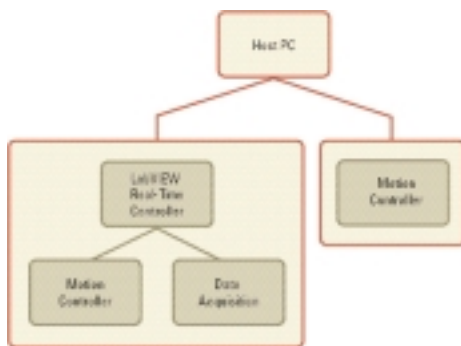


Write Motion Programs in NI LabVIEW Real-Time

If you need real-time determinism along with DAQ integration and easy-to-use programming tools, you can now write motion programs in NI LabVIEW Real-Time that communicate with the PXI-7344 high-performance stepper/servo motion controller.



Methods for Creating a Motion Control System

You can easily create complex, deterministic motion programs using any of the RT Series PXI controllers running an embedded LabVIEW application in combination with the PXI-7344 and FlexMotion™ 5.1.1 driver software.

With this new LabVIEW Real-Time compatibility, you now have three different methods for creating a PC-based motion control application:

1. Embed the PC-based controller or computer with the intelligence necessary to run motion control programs
2. Use the PC-based controller in combination with an industrial computer to achieve real-time communication between the computer and the controller
3. Run the motion control programs from the host computer

The new LabVIEW Real-Time compatibility included with the PXI-7344 motion controller makes real-time programming even easier by eliminating the need to program using the special onboard program functions. A motion system based on LabVIEW Real-Time technology, the PXI-7344, and any PXI data acquisition board also gives you the added ability to incorporate data acquisition into your motion system for powerful, highly integrated systems. ■

For application notes and example programs on motion control and LabVIEW Real-Time, visit ni.com/info and enter nsi1417.

ni.com/labviewrt

Boost Your PXI Measurement Capabilities

National Instruments has expanded its line of high-performance measurement modules to include the new wide-band, high-resolution digitizer for frequency domain measurements on the industry-standard PXI/CompactPCI measurement platform.

The new NI 5620 for PXI, a 14-bit, 64 MS/s frequency domain digitizer, delivers outstanding distortion performance and dynamic range. With a frequency range from 10 kHz to 36 MHz, the digitizer is ideal for many frequency domain applications, including spectral analysis, ultrasound and radar testing, high-resolution ATE, and video/imaging applications. The NI 5620 digitizer features:

- 32 or 64 MB of onboard memory for long, continuous acquisition
- 80 dB of SFDR for demanding applications
- 64 MS/s to 1 kS/s variable sample rate

The key features of the NI 5620 digitizer include its wide (80 dB) dynamic range, outstanding distortion performance, resolution, deep-segmented memory, and its onboard digital downconverter. With the downconverter, the NI 5620 can perform real-time digital decimation and filtering, acting as a hardware accelerator. The NI 5620



The new NI 5620 for PXI delivers outstanding distortion performance and dynamic range.

of frequency-domain averaging such as RMS, vector, and peak-hold.

digitizer also performs rapid acquisition and stores the acquisition results for future analysis.

The spectral measurements software included with the NI 5620 digitizer contains functions for frequency-domain measurements such as peak power and frequency, power spectral density, as well as measurements for communications applications, including power in band, adjacent-channel power, and occupied bandwidth. The software works with different types

Spectral Analysis Applications

The distortion and dynamic range specifications of the NI 5620, combined with the high-level measurements included in the software, make it an excellent tool for any challenging spectral analysis measurement application.

The NI 5620 digitizer is a reliable solution for applications in the high-frequency (HF) band, which spans from 3 to 30 MHz. Many applications in this band are military related, but include many radio applications, such as shortwave, AM, marine, ham, and mobile radio systems. You can use the NI 5620 to test wireless products, including RFID tags that airlines and shipping firms use for tracking purposes. The NI 5620 is ideal for testing components such as transducers for ultrasonic applications in the industrial and medical fields (up to 20 MHz). The superior dynamic range and resolution of the NI 5620 digitizer make it the ideal solution for these and other critical measurements. ■

For more information on the NI 5620 digitizer, visit ni.com/info and enter nsi1418.

ni.com/pxi

Aerospace Industry Implements PXI-Based Applications

Engineers and scientists in the aerospace industry are implementing PXI-based systems for diverse applications, including testing flight actuators, missile-guidance systems, satellite test stations, aircraft disk brakes, and space-telemetry and positioning-simulation test systems. PXI is the only open multivendor platform that integrates measurement, control, vision, and motion functionality. PXI is rugged, modular, and computer-based, so you can implement high-performance, multifunctional robust systems on factory floors, in the field, or on airplanes.

Parker Hannifin Tests Flight Actuators

The introduction of NI LabVIEW Real-Time on PXI systems, in combination with avionics products in PXI by members of the PXI Systems Alliance (PXISA), has greatly increased the use of PXI in the aerospace industry. Parker Hannifin, an aerospace



NI PXI-based systems provide an ideal framework for diverse applications, including the aerospace industry.

industry leader, recently adopted a PXI-based measurement system running LabVIEW Real-Time to test flight actuators. The actuators handle control surfaces such as tail rudder position, flaps, and ailerons. The primary sensors in the actuator are LVDTs that vary depending on the actuator and aircraft.

Parker Hannifin chose a PXI system with LabVIEW Real-Time to meet their test needs,

which included demodulating the various LVDT signals for flexibility and ease of use. They used a number of PXI data acquisition modules, PXI digitizers, and SCXI modules for signal conditioning to provide a compact, rugged, and high-performance solution. In this case, the ability to easily create a real-time solution on a standard, rugged measurement platform made PXI and LabVIEW

Real-Time the obvious choices.

