

Microsoft® **.net**TM *for manufacturing*

BRINGING THE POWER OF THE INTERNET TO THE ENTERPRISE



Plant Technical Operations

.NET Strategy

THE MICROSOFT .NET FOR MANUFACTURING PLATFORM IS CONNECTING THE PLANT FLOOR TO THE EXTENDED ENTERPRISE AROUND THE WORLD.



Beyond the Four Walls of the Enterprise

The basic goals of plant floor operators have traditionally been to increase quality and speed while keeping costs down. The Internet has made a fundamental impact on the way companies do business, and the plant floor has a pivotal responsibility for meeting the new demands and challenges of the digital economy. How deep a role the Internet plays in the way goods are manufactured and supplied depends on the company's business model.

In some cases, the decision is up to each individual manufacturer. In other cases, trading partners may impose specific plant operations and process monitoring requirements as part of a contract. In all cases, though, implementing an Internet-driven strategy is not a matter of *if*, but of *how*.

Some plant floor professionals shy away from implementing a full-scale Internet strategy, fearing that it would be a painful process that would, for one, require replacing equipment with costly new systems. That fear would have been well founded in years past.

offers a secure platform for scaling from the real-time requirements of plant floor control to broader e-manufacturing needs, including collaborative design and supply chain integration. Microsoft .NET for Manufacturing is based on the idea of supporting communication any time, any place, on any device via the Internet.

"Everyone's talking about e-business and how to get the Internet connected to their facilities," says Wengert. "If you don't have an open plant floor or a way to get information from the plant floor into your business systems, you're really a step behind."

Windows® DNA for Manufacturing, the precursor to Microsoft .NET for Manufacturing, serves as the glue between applications. It provides a way for devices, such as programmable logic controllers, distributed control systems, and motion control systems, to communicate to business systems. Once Windows DNA for Manufacturing has systems talking to one another, Microsoft .NET for Manufacturing can step in to extend com-

"Ten years ago, there were a lot of proprietary networks, controllers, and computers on the plant floor that didn't talk to each other," says Peter Wengert, Microsoft industry manager for manufacturing. "What you had were these individual cells of automation that would do their specific jobs, but that was all they could do."

Connecting proprietary plant floor devices to one another—never mind to internal or external enterprise business systems—used to require a nightmarish mix of middleware and other connectivity tools. But that's no longer the case...and keeping these systems separate prevents manufacturers from realizing greater business opportunities.

Microsoft .NET® for Manufacturing

munications outside the four walls of the organization—to suppliers, customers, and other plants—and plug information directly into Web-enabled business systems to support real-time decision-making.

HOW TO BREAK OUT BEYOND YOUR FOUR WALLS

A collection of solutions in the Microsoft .NET for Manufacturing strategy supports these external communications, as well as scalability, interoperability, availability, and manageability issues. Microsoft's new .NET Enterprise Server family, which includes Windows 2000, SQL Server™ 2000, Host Integration Server 2000, Exchange 2000, Application Center 2000,

Commerce Server 2000, Internet Security and Acceleration Server 2000, and Mobile Information 2001 Server, is based on eXtensible Markup Language (XML) and thus can work with any platform that supports XML.

One key piece is BizTalk Server 2000, which defines business processes and orchestration and then uses XML and the BizTalk Framework to connect to all sorts of enterprise resource planning and manufacturing execution systems. BizTalk Server provides the means by which manufacturers can tailor information to each employee's needs, share critical plant data with those who need to know, and synchronize systems to check for and set aside adequate materials and available manufacturing time.

SOLUTIONS BY FUNCTION

Plant floor professionals in various capacities take on different challenges, requiring different, yet interrelated technical solutions within the .NET for Manufacturing strategy:

Maintenance personnel, who are responsible for equipment upkeep and repair, face an uphill battle in keeping up to speed with an ever-increasing number of systems. Windows CE-based devices let them literally carry the knowledge they need wherever they go. A personal digital assistant can display machine diagnostics, CAD drawings, or even a training video on how to fix a machine. Besides enabling information visualization, Windows CE-based devices can also act as controllers, sending alarms and data values over numeric pagers, e-mail, cell phones, and PA systems.

Operations and plant floor managers oversee day-to-day manufacturing functions, which include scheduling and production. These professionals need to quickly and accurately visualize what's happening on the plant floor. Windows CE-based control panels and Windows NT®- and Windows 2000-based human machine interface software provide greater insight into operations than what proprietary, green-screen systems previously offered. Client/server, Web



servers, and Terminal Server technologies let these business decision-makers view real-time information any time, any place, and on any device. These systems allow managers to collect data from plant floor devices using OLE for Process Control (OPC) and log them into Open Database Connectivity drivers like Microsoft SQL Server.

Distribution and warehouse personnel regularly use barcode readers and scanners to keep tabs on inventory. SQL Server 2000 Windows CE Edition, which extends enterprise data management to Windows CE-based devices, allows barcode readers and scanners to store data on an SQL relational database, which ultimately will reduce paperwork and improve inventory control. Adding wireless technology further increases the business value by adding mobility.

