Microsoft .net™ for manufacturing

BRINGING THE POWER OF THE INTERNET TO THE ENTERPRISE

Collaborative Engineering and Design

.NET Strategy

THE MICROSOFT .NET FOR MANUFACTURING PLATFORM IS HELPING ENGINEERS SAVE TIME AND MONEY BY SPEEDING PRODUCT DEVELOPMENT AND OPENING THE DOOR TO GLOBAL COLLABORATIVE DESIGN.

Real-Time, All-the-Time Engineering

Increasingly manufacturers are putting more emphasis on engineering R&D in order to remain competitive and increase profits. Why? The growing complexity and technical requirements of products require more engineering than ever, and the product development phase offers a substantial opportunity to save time and lower costs.

While the overall goals of manufacturing have not changed, the Internet has brought new opportunities and pressures to bear on the primary issues facing engineering:

- Speed has become even more important as time and distance have been collapsed by the Internet.
- Global access to the Internet has expanded the definition of collaboration beyond local work groups and the enterprise to global, real-time, all-the-time interaction with suppliers and even customers.
- Hyper-focus on the customer has created a trend of mass customization of almost all products.

The Microsoft .NET® for Manufacturing initiative is designed to help organizations integrate engineering into the digital economy. This approach allows engineering organizations to benefit immediately by deploying Microsoft's new family of .NET Enterprise Servers as the foundation for building the systems that can support secure, reliable interaction both within an enterprise and outside to suppliers and customers.

Let's take a more specific look at how this new Microsoft initiative is already solving engineering dilemmas and how the technology will transform engineering.

INCREASING ENGINEERING PRODUCTIVITY

Microsoft provides the foundation for engineering productivity with Windows 2000®, which allows engineers to reduce cycle time, shorten time to market, and lower costs. For example, Windows 2000 Professional allows designers and engineers to run very high-end computer-aided design (CAD) applications (and other engineering applications) along with complementary best-of-breed Microsoft® productivity applications on the same workstation.

High performance and reliability are not limited to the desktop, because Windows 2000 Professional is part of a scalable family of servers that is ideally suited to support large computer clusters and even take advantage of idle computer cycles on engineers' desktops.

The power of Windows 2000 extends to analytical capabilities as well. With the increased performance of Windows 2000, Microsoft .NET for Manufacturing ensures that engineers have the means to work with very large models and to conduct computationally intense analysis on those models.

In fact, Windows 2000 now holds the top four world-record benchmarks for server application performance for any kind of system.

For engineers operating in heterogeneous computer environments, there is also good news. Microsoft Windows 2000 and Host Integration Server provide the facilities to integrate and interoperate with existing Unix and IBM legacy systems. A tool like Microsoft Interix allows organizations to use existing Unix code without rewriting.

The flexibility of Windows 2000 also allows users to work at their offices or remotely with a laptop computer using the same applications. In addition, Windows CE provides the capability to work with CAD drawings and other engineering data on handheld devices and share that data with other users.

ADVANCED COLLABORATION AND COORDINATION

Collaboration starts with effective management of the large amounts of data and complex processes that support the engineering function. Most companies have a multitude of product development information systems where they store everything from bills of materials to CAD files. Microsoft provides a comprehensive platform to enable engineers to integrate the content and data from these systems to limit time spent gathering information.

For example, document storage is centralized with Microsoft Exchange Server 2000's Web Storage System. It combines the functions of the file system, the Web, and the collaboration server with the facilities to serve as a central repository for CAD drawings, models, assembly models, documents, and multimedia application data.

Project 2000 gives engineers the power and the flexibility to plan and track projects and manage engineering change orders and product lifecycle processes. This functionality can be extended to the Web with Microsoft Project 2000, the Web-based extension that allows team members to communicate and collaborate on projects anywhere they have Web access. Additionally, combining Microsoft Project 2000 with a Microsoft digital dashboard can give team members access to information they need in a clear and easily accessible interface.

Once an effective management system for data and complex processes is in place, the next step is to begin collaboration beyond the four walls of a business. Microsoft supplies the .NET Enterprise Servers and tools to make this type of collaboration a reality:

- More people can be involved in the design process at earlier stages with the use of Visio® 2000 drawing and diagramming software, which enables effective communication between engineers and line-of-business managers.
- Exchange 2000 provides the message engine for sharing documents and collaboration.
- Windows 2000 NetMeeting® conferencing software supports real-time collaboration and conferencing.
- Microsoft provides the environment and tools for building digital dashboards that bring together personalized views containing analysis, content, applications, search, and visualization within Microsoft Internet Explorer.
- Security concerns in this collaborative relationship are governed by Windows 2000 Server's Active Directory™ service. This makes it possible for an IT coordinator to handle all access privileges from a single point.

