AutomationView™
The Industrial Automation Newsletter from National Instruments
Volume 5, Number 4 Fourth Quarter 2000

WIN LABVIEW 6*i*
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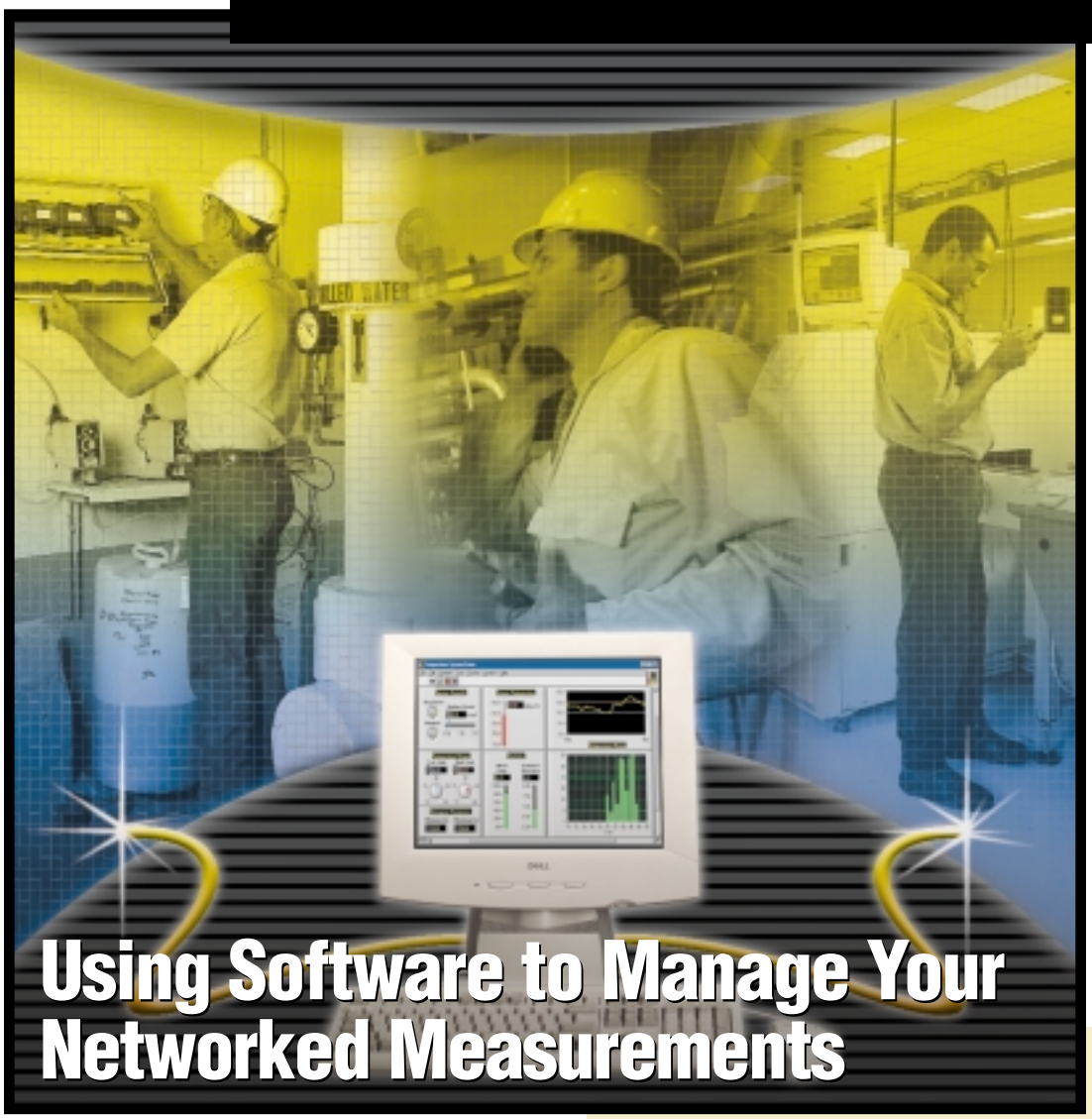

Using Software to Manage Your Networked Measurements

With the emergence of networking technologies, we are entering a new age of information connectivity and data sharing that delivers innovative ways to acquire, analyze, and present measurement and automation data across and beyond the enterprise.

We can capture data from anywhere, at any time, in any format. Now the real question is not how we can acquire or transfer this data, but how we can process it. Data acquisition tools and networking technologies, such as Ethernet, HTML, wireless communication, and the Internet, have been around for a while. The challenge today is to get this data and turn it into useful information with

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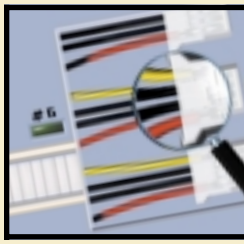

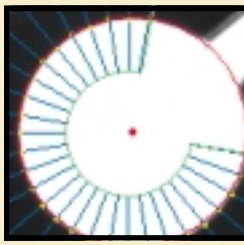

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John Graff, VP Marketing

Here's What You Missed...

- Networking machines into the enterprise
- Using the powerful tools of LabVIEW 6*i* on the manufacturing floor
- Understanding distributed machine vision as a networked solution for vision systems developers

...If You Missed the Last Issue

Check Third Quarter 2000 on the reply card to receive the last issue of *AutomationView*. For previous issues, check the appropriate box.

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AutomationView

Volume 5, Number 4 Fourth Quarter 2000

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Manufacturing Data at Your Fingertips

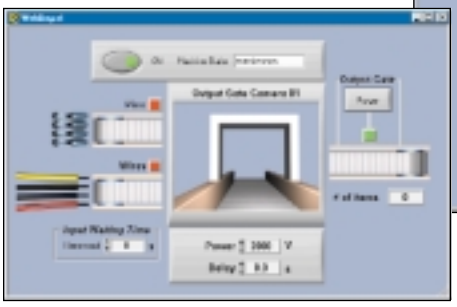
With increasing demand for data sharing, data integrity, and multivendor hardware integration, National Instruments provides the tools you need to efficiently develop large-channel count applications. The new LabVIEW Datalogging and Supervisory Control Module, which installs on top of LabVIEW, gives you configuration-based tools to get your distributed system up and running quickly.