Quality control personnel can also use Windows CE-based devices to store data for meeting FAA and FDA regulations and relaying quality measurements to Windows-based SQL databases.

Information technology managers are tasked with data management. Working with the control engineers, they can grab real-time data from plant floor systems and bring it into the enterprise. SQL databases can serve as repositories for this data, which can

then be Web-enabled and fed into enterprise business systems. Not only can this information flow occur from the plant floor up, but it can go bidirectionally from customer-facing business systems down. Commerce Server 2000, for example, can profile customer needs and share this data with the plant floor, which can in turn dynamically respond to changing customer requirements.

Microsoft .NET for Manufacturing's support for communication any time, any place, and on any device makes it a comprehensive solution for tying together disparate systems on the plant floor and making the most of the information that resides within these systems. Collecting and sharing information from plant floor systems—not to mention systems in other functional areas of the manufacturing enterprise, such as sales and marketing, engineering, and procurement and finance—will ensure that data previously kept in isolation now contributes to overarching business objectives.

Microsoft .NET for Manufacturing sets the stage for the next-generation Internet platform and services that will take plant floor automation far beyond where it is today. ■

By James E. Heaton

Despite the current market turmoil, the e-business transformation is not over. Indeed, for manufacturers, economic uncertainty redoubles the imperative. In any downturn, unlike their dot-com brethren, manufacturers face a world of competitive opportunity. E-business technologies and strategies have reached the point where they can be combined with the resources of the entire manufacturing enterprise. While manufacturers may no longer need to worry about venture-backed wildcards, the real race has just begun. From now on, traditional, head-to-head competitors will be the businesses creating disruptive change.

As they blend e-business techniques into the rest of their operations, companies need to focus on the difference between early adoption and scalable innovation. Implementations must account for hard-nosed realities on multiple fronts. E-business teams will need to reconcile the price of innovation with the sunk costs in existing systems. They will need to select technology platforms that allow for

Companies can recognize opportunities sooner and respond to customer issues faster today than they could have five years ago. However, the Internet is no longer solely the province of new customer creation. It represents a tremendous platform for both expanding the value offered to existing customers and reducing the total cost of customer service.

Innovative manufacturers are tightening the connections among customer service data, quality control data, and production processes. The plants own the most up-to-date production information. Companies compete on price and performance. If the competition has matched the price, how does the enterprise know whether it can up the ante and meet aggressive deadlines in order to capture customer demand?

GLOBALIZATION

In the high-touch model promoted by the Internet, customer expectations are rising in all the major international markets. Manufacturers and vendors committed to



E-Manufacturing: Plants Must Be Integrated with E-Business

rapid adoption of new functionality. As they build out new processes, they must be ready for flexible reconfiguration.

After all, e-business efforts will be extending ideas and business goals that have been popular among leading manufacturers for more than a decade. The shift is one of speed and style, not substance. And the change will continue to be constant and competitive. Any technology initiative needs to address five principles of strategic manufacturing excellence: customer value, globalization, competency, collaboration, and agility.

CUSTOMER VALUE

Customer-facing applications have been the early proving ground for e-business.

servicing customers globally will have to support more product and service customization than ever. As a starting point, that includes their Internet presence. How can a company claim to be a global player with a Web site that speaks one language?

The day-to-day manufacturing problem is much more complex. Manufacturers may manage production across dozens of locations around the world. The rate of change created by a global customer set externally leaves no room for downtime or internal error. Global organizations that are fast-tracking product innovation need to deliver consistent execution in all locations. Consolidating plant systems internally is one way to reduce the risks.

Training people and servicing equipment with consistency and without dis-

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tractions, however, has the greater potential to improve operations.

Manufacturers are beginning to use Internet-based training and collaboration that was originally developed to serve customers to support their international locations. These can serve as the life support for business strategies that configure the production, delivery, and support of products to customer specifications and market conditions around the world. As a starting point, enterprises will need to establish a standard technology foundation.