Using PXI to Design and Test Aircraft Wings

Another aerospace industry leader used PXI, along with the signal conditioning front-end SCXI, to design and test wings in commercial and military aircraft. PXI-based test systems also had design successes in turbine monitoring when the systems implemented could monitor 40 high-speed (>20 KHz) signals from accelerometers and voltage sources and approximately 50 low-speed (100 Hz) signals. On the high-speed end, the system needs to continuously acquire data at 50 KS/s on all channels. With a PXI-based system consisting of the high-performance PXI dynamic signal analyzer NI 4472 modules, data acquisition modules, and LabVIEW, they could implement a flexible, high-performance system at a low cost.

Inspecting Carbon Fibers in Aircraft Disk Brakes

A PXI-based system was also used for visual inspection of carbon fibers present in aircraft disk brakes. The visual-inspection system measures several parameters of the fiber at various stages of production. The primary goal is to relate parameters of the fiber found using a visual-inspection routine during production to the properties of the final carbon material. They use this information to increase uniformity and improve quality of the final carbon material.

NOAA Designs PXI Measurement Application

You can also use PXI in the aircraft industry in areas such as atmospheric science. The National Oceanic and Atmospheric Administration (NOAA) designed a PXI application that measures nitric acid concentration in the stratosphere. The instrument can measure

PXI is the only open multivendor platform that integrates measurement, control, vision, and motion functionality.

additional molecular concentrations, but its initial implementation was limited to a single molecule. The CIMS instrument is designed to fly on a NASA WB57 research aircraft and is mounted in one of four cradles beneath the aircraft. Its ambient environment is cold (-50 °C) and unpressurized (0.07 atmospheres).

The data system and several other components are mounted in pressure cans, which are pressurized to one atmosphere. The system consists of the following:

- PXI-1000B chassis
- Embedded PXI controller
- PXI-based serial ports
- PXI-6602 counter module
- PXI-6533 DIO module
- PXI-6031E 16-bit multifunction module
- Two PXI-6071E 12-bit multifunction modules
- SCXI and Ethernet module

NOAA chose a PXI system because it was mechanically rugged and could run seven data acquisition boards. Previously, they had many problems trying to use more than four PCI boards in a single PCI bus system.

National Instruments PXI-based solution provides an ideal framework for high-performance, modular measurement, vision, motion, and control systems that you can scale to use on the manufacturing floor, field deployments, or in aircraft. ■

To learn more about the using PXI in aerospace applications, visit ni.com/info and enter nsi1419.

ni.com/pxi

B&B Technologies Uses NI PXI to Test Avionics Systems

by Elizabeth Kuranz, SI Team Leader,
Stephen Orton, SI Team Leader,
and Chris Cahoon, System Integrator,
B&B Technologies, Inc.

The Challenge: Finding an adaptable test platform that can test both a wide variety of avionics products and components prior to shipping, as well as troubleshoot and verify systems in the field.

The Solution: Using a PXI-based system that contains a variety of measurement devices for stimulus and response testing, communications interfaces, and a variety of GPIB-controlled power supplies.

Developing a Flexible, Modular Platform

B&B Technologies, Inc. (BBT) has developed a flexible modular platform for testing avionics components of a helicopter-based anti-submarine warfare system. We selected PXI because it is expandable and can house many types of instruments, communication, and switching modules. The great advantage of using National Instruments PXI modules is that we can synchronize them through the PXI backplane. This advantage proved invaluable because we could easily synchronize the arbitrary waveform generator, the oscilloscope, and a multifunction data acquisition board to perform complex data acquisition procedures with a common clock and trigger between several different instruments.

Functional Testing on Avionics Equipment

We designed the Test Adapter Test Station (TATS) to perform functional testing on

With LabVIEW, we reduce programming and development time by more than half compared to Visual C++ development.

a variety of avionics equipment for manufacturers. The TATS test set consists of two major elements – the core test set and the interchangeable test adapter (ITA).



The resulting TATS system is flexible enough to thoroughly test different avionics components.

The core test set is a rack containing a variety of switching, instruments, and power supplies.

Finding a Flexible Testing Platform

The key to achieving flexibility is to provide a means of connecting all the instruments to the different devices. We used a Mac Panel interface, which mounts nicely in front of a rack-mounted PXI chassis to connect them to various devices. With this interface, the test set can connect to different devices with no changes to the core test set and requires minimal design and programming time to test a new product.

Rapid Development and Accuracy with NI Solutions

We chose NI LabVIEW because of its rapid development time, large instrument driver selection, and high level of compatibility, connectivity, and features. It has the flexibility, speed, and power to perform serious tasks, yet is much quicker to code and easier to debug than text-based languages.

We selected NI PXI measurement modules for all our data acquisition, digital testing, and stimulus signals because of their accuracy and the built-in synchronization capability embedded in PXI. This synchronization tool includes an MIO board (PXI-6071), arbitrary waveform generator, oscilloscope (NI 5112), digital I/O

board (PXI-6527), multimeter, and counter/timer board. With this combination of instruments, we could test and generate almost any type of signal in a single PXI chassis.

Additionally, we used a PCI-GPIB board for communicating with power supplies, a four-port RS-485/422 module for communicating with equipment, and a MXI™-3 board for connecting the PXI to an industrial computer.

Cutting Costs and Development Time with NI Software and Hardware

With LabVIEW, we reduce programming and development time by more than half compared to Visual C++ development.

Using PXI saved us approximately \$20,000 (USD) per system when compared to a VXI system. The complete package of drivers and examples shipped with the NI products saved weeks of development and testing time.