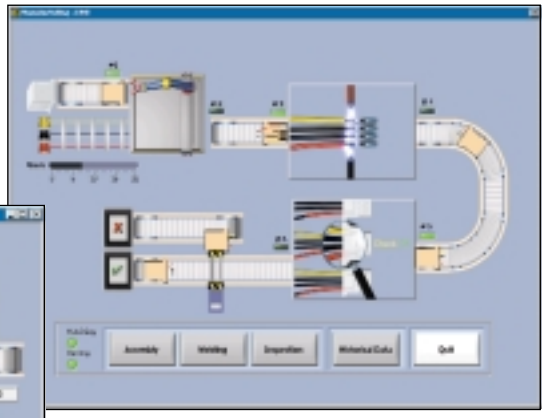
Distributed Data Logging and Open Connectivity

These new LabVIEW tools, shipped as the LabVIEW Datalogging and Supervisory Control Module, make monitoring and historical logging applications easy. This LabVIEW module provides extensive historical data logging, trending, and graphing capabilities. Whether you are collecting data from National Instruments data acquisition (DAQ) products, FieldPoint™ I/O modules, or PLCs, you just configure the points you want to collect. The Tag Monitor shows the data in real time as it is acquired and logged in the system. The Historical Trend Viewer is a built-in utility that provides an easy mechanism for your operators to view historical data. All historical data information resides in an ODBC-compliant database, Citadel™, so that you can use standard database tools to extract the information into other parts of your business enterprise. Because historical logging takes place automatically, you can use LabVIEW to develop a data logging application with no programming. You can also log data into any machine that you select on a network. This distributed data logging capability gives you unprecedented flexibility to log data from many applications to one particular computer or to any number of computers on a network.

Alarm and Events Management

This new LabVIEW module offers full alarm and event management. It automatically calculates and logs alarm information and events for the system. You configure alarm conditions for individual tags or use LabVIEW graphical programming to develop more sophisticated alarm schemes. Any networked client can view alarms or events on one or more server machines and acknowledge them.





This new LabVIEW add-on module adds powerful configuration-based tools for your large-channel count applications.

In addition, with the LabVIEW module, you can quickly and easily share data between machines. The module uses TCP/IP to share data transparently between LabVIEW systems around your lab, your production floor, or around the world. You can connect to any data residing on different computers as easily as you connect to data on a single machine. In addition, the LabVIEW module adds full OPC client and server capabilities to your application, so that you can communicate with any OPC server running on the network. With little programming, you can turn any existing LabVIEW program (VI) into an OPC server to easily publish your data across the plant floor to any OPC client, such as human-machine interface (HMI), maintenance, manufacturing execution systems (MES), and databases.

Built-In Security

Now, with the LabVIEW Datalogging and Supervisory Control Module, security is built into your LabVIEW environment and implemented across the network in a seamless fashion. You can turn any existing VI into a secured application by defining system level and operator interface security in only a few mouse clicks and without programming. You can limit user access to different utilities, such as Tag Monitor, or Historical Trend View, to front panels, and even to individual graphical objects.

This LabVIEW module adds unparalleled flexibility to your LabVIEW applications to meet your measurement and automation needs. Whether you need full-scale industrial automation and control or simply need to monitor and log a few dozen I/O points for historical collection, the new LabVIEW module offers the best productivity.

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For more information on the LabVIEW module, visit ni.com/info and enter the code *newsletter*.

The new LabVIEW Datalogging and Supervisory Control Module, which installs on top of LabVIEW, gives you configuration-based tools to get your distributed system up and running quickly.

Repackaging BridgeVIEW™

In an effort to further integrate BridgeVIEW into LabVIEW, we are repackaging the product into a module that installs on top of LabVIEW – the LabVIEW Datalogging and Supervisory Control Module. This new LabVIEW add-on module provides powerful configuration-based tools to new or existing LabVIEW users for developing high-channel count applications. Whether you want to log a few dozen channels for historical collection or you want to supervise and control a distributed system, these tools help to increase your productivity.

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Using Software to Manage Your Networked Measurements

continued from cover

little effort and at a reduced cost. The answer is the software. Software plays an important role in your measurement and automation system by providing easy to use, flexible, and powerful tools, and it is the key to hardware integration.

Networked Measurement Systems

Before we discuss the software role and how it can improve your productivity, we should first take a closer look at a networked measurement system. Such a system is by definition open, flexible, and expandable like any other network. The variety of system architectures is endless. To simplify our discussion, let's define three basic types of systems:

Remote measurement system – With this system, you can perform remote data acquisition with hardware distributed across a network. Data collection in harsh or explosive environments often requires a close proximity to the process, while analysis and presentation occur in a remote and safe location.

Measurement publishing system – Such a system publishes data from a measurement node to the Internet or an intranet through a Web server. A typical example is publishing your manufacture test quality results through the intranet and sharing them with the R&D group for a better and more efficient product design.

Remote execution system – In this setup, a central computer executes remote tasks on various machines on a network. This is an ideal set up for distributing tasks across several computers to take advantage of the processing power of a dedicated machine. By combining any of these networking techniques in your measurement system, you can easily network your existing GPIB or serial equipment into one single application. You can also control distributed machine vision systems across your production line, or remotely supervise your PLCs or distributed I/Os for machine monitoring purposes.

For a more in-depth discussion on networked measurement systems, please refer to "Network Measurements and the Technical Enterprise" (*Instrumentation Newsletter*™, Third Quarter 2000, page 1). You can view this article at **ni.com/newsletter**

In an industrial environment, such as the manufacturing floor, these networked measurement systems possess a common thread. Whether you execute locally or remotely, or you publish your measurements, the amount of data involved can easily increase with the complexity of the system you have to monitor and control. Because of this large amount of data, you need a robust system with software tools capable of managing the load in a cost-effective and efficient way. With increasing demands for data sharing, multivendor hardware integration, and factory floor connection to the enterprise, efficiently developing and managing high-channel count applications is a primary concern.

Software plays an important role in your measurement and automation system by providing easy to use, flexible, and powerful tools, and it is the key to hardware integration.