Because this is an era of rapid change, it should be noted that all these solutions are based on flexible programming models and Web-based technologies. As a result, quick changes can be made to reflect the need for a flexible workflow, and these changes can be easily integrated into changing business partnerships.

KEEPING UP WITH MASS CUSTOMIZATION

The highest levels of productivity gains may actually come as organizations begin to find more and better ways to include customers directly in the collaboration process.

The Microsoft .NET for Manufacturing Enterprise Servers platform provides the tools to improve communication with customers, suppliers, and partners throughout the supply chain and enables manufacturers to cost effectively compete in a make-to-order world.

For example, Commerce Server can collect important information through customer profiling and link that data to product development to speed up the development and manufacturing of engineer to order type products.

In another example, BizTalk™ Server 2000 provides support for developing, executing, and managing distributed business processes such as engineering change orders and provides links with the manufacturing enterprise and suppliers through Internet standards based on XML technology.

A LOOK TO THE FUTURE

Windows 2000 and the .NET Enterprise Servers already provide the foundation pieces for the .NET platform, and Microsoft .NET for Manufacturing will continue to evolve over the coming months.

Microsoft will continue to add essential pieces to the platform, including foundation services to enable organizations and application providers to extend process orchestration and delivery of personalized information views to all users. Microsoft will also continue to work with application providers who are building the portals and exchanges of the future in order to provide the right tools for a rich user experience, with security and high performance. ■

E-Manufacturing: Collaborative Engineering is Key

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, manufacturers, unlike their dot-com brethren, 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 rapid adoption of new functionality. As they build 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. Companies can recognize opportunities sooner and respond to customer issues faster today than they could 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.

Manufacturers need to apply industrial-strength standards to serving customers via the Internet and communicating the business-to-consumer (B2C) lessons learned across the entire enterprise. The digital loop of B2C feedback is only valuable for a manufacturer if it can be tied into the activities of the entire business.

The role of engineering in this transformation is critical. By leveraging digital technologies for collaborative design, engineering groups can reduce costs across the entire manufacturing supply

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chain and accelerate new product initiatives. Already many manufacturers are relying on engineering to improve business-to-business (B2B) client relationships through better project management. Engineering teams streamline the change order process with customers and add value to both sides of the relationship.