Achieving a Flexible System

The resulting TATS system is flexible enough to thoroughly test different avionics components, such as aircraft power supplies, system computers, operator interfaces, and displays. The core test set includes a variety of analog and digital instruments to inject signals. It also takes measurements and provides serial ports and 1,553 buses to communicate with the aircraft components. The next phase of development includes standardizing their testing platform with this modern, off-the-shelf platform. The relatively low additional cost to test new devices is the key to a successful test platform. ■

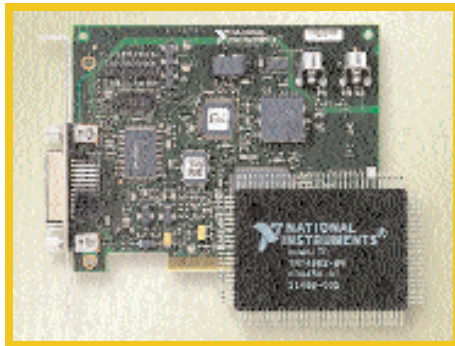
For more information, contact Timothy R. Brooks at B&B Technologies, Inc., 6610 Gulton Court N.E., Albuquerque, NM 87109, tel (505) 345-9499, e-mail tbrooks@bbtechno.com.

ni.com/success

Develop Instrument Firmware with New Source-Code Tool

NI introduces NI-Device DDK, a source-code version of our recently introduced NI-Device software. NI-Device software helps designers of ANSI/IEEE Standard 488.2 devices write bus-independent firmware for their instruments. The new NI-Device DDK enhances the compatibility of NI-Device to additional GPIB hardware interfaces and expands its implementation to devices with or without an operating system present.

National Instruments NI-Device is one of the first tools available in the industry that helps designers create IEEE 488.2 instruments while isolating the user code from bus-specific details. NI-Device handles most of the IEEE 488.2 protocol components, such as input and output queues, device triggering/clearing, and status reporting. It also transparently handles the IEEE 488.2 Message Exchange Protocol. NI-Device performs the specific tasks that were formerly



The new NI-Device DDK enhances the compatibility of NI-Device to additional GPIB hardware interfaces.

implemented by designers, so developing the communications bus code for the instrument is easier and faster.

This version of NI-Device is a comprehensive C++ source-code package that contains all the necessary NI-Device functionality of the driver. By adding the

specific operating system features necessary to implement a driver in your particular OS, you can design your connectivity firmware without modifying the NI-Device specific code.

With this latest release of the NI-Device software tools, you can now write the firmware for instruments in which the connectivity interface is either a PCI-based NI GPIB interface (PCI-GPIB, PXI-GPIB, PMC-GPIB), an ISA-based interface (AT-GPIB/TNT, PC/104-GPIB), or a GPIB ASIC (TNT4882). ■

To download the NI-Device DDK full API documentation and examples, visit ni.com/info and enter nsi1420.

ni.com/gpib

IVI™ Foundation Defining Driver Specifications

National Instruments is working with the Interchangeable Virtual Instruments (IVI) Foundation to help define standards for better-performing, interchangeable instrument drivers. These specifications define a two-tiered architecture, with instrument-specific drivers designed to provide a more robust interface to individual instruments and class drivers to achieve instrument interchangeability. The IVI Foundation is defining specifications for common instrument classes such as DMMs, oscilloscopes, function and arbitrary



National Instruments IVI drivers provide you an easy and native way to communicate with your instruments.

waveform generators, DC power supplies, and switches. The IVI Foundation is also defining instrument driver architectures based on ANSI-C and Microsoft COM technology. These architectures describe the processes for creating, using, and configuring IVI drivers, as well as the capabilities of those drivers.

Regardless of the architecture on which a driver is built, IVI drivers can provide programming interfaces native to your application development environment. We provide our current C-based instrument specific drivers as dynamic link libraries (DLLs) for general-purpose use in any environment, such as Microsoft Visual Basic or Visual C++. We also add NI LabVIEW VIs and LabWindows™/CVI function panel (fp) files that call into the DLLs for more intuitive and native use in those environments. In addition, with the release of Measurement Studio 6.0, IVI drivers now provide an object-oriented C++ class interface native to Visual C++.

NI also provides class drivers for instrument interchangeability. You can use these drivers in

all the environments already mentioned above, and in addition, we provide IVI-class ActiveX controls in Measurement Studio that you can natively use in Visual Basic. In NI TestStand™ 2.0, we also provide dedicated IVI step types to directly communicate with instruments.

No matter what your test development environment, National Instruments IVI drivers provide you with an easy and native way to communicate with your instruments. Our instrument-driver network has IVI drivers available for more than 170 instrument models. As the IVI Foundation completes standardization for more instrument classes such as power meters, RF signal generators, spectrum analyzers, and digital instruments, NI plans to provide drivers for those instrument types as well. ■

To access our instrument driver network, visit ni.com/info and enter nsi1421.

ni.com/ivi

New PXI Embedded Controllers Deliver High Performance

With powerful processors up to 1.26 GHz, the new NI 8171 Series 3U PXI/CompactPCI embedded controllers expand the application areas for PXI systems – from low-cost embedded systems to high-performance automated systems. The series contains:

- NI 8176 – highest-performance available with 1.26 GHz Pentium III processor and 512 kbytes of on-die advanced transfer cache
- NI 8175 – high-performance embedded controller with 866 MHz Pentium III processor
- NI 8174 – low-cost embedded controller with 566 MHz Celeron processor

Deliver More in Less Space

The NI 8171 Series incorporates an extensive set of standard and extended peripherals into a small, compact 3U controller (3.2 x 5.1 x 8.5 in.). With the hard drive, floppy drive, Ethernet, and GPIB integrated into a single module, you preserve all active slots for PXI measurement modules. With an instrumentation feature

unique to the NI 8171 Series, you have access to the timing and synchronization signals of the internal PXI trigger bus. This feature helps achieve tight-timing integration between multiple PXI systems or with other system components.



The NI 8171 Series embedded controllers give you flexibility in less space.

Integrate Seamlessly

The NI 8171 Series embedded controllers integrate seamlessly with NI software, including NI LabVIEW, Measurement Studio, and TestStand. When powered by NI software, the NI 8171 Series combine with NI PXI chassis and modules to give you a flexible platform for your measurement and automation applications. The rugged, industrial packaging of PXI and the NI 8171 Series controllers make your system ideally suited for deployment in manufacturing, production, field test, or other harsh environments. ■

To upgrade and receive substantial savings, visit ni.com/info and enter nsi1422.

ni.com/pxi

Deploy Low-Cost Embedded Real-Time Solutions

The new low-cost PXI-8140 RT Series controllers are optimized for creating embedded real-time systems. You can develop custom applications in NI LabVIEW Real-Time and download them to a modular PXI system with a PXI-8140 RT controller and several plug-in I/O modules. The dedicated processor in the controller runs LabVIEW applications deterministically for real-time performance while the headless nature and single-board architecture makes the PXI controller easily embedded into larger systems. With this streamlined design, you can build real-time applications while reducing the cost of deploying real-time solutions.