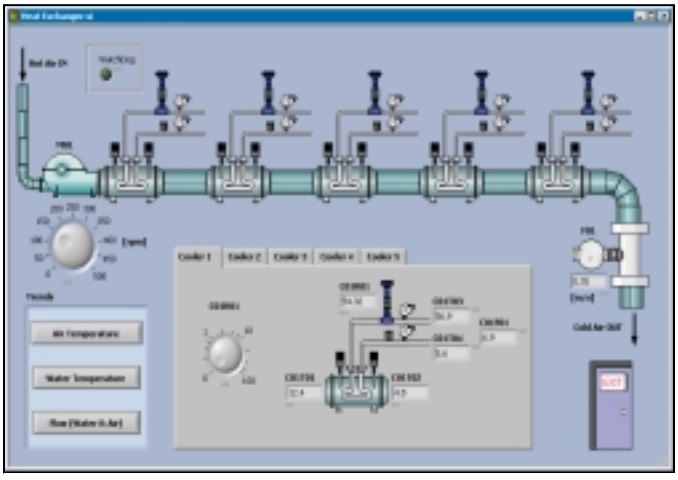
Efficient Data Management

An open programming language can certainly offer extensive flexibility in the development process of an application with a small number of channels, and it is the standard development path for small-channel count applications adopted by most users. The approach changes, however, when you are developing a larger system. You quickly realize that programming your networked measurement system on a channel-by-channel basis using a standard application programming interface (API) is too time consuming. As your system grows in size and complexity, managing your channel configurations, multiple I/O sources, and data processing quickly becomes very challenging.

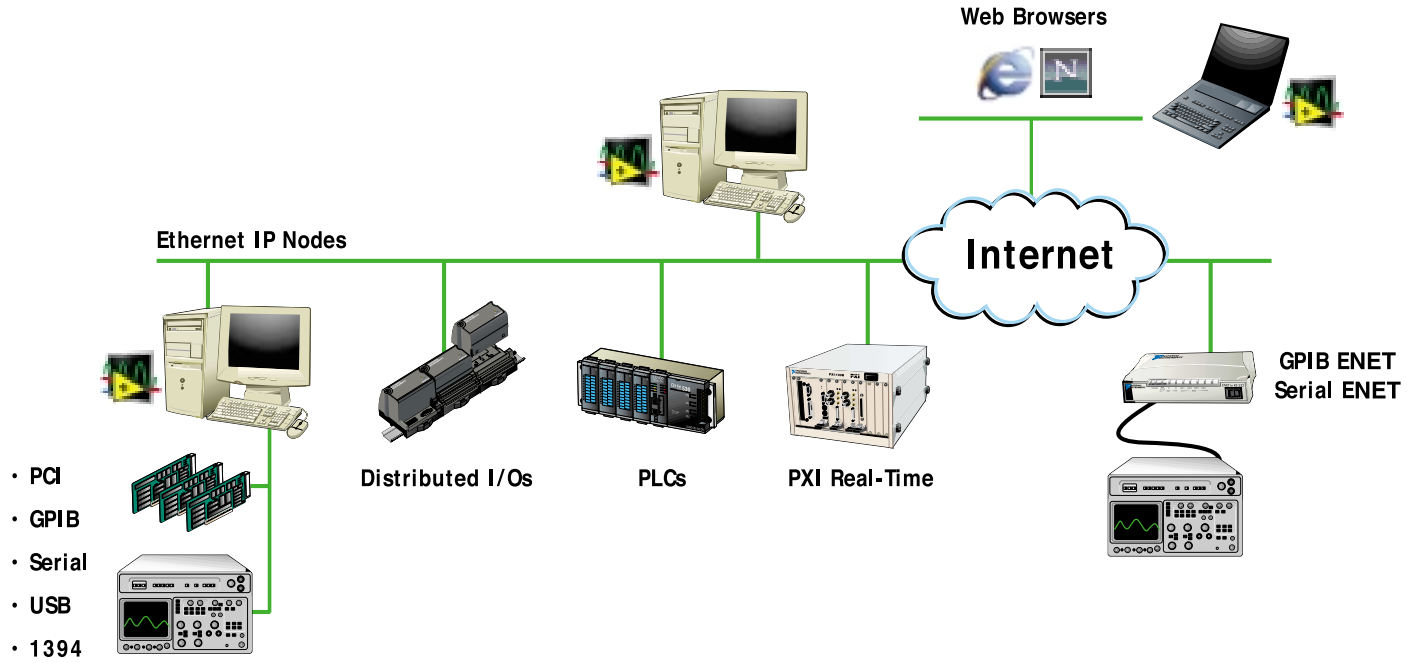
A configuration-based system offers a better approach for large-channel count application development because it treats I/O as an inherent part of the system. The system automatically manages different configuration settings and tasks, such as logging, alarming and event management, scaling, and device connections, as fundamental steps in the process. By taking advantage of these tools, you can concentrate on the development of your large-channel count application rather than spending time developing fundamental tools to manage, log, and view your real-time and historical data.

Troubleshooting and Diagnostics

Other important tools for high-channel count management are diagnostic utilities. Instead of starting right away with the application development, you can easily get a quick snapshot of what is happening in the system and verify that the hardware is properly configured and the channel connection correctly established. Once you know that the I/O is working properly and the data is accurate, you can start developing the analysis, display, and control pieces of the program.



The LabVIEW add-on module increases your productivity by providing you with powerful and easy to use tools for high-channel count applications.



Typical Networked System with Different Measurement Nodes

Security across the Network

Without a doubt, security plays an important role in networked systems. Again, using a standard API to implement system-level and operator interface security can be very complex and requires extensive knowledge. For a better solution for large-channel count applications, you should integrate these capabilities as part of your system and make them available to the developer in a configuration-based approach. You can easily create password-based user accounts, define security settings, and limit user access to data management tools, diagnostic utilities, as well as individual graphical objects on the front panel. You can then implement these security settings across the network, in a seamless fashion.

New LabVIEW Module Increases Productivity

We have seen how a standard API can give you extra power and flexibility and how configuration-based tools increase your productivity in setting up a high-channel count networked measurement system.