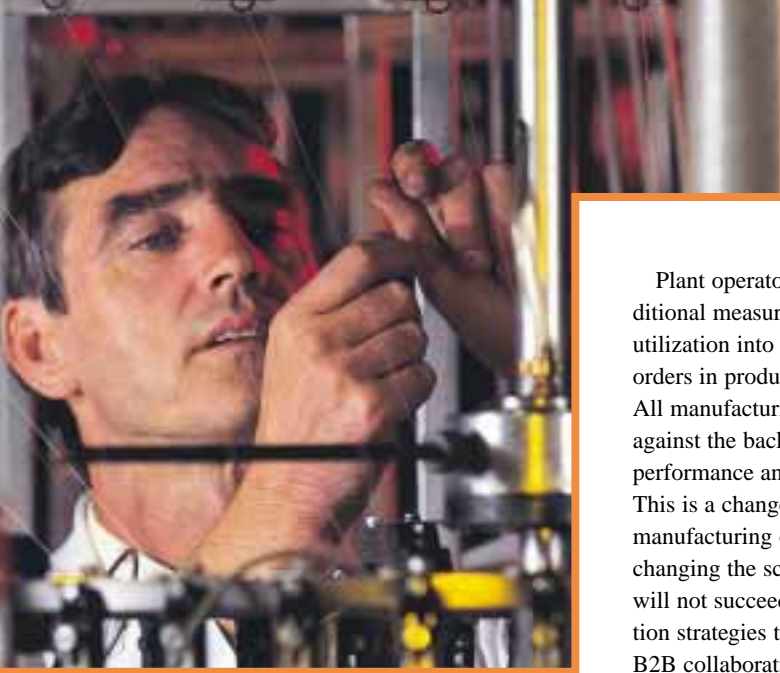
COMPETENCY

The single-minded pursuit of excellence will continue to distinguish the best from the rest in a world where the possibilities have started to appear endless. The popular adoption of the Internet has lowered the costs of communication between businesses. Lean manufacturers can push the envelope even further and expand their outsourcing practices.

Such innovation will only happen if the proper technology is in place. Better manufacturing data will allow engineers and managers to employ predictive and diagnostic analysis either on-site or remotely. Intelligent manufacturing happens at the production line level, but supply chain partners will need to validate the results. Without standard tools for assessing problems, manufacturers will struggle to share lessons learned from one plant, product line, or partner to the next.

COLLABORATION

The other side of the competency coin: Master the supply chain. However, on-time quality is only the first order of business. Leading manufacturers are using information to ensure performance at all levels of the business-to-business (B2B) collaborative process. Today, manufacturing plants must answer to the customer. In contrast to the days of broadcast electronic data interchange, companies have learned that collaboration requires more than data alone. There must be value-added interaction.



Plant operators will have to put traditional measures of productivity and utilization into the context of the orders in production at any given time. All manufacturing activity takes place against the backdrop of time-to-market performance and customer service. This is a change in culture for many manufacturing organizations. Without changing the scorecard, manufacturers will not succeed in adapting production strategies to the new demands of B2B collaboration.

This remains true for the extended supply chain as well. Companies are using the Internet to certify and recertify suppliers as new products are introduced to the supply chain. By taking interactive training and collaboration further, manufacturers reduce the cost of operations at their own locations.

AGILITY

Now more than ever, strategy has to be executed with agility. What do we mean when we say “agility?” Design processes and systems to accommodate unanticipated comprehensive change. In this environment, accurate planning has proven difficult. Do not hard-wire anticipation. Rather, think through the requirements for operational flexibility.

For agile manufacturing veterans, the clear imperative is to expand their use of information as an ingredient in the change process. However, even these companies need to consider how e-business technologies extend agility across their entire manufacturing presence.

All of the aforementioned e-business strategies need to incorporate agile thinking. Companies need to make smart choices that allow for changing methods and shifting tactics. Without this type of readiness, manufacturers are simply repeating practices with e-business that were abolished 20 years ago in the plant.

The fundamental change is the widespread demand for this information and interaction among suppliers, partners, and customers. The requirements themselves are not new. It is the urgency with which the market expects a response. New technology options give manufacturers the opportunity to reset the playing field within their plants. By improving their return on assets and their customer-oriented productivity, many manufacturers are extending the life of production facilities and retooling for a competitive advantage.

Some observers look at these issues and generically bucket them under supply chain integration. And, in doing so, they miss the point. Agility will not proceed in a wholesale fashion. Smart e-business strategies will move forward with opportunistic integration and creation of new Internet services. Plants should work with information technology teams to combine critical real-time production information with e-business information for better decision-making.

For these reasons, e-business architects must stop looking at their existing systems as baggage and utilize them instead as the foundation for new value creation. They need to select e-business technology that will allow them to address a portfolio of strategies: adding new functionality, preserving old applications, and leveraging new services from the Internet applications provider world as well. At

the business level, supply chain integration and B2B collaboration are vital. However, manufacturers must avoid the trap of hardwiring their strategies at the outset. New Internet technology-based initiatives such as Microsoft® .NET for Manufacturing promise new, concurrently rapid and agile solutions to this set of challenges.

In particular, four products are especially significant in meeting today’s manufacturing service challenges. As a foundation, the leading control systems and mobile device vendors have adopted the Windows® CE embedded platform for the delivery of next-generation plant systems and for securely publishing and accessing information over the Internet.

To bring together all forms of business data, Microsoft BizTalk™ Server provides a next-generation eXtensible Markup Language-based integration bus for integrating plant controls, human machine interfaces, and business systems. Manufacturers can leverage Microsoft SharePoint™ Portal Server to pull together diverse information and file types across internal and external locations and put it in one place for end users. As manufacturers work across the extended enterprise, Microsoft Exchange 2000 Conferencing Server enables collaborative training and decision-making across multiple sites.