Customer-Defined Solutions

Similar to other RT Series PXI controllers, you can use the PXI-814x RT to create an integrated real-time PXI system. However, with the lower-cost controller, you can deploy multiple systems with integrated I/O, such as high-speed data acquisition, dynamic signal acquisition, signal conditioning, motion control, CAN, and serial connectivity.

	PXI-8145 RT	PXI-8146 RT
Processor	266 MHz low-power Intel Pentium	266 MHz low-power Intel Pentium
Maximum Rate for Single PID Loop	6 kHz	6 kHz
Nonvolatile Memory	32 MB Compact Flash	32 MB Compact Flash
DRAM	32 MB, upgradeable to 128 MB SDRAM	64 MB, upgradeable to 128 MB SDRAM
Ethernet Connectivity	100BaseTX/10BaseT	100BaseTX/10BaseT
Serial Ports	1	1
GPIB Ports	1	–
Watchdog	Internal	Internal with external SMB connector

Specifications for the PXI-8140 RT Series Controllers

Create a Low-Cost System for Sound and Vibration Applications

The PXI-8140 RT is ideal for real-time sound and vibration applications. With a PXI-8145 RT controller and an NI 4472 dynamic signal acquisition module, you can create a low-cost system for a dedicated sound and vibration monitoring system in a four-slot PXI chassis.

With the PXI-8145 RT running the embedded LabVIEW application, you can develop a dedicated stand-alone system for vibration or audio monitoring. With the

built-in networking and dedicated processing power of the PXI-8140 RT controllers, you can build custom systems with greater flexibility than traditional dedicated instruments. ■

For more information on the PXI-8140 RT, visit ni.com/info and enter nsi1423.

ni.com/labviewrt

Easily Create Applications with Windows XP

On October 25, 2001, Microsoft released Windows XP, the most significant update to the Windows operating system since Windows 95. Windows XP replaces both the Windows 9x and Windows 2000/NT product lines and now extends to home and professional editions. Creating PC-based measurement and automation applications is now easier with several new enhancements, including improved reliability and better connectivity.

Improved Reliability

Test applications and machines must be stable, so they can run for long periods of time without crashing or restarting. XP makes considerable stability gains if you need this kind of reliability. Its operating kernel is based on the more stable

Windows 2000/NT line, but includes the ease of use and native hardware support of Windows 9x. XP also addresses instability from third-party software, such as driver software with poor compatibility or software that installs multiple versions of shared libraries. With a feature called System Restore, you can revert to previously known configurations if an installation of hardware or software leaves your computer unstable.

Well-Connected Desktop

Windows XP also simplifies the task of remote and distributed computing if you want to use remote instrumentation or collaboration. You can connect to remote machines with a feature called Remote Desktop, which gives you a full-screen

interactive view of the remote machine's desktop. In environments such as the manufacturing floor, you can remotely log onto test machines, change configurations, and restart an application. ■

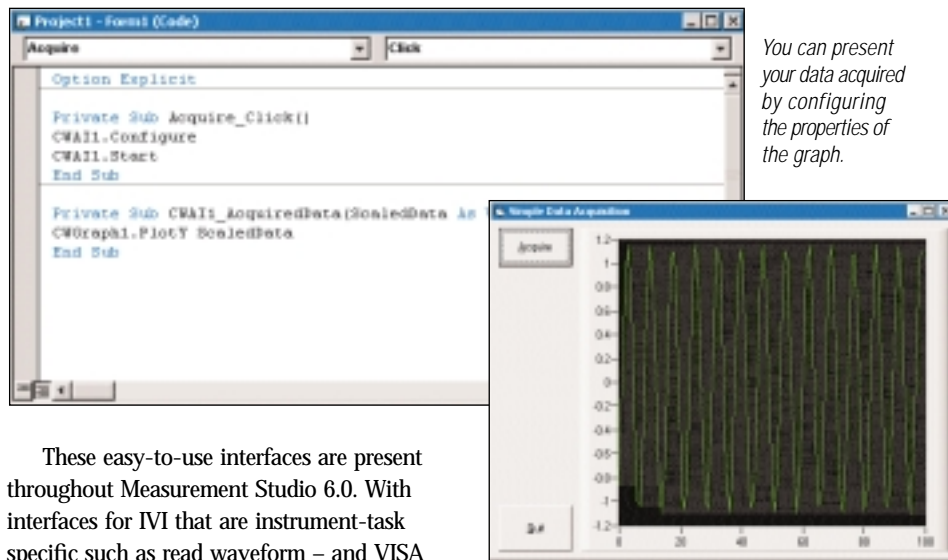
For more information on NI product compatibility, upgrading techniques, and tips on the features in Windows XP, visit ni.com/info and enter nsi1424.

ni.com

Use Visual Studio to Develop Measurement Applications

NI Measurement Studio is designed for building measurement and automation applications using Microsoft Visual Studio and ANSI-C development. You can create more powerful test, measurement, and control applications using your existing programming knowledge in Microsoft Visual Basic and C/C++.

When you are connecting to hardware, whether it is instrument control, data acquisition, vision, or motion, NI Measurement Studio provides intuitive configuration dialogs and functions designed specifically for tasks you need to solve. For example, when configuring your data acquisition system using ActiveX controls, the property pages take care of configuring your memory, range, clock, and any triggering available. You can present the data acquired in the previous example by configuring the properties of the graph, such as cursors, axes, plots, and annotations. The graph also provides pre-configured sets of properties, called styles, for the most common settings. Therefore, all the code required to create a simple data acquisition application is the code to configure and start your acquisition pages and display the data returned from the acquired event.



You can present your data acquired by configuring the properties of the graph.

