GPIB remains the prevalent bus for instrument control, engineers and scientists are taking advantage of common bus technology products that bridge other buses, such as USB, Ethernet, and IEEE 1394, to GPIB. With bridge products, you profit from the widespread availability of computer buses, such as USB and Ethernet, while preserving your investment in software and hardware.

Using bridge products, you can transparently convert one bus type to a different bus type, therefore taking advantage of the latest technology while maintaining backward compatibility. For example, one end of a bridge

product may plug in to an Ethernet, USB, or IEEE 1394 port in your computer or system, while the other end connects to traditional instruments through GPIB or serial ports. You benefit from Plug and Play capabilities, ease of use, and the wide availability of these new buses on most new computers. Moreover, by maintaining instrument control software compatibility, you can conserve your investment in software and development time.

Get Up and Running Quickly

National Instruments offers low-cost, high-performance solutions for a wide variety of GPIB external controllers to quickly get you up and running. With the NI GPIB-ENET/100 controller, you control and share instruments located anywhere in the world via a TCP/IP network. In addition, you can adopt the code written for any other NI GPIB interface for use with the GPIB-ENET/100.

The compact NI GPIB-USB-A controller transforms any computer with a USB port into a full-function Plug and Play, IEEE 488.2 Controller that can control up to 14 programmable GPIB instruments. The small size and weight of the GPIB-USB-A makes it ideal for portable applications using a laptop computer or other applications

in which the computer has no available internal I/O slots.

Additionally, the NI ENET-232 and ENET-485 controllers install as standard serial ports in your computer, but you can remotely control your serial instruments across 100BaseTx (100 Mbytes) or 10BaseT (10 Mbytes) Ethernet networks.

Keys to Success

Regardless of which bus you use in conjunction with GPIB, software compatibility and integration are key to your success using bridge products. Software that maintains backward-compatibility, while seamlessly integrating new buses, makes the difference between spending three hours bringing a new instrument online and spending three months rewriting the application.■

For more information on using external GPIB or serial bridge products, visit ni.com/info and enter nsi2122.

ni.com/gpib



External GPIB or serial bridge products expand your bus connectivity options.

NI Uses Tools to Create Manufacturing Test Framework

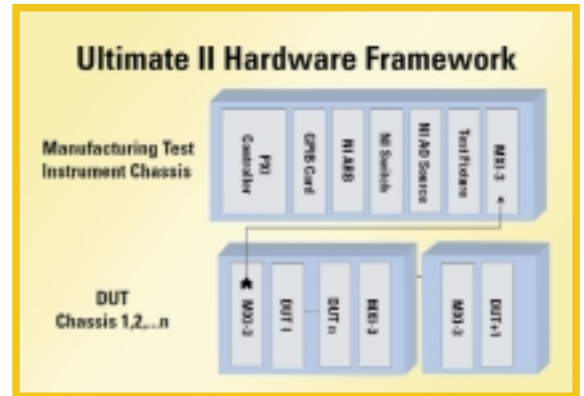
Several years ago, product development and manufacturing test engineers at NI began an internal project to define a next-generation software and hardware framework. This framework is based on commercial, off-the-shelf tools for functional testing a variety of products manufactured at National Instruments Austin, TX, USA facility. Code-named Ultimate II, the new functional test system framework is based on National Instruments tools including PXI, TestStand, and LabVIEW.

project delivers a standard test framework and tools that NI design and manufacturing engineers use from design validation through manufacturing.

The Ultimate II hardware framework uses PXI and MXI™-3, so you can build test systems with many device under test (DUT) slots in a smaller system footprint. We can test more circuit boards in a

single test pass and increase our manufacturing throughput, while saving considerable space on our manufacturing floor. Defining this standard hardware test framework also:

- Leverages PC technology and industry standards
- Increases flexibility to accommodate the growing test needs of many new NI products
- Decreases costs by products sharing a common hardware platform



Ultimate II Test Systems are based on a common hardware platform.

Quickly Develop with LabVIEW

We used LabVIEW to develop code for testing hardware modules in manufacturing. Test engineers who are not experienced programmers can become productive very quickly with LabVIEW, and this decreases test development time. Also, maintenance and re-useability of test code is much easier with LabVIEW. The graphical programming language and the ability for developers to document their code makes it easy to understand and maintain LabVIEW code developed by other engineers.