Real change is what happens after the hue and cry of the revolution. It is a constant process, not a one-time event. Manufacturers should marshal their leadership and prioritize today’s apparent innovations accordingly. ■

Knaack Manufacturing Co.

While implementing wireless mobile computing solutions may, for the time being, be far down on some companies' technology wish lists, Knaack Manufacturing Co. realized that providing employees with access to manufacturing data from anywhere within its facilities had to be an immediate priority for its operations. The manufacturer of job site storage equipment and Weatherguard truck and van equipment understood that implementing a mobile solution was necessary to deliver on some of its top technology-related goals:

in-progress assemblies. Knaack management wanted to give workers mobility on the shop floor and provide them with access to the company's ERP software, Visibility, running on its Hewlett-Packard (HP) 9000 host. Knaack has about 150 workstations in its manufacturing facility, all running the Windows NT® Workstation operating system.

Although the workstations access Visibility, plant personnel still needed to collect inventory and work-in-progress data from various locations within Knaack's plant and return to their work-



Mobile Strategy Rests on Being a Team Player

- to enable workers to freely move around the manufacturing plant floor to locate parts and better manage inventory;
- to allow supervisors to review work in progress and update the company's enterprise resource planning (ERP) system from the plant floor;
- to empower production managers with real-time, accurate data, which would enable them to make more informed business decisions.

stations to input the updated information. Ultimately, this time-consuming process often compromised the company's ability to access current data and provide real-time reporting. Knaack management knew that it had to find a solution offering a quicker return on investment.

To address its mobile computing hardware needs, Knaack purchased six HP Jornada 820 handheld PCs running Windows CE—a key part of the Microsoft .NET for Manufacturing solution that supports computing any time, any place, and on any device. The HP Jornada, equipped with a wireless local-area network adapter, provides Knaack

PUTTING THE PIECES IN PLACE

The first order of business was to improve parts location control for work-



*Mobile PCs now enable workers to enter data into the system from the **plant floor**, saving time and **increasing accuracy.***



personnel with constant access to the company network. A network backbone, providing 12 antennas within the plant and one within the administrative offices, allows completely wireless communication back to the network.

The next step was to find a connectivity package. Knaack's three main requirements for a connectivity package were support for HP emulations, a 132-column screen display for use with Knaack's ERP software, and the ability to run on a handheld PC.

"We evaluated several terminal emulation software packages and rejected them because they could not display the 132-columns necessary for our application," says Jamie O'Connor, Knaack's help desk administrator. "Then I discovered Pericom Software on the Web. Pericom had released their new product, teemtalk for Windows CE, promoting it as a low-cost, multi-platform terminal

emulator designed for PC devices utilizing the Windows CE operating system."

teemtalk for Windows CE provides access to a variety of hosts, including IBM, HP, Digital, and Tandem. Data is transferred from the mobile device to the host via serial/modem, TCP/IP, or NS/VT connectivity.



O'Connor initially tested a 30-day demonstration copy of teemtalk for Windows CE and was impressed with its features, including a small memory footprint of 1.2 megabytes, keyboard mapping, mouse integration, full print capabilities, and soft buttons.

O'Connor was concerned, however, that the product might not support the required wide-screen format.

"I contacted Pericom for sales support and explained that the screen did not appear to scroll correctly and would display in a large font, making viewing the entire screen extremely unwieldy,"

O'Connor says.

In response, Pericom sent an updated version of teemtalk for Windows CE with a selective zoom feature that would allow the user to magnify selected portions of the screen for improved legibility and ease of use. "We found the Selective Screen Zoom particularly helpful with viewing our screens,"

O'Connor reports. "I was pleasantly surprised by Pericom's technical and sales support. When I called up and said: 'This doesn't seem to be working,' they said, 'We'll look into it,' or 'we can do it.' They never told me 'No.'"

SUPPORT FOR REAL-TIME DATA

Once Knaack fully implemented the integrated software/hardware solution, the plant personnel and production managers gained immediate benefits.

"It was obvious to everyone that this solution could improve efficiency and the communication of real-time data in several key areas," says Steve Seibert, Knaack's information services manager. "Even though plant personnel had to make an initial adjustment when using the handheld PC because of its smaller screen, they loved teemtalk's ability to allow them to pan the screen. Now everybody's asking for a mobile solution!"

teemtalk and Windows CE have simplified numerous plant floor activities at Knaack. For example, cycle counting, an ongoing inventory monitoring process, formerly required plant floor staff to manually note inventory. After completing their notes, cycle counters would return to their workstations to update the ERP system.

Mobile PCs now enable workers to enter data into

PROBLEM:

Knaack Manufacturing Co. decided it needed to give its workers mobility on the shop floor while providing access to enterprise resource planning (ERP) data running on its Hewlett-Packard (HP) 9000 system. Once the company decided that a wireless mobile device running Windows CE would best meet its needs, the next step was finding the right hardware and connectivity software package.