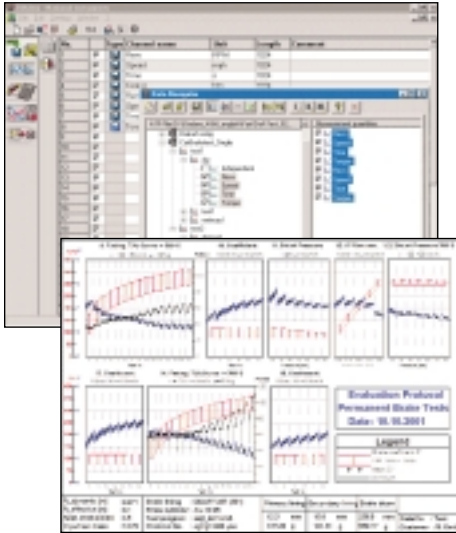
These easy-to-use interfaces are present throughout Measurement Studio 6.0. With interfaces for IVI that are instrument-task specific such as read waveform – and VISA and GPIB interfaces that have configurable parsers to retrieve data more easily – you can focus on completing your solution instead of retrieving the data. There are also simplified task-oriented interfaces for advanced hardware, such as motion and vision, that make creating your systems extremely intuitive. NI Measurement Studio makes your development easier, so you can create powerful solutions while saving time and money. ■

To receive a FREE evaluation version of Measurement Studio, visit ni.com/info and enter nsi1425.

ni.com/mstudio

New Analysis and Report Generation in DIAdem™ 8.0

You now can easily perform in-depth analysis of your test data and create powerful charts and graphs using National Instruments DIAdem 8.0.



Create powerful charts and graphs with DIAdem 8.0.

Manage and Analyze Data

DIAdem 8.0, the latest upgrade of this offline analysis and report generation tool, gives you a valuable, affordable component in the enterprise-wide management of technical data. With DIAdem, you can use a standard Microsoft Windows PC to quickly analyze measurement data. DIAdem easily imports ASCII, Microsoft Excel, and NI LabVIEW data files as well as files stored in industry-standard databases. Locating and importing files into DIAdem is easy with built-in navigation tools and wizards.

Users can import files more than 2 GB into the DIAdem environment and analyze them using DIAdem technical and mathematical tools, such as signal analysis, statistics, curve-fitting functions, and more.

Create Automated Reports

After analyzing your data, you can use DIAdem to interactively create technically focused

graphs and charts, which you can then use to create complete reports. DIAdem automatically integrates your data, graphs, and charts into a Microsoft Word or other standard word processing file formats.

With DIAdem 8.0, you also can automate standard tasks needed to create frequently used reports and charts using Microsoft Visual Basic Script (VBS).

DIAdem is a proven design and validation tool. It has been in use for more than a decade in the research, test, and the design validation areas of a number of industries, including automotive, consumer appliances, and aerospace. ■

To receive a *FREE* evaluation version of DIAdem, visit ni.com/info and enter **nsi1426**.

ni.com/diadem

NI Developer Suite Adds New Software Products

NI Developer Suite, the comprehensive subscription program for National Instruments software, has added new components for subscribers over the last year. NI Developer Suite, which bundles popular NI software at an attractive price, includes quarterly updates with all the latest releases of NI software. In addition to the latest software versions, we also include new products in NI Developer Suite Professional Control Edition.

LabVIEW Report Generation Toolkit for Microsoft Office

NI Developer Suite already includes a set of add-on toolkits for LabVIEW and Measurement Studio, including specialized libraries for advanced signal processing, Internet connectivity, database access, and more. With the new LabVIEW Report Generation Toolkit for Microsoft Office, you can programmatically create and easily edit Microsoft Excel and Word reports. You can use this new set of VIs to speed your development to create reports

summarizing manufacturing test results or compile process statistics to improve production yields.

Measurement Studio Added to Professional Control Edition

The NI Developer Suite Professional Control Edition, a set of tools useful for control, automation, and industrial applications, includes LabVIEW, the LabVIEW Datalogging and Supervisory Control Module, and LabVIEW Real-Time. This edition now includes Measurement Studio 6.0, which offers several features useful in the development of control applications. With Measurement Studio, you can create DLLs for use in LabVIEW Real-Time. With LabVIEW Real-Time, you can now deterministically access ANSI-C shared libraries within the real-time environment. In addition, the PID Toolkit and Automation Symbols library for Measurement Studio are included in the add-on toolset CD, providing you with more options for developing control

routines in NI LabWindows/CVI, Microsoft Visual Basic, and Visual C++.

For more information on NI Developer Suite, visit ni.com/info and enter **nsi1427**.



NI Developer Suite now includes the LabVIEW Report Generation Toolkit and Measurement Studio 6.0.

ni.com/suite

Increase Productivity with Vision-Guided Motion

Automated processes often involve motion control to help increase productivity. A recent trend in motion control is to incorporate vision as a type of feedback that helps determine the trajectories the motion system should follow.

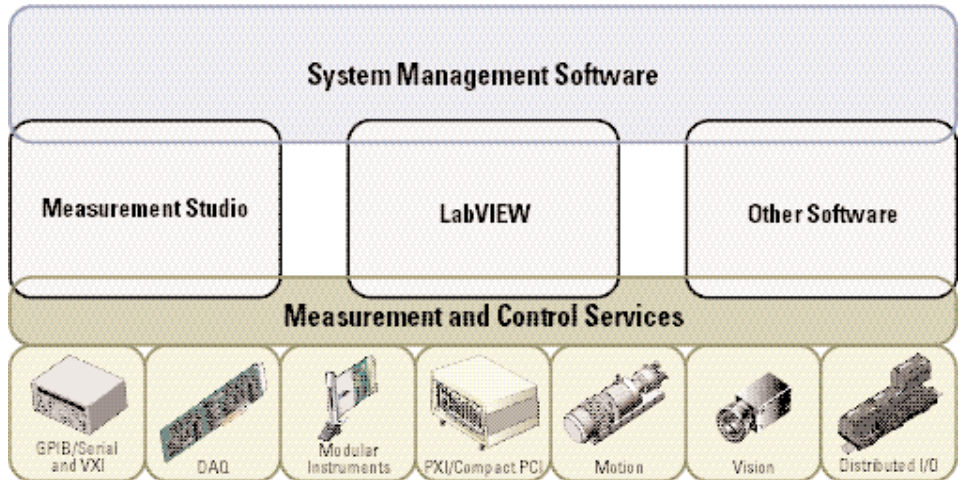
In many biotech, semiconductor, and optoelectronics automation applications, vision-guided motion control is quickly becoming a standard. With a vision system, you can acquire a whole field of two-dimensional data at one time, which is increasing the popularity of integrated systems. This capability is useful for two or three-dimensional motion systems that may need to rely on more than just one-dimensional sensor data. The current availability of off-the-shelf tools and easy-to-use software interfaces makes these types of systems lower in cost and easier to create than ever.