GLOBALIZATION

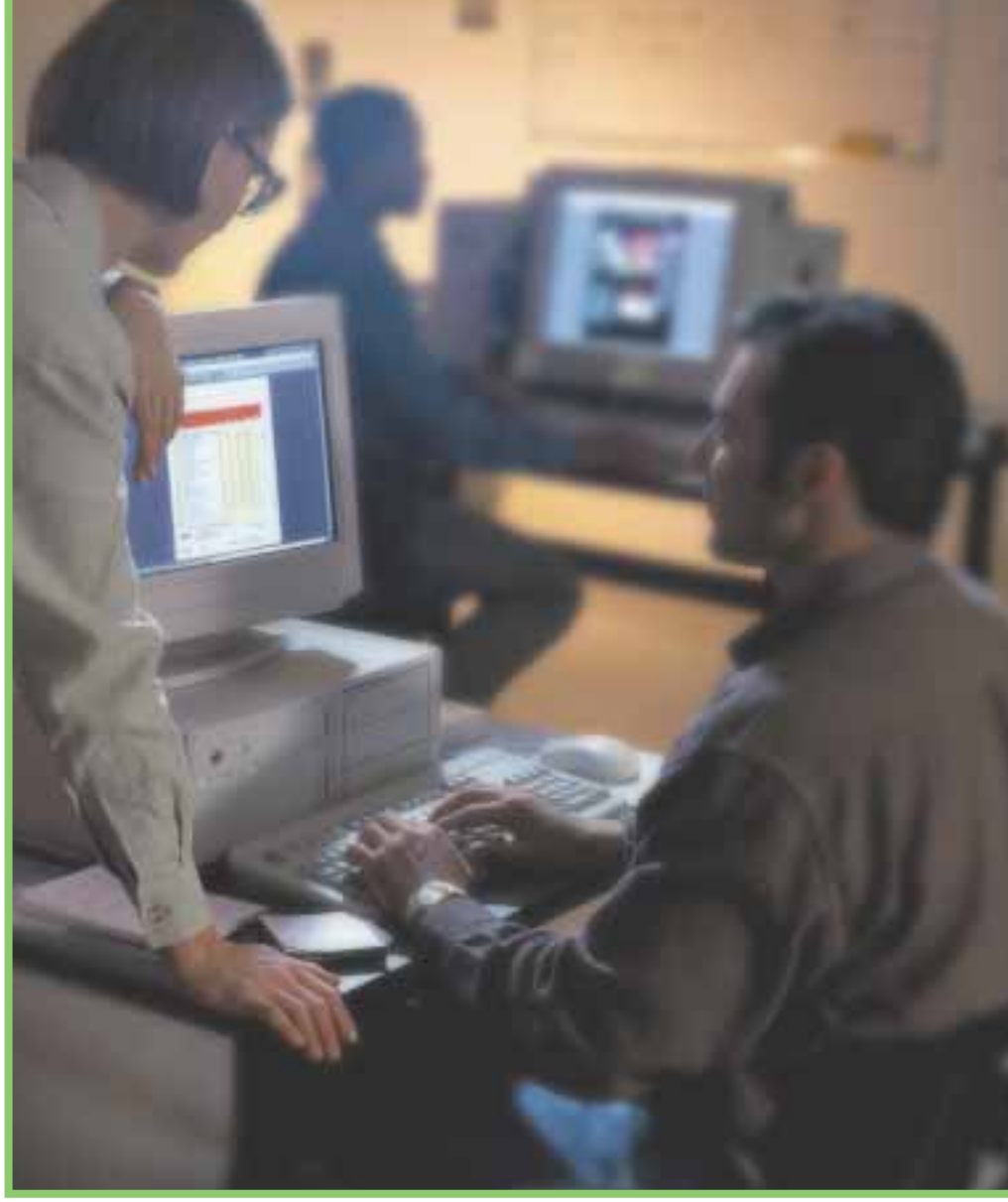
In the high-touch model promoted by the Internet, customer expectations are rising in all the major international markets. Manufacturers committed to serving customers globally will have to support more product and service customization than ever. As a starting point, that includes their Internet presence. How can a company claim to be customer-oriented in 70 countries with a Web site that speaks one language?

The change does not stop there. With e-business techniques originally developed to serve customers, companies can save time for their international employees and partners through Internet-based training and collaboration. These applications will 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.

In a world of change, well-coordinated engineering will be essential for success. What does it cost for one person to learn how to use a new product? In the age of the World Wide Web, technicians and engineers can train people everywhere in the world from their desktop. Internet conferencing and secure, customer support-oriented Web Sites are two areas where engineering knowledge should be leveraged to the advantage of the extended enterprise.

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. As a result, lean manufacturers can push the envelope even further and expand their outsourcing practices.



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In the extended enterprise, engineering organizations will be especially vulnerable to erosion in competency. Companies will need to monitor quality in order to preserve it. In global enterprises, engineering analysis of production results will need to be vigilant in order to prevent economic or actual catastrophes. Increasingly, engineering teams may be called upon to certify partners' production lines and personnel.

COLLABORATION

The other side of the competency coin is mastery of the supply chain. However, on-time quality is only the first order of business. Leading

Without readiness, manufacturers are simply *repeating practices* in IT that were abolished *20 years ago in the plant.*

manufacturers are using information to ensure performance at all levels of the B2B collaborative process. In contrast to the days of broadcast electronic data interchange, companies have learned that outsourcing excellence requires value-added interaction. The tightening of B2B relationships will affect sales, marketing, product development, and even finance. Innovative manufacturers are delivering convenient information-based services that enable supplier action.

Among virtual manufacturers, engineering collaboration before, during, and after production is already common practice. As traditional manufacturers further their use of extended supply chain strategies, engineering will need to leverage partners' engineering expertise in order to achieve the milestones for product innovation and time to market.

AGILITY

Now more than ever, strategy has to be executed with agility. So, what do we mean when we say "agility?" What we mean is this: Processes and systems must be designed to accommodate unanticipated comprehensive change. But in this environment, accurate planning has proven increasingly difficult. Therefore, you should 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 a key ingredient in the change process. However, even these companies need to consider how e-business technologies extend agility to the information technology (IT) infrastructure itself.

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

Engineering organizations need to consider how these technologies can and will change the way they work. How much time does it take to develop new products today? How long does it take to resolve quality control problems? If a company is wasting critical engineering resources on travel, meetings, and the paper trail, it is time to consider a new approach.

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—the speed—with which the market expects a response. 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.