What about combining both benefits – the power of an open environment such as LabVIEW™ with configuration-based tools for high-channel count management? Today, National Instruments provides a software solution that satisfies these requirements by eliminating the need to develop your own methods of managing large-channel count applications. With the new LabVIEW Datalogging and Supervisory Control Module, an add-on LabVIEW module, you can include these extra built-in functionalities in your LabVIEW application. (For more information on the LabVIEW add-on module, see page 3 of this newsletter.)

A configuration-based system offers a better approach for large-channel count application development because it treats I/O as an inherent part of the system.

By using the right software tools for your high-channel count networked measurement system, you can dramatically increase your productivity. LabVIEW and its extended data logging and supervisory control functionality provide an ideal platform by offering the power of graphical programming with configuration-based tools to easily implement and manage a large-channel count networked measurement system. This new LabVIEW functionality also adds full OPC client and server capabilities to your LabVIEW application, so that you can communicate with any OPC server available on the market today. In addition, you can take full advantage of the new LabVIEW 6*i* functionalities to quickly build high performance Internet-ready applications and easily integrate them throughout all levels of your enterprise.

With the new LabVIEW Datalogging and Supervisory Control Module, you now can easily manage your high-channel count system in the open, flexible environment of LabVIEW. These software tools put networked technologies to work for you by turning your acquired data into useful information at a reduced cost.

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For more information on networked measurements, visit ni.com/info and enter the code *newsletter*.

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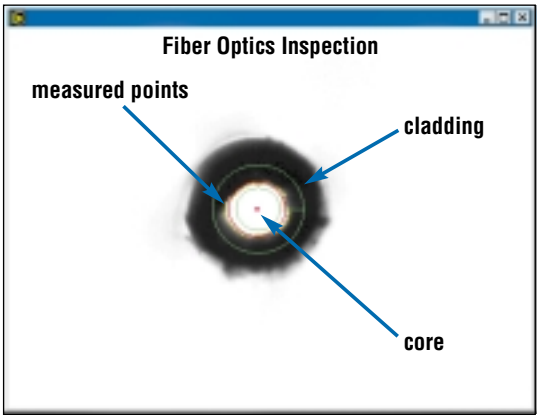
Make the Move from Signals to Images

National Instruments introduces IMAQ™ Vision 6.0 to simplify machine vision software development for new and experienced vision developers. You can quickly learn to apply machine vision operations to solve a wide range of applications. Using your basic measurement background operations, such as histogram, threshold, morphology, blob analysis, edge detection, and pattern matching, you can quickly develop inspection applications.

High-Level Machine Vision Tools

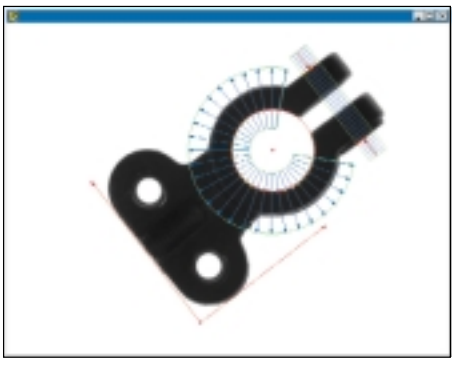
New IMAQ Vision 6.0 for LabVIEW dramatically improves development productivity and simplifies vision software development. The new algorithms use edge detection and region of interest (ROI) tools to extend visual inspection capabilities. Version 6.0 simplifies the challenge of configuring and automating edge detection along hundreds of search lines within an image with new functions that include edge detection tools for quickly finding edges along multiple search lines in rectangles, the radii of a circle, and within concentric circles.

For example, using these new tools, you can quickly inspect the cross section of a fiber-optic cable. A fiber includes a core, which is surrounded by cladding. Important measurements include the diameter of the core and the circularity of the core. Using just two machine vision functions from IMAQ Vision Version 6.0, you can measure the diameter and center location of either the core or the cladding. With the new ROI tool, IMAQ Select Annulus, you can quickly draw or program a region bounded by two concentric circles. You draw this region so that it contains the perimeter of the circle to be measured. Another tool, IMAQ Find Edge Circular, then identifies points on the circular shape within the ROI, calculates a best fit circle for these points, and gives the diameter and center location as a result. Once IMAQ Vision has calculated the center of the core and cladding, you can easily measure core-cladding concentricity by using edge detection tools to measure the thickness of the cladding along several lines going through the center of the fiber. Plus, using the edge information, IMAQ Vision can measure core and cladding circularity. Other new functions include nondestructive overlay for displaying and manipulating graphics on acquired images without changing the underlying image data.



New vision software measures fiber-optic core and cladding.

With IMAQ Vision 6.0, you reduce development time and increase the accuracy of your vision applications.


New high-level functions simplify inspection.

Measurement Ready Images – Lens and Camera Angle Calibration

Inspection applications often use relative pixel distances within the image to gauge manufacturing quality. If the distance in pixels is within preset tolerances, then the part is considered good. Many factors go into gauging the actual length or width of an object in microns or millimeters, and the position and angle of the camera are critical. A nonperpendicular camera may cause part of an image to appear larger than it really is. Another measurement challenge is that lenses have non-linear geometrical aberrations where the magnification changes in the field of view. A non-perpendicular camera and lens aberrations cause images to appear distorted, misplacing information in an image but not necessarily destroying it.

IMAQ Vision 6.0 now includes spatial calibration functions to make accurate measurements from images, regardless of camera angle or lens distortion. To calibrate your imaging system, you first define a calibration template consisting of circular dots, template pattern, laser grid pattern, or list of coordinates. Using a grid that provides constant spacing in the x and y directions and then selecting a calibration method, you can calibrate for camera angle and nonlinear lens errors. You then map pixel coordinates to units, improving the accuracy, consistency, and reliability of your inspection system.

Color Pattern Matching

IMAQ Vision 6.0 offers fast and accurate pattern matching software for color inspection applications and challenging gray-scale applications. Color can often simplify a monochrome problem by improving contrast or separation of the object from the background. Using color pattern matching, you can quickly locate matches and obtain the precise location of the match, returning a match score based on the color and shape information to relate how closely the model matches the pattern found. With IMAQ Vision 6.0, you reduce development time and increase the accuracy of your vision applications.