SOLUTION:

Knaack purchased HP Jornada handheld PCs running Windows CE—a key part of the Microsoft .NET for Manufacturing initiative—and installed Proxim's RangeLan2 7401 wireless network adapter cards. Pericom Software Inc.'s teemtalk for Windows CE provided Knaack with a low-cost, multi-platform terminal emulator that allowed it to run its ERP software on the mobile devices.

the system from the plant floor, saving time and increasing accuracy. Supervisors can update the work-in-progress status on the ERP software while walking through the plant. And production managers equipped with the HP Jornadas now have access to real-time plant floor and inventory information to resolve customer service or production issues on the spot and make more informed business decisions.

Knaack has implemented teemtalk at its corporate headquarters and manufacturing facility in Crystal Lake, Ill., with plans to deploy it at its other plant in Payson, Utah. The combination of Windows CE and teemtalk for Windows CE on the handheld PCs has enabled Knaack to stay on top of all areas of its enterprise, and ultimately, provide the best products and services for its customers. ■

Flextronics International

Flextronics' contract manufacturing business is on the inside track of a powerful trend toward outsourcing. The company gives its customers in the communications, networking, computer, medical, and consumer markets the ability to focus on core competencies in such areas as research and development, design, and marketing with the confidence that their end products will meet the highest standards of quality.

Meanwhile, Flextronics is focusing on explosive growth. Flextronics now has design, engineering, and production operations related to its electronic manufacturing business in 28 countries on four continents. With more than 55,000 employees and 11 million square feet of manufacturing space, the Singapore-based company generates annual revenues of more than \$10 billion.

Flextronics continues to grow at a rate of 30% annually, requiring continual expansion in its global network of manufacturing facilities—and an increasing need for systems that can ensure uniform processes at every plant worldwide.

To extend its impressive record of success

customers know exactly where each unit is at any given time. Datasweep and Microsoft are mission-critical elements in that ability, providing the tools we need to see what's going on down at the shop floor and to collaborate with everyone along our supply chain."

A SOLID FOUNDATION

Flextronics didn't have to wait long to see how Advantage would impact its business. It deployed the collaborative manufacturing system at a production facility dedicated to a large telecommunications customer, and the complete implementation—including design, configuration, training, and roll-out—took just 10 weeks.

Early indications from the Flextronics facility, which represents every type of shop operations used by the company, are promising. Puzar sees these higher-level performance indicators as proof that Microsoft .NET for Manufacturing is the foundation for further extending Flextronics' capabilities.



Excellence in Outsourcing

and streamline its supply chain from design to production, this leading contract manufacturer has chosen to bet its entire IT "end-to-end" strategy on systems powered by the Microsoft® .NET for Manufacturing platform.

For example, to satisfy one of its most urgent systems needs, Flextronics chose Advantage, a real-time collaborative manufacturing system from Datasweep, a Microsoft Certified Partner, for its plant operations requirements. Built around server technology from the Microsoft .NET for Manufacturing platform, Advantage represents the latest in Internet-enabled production automation technology.

"We need to track products right down to the unit level," explains Jim Puzar, Flextronics' enterprise-wide application manager, "so that our managers and our

At the heart of the .NET development platform is the .NET Framework. The .NET Framework is a new platform for building integrated, service-oriented applications that gather information from and interact with sources, regardless of the platforms or languages in use.

This will come in handy particularly as Flextronics continues to expand its manufacturing operations into such nations as China, Thailand, and Malaysia. Fortunately, Microsoft server products are available in numerous languages and offer native support for the international Unicode character set, making them an ideal choice for the global enterprise.

Today, Flextronics information technology professionals deploy manufacturing systems on a remote basis, even across the globe. Then they use Microsoft Exchange

Server and Microsoft NetMeeting® conferencing software sessions to help local users get up to speed quickly and cost efficiently.

“The standardized architecture of the Microsoft .NET Framework makes everything easier,” Puzar says. “With our old Unix-based systems, it was harder to find people who knew how to implement and use the systems. But because Microsoft offers a server platform that’s popular everywhere in the world, it’s a real plus for us to roll it out in other locations.”

Flextronics is also an active acquirer of outstanding contract-manufacturing companies that offer unique technologies in specialized market niches. Here, too, the company has found that standardizing on Microsoft is a valuable asset.

SEAMLESS COLLABORATION

Customers are benefiting from the move to Microsoft as well. They are understandably interested in knowing every detail about every product at every moment, so they are now receiving real-time production data from the plant floors of Flextronics facilities.

In addition, customers are in constant communication with Flextronics’ manufacturing arm. Flextronics executives use Microsoft Exchange Server and Microsoft NetMeeting to discuss strategies and to collaborate with customers.

If the customers are interested in engineering drawings, the company’s product design and engineering centers use Microsoft Visio® drawing and diagramming software to create, share, and transmit new product designs, which can be delivered to the customer and ultimately right to the manufacturing floor for implementation.

MISSION ACCOMPLISHED

Most important, however, is the fact that Flextronics has achieved the increased manufacturing agility that it sought from the new systems.