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 promise new, concurrently rapid and agile solutions to this set of challenges.

Four Microsoft products are especially significant in meeting collaborative engineering challenges. First, engineering processes require a high-performance foundation. Windows® 2000 Professional offers engineers a robust engineering workstation platform upon which they can build flexible collaboration solutions. Second, SharePoint™ Portal Server provides a readily implemented means of integrating diverse information and file types across internal and external engineering sites. Third, Exchange 2000 Conferencing Server supports unstructured collaboration among multiple sites and organizations. Finally, BizTalk™ Server provides a next generation XML-based integration platform for integrating engineering, PDM, and business systems.

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. ■

A High-Powered Boost for Higher Education

Cornell Theory Center, Cornell University

The finest academic minds not only debate mathematics and other complex principles, they also need to put their theories into practice in environments that can support such heavy-duty computational work. Call it the pursuit for a high-powered education, if you will.

In 1985, Cornell University opened the doors to the Cornell Theory Center (CTC), a high-performance computing facility and interdisciplinary research center. The CTC now supports more than 100 data-intensive and computational applications for research from faculty representing a wide range of disciplines, including finance, computer science, engineering, genomics, and economics.

Until recently, CTC supported its diverse user community on an IBM SP system running AIX. But when faced with the cost of upgrading the SP, CTC wanted to examine more cost-effective alternatives. At the time, server clusters running Microsoft® Windows NT® were beginning to gain momentum and attention as a new architecture for high-performance computing.

While CTC administrators were aware that moving from the familiar Unix-based operating system to another might present some obstacles, they wanted to determine whether this new architecture could perform and scale like a traditional supercomputer.

PERFORMANCE MAKES THE GRADE

In 1997, Intel presented Cornell with its second-largest grant as part of its Technology for Education 2000 Program. CTC's role in this grant was to develop a trial parallel job scheduling system to evaluate the performance of clusters running Windows NT against that of the SP. Because the parallel scheduling system surpassed the SP in performance, CTC decided to move forward with a trial cluster to evaluate the system's ability to scale and to support parallel jobs.

In 1998, CTC purchased eight Dell Precision 610 Workstations running Windows NT in order to introduce a trial cluster and to evaluate its performance when porting a complex code, such as a large combustion-modeling Fortran application. CTC ported the application to the trial cluster in one day and saw an estimated performance gain of 10% in comparison to the IBM SP.

"We were surprised and extremely encouraged to see a performance gain from the trial cluster," Dave Lifka of the CTC says. "From there, it was a fairly easy decision to move beyond the trial cluster to a full-scale migration."

Encouraged by the early success of the trial cluster, CTC partnered with Dell, Intel, and Microsoft to form the Advanced Cluster Computing Consortium in August 1999. The consortium sought to establish server clusters running Windows NT as a viable high-performance computing alternative to traditional supercomputers.

The original cluster, named Velocity, includes 256-processor Dell PowerEdge servers, ranging from 2450s to 6350s, and a GigaNet high-performance interconnect based on its cLAN technology, which provides high-throughput, low-latency interconnect capabilities, and allows communications of 100 megabytes per second. Microsoft provid-

ed technical support and consulting services to assist with the application porting and to mitigate integration issues.

For job scheduling and management of the cluster, CTC selected MPI Software Technology's MPI/Pro with Cluster Controller for Windows® NT and Windows® 2000, an application developed by Lifka as part of the initial Intel grant. Cluster Controller ensures that jobs, ranging from serial to massively parallel, are run in a timely fashion, making it an ideal scheduler for dedicated computational clusters with a demanding user community.

"To be honest, the faculty was initially reluctant to migrate to the Windows platform, many having worked only in Unix for the length of their careers," Lifka says. "Once faculty members saw the performance gains from Velocity and realized the benefit of the broader range of research applications available for Windows, we saw a rapid increase in requests for time on Velocity, and the system has been fully utilized. We are witnessing a real cultural shift toward the Windows platform, and I attribute our success to a truly combined effort on the part of Dell, Microsoft, and Intel."

"We are witnessing a real cultural shift toward the Windows platform."

—Dave Lifka, Cornell Theory Centers

THE FINAL EXAM

In the fall of 1999, CTC brought up Velocity on Windows NT. Today, CTC has successfully ported all applications to Velocity, and an estimated 90% of the faculty have migrated completely. At roughly one-fifth the cost of the SP system, the cluster outperforms its former system with performance gains ranging from 10% to 100%, depending on the application.