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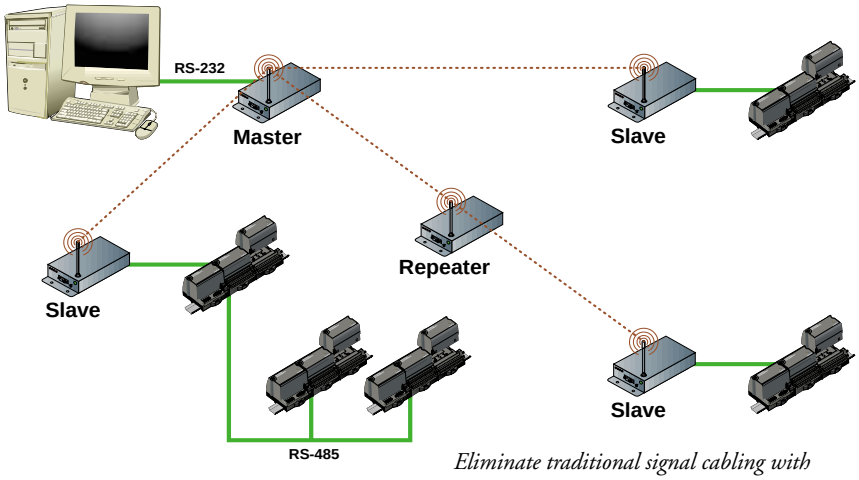
For more information on IMAQ Vision 6.0, visit ni.com/info and enter the code *newsletter*.

ni.com/vision

Eliminate Traditional Signal Cabling with Wireless Technology

Radio modem communication replaces miles of cabling between the host and the data acquisition device, reducing cost and providing a way to perform data acquisition in situations where cabling is impossible.

Wireless technology offers a way to completely eliminate traditional signal cabling. Now, instead of running hundreds of feet of cable, engineers can design wireless DAQ systems.



Eliminate traditional signal cabling with wireless technology.

Cabling Inadequacies

There are numerous cases where cabling is not adequate for an application. Wiring is often very expensive, costing up to $40/ft ($U.S.) in a typical industrial environment, and even up to $2,000/ft in a nuclear plant. These costs include the cable itself, installation, and maintenance. In applications where there are moving vehicles, conveyer belts, or moving platforms, a physical cable connection does not work. For those applications, a wireless communication system is the best solution. In addition, wireless connectivity is a more convenient solution than cables.

Wireless offers an alternative to traditional cabling in applications where cabling is a very expensive solution.

Spread-Spectrum Technology

Spread-spectrum technology has increasingly gained acceptance in both consumer markets (such as wireless LAN and Bluetooth) and industrial applications. Spread spectrum distributes communication over a wide frequency band to provide a secure and interference-immune transmission. Each geographical region of the world has a different spread-spectrum frequency band allocated for license-free operation. Each region also defines maximum transmission power permissible. In North America, the Federal Communication Commission (FCC) allocated several frequency bands for license-free operation, such as the 902-928 MHz frequency band.

With National Instruments FieldPoint, you can use radio modems instead of serial cables for 20 miles maximum line-of-sight or more using repeaters. You can set up systems with multiple slaves, where a single master can talk to the slave machines. If your situation includes obstructions or the distance is greater then 20 miles, you can use repeaters to extend your distance. The same radios are used for slave, master, and repeater set-ups, with a simple software configuration that identifies each one. Most importantly, the radio modems come preconfigured for use, making the operation transparent to the user.

Worldwide Wireless Solution

For wireless spread-spectrum communication in the United States, Europe, and Asia, many wireless radio modems operate in the license-free 2.4 GHz range, a frequency accepted almost worldwide. In Europe and Asia, the transmission power is limited to 100 mW as opposed to 1 W for North America. Lower transmission power results in a more limited transmission distance. The topology of the 2.4 GHz wireless systems is the same as for the 902-928 MHz system.

Narrow-Band Technology

In addition to various frequency bands for different geographical regions, narrow band radio transmission is more applicable when a very large amount of physical and/or radio interference is present. While spread-spectrum technology behaves very well for most applications, in situations where there are obstructions, you need a very high powered radio to overcome these barriers. Spread-spectrum transmission power is limited in the United States to 1 W, and you can use the narrow-band transmission technology at up to 100 W. The drawbacks of using narrow-band technology are that you have to apply and pay for an annual license, and data transmission speed is lower.

Wireless Solutions

National Instruments offers several options for your wireless needs, covering wireless solutions for the lower-speed distributed I/O (FieldPoint) and higher-speed data acquisition application. For higher acquisition rates, you have an option to use wireless Ethernet in conjunction with distributed DAQ products. ViaSat, a NI Alliance Program member, offers an Ethernet wireless solution for 200 to 300 kS/s wireless DAQ. You can view the ViaSat customer solution in the Third Quarter 2000 *Instrumentation Newsletter*, which is available at **ni.com/newsletter** Wireless offers an attractive alternative to traditional cabling in applications where cabling is very expensive or an impossible solution.

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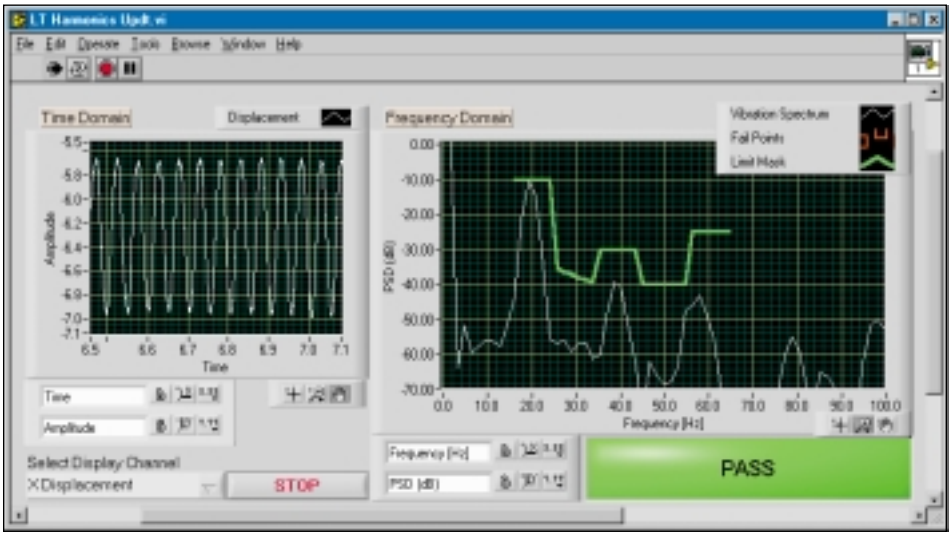
For more information on wireless technology, visit ni.com/info and enter the code *newsletter*.