Hardware for Your Vision-Guided Motion System

The hardware for a motion and vision system based on the National Instruments platform consists of eight main components, including:

- A motion controller, such as the NI 7344 Series controller
- A motor drive, such as the MID-76XX drive or third-party drive
- A stage actuator or motor
- Mechanics for power transmission
- An image acquisition board, such as the PCI 1409 board
- Camera
- Optics
- Lighting

In a motion and vision system, the vision portion often acts as feedback to tell the motion controller where to move the actuators. If you think of an image as data, you can think of your camera as a sensor and the lens and lighting as the necessary signal conditioning. A common misconception about vision systems is that the software can always compensate for bad lighting and lens conditions. In reality, a simple lighting adjustment can often save you a great deal of time when designing your system.



Use NI software and hardware to synchronize your vision and motion system.

One of the common actuator and power transmission combinations that many industries use is the simple linear stage. A linear stage is a device that transfers the rotational movement of a motor shaft to useful linear or rotary movement. The main advantage of using off-the-shelf stages is that you can save a great amount of time by not having to design your own mechanical system. One of the powerful features of NI motion and vision hardware is the RTSI bus. The RTSI bus gives you direct communication between motion and vision hardware for applications requiring precise timing and synchronization between the two components.

Software That Connects Your Vision and Motion System

One of the key factors to consider when creating the software for a vision and motion

This guarantees that a distance measurement provided by the vision system in pixels translates to the correct distance in steps or counts for the motion system.

One advantage of a combined vision and motion system is using the vision system to calibrate your motion system. By calibrating your motion system using the measurement capabilities of your vision system, you automatically generate a calibration between the two without using external measurement devices. This process provides a fast and cost-effective method for creating an accurate, integrated motion and vision system. The pattern matching software included with IMAQ™ Vision is key in most inspection and vision guided motion applications, such as guiding pick and place machines and locating biological cells. ■

For application notes and example software on vision and motion, visit ni.com/info and enter nsi1428.

For help in selecting a camera with Camera Advisor, visit ni.com/info and enter nsi1429.

For help in selecting a stage with the Motor and Stage Advisor, visit ni.com/info and enter nsi1430.

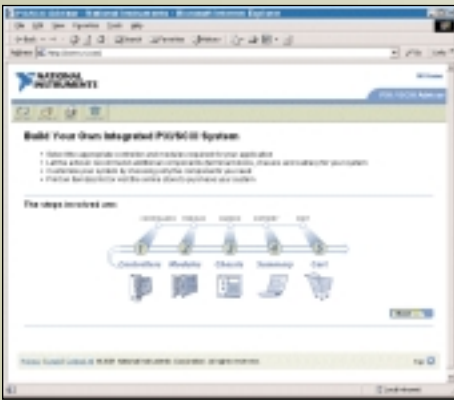
Off-the-shelf tools and easy-to-use software interfaces make integrated systems lower in cost and easier to create than ever.

system is how the vision communicates with the motion. A vision system takes measurements in units of pixels, while motion takes commands in units of steps or counts. To communicate distance measurements from the vision system to the motion system, you need to perform a calibration.

ni.com/vision • ni.com/motion

Use the PXI Advisor to Customize Your PXI System

National Instruments PXI product line has hundreds of options to meet your unique needs. With the PXI Advisor you can easily select the appropriate modules, chassis, cables, and other accessories your application requires. This advisor not only informs you of the different options available, but also eliminates ordering mistakes and product compatibility errors. You simply select the PXI modules needed for your application and then the online PXI Advisor guides you to select any type of PXI or PXI/SCXI combination chassis and accessories.



Use the PXI Advisor to select modules for your application.

After you have completed your selections, PXI Advisor generates a Configuration ID, which includes a summary of all NI PXI part numbers. To order, you can simply purchase your system online or print the summary page. In addition, you can save the configuration so you can access it later or share it with your colleagues, purchasing agents, or an NI sales engineer.

To begin using the PXI Advisor, visit ni.com/info and enter nsi1431.

Take a FREE Online Tutorial

In our efforts to make ni.com your definitive resource for measurement and automation, we have developed highly technical online tutorials. With these self-paced multimedia tutorials, you can learn and refresh your knowledge of fundamental engineering concepts. Topics currently available include:

- Fast Fourier Transform (FFT) - This tutorial covers the fundamentals of frequency domain measurements in addition to some derived measurements.
- Machine Vision and Scientific Image Processing – This tutorial helps you start developing a machine vision and image processing application. It guides you through the issues you need to consider, the software and hardware involved in development, and the recommended programming techniques.

To take an online tutorial today, visit ni.com/info and enter nsi1432.