“Prior to using these new Microsoft tools,” Puzar reports, “our average time from project start to finished product ran approximately 15 weeks. Today, through online collaboration and improved manu-

PROBLEM:

To keep pace with demand for faster production times, as well as rapid internal growth, Flextronics needed to streamline every process in its global supply chain, from design to production. That meant choosing a reliable, scalable, and flexible platform that could be implemented rapidly at locations around the world, including developing nations where experienced information technology professionals may be scarce.

SOLUTION:

Flextronics chose the Microsoft .NET platform. To manage its mission-critical manufacturing processes, the company implemented Datasweep’s Advantage, a Windows® 2000-based real-time collaborative manufacturing solution that helps it track products down to the unit level and to collaborate with everyone along its supply chain. Flextronics now provides its customers with real-time data from the plant floor and uses Microsoft Exchange Server and Microsoft NetMeeting to confer with customers and business partners. The company’s product design and engineering centers use Microsoft Visio to create, share, and transmit new product designs between parties.

facturing efficiency, we’ve been able to compress that to approximately three to four weeks.

“These systems give Flextronics a serious competitive advantage,” Puzar adds. “After all, this is a field where customer decisions are made on the contract manufacturer’s ability to deliver their product as quickly as possible. We win business on our ability to deliver faster than our competitors.”

That increased agility also helps Flextronics adapt its own business to changing market conditions.

With Microsoft .NET for Manufacturing, Flextronics International now has a solid, Web-enabled strategy for building future manufacturing capacity while controlling costs and production processes like never before.

Going forward, Flextronics is evaluating Microsoft BizTalk™ Server 2000 and plans to use Microsoft SQL Server™ 2000 Enterprise Edition as the database foundation for its Baan enterprise resource planning system, taking advantage of the new database application’s power and flexibility.

“Our experience with Datasweep Advantage illustrates the benefits of using solutions that are fully interoperable with Microsoft .NET,” Puzar says. “We plan to make that level of compatibility a fundamental requirement of all new systems that become part of our manufacturing environment.” ■



Freightliner

Freightliner, a DaimlerChrysler subsidiary, knows a thing or two about support. Its trucks and vehicles help support commerce across North America through the Freightliner network of dealers.

As a matter of fact, this global provider of transportation products and services, which has 40% of the heavy commercial vehicle market and also manufactures school buses, medium-duty vehicles, and emergency fire and rescue vehicles, is known as much for its customer and dealer support initiatives as for its leading-edge engineering. The dealers of these end products look upon the manufacturer's support as a main reason they are able to dominate many of the markets in which the Freightliner brands—which include Freightliner, Sterling, American LaFrance, and Thomas Built Buses—compete.

To support its dealers, Freightliner maintains over \$200 million in parts inventory, with more than 125,000 unique part numbers stocked. Each truck manufactured by Freightliner is built to order and, as such, has a unique custom parts list identified by the vehicle's serial number.

greater access to parts data, Freightliner LLC is migrating its Windows-based PartsPro application to the Internet. The company selected Microsoft SQL Server™ 2000, part of the .NET Enterprise Server family, as the database for this mission-critical application because it provides high levels of performance, availability, and scalability, and because it offers the best return on investment as compared to competing products.

SO LONG TO CDs

The need to move to the Web had grown quite apparent in recent years. The release procedure for quarterly updates of PartsPro was expensive, complex, and time consuming—usually taking six to eight weeks. Due to the lengthy updating process, data on the CDs did not necessarily correspond with newly delivered vehicles.

In addition, CDs were no longer an appropriate method to document the information that dealers needed. Expansion in Freightliner's product lines and production rates resulted in an amount of data and



First-Class Server

Until recently, dealers relied on a Windows®-based application to provide the parts data and images for each vehicle built by Freightliner. Data for this mission-critical application—called PartsPro—used to be stored and managed on the company's mainframe systems, and was provided to dealerships on a set of compact disks (CDs) that were updated on a quarterly basis.


"PartsPro was designed to enhance sales by meeting the need for parts information," explains Doug Vakoc, director of Freightliner Software, the division of Freightliner responsible for managing the development, deployment, and support for all of its software applications. "It saves dealers and customers time and money by enabling faster repairs and by eliminating parts specification errors."

To further reduce costs and provide its extensive dealer network with even

images that exceeded the capacity of a reasonable number of CDs.

Freightliner saw the Web as the answer. So its first step was to enlist the aid of Actco Systems, a Microsoft Certified Partner.

"Once Freightliner decided to create a new Web-based application, the first decision we were faced with was which platform to use," explains Ric Bedard, president of Actco Systems. "Database selection was a key component of this decision process. Freightliner needed a database that provided a mission-critical level of reliability and could easily scale to support several hundred simultaneous users. Response had to be fast so that user productivity was not impaired. In addition, they wanted a database solution that would not need to be upgraded in the near future."



Response had to be fast so that user productivity was not impaired.