The Ultimate II project demonstrates how you can leverage commercial off-the-shelf products such as PXI, TestStand, and LabVIEW to streamline and accelerate the process of getting a product from design through manufacturing to market. Currently, National Instruments has deployed a total of three systems and is using these systems to test a total of six products – two plug-in boards, the PCI-6115 and PXI-6115, and four FieldPoint distributed I/O modules.■

For more information on Ultimate II, visit ni.com/info and enter nsi2123.

The Ultimate II project demonstrates how you can leverage commercial, off-the-shelf products such as PXI, TestStand, and LabVIEW to streamline and accelerate the product cycle – from design through manufacturing to market.

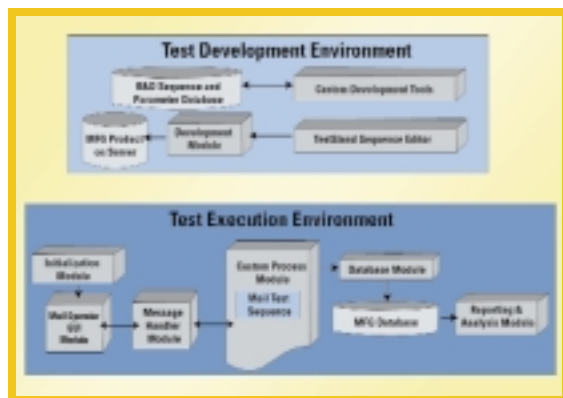
Bridging the Gap between Design and Manufacturing

We installed the first Ultimate II functional test system on one of National Instruments manufacturing lines last July. The Ultimate II framework bridges the gap between design and manufacturing – to streamline and accelerate the product life cycle from design through manufacturing and out to market in the shortest time, while delivering the highest quality, functionality, and value to our customers. To increase design and manufacturing productivity and efficiency, we needed the capability to leverage a standard test environment across our manufacturing facilities around the world. The Ultimate II

Building with TestStand Tools

In the Ultimate II Software Framework, TestStand is at the core of the test development environment, management, and test execution engine. Using off-the-shelf tools such as TestStand, NI design and manufacturing engineers customized the TestStand environment for our specific needs. TestStand provided many powerful tools for building automated manufacturing test systems out-of-the-box such as:

- Multithreading and parallel DUT testing for increased throughput
- Direct instrument connectivity and IVI driver compatibility for simpler test development
- Projects, workspaces, and source-code control for code development and management
- Interfaces to LabVIEW and many other test development environments
- Easy and flexible tools for database integration of test results
- XML to generate and publish test results via Web-based reports



Ultimate II Software Framework

ni.com/teststand

Using LabVIEW and IMAQ Vision for Laser-Beam Profiling

by Austin Richards, Ph.D., Senior Applications Engineer Indigo Systems Corporation

The Challenge: Integrating a near-infrared imaging (NIR) system for telecommunications laser-beam diagnostic applications.

The Solution: Developing an NIR imaging system using an Indigo Systems Corporation Alpha NIR infrared sensor with NI LabVIEW and IMAQ software and hardware.

We developed a near-infrared imaging system (NIRIS) that enables 2D laser-beam profiling and analysis. Engineers and scientists use laser-beam profiling in applications such as diode laser test and measurement, optical component analysis, and optical fiber inspection. For example, diode lasers emit laser light in a beam that typically has an elliptical beam profile. A defective laser might emit light in a ragged elliptical beam, thus making it unsuitable for coupling into an optical fiber or waveguide. A beam profiling system

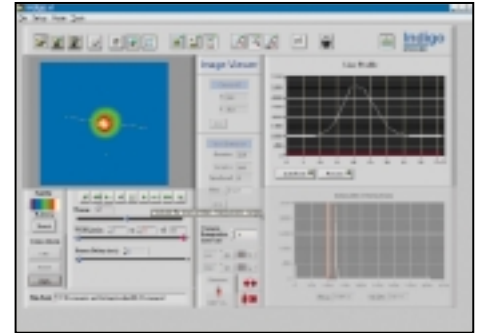
generates a 2D map of the beam cross section, which you can use to make a decision about the quality of the diode laser.