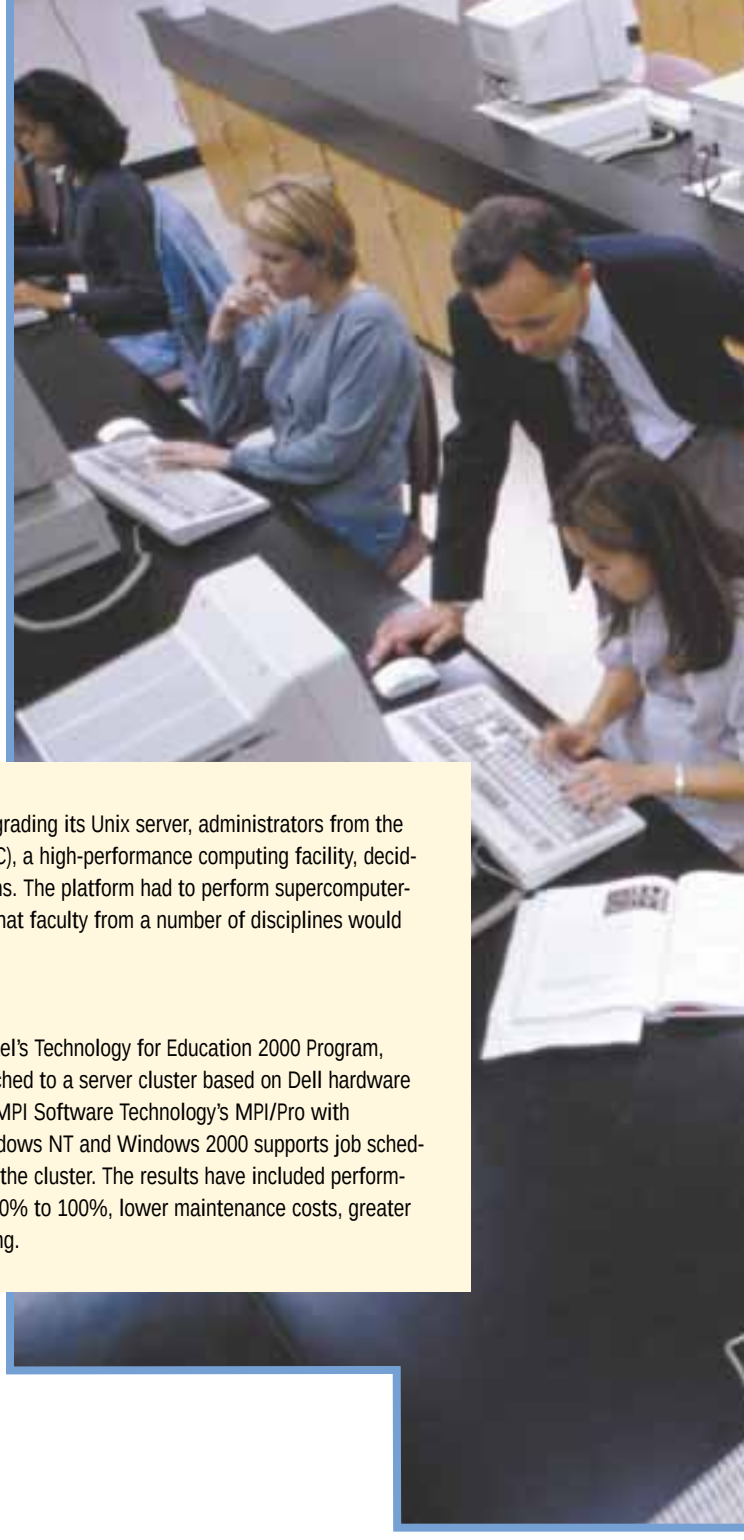
CTC derives additional savings because the cluster is less expensive to maintain. In addition to these performance gains and cost savings, CTC also realized greater stability when it migrated Velocity to Windows 2000 upon its release for general availability in the summer of 2000.

"Not only are our faculty members getting more work done because of the performance gains achieved with Windows running on Dell, but with the cost savings, we have also been able to expand our computing resources much sooner," Lifka says.

Migrating to the Windows 2000 platform means that sophisticated users, who may have used a Unix machine for some tasks and a PC for others in the past, can now consolidate their work on one workstation. In addition, the migration has enabled CTC to extend its high-performance computing resources to new classes of users, because the Windows platform requires minimal training.

And because Windows also allows users to access Velocity from desktop PCs, more novice users are conducting work on the cluster. For example, with software developed by CTC, corporate biologists are matching gene sequences to protein structures through an easy-to-use Web interface, without ever knowing they are using a high-performance computing cluster.