THE SERVER IS...

That led Freightliner to choose Microsoft SQL Server 2000 Enterprise Edition as the database for its Web-based, mission-critical application. The PartsPro database now resides on a pair of Compaq 6400 four-processor servers, each running Windows 2000 Advanced Server. To maximize availability, the servers are clustered via the clustering capabilities provided in the Microsoft platform.

Now dealers and others that need access to parts data can access PartsPro via a Web browser, where they will get up-to-date information extracted directly from the company's mainframe-based parts management systems. Parts lists, illustrations, and other vehicle data are extracted from the company's mainframe applications to a staging server on a regular basis.

From there, the data is converted into eXtensible Markup Language (XML) documents. These documents are then transferred to the production server, where they are readily accessible to dealers via the Web.

Web standards such as XML are a key component of the makeup of Microsoft's .NET Enterprise Servers. Those standards are also a part of Microsoft's broader .NET strategy, which endeavors to set up a distributed computing model based on Internet protocols and standards.

"We chose an XML-based approach because it provided the best performance for our situation," Vakoc says. "Once a vehicle is manufactured, data relating to that vehicle remains relatively static, so there's no need to reassemble it dynami-

PROBLEM:

To reduce costs and provide its extensive dealer network with better access to parts data, Freightliner LLC needed to migrate its Windows-based PartsPro application to the Internet.

SOLUTION:

By selecting Microsoft SQL Server 2000 as the database for this mission-critical application, Freightliner was able to obtain high levels of performance, availability, and scalability, as well as a superior return on investment compared to competing products.

cally every time it is requested. By converting the relational data to XML during the staging process, we're able to take advantage of this static nature of the data and improve the application's access and response times."

ONLINE SUPPORT

With the PartsPro database now accessible through the Web, dealers have the up-to-the-minute updates that they need, and Freightliner has the systems in place to ensure that high levels of service are maintained over the next several years.

"The preeminent concern on the back end was database performance, scalability, and reliability," Bedard adds. "SQL Server 2000 was the obvious choice. The feature set, including XML support, comprehensive 'full-text search' capabilities, and simplified database administration, provided a flexible and highly usable database server environment. Rapid realization of new features and strong development support via the integrated Visual Studio development environment resulted in a faster time to market—as did the ease of clustering mission-critical databases using Microsoft Cluster Services. All this, coupled with an excellent return on investment, as compared with other products, made the decision to use SQL Server 2000 straightforward." ■

Honeywell International

International Data Corp. estimates that more than a quarter of a trillion dollars worth of business was transacted via the Internet in 2000. This rise of e-business mirrors another trend: the shifting of focus from individual Web sites or devices connected to the Internet to constellations of computers, devices, and services that work together to deliver broader, richer solutions.

These trends are at the center of Honeywell International's collaborative business-to-business (B2B) plans.

As one of the leading providers of control technologies for buildings, homes, industry, space, and aviation, Honeywell is in a unique position to understand that large-scale production requires efficient operations to drive profitability. Plus, it knows that proper management of production process assets is required for optimal efficiency.

To better manage assets and processes, engineers and maintenance workers need relevant, current information. In many cases, however, information for manufacturing assets is still in paper form and tends to be outdated and poorly organ-

providers (sellers) and 13,500 members were participating in the MyPlant.com portal. MyPlant.com and MyFacilities.com, which both use Microsoft-centric platforms, are accessible through the Internet or extranets.

Honeywell is in the midst of designing the next phase of its e-commerce strategy, which will even more completely answer companies' asset management problems: the @sset.MAX megaservices e-hub, which the company is building on Microsoft® .NET Enterprise Servers. The @sset.MAX megaservices e-hub will aggregate information relevant to the mission-critical assets of its target industries.

The initial version of the service will include features related to delivering a range of product-specific information to users of the e-hub. @sset.MAX will integrate with the MyFacilities.com and MyPlant.com portals through a frame on the sites so that customers using those sites can also take advantage of the @sset.MAX tool set.

"Many of the problems associated with asset management and MRO (main-

A Repair Job on Inefficient Maintenance

ized. There is a tremendous need for collaboration between vendors, service providers, and domain experts.

IMPLEMENTING THE E-BUSINESS STRATEGY

"The first wave of our e-business strategy was to create value-added portals that could be more effective in reaching our existing customers as well as reaching new customers and provide them with more access to solutions, both Honeywell products and services as well as third-party offerings," says Honeywell's Gary Bird. Among these customer-facing portals are MyFacilities.com and MyPlant.com.

In August 2000, nearly 1,000 solution

providers (sellers) and 13,500 members were participating in the MyPlant.com portal. MyPlant.com and MyFacilities.com, which both use Microsoft-centric platforms, are accessible through the Internet or extranets.

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STRATEGIC DECISIONS ABOUT FIXED ASSETS, EQUIPMENT

Malfunctioning equipment means lost revenue. Honeywell estimates that in the U.S. process manufacturing industry alone—one of the market segments that @sset.MAX targets—3% to 15% of capacity is lost due to underperforming equipment. U.S. industries spend nearly

\$240 billion annually to maintain, repair, and replace mission-critical equipment, according to Bird.