Flexible Integration Times

Inspecting telecom lasers presents a special challenge because the specific light wavelengths we use for DWDM data transmission are not detectable with traditional beam-profiling sensors such as silicon CCD arrays. The Indigo Systems NIRIS system is made of indium gallium arsenide (InGaAs) semiconductor material which has high sensitivity in the telecom wavebands around 1,300 and 1,550 nm. The integration time of the Alpha NIR detector can be as short as 1 ms and as long as 8 s, greatly increasing the effective dynamic range of the camera and making it suitable for applications with extremely different signal strengths such as laser-beam profiling and photo-emission spectroscopy.

Seamlessly Integrate the Sensor

The open architecture of LabVIEW gives you the ability to seamlessly integrate the sensor into your system, controlling low-level



With LabVIEW, we seamlessly integrated the sensor into our system.

sensor functions with ease. We provide a comprehensive serial command interface document to original equipment manufacturer (OEM) customers who want to create their own LabVIEW software. We are currently developing a toolkit, so LabVIEW users can save time using canned programs written specifically for the Alpha NIR.■

For more information on Indigo Systems visit ni.com/info and enter nsi2124.

ni.com/success

Quality Compliance for Steel Mills Using LabVIEW Real-Time

by Nancy Hollenback, Associate, SES Technology Integration; Frank Mesce, Operations Director, Blue Sky Industries

The Challenge: Replacing the control electronics for an isotope, non-contact gauge, which measures the thickness of metal in a steel mill, with an effective solution in a minimal amount of time. The system must provide accuracy, deterministic control, and flexibility and include an intuitive graphical user interface (GUI).

The Solution: Using PXI hardware for measurement and control and LabVIEW graphical development to streamline software development of complicated systems for the factory floor.

Calculating Thickness

Steel mills typically operate at up to 2,000 ft/min and require a non-contact thickness gauge to measure and document compliance with quality standards. In a strip mill, a gauge emits radiation on one side of the metal. The amount of radiation absorbed by the metal is proportional to its composition and thickness. The resulting radiation sensed on the detector yields a voltage that operators use to accurately calculate metal thickness.

Rapid Development with PXI and LabVIEW

The heart of the gauging system is the radiation measurement and the subsequent control algorithms. Blue Sky Industries and SES Technology Integration, an NI Select Integrator partner, developed a robust, cost-effective

solution for modernizing older thickness gauges. They used PXI real-time hardware to seamlessly integrate both real-time deterministic control and non deterministic control and monitoring of the system. They also used LabVIEW as the software platform for rapid development, efficient processing, and easy integration. By using NI software and hardware tools, they developed a system that exceeded performance requirements and reduced modernization costs.■

To read the full customer solution, visit ni.com/info and enter nsi2125.

ni.com/success

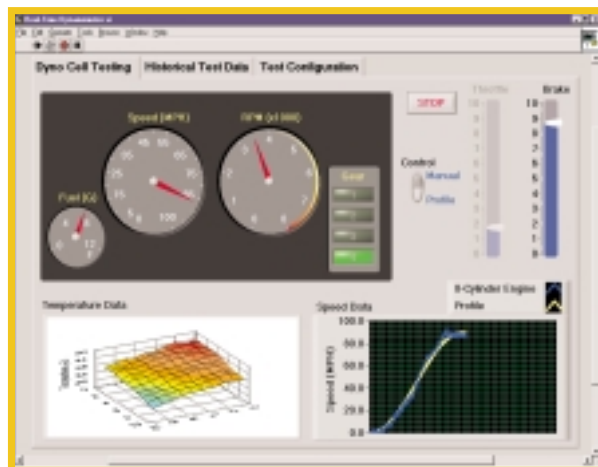
Develop Control Applications with LabVIEW 6.1 Family Tools

LabVIEW 6.1 combines the embedded capabilities of LabVIEW Real-Time Module with the distributed monitoring and control tools of LabVIEW Datalogging and Supervisory Control Module into one integrated software platform. With this latest release, LabVIEW Real-Time Module 6.1 improves real-time system performance while the LabVIEW Datalogging and Supervisory Control Module 6.1 provides enhanced tools for data logging and historical data management.

Minimize Development Time for Distributed Monitoring and Control Solutions

LabVIEW Datalogging and Supervisory Control Module extends the power of LabVIEW by providing tools essential for monitoring systems such as logging, alarm and event handling, historical and real-time data viewing and scaling, and security management. This module automatically handles these tasks as fundamental aspects of the system.