Computerworld magazine and the Smithsonian American History Museum recognized Velocity in the fall of 1999, and the cluster earned a position on the list of Top 500 most powerful computers in the world, the first Windows 2000-based system to be named to the list. CTC recently added a second cluster, Velocity Plus, which consists of 256-processor Dell PowerEdge 2450 and 6450 servers. CTC plans to add a third and fourth Velocity as well. ■



PROBLEM:

Faced with the cost of upgrading its Unix server, administrators from the Cornell Theory Center (CTC), a high-performance computing facility, decided to evaluate their options. The platform had to perform supercomputer-like computational tasks that faculty from a number of disciplines would require.

SOLUTION:

As part of a grant from Intel's Technology for Education 2000 Program, CTC tested and then switched to a server cluster based on Dell hardware and Microsoft Windows. MPI Software Technology's MPI/Pro with Cluster Controller for Windows NT and Windows 2000 supports job scheduling and management of the cluster. The results have included performance gains ranging from 10% to 100%, lower maintenance costs, greater stability, and easier training.

Kenworth

With its mission to provide "The World's Best" transportation solutions, Kenworth is dedicated to developing vehicles that break new ground in technology while being recognized as the best in their class.

Kenworth's leadership team is equally dedicated to the business principles and technology that will get them there. Keeping up with technological advances and maintaining agile business processes are key to their continued success in meeting and exceeding their customers' expectations.

So when it was time to upgrade or replace the engineering group's aging Unix workstations so that its engineers could do their best work, Kenworth evaluated its options based on three criteria: system performance, engineer productivity, and total cost of ownership.

After a thorough economic analysis, Kenworth chose to migrate to Dell Precision Workstations running Microsoft® Windows NT® Workstation.

One pleasant surprise was how much time engineers were saving once they had one desktop from which they could quickly access all of the 40 to 50 applications they regularly use. They didn't have to wait for drawings to regenerate either, another big time saver.

"Now that we're on Windows, the frustration factor of waiting on Unix workstations or a PC emulator to do things like check e-mail is gone. This is a big benefit that wasn't figured into our initial economic analysis," Shearn explains.

FEEDBACK FROM ENGINEERS

Moving away from Unix in favor of the open Windows platform brought new opportunities and benefits to Kenworth.

"We are able to pull up much larger models incorporating many more parts than ever before. We are also able to perform finite element analysis, which is used for stress calculations, on our own machines rather than send it to the tech center," says Ryan Reed, a Kenworth design engineering.

Performance Enhancers

RESISTANCE TURNS INTO DEMAND

As expected, not all engineers were enthusiastic about trading their familiar Unix system in for a Windows®-based workstation. Yet as the rollout progressed, the initial resistance quickly turned into pressure from the engineers to deliver the new Windows-based/Dell machines more quickly.

"With 140 or so engineers, we could only deploy a few a week. For the first 25% of those desktops, we had to talk the engineers into it. By 50%, the engineering managers were telling me that their engineers couldn't do their work without them," says Ken Shearn, computer-aided engineering manager at Kenworth.

Kenworth expected to see performance gains with the move to Windows, but was pleasantly surprised at how great those gains were.

"The system has allowed us to look at a larger portion of the product on the screen at a time allowing us to make better decisions. With the increased speed we are able to try multiple design iterations without sacrificing time," he adds.

Sharing information between engineers and applications is easier now, too. "We are able to cut and paste directly into PowerPoint and Word as well as create intranet Web pages to share this design information," Reed says.

With all these time savings, Kenworth is getting its products out the door more quickly. Ed Caudill, Kenworth general manager and vice president of PACCAR, Kenworth's parent company, notes, "We're now able to reduce new model introduction time to market by six to 12 months, and reduce time to market for major interior upgrades by six months."

PROBLEM:

After conducting a thorough economic analysis, Kenworth Truck Co., a division of PACCAR Inc., discovered that it could realize at least a 20% to 30% increase in performance by replacing its Unix workstations with Dell Precision Workstations running Microsoft Windows NT Workstation.

SOLUTION:

Kenworth's migration from Unix to Windows was so successful that all other divisions of PACCAR are following suit. Moving engineers to a single Windows-based desktop has increased engineer productivity while decreasing long-term hardware, support, and maintenance costs.

Engineers can use their time more wisely as well. "The engineering group responsible for production engineering was reduced from 52 to 24 engineers handling the same workload," Caudill continues. "The additional 26 engineers were moved to new product development, allowing for more new product design.