Honeywell estimates that 30% of all maintenance spending is ineffective: Either the wrong item gets fixed or something else gets broken in the process. Furthermore, Honeywell research shows that nearly 40% of unplanned disruptions that result in loss of production or other adverse incidents are equipment-related.

The goal of the @sset.MAX megaservices e-hub is to make the maintenance process more cost-effective, help companies avoid lost opportunities related to under-performing equipment, minimize disruptions that could lead to equipment related accidents or incidents, and optimize maintenance expenditures.

“@sset.MAX will help customers make strategic decisions about the fixed assets or equipment that make up their manufacturing facilities and the facilities themselves,” Bird explains. “Once @sset.MAX has helped the customer find the problem, it will help them to find the solution.”

.NET PULLS IT ALL TOGETHER

By leveraging Microsoft .NET Enterprise Servers, @sset.MAX will help Honeywell create new business value opportunities and ways to reach customers.

According to a recent *BusinessWeek* article, Microsoft .NET technology will enable Honeywell to add products from hundreds of suppliers so customers can comparison shop and arrange plant repair and purchasing in one place. Parts, equipment, and service companies will be able to easily plug their catalogs and e-commerce systems into Honeywell's systems and provide customers with instant updates of prices and inventories. With .NET, the article went on to say, all the sites automatically interact with one another, giving the impression that it's all one site.

Microsoft .NET Enterprise Servers, which comprise a database, an operating system, a programming model, and application services, will enable

40% of unplanned disruptions that result in loss of production or other adverse incidents are equipment-related.

PROBLEM:

According to Honeywell research, as much as 15% of the capacity of U.S. process manufacturers is lost due to underperforming equipment, and U.S. industries spend nearly \$240 billion annually to maintain, repair, and replace mission-critical equipment. Management of production process assets, however, is largely still paper-based, making the sharing of equipment-related information in a timely manner difficult.

SOLUTION:

Honeywell is creating @sset.MAX megaservices e-hub, which will support collaborative business-to-business functionality and will enable parts, equipment, and service companies to provide customers with pricing and inventory information in real time. Honeywell is implementing solutions from the Microsoft .NET Enterprise Server line, including Windows 2000 Advanced Server, SQL Server 2000, Commerce Server 2000, Exchange 2000, Application Center 2000, and BizTalk Server 2000, to power its e-commerce plans.

Honeywell to create a truly distributed Web service that will integrate and collaborate with a range of complementary services.

At Honeywell, Windows® 2000 Advanced Server acts as the operating system. The advanced Directory Services and Web Services functionality in Windows 2000 Advanced Server ensures that the platform will scale with business requirements.

SQL Server 2000 will provide data management capabilities. SQL Server will provide reliable data availability and excellent performance for the data-intensive Web service. To provide a rich user experience, Commerce Server 2000 offers personalized commerce transaction capabilities.

Exchange Server 2000 will be used for messaging, B2B document delivery, and processing. Application Center 2000 will give Honeywell advanced application management, load balancing, and monitoring features and will allow the company to rapidly and seamlessly deploy additional capacity through software scaling. BizTalk™ Server 2000 will provide B2B integration to easily map a variety of messages to internal business processes.

B2B integration will connect Honeywell's partners with existing data and applications. The B2B integration features of Microsoft .NET Enterprise Servers will provide Honeywell with increased efficiency and lower overhead by seamlessly integrating its existing back-office infrastructure with the new solution. As a result, Honeywell will be able to offer better service to customers, making it easier to extract operational data for more informed decision-making. ■

Plant Technical Operations: How Agile Are You?

CAN YOUR ORGANIZATION...

Communicate shop-floor-to-top-floor information with your customers and suppliers electronically, even if they have different business systems?

Reduce downtime by predicting what plant floor machine is going to fail before it fails? And then notify the correct personnel to fix it wherever they are? And make sure that person has the correct tools, drawings, and training to complete the job?

Reduce your excess inventory by linking your supply partners over the Internet?

Efficiently, automatically, and dynamically schedule production depending on machine availability in your plant or at another plant located half way around the world?

Visualize real-time production data from any Internet-enabled device in the world?

Make key decisions based on up-to-date production information instead of analyzing week-old production reports or forecasts from last year?

Respond within seconds if you can meet a customer's request for delivery based on production demand and delivery schedule?

Respond to the new digital economy while protecting your existing systems?

Reduce expensive recalls by tracking the genealogy and product quality of a recalled part all the way through the supply chain?

Increase production throughput by reducing changeover times, recalibration, and unscheduled downtime?



For more information about Microsoft .NET for Manufacturing, visit www.microsoft.com/business/manufacturing

also visit:

Actco Systems, www.actcosys.com

Datasweep, www.datasweep.com

Pericom Software, www.pericom-usa.com