LabVIEW Datalogging and Supervisory Control Module 6.1 introduces the new historical data viewer that integrates data, alarms, and events in the same utility for better access to your historical data. For increased flexibility, you can use the historical VIs to create your own custom viewer. In addition, you can easily export your data to text or DIAdem offline data management software package, as well as



Quickly create embedded real-time applications.

archive and merge your historical data. You can also rename, delete and compact your traces.

By taking advantage of these tools, you can concentrate on the development of your measurement and control application rather than developing fundamental tools to log, view, and manage your data.

Increase Performance of Real-Time Systems

LabVIEW Real-Time Module extends the power of LabVIEW to quickly create embedded real-time applications. The new version 6.1 increases performance and features enhanced control tools to increase your development productivity.

LabVIEW Real-Time Module 6.1 handles the new 1.2 GHz PXI controller, which is capable of running at up to 40 kHz for a single PID loop. You can use this high-speed controller to develop more powerful real-time systems for applications such as hydraulic actuator testing, automotive engine testing, and aircraft flight control systems.

With the built-in control tools of LabVIEW Real-Time Module 6.1, you can easily create multi-channel PID control systems. The new PID functions have improved performance for single loops and automatically adapt to multiple PID loops providing independent setpoints, process variables, and gain scheduling for each loop. In addition, the built-in tools now include advanced control algorithms for creating applications such as hardware-in-the-loop simulation.

Real-time systems that share data across the network can take advantage of the faster network data transfer rates available with new LabVIEW Real-Time Module 6.1. The expanded bandwidth



New historical data viewer integrates data, alarms, and events in the same utility.

enables real-time PXI chassis and embedded FieldPoint systems to share more data with other network nodes. The improved network functionality for TCP/IP requires less processor overhead, providing additional real-time analysis in more sophisticated systems.

Integrated Software Framework for Better Productivity

With the release of the LabVIEW 6.1 Family of products for monitoring and real-time control, National Instruments offers a unified environment to build your real-time applications, as well as your supervisory control and monitoring applications, in a single integrated environment for overall better productivity.■

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For more information on the LabVIEW 6.1 Family of products, visit ni.com/info and enter **nsi2126**.

ni.com/labview

NI Tools Integrate with Microsoft Visual Studio .NET

Microsoft recently released Visual Studio .NET, its newest version of Visual Studio built on the latest Microsoft Windows server platform. If you plan to use Microsoft Visual Basic .NET, Visual C++ .NET, or the newest language included in Visual Studio .NET, Visual C# .NET (pronounced C-sharp), National Instruments Measurement Studio provides you increased productivity throughout the design and deployment of your automated test, measurement, and control systems. By providing advanced hardware connectivity, signal analysis, data visualization, and live data networking, Measurement Studio ensures faster development and added measurement features. In addition, Measurement Studio development tools are designed specifically to integrate seamlessly with Visual Studio .NET, using intuitive property pages and powerful methods and events.

Seamless Integration

Measurement Studio version 6.0 provides integrated tools that are compatible with the latest versions of Visual Basic .NET, Visual C++ .NET, and Visual C#. In addition, NI complements

the release of Visual Studio .NET with a FREE update for Visual C++. "Microsoft is excited that National Instruments is bringing .NET measurement solutions to measurement and automation engineers worldwide," said David Lazar, Group Product Manager for the Developer and Platform Evangelism Division at Microsoft Corp. "The combination of Visual Studio .NET and National Instruments Measurement Studio empowers developers to build robust networked measurement systems."

Enhanced Compatibility

Measurement Studio add-in components for Visual C++ .NET are updated to ensure compatibility with Microsoft Foundation Classes (MFC) version 7.0, for improved integration with the Visual Studio .NET environment. ActiveX controls included in Measurement Studio are also functional in the new development language, Visual C#, while continuing to be compatible with Visual Basic .NET. With Measurement Studio and Visual Studio .NET, you can quickly create multifunction measurement and control



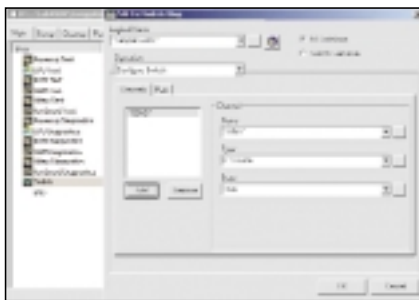
Measurement Studio Integration with Visual Studio .NET

systems using your inherent programming knowledge, with the added flexibility to incorporate motion, vision, instrument control, and data acquisition.■

To download a FREE trial version of Measurement Studio, or to request the Visual Studio .NET update, visit ni.com/info and enter **nsi2127**.

ni.com/mstudio

Integrating Switching in a Flexible Test Architecture



NI TestStand and IVI simplify configuration tasks.