"In addition, product quality as measured by outside agencies has improved."

REDUCED COSTS, NEW OPPORTUNITIES

Moving to Windows has also had other significant cost benefits for the company. Besides being able to buy 2.5 Windows-based workstations for the price of one Unix workstation, ongoing support, maintenance, and training costs are lower. It's also easier to find the skilled engineers they need.

More experienced engineers also find it easier to work with the many applications they use. "Most of our programs have the same look and feel now with Windows," Shearn says. "It's smoother to move from one application to the next."

The stability of Windows is also contributing to Kenworth's bottom line, as engineers don't lose time to system problems. "After switching from Unix to Windows, systems are not down as often and are more stable. There is reduced maintenance needs, and everything runs better," Shearn says.

Overall, Kenworth is delighted to have exceeded the impressive 64.1% return on investment in the first year and 1.4-year payback their careful economic analysis had predicted.

LOOKING FORWARD

Because Microsoft Windows provides a single desktop solution, Kenworth has been able to provide its engineers with the best of both worlds: high-end performance and no compromises on collaboration or productivity.

"Kenworth was the first division of PACCAR to adopt Windows instead of Unix for the engineering workstation," Shearn says. "The success of the project was validation of our economic analysis. We're pleased that the project exceeded our initial expectations."

Patrick Flynn, chief information officer at PACCAR, adds, "Due to the success at Kenworth, the scope of our adoption of Windows for engineering has grown significantly greater. All of our division engineering resources are now in various stages of the migration to Windows, including our international folks."

Kenworth and all of PACCAR's divisions plan to stick with Microsoft technologies to help them achieve outstanding results today while providing a flexible platform for building the digital business of tomorrow.

"We think that Microsoft's technologies, particularly the .NET strategy, will continue to provide us with the best combination of performance and cost-effectiveness," Flynn notes. "As these products mature and our needs change, we will be adopting them as quickly as feasible. Windows 2000 on both the desktop and servers will be significant parts of our technology platform going forward." ■

DesignKNet

Web Collaboration Grows Up

The idea of Web-based engineering collaboration is almost as old as the Web itself. Back when the now-ubiquitous network was just an emerging technology, forward thinkers were already fantasizing about how it could link geographically dispersed engineering teams.

The earliest efforts were limited to project home pages where information such as specifications, standards, and team member contact data was posted for easy access by project participants. Although this was a step in the right direction, these sites only slightly improved collaboration. Even later efforts at Web-based teamwork, offering the ability to post and view computer-aided design (CAD) models on a Web site, didn't fully leverage what this technology has to offer.

In fact, many of the initial efforts at Web-based engineering collaboration seemed like all the other "rush to the Web" efforts that characterized the early, heady days of widespread Internet access. Upstart "e" vendors rushed to get collaboration products to market without taking the time to think about what end users actually needed.

REAL COLLABORATION

Microsoft Corp.'s and Unigraphics Solutions' introduction of Design Knowledge Network (DesignKNet) brings a more mature vision of Web-based collaboration to the product development community. One of the biggest differences between this collaboration tool and others is the extent of the thought and planning that went into DesignKNet (pronounced "design net"). DesignKNet's developers, using their knowledge of the product development process, began by listing everything a Web-based collaboration tool should offer.

"We called it 'game changing' collaboration, and we didn't limit ourselves to what was state of the art at the time," says Mike Sayen, director of the DesignKNet business unit at Unigraphics (UGS). "We asked ourselves how the Web could be used to supply what we believe is the ultimate in Web-based collaboration: real-time sessions where participants can simultaneously see and change multiple CAD models, even models from different CAD systems."

The DesignKNet solution is based on the scalable collaboration platform of Microsoft® Windows® 2000 and its Active Directory™ service, and Exchange 2000, featuring some of Exchange 2000's latest collaboration and conferencing capabilities. DesignKNet also relies on the secure nature of the Windows advanced server technology and its Active Directory to ensure that user authentication for the collaborative system remains trustworthy and to track authorized users on the site.

"We knew that we could use our iMAN products to provide the engineering-specific functionality of DesignKNet. But we saw no point in reinventing the wheel when it came to key tools like user authentication, discussion threads, calendars, instant messaging, and libraries that people expect in a collaboration session," Sayen says. "For that, we rely on Microsoft Windows 2000 and Exchange 2000."