National Instruments Web Site Named Top Customer Support Site

The Association of Support Professionals selected ni.com as one of the 10 Best Web Support Sites for 2001. National Instruments Web site was evaluated on navigation, ease of use, KnowledgeBase content, personalization features, and interactivity. Key support elements on our site include:

- NI Developer Exchange (ni.com/zone) - This interactive forum enables you to talk with peers, as well as post and answer technical issues.
- Request Support (ni.com/support) - If you have a support issue, you can type in your specific question and we automatically pull information related to your topic. If you want additional help, you can choose from a personalized set of options for contacting an engineer.
- Support Search (ni.com/support) - When looking for a specific support issue, enter it under "Ask Your Question" and our intelligent search feature pulls solutions



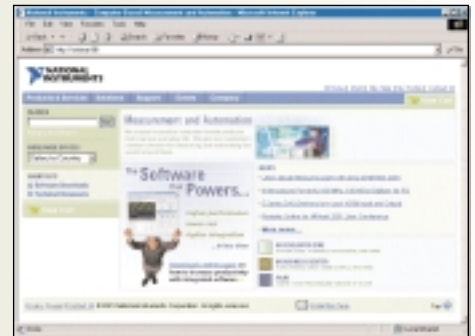
National Instruments ni.com Selected as One of the 10 Best Web Support Sites for 2001

from our KnowledgeBase, common troubleshooting problems, product manuals, and discussion forums.

New Enhancements with ni.com Redesign

To improve your online experience, we have listened to your feedback and launched an improved ni.com. Be sure and check out new redesign features including:

- Content integration (ni.com/products) – By combining product information pages with catalog pages, you have access to all product information in one location. This is your source for all product information,



Check out the newly redesigned ni.com

- including specs, manuals, and tutorials. You can also go to ni.com/products to check product compatibility, download software, and view upcoming events.
- Site design and navigation (ni.com) – Along with a refreshing new color scheme, we added breadcrumbs on all pages for easy navigation.
- NI Developer Zone (ni.com/zone) – To enhance your community experience, we combined user forums with code sharing, so you can ask and answer questions and share code at the same time. We have also expanded the Measurement Glossary to a Measurement Encyclopedia with additional measurement and automation concepts. ■

ni.com

PXI Photonics Modules Improve Laser Test

The new family of PXI photonics modules from PX Instrument Technology (PXIT), an NI Alliance Program member in Ireland, provides a tightly integrated solution for testing and characterizing semiconductor devices.

The initial release includes a laser control, an optical power measurement, and a thermoelectric cooler (TEC) control. All modules offer a common core, which includes a 2 MB stimulus/store memory, an intelligent sequence



The new photonics modules from PXIT offer a tightly integrated solution.

engine, and nonvolatile memory for calibration purposes. PXIT uses the local bus and interrupt of PXI to synchronize groups of modules. All modules are fully compatible with VISA, NI LabVIEW, and NI Measurement Studio. PXIT provides additional compatibility with NI TestStand and Microsoft Visual Basic, C, and C++ through documented DLLs and example programs.

You can combine the PXI modules in groups to test

sophisticated components or more than one component at a time. With the open architecture, you can add other suppliers' modules to implement automation or I/O functions. With fully scalable solutions, multiple test-heads can run from the same PXI system. ■

For more information on PXIT, visit ni.com/info and enter nsi1433.

ni.com/alliance

National Instruments Announces New Select Partners

NI has expanded the NI Alliance Program of third-party developers, consultants, and systems integrators to include Select channel partners with expertise in specific industries and applications. The NI Alliance Program now has 17 Select partners chosen from more than 600 NI Alliance Program members worldwide. The new Select channel partners include Alfautomazione S.r.l for electronics manufacturing test, Amfax Ltd. for optoelectronics, and DAQTron Inc. for broadband test.

Founded in 1991, Alfautomazione of Lissone, Italy has gained worldwide

success as a manufacturer of automated test equipment in industries such as automotive, telecom, and consumer electronics.

Amfax of Dorset, U.K., founded in 1986, supplies functional test solutions for packaging and components manufacturers in the photonics industry in Europe, Canada, and the U.S.

Since 1994, DAQTron of Atlanta, GA, USA, has designed, built, and integrated test systems for the broadband marketplace. With products for cable modem design verification and manufacturing testing and voice over IP (VoIP) testing, DAQTron provides high level, turnkey



design validation and manufacturing for a wide variety of commercial and industrial applications. ■

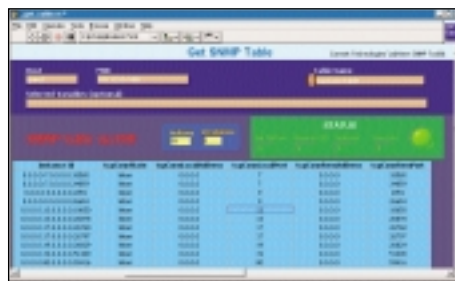
For more information on NI Select channel partners, visit ni.com/info and enter nsi1434.

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Automating SNMP Testing of Communication Equipment

Comnet Technologies has announced the SNMP Toolkit for LabVIEW (STL) for automated testing of Simple Network Management Protocol (SNMP) devices. You can rapidly test SNMP functionality, configure SNMP devices, and gather test data. STL features error processing, transaction management, session control, and real-time event processing required for SNMP operations. The toolkit includes an Embeddable SNMP Engine (ESE) and a complete set of LabVIEW drivers with source code.

With an ESE, the toolkit functions as a fully programmable SNMP Manager or Agent



Automated Testing of SNMP Devices

that can add comprehensive SNMP functionality to your test application. You can use the ESE in a manager-to-manager

role for hierarchical distribution of management systems or test applications.

The SNMP Toolkit for LabVIEW is available from Comnet Technologies for \$495 (USD) per CPU. This price includes 30 days of technical support and six months of FREE upgrades. ■

To download a 30-day trial copy of the SNMP Toolkit, visit ni.com/info and enter nsi1435.