ni.com/fieldpoint

Perform Signature Analysis for Machine Condition Monitoring with LabVIEW 6*i*

Signature analysis, sometimes called limit mask testing, is a type of machine condition monitoring that involves measurement of dynamic signals generated by rotating machinery. The idea is to check signals such as displacement, velocity, and acceleration for changes and patterns that can warn of future trouble and assist in problem diagnosis. With several new LabVIEW 6*i* measurement analysis tools, you can easily build applications to automate machine condition monitoring with signature analysis.



With the new LabVIEW 6i limit mask testing tools, you can continuously compare a running vibration spectra to high and/or low limits that define a working region.

Baseline Vibration Signal

Signature analysis starts with measurement of a baseline vibration signal. This baseline provides a reference for later comparison with signals from the working machine. More specifically, it defines limits within which the vibration signal can reside and not flag a fault or warning.

Frequency Domain

With vibration signals, it is useful to work within the frequency domain for these comparisons. The frequency domain simplifies the analysis because the signal contains components that relate to the rotational frequency of the elements of the machine. As a result, specific problems often impart specific, predictable signatures that are clear only in the frequency domain.

With several new LabVIEW 6*i* measurement analysis tools, you can easily build software to automate machine condition monitoring with signature analysis.

Machine Faults

The following lists a few example machine faults that you can look for in your spectra:

- Imbalances can change the amplitude of the spectral peak associated with the rotational speed of your machine
- Gear faults can change the amplitude of and/or modulate the frequency of the peak associated with the meshing frequency
- Bearings generate frequency components associated with parameters such as the number of rolling elements, the amount of wear, and imbalance of the shaft. As bearings wear down, they often impart increasingly random noise to the spectra and can change its overall level

LabVIEW 6*i*

Several new LabVIEW 6*i* measurement analysis tools can speed up development of software to automate signature analysis. First, after acquiring the time domain samples of your vibration signal, you can apply the new Power Spectrum VI to find an averaged frequency-domain representation of the signal. This tool automatically takes care of details such as averaging scaling and application of windows to give you a power spectrum that you can optimize for your needs.

Limit Mask Testing VIs

After finding the frequency-domain representation, you can next apply the new Limit Mask Testing VIs to check your power spectrum against your baseline. The Limit Testing VI compares your input signal to your baseline and flags instances that cross its limits. Your baseline can consist of limits that define a region of acceptance in which the spectrum of the running machine should reside during normal operation. You can define limits by either specifying the frequency and amplitude turning points or with a function.

With the new limit mask testing and spectral analysis capabilities in LabVIEW 6*i*, you can easily implement signature analysis for machine condition monitoring. Signature analysis offers a comprehensive method of checking the shape of your spectra against one or more baselines. In doing so, you can monitor your machine for immediate problems and use your results to assist in problem diagnosis.

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For more information on LabVIEW 6*i* analysis, visit ni.com/info and enter the code *newsletter*.

PXI™ Systems Alliance Releases PXI 2.0

The PXI Systems Alliance, a group of more than 50 company members, released revision 2.0 of the PXI Specification on August 16, 2000. The PXI specification defines extensions to the CompactPCI architecture that meets the specific needs of measurement and automation systems developers. The extensions of PXI are completely compatible with core CompactPCI products but provide a higher level of system functionality and interoperability. As an open document, no single company controls the PXI specification, but rather the PXI Systems Alliance distributes and maintains it free of charge.

Key Updates in PXI 2.0

This revision is the first update to the specification since PXI 1.0 was announced in August 1997. It includes updates to the requirements and guidelines in the mechanical, electrical, and software sections, while maintaining complete interoperability with revision 1.0. PXI 2.0 reflects the latest revision of CompactPCI (PICMG 2.0 R3.0) and includes geographical addressing capability and the option for 66 MHz PCI operation.

PXI 2.0 also includes updates to electromagnetic compliance specifications and adds Windows 2000/98 software frameworks. Perhaps the most significant updates are guidelines that better define how to build PXI chassis with significantly more than eight slots. Elaborating on this update, Mark Wetzel, PXI Systems Alliance Technical Subcommittee Chairperson said, "A key element of this new revision specifies bus bridging beyond two segments, thus defining larger PXI systems more accurately and revealing the path for higher performance systems."

The PXI Systems Alliance

Formed in June 1998, the PXI Systems Alliance shares a common commitment to user success with open CompactPCI systems for applications in measurement and automation. PXI Systems Alliance membership is open to vendors who share the PXI philosophy and have a desire to produce and promote products and solutions that are compatible with Alliance goals.

To download a free copy of the PXI Specification and to get membership information, please visit the PXI Systems Alliance Web page at pxisa.org

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Direct Serial and GPIB Instrument Network Connection

Using ENET-232 or ENET-485 and GPIB-ENET/100, you can communicate with and control remote devices, such as I/O controllers, PLCs, or any serial or GPIB-based device, as if these devices were connected to the native serial or GPIB port of the controlling computer. These new 10/100 Mb/s Ethernet-based device and instrument control products are self-contained box products that work with TCP/IP input and either two or four ports of RS-232/RS-485/RS-422 or a single GPIB port output.