When integrating switching into large-scale automated test systems, developers have always faced the challenge of implementing a component that is both an integral piece of the architecture and also an extremely complex system on its own. Traditionally, the solution was to bury the switch control inside the individual test code, whether written in LabVIEW, C, or Visual Basic. NI TestStand 2.0.1 test management software eliminates these issues by introducing a new IVI Switch Step Type and integrated

configuration-based panels for higher-level switching control.

Building on IVI Technologies

TestStand builds on the power of IVI drivers to deliver fully interchangeable switch control. Specifically, TestStand 2.0.1 contains direct IVI Switch control with the new IVI Switch Step Type. This combines with IVI Scope, IVI function generator (FGEN), IVI DMM, and IVI Power Supply to deliver easy direct instrument connectivity.

Simple Configuration

In addition to delivering fully interchangeable switch control, TestStand can associate your predefined switch routes and groups with each test step using new configuration-based panels. Thus, the once complicated task of implementing and maintaining buried switch code associated with each test is now as easy as a simple configuration task.

Easy Maintenance

Switches, especially mechanically based relay switches, are subject to huge electronic and mechanical stresses. Ultimately, a switch fails and you must choose between replacing the whole switch module box or attempt to change all the tests that route the switching through that particular point. With TestStand 2.0.1, in minutes you can reconfigure the switch routes associated with a test step using a particular relay, minimizing maintenance time and effort. National Instruments TestStand delivers exceptional test flexibility, as well as switch control and integration.■

For more information on integrating switching with TestStand, visit ni.com/info and enter **nsi2128**.

ni.com/teststand

NI Developer Exchange

Receive and Share Feedback with Engineers

NI Developer Exchange is your resource for development. You can use the discussion forums to ask other developers for tips and code or answer questions others have asked.

Get Answers to Your Application Questions

NI Developer Exchange is also your first stop for development questions. Not sure where to start when creating a data acquisition system involving various sensors, or why your top VI is still referencing a renamed subVI? With NI Developer Exchange, you can reach both NI engineers and those in your industry to get more results and advice for your application question. An engineer answers your question within 24 hours. Once someone answers your question, you also have a variety of options for notification.

Visit NI Developer Exchange at ni.com/exchange

Share Your Knowledge – Become an Enthusiast

Are you an expert in LabVIEW or other products? Help other developers by contributing your expertise in the NI Developer Exchange discussion forums. After you have posted 25 answers or comments, you can apply to become an Enthusiast. As an Enthusiast, NI recognizes you as an expert in the developer community through a special designation and

you can post a biography listing in the forums. To stay in touch with topics, keywords, or areas of interest, you can subscribe to receive immediate, daily, or weekly notifications.■

For more information on becoming an Enthusiast, visit ni.com/info and enter **nsi2129**.

FREE Diagnostics Tool for Testing and Calibrating E Series Hardware

NI has developed a FREE online tool for testing and internally calibrating your E Series data acquisition hardware. To perform the test, launch the tool at ni.com/support/selftest. The tool performs five diagnostics tests on your device – device detection, analog input, digital I/O, counter/timer, and analog output. If a problem exists, you can easily submit your test results to an NI Applications Engineer for technical support via our FTP site.■

For more information about this diagnostics tool, visit ni.com/info and enter **nsi2130**.

New Online Tutorials Cover Fundamentals

With these FREE self-paced multimedia tutorials, you can refresh your knowledge of fundamental engineering concepts:

Order Analysis

This technical tutorial covers applications and industries, rotational speed changes, and demos of LabVIEW. You need to have experience in analyzing rotating objects and basic knowledge of LabVIEW to benefit from this tutorial.

Remote Laboratories Using LabVIEW Remote Panels

This technical tutorial provides a brief overview of remote laboratories,



Calibrate your E Series hardware with a FREE diagnostic tool.