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Advanced Measurements Offers Fuel Cell Test System

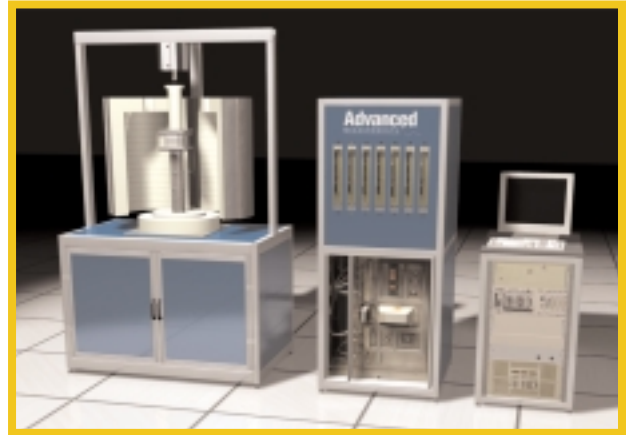
With the highly flexible, modular, rack-mounted fuel cell test system from Advanced Measurements, an NI Select integration partner, you can monitor, control, and test fuel cell stacks and systems, an emerging, alternative source of electric power. Based on NI LabVIEW and PXI, the modular fuel cell test system meets the evolving needs of fuel cell testing. Advanced Measurements delivers a customized, turnkey fuel cell test system in 10 to 12 weeks.

Fuel cell manufacturers are testing fuel cells, electrochemical devices that generate electricity without creating harmful emissions, to determine how the technology might power homes and automobiles. Fuel cells combine hydrogen and oxygen to produce electricity, with a byproduct of pure water, and are used

for automotive, residential, commercial, and portable power applications.

Advanced Measurements test system measures fuel-cell characteristics such as voltages, current, humidity, temperature, and gas flows into a fuel cell. The system also controls all aspects of the test environment. ■

To download a **FREE LabVIEW-based fuel cell software demo**, visit ni.com/info and enter **nsi1436**.



Monitor control and test fuel cell stacks and systems faster.

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VI Engineering Delivers Rapid Automated Testing

With the USB Pre-Compliance Tester from VI Engineering, an NI Select integration partner, you can test your low or full-speed universal serial bus (USB) device for electrical performance and compatibility before you send the device to the USB compliance lab. The tester from VI Engineering is based on NI LabVIEW, the NI 5112 high-speed digitizer for PXI, and the NI 6508 digital I/O board for PXI.

You can use the USB Pre-Compliance Tester to test more than 30 USB product

families including digital cameras, computer peripherals, game controllers, USB Ethernet and hub connectivity, and uninterruptible power supplies.

After you enter preliminary test specifications, the system can run automated testing, data collection, and data processing in less than one minute. To operate the tester, you plug the USB device into the tester, use the LabVIEW-based software to configure and run the test, and analyze the results. You can review

data on screen and analyze it with the push of a button. You can also export tabular data into an ASCII file. ■

For more information on the USB tester, visit ni.com/info and enter **nsi1437**.

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Save Development Time with Toolkit from Cal-Bay Systems

With the Electroglas Probe Station Toolkit for LabVIEW from Cal-Bay Systems, an NI Select integration partner, you now can seamlessly integrate NI LabVIEW with the Electroglas 20xx series of probe stations for the semiconductor industry.

With the toolkit from Cal-Bay Systems, you can automatically move the prober from die to die, raise and lower the chuck, and configure an inker to mark defective die. In addition, you now can easily create custom test system interfaces for specific applications.

You can save valuable development time with the new LabVIEW toolkit from Cal-Bay Systems by automating wafer-level tests. You no longer have to operate the prober manually or write a software driver for the prober. The toolkit integrates easily into existing NI LabVIEW programs with the standard look and feel of a LabVIEW instrument driver.

The toolkit works with the Electroglas 2001, 2010, and 4085 series of probers and can connect with the prober through a GPIB

or RS-232 interface. The toolkit includes 88 commonly used commands on the prober. ■

For more information on the Electroglas Probe Station Toolkit, visit ni.com/info and enter **nsi1438**.

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Come to NIDays 2001-2002 Technical Symposium

The annual series of measurement and automation conferences kicked off on September 26, 2001 in Lisbon, Portugal and runs through March 7, 2002 when NI holds its last conference of the series in Padova, Italy.

Thousands of industry experts worldwide come to NIDays to learn about the latest developments in computer-based and networked measurement and automation. This technical symposium brings 25 years of NI advancements, including our most recent product innovations, to a city near you.

About NIDays

NIDays 2001 is the ideal venue for engineers, scientists, NI Alliance Program members, developers, systems integrators, consultants, instrument manufacturers, and educators to gain and share information about the latest software, hardware, and networking technologies.

NIDays one-day technical sessions include in-depth training on our software and hardware products and give you the opportunity to:

- Network with engineers and scientists in your area to exchange ideas about the latest technologies in measurement and automation
- Attend various technical sessions covering hot technologies, software, measurement techniques, and automated test and manufacturing applications

Technical and Keynote Presentations

Each NIDays worldwide conference features a keynote presentation and several technical sessions where you can learn how to use our emerging software, hardware, and networking technologies to increase productivity and lower costs. NI engineers and managers touch on the hottest topics in the industry, such as integrating motion and vision into measurement systems, logging data the easy way, and creating real-time applications. ■

For remaining NIDays dates and locations, visit ni.com/info and enter **nsi1439**.



Engineers in Portugal learn about the latest developments in measurement and automation at NIDays 2001.

ni.com/nidays

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

Embedded Computing and Real-Time Computer Show – Tel Aviv, Israel	Dec 3	Teknik & Data – Odense, Denmark	Feb 5-7
Int'l Exhibition on Image Technology and Equipment – Yokohama, Japan	Dec 5-7	NIDays – Paris, France	Feb 7
ECT/RTC Show – Copenhagen, Denmark	Jan 15	ExpoComm – Mexico City, Mexico	Feb 12-15
EP 2002 – Stockholmsmässan, Sweden	Jan 15-18	IPOT Expo – NEC Birmingham, U.K.	Feb 13-14
Electrotest Japan – Tokyo, Japan	Jan 17-19	MTEC Expo – NEC Birmingham, U.K.	Feb 13-14
Photonics West – San Jose, CA	Jan 22-24	MCS 2002 – Bologna, Italy	Feb 20-23
Messtechnik Essen – Essen, Germany	Jan 23-24	M+R Veldhoven – Veldhoven, Netherlands	Feb 21



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