With ENET-232, ENET-485, and GPIB-ENET/100, your instruments connect directly to the network. The ENET-Serial virtualizes the additional serial ports as if they were native on the host computer. The driver software takes care of all the TCP/IP routing and messaging, regardless of the physical location of the device on the Internet. The driver software handles standard Microsoft Windows serial commands, which means any application software package or protocol that uses standard serial commands can communicate with the additional serial ports. With the GPIB-ENET/100, you can control up to 14 instruments and run unmodified any program previously written for any other National Instruments GPIB controller. The ENET-232, ENET-485, and GPIB-ENET/100 are compatible with any prewritten software developed in programs such as Microsoft Visual Basic and C++ and National Instruments LabVIEW or Measurement Studio.

You can easily configure and use both the ENET-Serial and GPIB-ENET/100. You do not have to set dip switches or jumpers, and all configuration is completed with an Ethernet configuration utility that handles either dynamic host configuration protocol (DHCP) or static IP assignment. Both offer flexible installation options including rack mounting, DIN rail mounting, wall mounting, and stackable stand-alone use.

With the easy ENET-232, ENET-485, and GPIB-ENET/100 installation and configuration, you can quickly connect your instruments to the network and communicate with them as if they were directly connected to the native serial or GPIB port of your controlling computer.

For more information on GPIB-ENET/100, visit ni.com/info and enter the code *newsletter*.

ni.com/enet

ENET/GPIB-ENET Communication Ports and Transfer Rates

Product Name	Communication Port	Max Transfer Rate	Number of Ports
ENET-232/2	RS-232	230 kb/s	2
ENET-232/4	RS-232	230 kb/s	4
ENET-485/2	RS-485/422	460 kb/s	2
ENET-485/4	RS-485/422	460 kb/s	4
GPIB-ENET/100	GPIB	800 kbytes/s	1

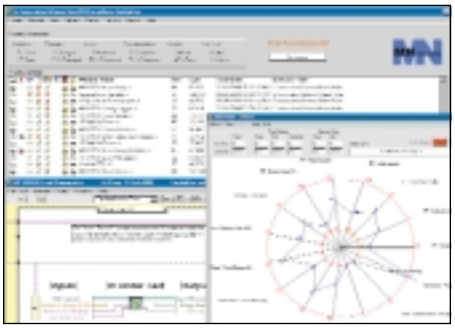
OverVIEW Extends LabVIEW Project Management

OverVIEW from MNovation is the first project-centric environment for creating, managing, and controlling applications developed with LabVIEW. With OverVIEW, you can organize, design, and control your project from the top down. You can apply many utilities to the project as a whole or to an individual VI, resulting in higher confidence, more reusable code, and less time spent on activities not related to development.

OverVIEW improves quality and increases productivity by automating tasks associated with formal software development and by providing consistent status information on several key development categories. OverVIEW includes at-a-glance project status reporting, automated unit testing, metrics visualization, and issue tracking.

You can also use OverVIEW to control the project once it has been released to production. The run-time loader from MNovation Inc., LaunchPad, serves to verify that all the links are accurate and that you use the correct version of software each time you load the application for execution.

For more information, contact MNovation Inc. at 5012 Upton Ave. S, Suite 200, Minneapolis, MN 55410, tel (651) 283 5803, e-mail info@mnovation.com, or Web mnovation.com



Organize, design, and control with OverVIEW.

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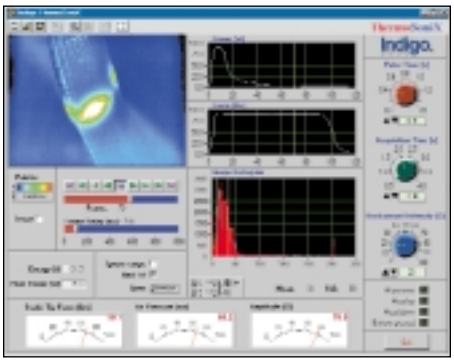
Easily Find Cracks and Defects with ThermoSoniX

Cracks and defects in parts can cause catastrophic failures when the parts are stressed during use. Using National Instruments LabVIEW software and hardware, Image Therm Engineering and Indigo Systems created ThermoSoniX (patent pending), to find these cracks and defects quickly and accurately.

ThermoSoniX works by synchronizing ultrasonic stimulation with infrared imaging to identify cracks and defects in metals, ceramics, and composite parts. By combining LabVIEW with IMAQ and DAQ measurement hardware, ThermoSoniX analyzes the images acquired from the Indigo camera and analog signals from the integrated ultrasonic excitation source, then automatically produces intuitive images that highlight the cracks and defects in the part.

The portable ThermoSoniX Test Station is sold by Indigo Systems as a fully integrated NI-based system with either a PC or PXI chassis.

For more information, contact Dino Farina, President, Image Therm Engineering Inc., 142 North Rd, Suite 100, Sudbury, MA 01776, tel (978) 371-8822 x201, e-mail dfarina@imagetherm.com or Dr. Austin Richards, Applications Engineer, Indigo Systems Corporation, 5385 Hollister Ave #103, Santa Barbara, CA 93111, tel (805) 964-9797, e-mail richards@indigosystems.com



ThermoSoniX Software Interface

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Ultrasonics Used in Nondestructive Material Testing

t.e.s.t introduces the Ultrasonic Material Analyzer (UMA), a nondestructive test system that uses ultrasonics to test an object's material composition and continuity. You can use the system for analysis and research of material composition in the laboratory or for monitoring the composition during the production process. UMA is based on an ultrasonic waveform, test and production environment conditions, and analysis algorithms to characterize the material under test. The system characterizes the standard material composition and detects any differences from the standard. You can also implement control algorithms to maintain the desired composition.

The UMA uses National Instruments data acquisition boards and a custom LabVIEW program to give you functionality ranging from test configuration to analysis and report generation. You improve productivity with the flexibility to create and use configuration programs as well as extensive analysis capabilities. The overall system performance provides accurate understanding of the material composition during research and manufacturing.

With the UMA, you can test the continuity of the material and inspect for cracks, chips, or defects, either during the manufacturing process or after a fatigue test. The UMA also ensures that the material thickness is maintained during production by monitoring and adjusting the material to required specifications.

For more information or a demonstration, contact the t.e.s.t. sales department at 65 Bellwoods Ave, Suite 106, Toronto, ON M6J 3N4, tel (416) 363-0404 x224, fax (416) 363-0971, or e-mail test@lukas.org

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Behlen Industries Chooses LabVIEW Real-Time for Deterministic Networked Machine Control

by Greg Harasym, Systems Engineer, Advanced Measurements, Inc.