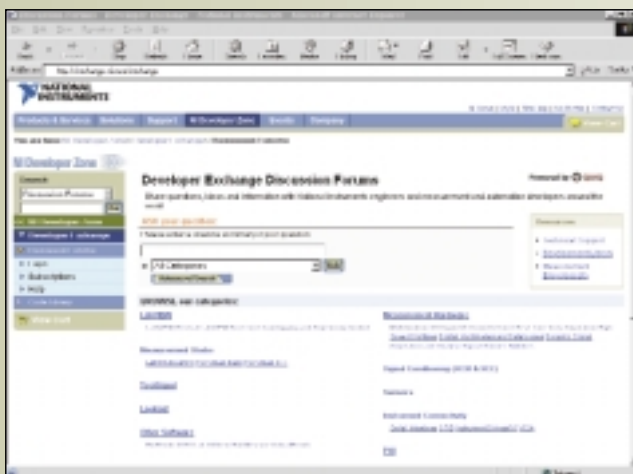
demonstrates the usefulness of remote panels, and provides an example of this application. You learn how to implement NI LabVIEW remote panels to launch a remote laboratory across the Internet.

To take an online tutorial, visit ni.com/info and enter **nsi2131**.

New Online Paid Training

We now have in-depth online training available so you can enhance your product knowledge easily from your own desktop at your own pace. Each training module covers a specific topic and includes exercises. You only purchase the modules that fit your needs, lowering your cost. Modules take 1 to 4 hours to complete and are accessible for 20 days after purchase. The current online training course available is LabVIEW. This complete online training course consists of 16 different modules covering LabVIEW topics such as creating subVIs and designing front panels.■

To learn more visit ni.com/info and enter **nsi2132**.



Use the discussion forums in NI Developer Exchange for tips and techniques.

Remote Monitoring via Satellite Communication

Quantum Controls, a Select Integrator partner in the NI Alliance Program, introduces qDATA, a remote, mobile data acquisition system based on National Instruments FieldPoint. Consisting of an enclosure, a Web address, and a login, qDATA uses satellite communication to collect data from sensors at remote locations. First, you mount the qDATA enclosure on the remote asset. qDATA then sends the data from the enclosure through a satellite to a customer-specific Web interface that authorized users can access from anywhere in the world.

With qDATA, you can remotely monitor existing SCADA systems to immediately find problems. You can also monitor tank levels to eliminate trips to remote locations for routine monitoring and monitor power distribution stations to minimize downtime. Any authorized user can login to the qDATA Web site from anywhere in the world to enable or disable the channels for transmission or set up the channels for off-sets and scaling.

Quantum Controls can also build an interface for automatic limit checking of incoming signals. Instead of logging on to

the qDATA Web site regularly to monitor conditions, you can receive e-mail alarms to a computer, pager, cell phone, or personal digital assistant (PDA) as soon as qDATA senses out-of-limit conditions.■

For more information on qDATA, visit ni.com/info and enter **nsi2133**.

ni.com/alliance

Communicate with Semiconductor Manufacturing Equipment

With the SECS/GEM Communications Toolkit for LabVIEW from VI Technology, a Select Integrator partner in the NI Alliance Program, you can easily communicate with semiconductor manufacturing equipment from NI LabVIEW. The SECS/GEM Communications Toolkit consists of a configurable driver, a message editor, examples, documentation, and a suite of VIs that LabVIEW applications can use to access tool data.

With the SECS/GEM Communications Toolkit, you can send and receive primary and secondary SECS II messages, select SECS I or HSMS communications at run time, and access data items by user-assigned



SECS/GEM Communications Toolkit Menu

names. An XML message definition file facilitates modification of messages without recompiling the LabVIEW application. The toolkit also has pass-

through capability for port sharing between the local and factory host.

The SECS/GEM Toolkit conforms to the following semiconductor equipment communications standards:

- SECS I and HSMS-SS message transfer
- SECS II message content
- GEM generic model for communications and control■

To request an evaluation version of the toolkit, visit ni.com/info and enter **nsi2134**.

ni.com/alliance

LabVIEW-Based Toolkit Monitors Power Quality

In industrial applications, monitoring power quality for nonlinear electrical loading is an important operational cost factor. The cost savings associated with early recognition of power distortion can be significant.

With the NI LabVIEW-based power quality toolkit from Emergent Information Technologies, an NI Alliance Program member, you can quickly and easily identify many of the most troubling line power problems industrial and commercial power consumers face today. The monitoring toolkit is a set of robust and customizable add-in modules

for LabVIEW that combine for a fully functional power quality analysis application.

Whether the application is single phase or multiphase, data analysis from the toolkit reveals harmonic distortion, power factor, and power quantity measurements. Detection and trending of transient power line, such as voltage sag and swell, is represented as easy-to-understand industry-standard Computer and Business Equipment Manufacturers Association (CBEMA) curves.

With the deregulation of the electric utilities industry, responsibility for power quality identification and abatement has

shifted more toward the consumer. The power quality monitoring toolkit from Emergent gives you information analysis capabilities you need to proactively make decisions that protect your business from expensive wear on equipment and avoid revenue-diminishing downtime.■

For more information on Emergent Information Technologies, visit ni.com/info and enter **nsi2135**.

ni.com/alliance

Bloomy Controls MID Drive Interface Simplifies Motion Control Wiring

With the MID Drive Interface from Bloomy Controls, a Select Integrator partner in the NI Alliance Program, you can easily connect National Instruments MID-76xx stepper and servo-motor power drives to a wide variety of motion control stages.

With the rear-panel pluggable screw terminal connectivity of the NI MID-76xx, you can make custom connections to motors, home and limit-switches, and encoders by connecting a wide range of single and multiple-axis motion stages. Most manufacturers of motion stages bundle these conductors into a single high-density cable and connector. This configuration requires you to create a custom wiring harness, fanning out individual wires or pairs to the respective screw terminals on the MID drive. This type of wiring scheme can be difficult to fabricate and tedious to debug.

With Bloomy Controls MID Drive Interface, the connections are housed in a standard 19-in.

rack mount chassis. The NI MID-76xx and all required interconnections are prewired internally and terminated to a single connector (per axis) on the chassis rear panel. Grounding and shielding connections are complete, as well as pull-up resistors for open collector transistor type limit switches. You only need to plug the motion stage cable into the chassis connector and the MID Drive Interface is ready to operate.

Standard models of Bloomy Controls MID Drive Interface are available as two or four-axis units for Newport CMA actuators and UTM and UZM series stages. Bloomy Controls can also provide custom interfaces for other manufacturers and models.■

For more information on Bloomy Controls, visit ni.com/info and enter nsi2136.

ni.com/alliance

Toolkit Applies Gabor Transform to Sound and Vibration

Engines, turbines, pumps, transmissions, and other mechanical systems generate a variety of signals during operation that can act as indicators of machine design and condition. Especially useful for the job are "orders," signal components harmonically related to machine operating speed.

Roush Industries, an NI Alliance Program member, has released GABRIEL, a stand-alone software package for interactive order analysis. Built using LabVIEW 6i and the Order Analysis Toolset for LabVIEW, GABRIEL applies the Gabor transform – a type of JTFA analysis. The result is a plot that shows the evolution

of frequency content as a function of time or speed. You can interactively select orders on the plot by drawing a mask on order-related energy. The software can then reconstruct the time-domain amplitude of any selected orders. Audio playback of the original waveform, produces subjective interpretation of a signal.■

For more information on Roush Industries, visit ni.com/info and enter nsi2137.

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NIWeek™ Call for Papers

Share your innovative computer-based measurement and automation applications with colleagues around the world. We invite you to submit a paper to the NIWeek 2002 Best Applications of Measurement and Automation Contest, and receive a discount on your conference registration fee.■

To download the author's packet, visit ni.com/info and enter nsi2138.

In the News...

DAQTron Automated Cable Modem Test System Meets DOCSIS 1.1 Requirements

DAQSIS, an automated cable modem performance test system from DAQTron, a Select Channel partner, now conforms to the data over cable service interface specification 1.1 (DOCSIS). With DAQSIS, cable modem manufacturers can test products to published industry standards before submission for DOCSIS certification. DAQSIS is a comprehensive testing tool that replaces many manual steps associated with modem performance verification.

DOCSIS 1.1 is a building block for advanced Internet provider (IP) service cable operators to deliver across their broadband access networks, such as voice, streaming media, and tiered data services.■

To download a FREE cable modem test software demonstration, visit ni.com/info and enter nsi2139.