The Challenge: Replacing a 25-year-old, obsolete production line digital controller and updating production line components to reliably connect to a network and provide next generation user interface.

The Solution: Using a PC-based control system with software developed on LabVIEW Real-Time for rapid development, simple integration, and lower project cost.

Introduction

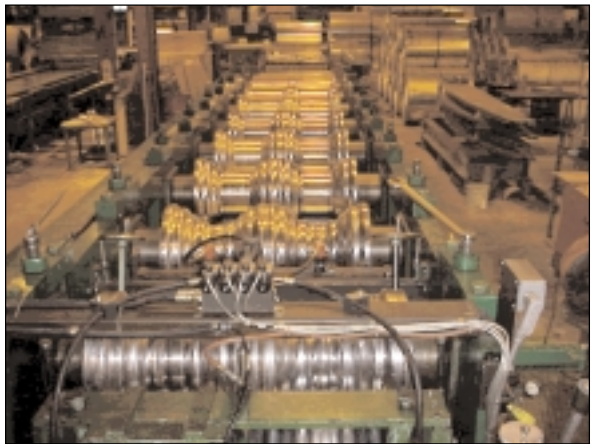
Behlen Industries, a manufacturer of self-supporting sheet metal buildings, wanted to replace a 25-year-old control system on their production line with a PC-based control system. The line produces building panels from flat sheet steel by corrugating the sheet through a series of die rollers, punching bolt holes in it, and cutting the formed sheet to length. The old system used two hydraulic punches to punch bolt holes in the panels, and then a hydraulic "flying" shear for cutting to length. This system had lost some of its functionality and had an antiquated operator interface. We replaced this old system with a new control system that uses a National Instruments PCI-7030/6040E real-time board and custom software developed with LabVIEW Real-Time.

Controlling Hole Punch Timing and Shearing

The Behlen Industries production line had several key quality requirements, such as keeping bolt hole locations and panel lengths within a tolerance of 1/16 in. We had to maintain these tolerances with the mill running at a speed of 8 in./s and while starting and stopping. Hydraulic punches were activated by a solenoid for 200 ms, so the punch could pass through 12 gauge sheet steel, and the interval between hole punches could be as little as 250 ms. When a panel reached the desired length, the LabVIEW Real-Time application executed the shear process (including acceleration, shear, and deceleration) in less than 1 s.

Deterministic Control and Parallel Process

The quadrature encoder provided displacement information that told the system when to punch bolt holes and shear panels. The encoder generated 1,000 pulses per revolution, approximately 64 pulses per inch of sheet, or 2 ms interval. To meet the customer's tolerances, the LabVIEW Real-Time engine provided a deterministic control loop of 2 ms or less. The punch and shear controls had to operate simultaneously and independently, and so we programmed them to run as parallel processes. Using LabVIEW Real-Time to develop the control software greatly facilitated the programming and troubleshooting of the parallel processes.



Flat sheet steel is corrugated through a series of die rollers.

The networked control solution using LabVIEW Real-Time easily accommodated parallel control processes and made possible a 2 ms deterministic control loop.

Simple Operator Interface and Networking

Using LabVIEW Real-Time, we developed a powerful operator interface for fast and intuitive operation and control of the system. The operator interface, running on the host PC, takes production orders from the factory's networked database or the user through a job configuration screen. With the interface, the user can perform calibration of the control system, monitor production runs, and modify control parameters. With LabVIEW Real-Time, rapid integration with other plant computer database systems was also possible. Database tools and networking capabilities were essential in the control system's effective communication with other plant systems, linking the engineering drawings database, work order database, and production reporting database.

Using LabVIEW Real-Time, we developed a powerful operator interface, and rapid integration with other plant computer database systems was possible.

New Networked Control Solution

The PC-based solution using LabVIEW Real-Time made possible a 2 ms deterministic control loop, while easily accommodating parallel control processes. The programming flexibility of LabVIEW Real-Time helped us create a completely new high-speed control system, meeting all customer requirements, within a two-month time frame and giving us a networked next generation user interface.

For more information, contact Greg Harasym, Advanced Measurements Inc., 6205 10th Street SE, Calgary, AB, T2H 2Z9 Canada, tel (403) 571-7273 ext. 227, fax (403) 571-7279, e-mail greg.h@advmeas.com, Web advmeas.com

National Instruments and Royal Philips Electronics Sign Global Purchasing Agreement

Royal Philips Electronics named National Instruments as its preferred supplier of measurement and automation tools for its research, engineering, and manufacturing plants around the world. The agreement is intended to decrease operational costs for both parties by improving the processes for ordering products and tracking product deliveries. Philips uses NI computer-based tools, including PXI, LabVIEW, and IMAQ Vision, to develop, manufacture, and test many of their products. "Through the agreement with NI, our global operations further extend a world-class performance level in manufacturing, research, and development that exceeds the standard in the electronics industry," said Mark Strubbe, Senior Manager of Process Engineering and Technology for Philips Consumer Electronics.

Share VIs with LabVIEW Player™

The new LabVIEW Player is a compact, Web-enabled version of LabVIEW designed for sharing LabVIEW VIs over the Internet. By downloading and installing the LabVIEW Player, which is available for FREE from **ni.com**, anyone can open and run secure, LabVIEW Player-enabled VIs. You can try the LabVIEW Player today. The NI Developer Zone at **ni.com/zone** now features the LabVIEW Player VI Gallery, a collection of VIs designed to illustrate the powerful measurement and analysis capabilities of LabVIEW.

To download LabVIEW Player, visit ni.com/info and enter *newsletter*.

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

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MOCON – Hertogenbosch, Netherlands ..... Dec 6-7	NIDay – Paris, France ..... Feb 7
ELEC – Paris, France ..... Dec 11-15	Embedded Systems – Nuernberg, Germany ..... Feb 14-16
International Technical Exhibition on Image Technology and Equipment – Yokohama, Japan ..... Dec 6-8	MT Essen – Essen, Germany ..... Feb 21-22

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