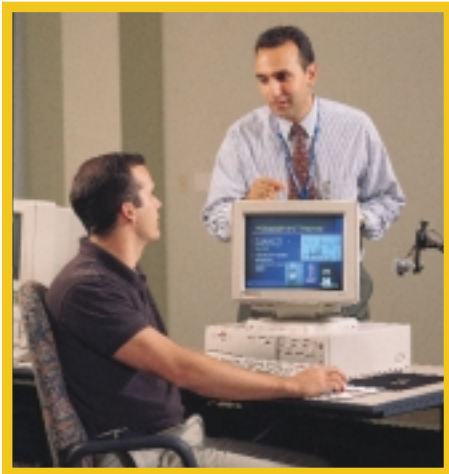
New Version of SNMP Toolkit from Viodia

With Version 2.0 of the Simple Network Management Protocol (SNMP) Toolkit for LabVIEW from Viodia Inc. and Sunrise LLC, you can create hundreds of agents and managers on a single PC and use encryption and authentication in your SNMP applications. New features for version 2.0 include full compatibility for SNMPv3 and Diffie-Hellman Key Change. It also includes enhanced compatibility for SNMPv2c that includes inform and get-bulk message types, a more efficient MIB compiler, and better connection management.■

To download a FREE reference manual about SNMP Toolkit version 2.0 for LabVIEW, visit ni.com/info and enter nsi2140.

Get Recognition with NI Certification Program

National Instruments is introducing a redesigned Certification Program that provides professional recognition for individuals who have a high degree of skill and knowledge of NI products and technologies. The new Certification Program includes more recognition, visibility, and industry credibility than ever.

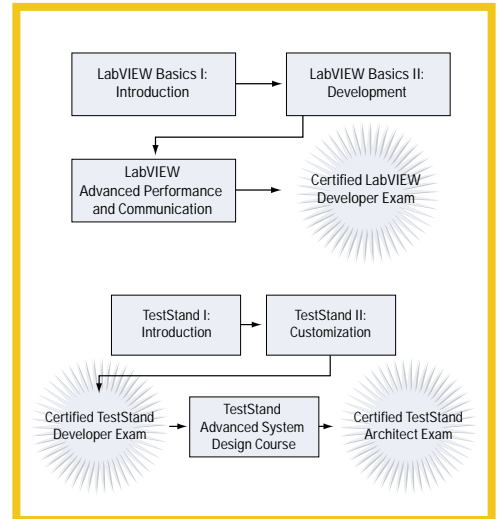


Instructor-led training can help you achieve certification.

NI certification works to reflect your skill and knowledge in industrial automation, measurement, and control.

Recent advanced courses leading to TestStand certification have been well attended by our Select Integrators, with engineers from Bloomy Controls, Data Science Automation, VI Engineering, MicroCraft Corporation, and VI Technology receiving certification. National Instruments certificates include the following:

- **Certified LabVIEW Developer (CLD)** – Provides comprehensive solutions for business and industry using LabVIEW development tools
- **Certified TestStand Developer (CTD)** – Develops customized test sequences for industrial automation systems using TestStand
- **Certified TestStand Architect (CTA)** – Provides complete testing solutions for a wide variety of industrial and commercial applications using TestStand
- **Certified Professional Instructor (CPI)** – Provides in-depth technical training on National Instruments products and technologies in a clear, understandable manner



Certification Program Tracks

For more information on the NI Certification Program, please visit ni.com/info and enter code nsi2141.

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Look for the National Instruments booth at these upcoming trade shows:

SAE – Detroit, MI	Mar. 4-7	Hannover Messe – Hannover, Germany	Apr. 15-20
PittCon – New Orleans, LA	Mar. 18-21	Eirtronics – The Point, Dublin	Apr. 30 - May 1
NMW – Chicago, IL	Mar. 18-21	Embedded Computing and Real-Time Computer Show – Zurich, Switzerland	May 7
Drives and Control – Birmingham, U.K.	Mar. 28-30	Testing Expo – Stuttgart, Germany	May 14-16
High Technology – Toronto, ON, Canada	Apr. 3-4	Embedded Systems Show – Excel, London, U.K.	May 15-16
DanMiljø – Herning, Denmark	Apr. 9-11	Sensors Expo – San Jose, CA	May 21-25
ISA Alberta – Alberta, Canada	Apr. 10-11	ISA Toronto – Toronto, ON, Canada	May 28-29



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