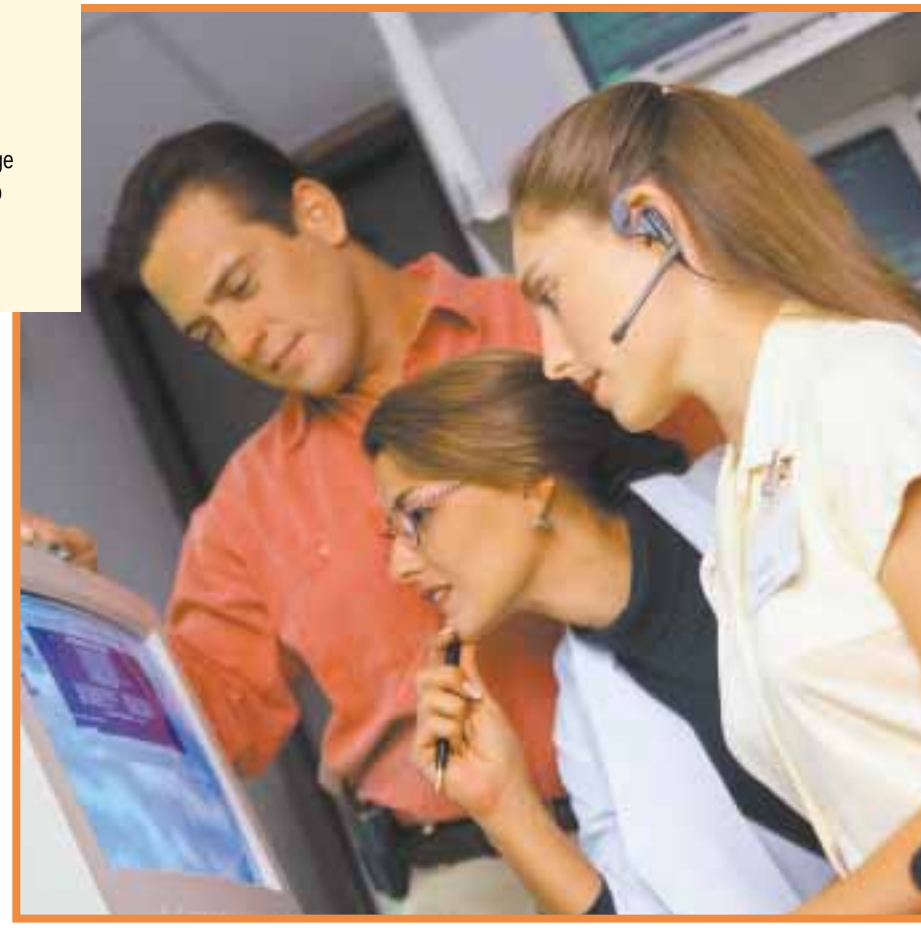
The Microsoft Digital Dashboard technology is behind the graphical presentation of DesignKNet. The dashboard can present several "panes" of information, each capable of highlighting an individual data source, on the user's screen. A user can change the look of the interface to his liking. "This is all cutting-edge stuff," Sayen says.

PROBLEM:

Lift Web-based engineering collaboration from its moorings in Web-site-posted specifications, standards, and team member contact data and elevate it to a new, more useful level with the latest collaboration and conferencing technologies.

SOLUTION:

Microsoft and Unigraphics Solutions' Design Knowledge Network (DesignKNet), which allows all participants to modify models during a session, with their commands updating others' models in real time.



What Sayen describes is very different from the capabilities of current Web collaboration tools. At best, today's collaboration tools let people in different locations view a CAD model, but all locations see the same image. And while mark-up is usually possible, in most cases it is not possible to actually change the CAD model during the collaboration session. Generally, these tools are used as a virtual white board to help people in different locations discuss a design. Then they go back to their individual offices, work on the changes that were decided on in the meeting, and hold another collaboration session days or weeks later to discuss them.

DESIGN EXAMPLE

DesignKNet compresses that process dramatically by providing a richer set of collaboration capabilities. For example, rather than everyone looking at the same CAD model, DesignKNet lets people in different sites see the model that is most relevant to their work. Engineers in one site might look at an automobile's internal assembly, for instance, while a mold maker at another site views the housing for the internal assembly's outer shell. All participants can modify their models during the session, with their commands updating the others' models in real time.

Assume, for instance, that the engineers want to show the mold maker a change to be made to an internal subassembly. During the collaboration session, they modify their model to show the new configuration. DesignKNet transmits the commands to the mold maker's model, which is updated to reflect the change. The mold maker can immediately tell what effect the change to the subassembly has on the mold design. If it's going to cause a problem with the mold, he can suggest a different course of action, making changes to his model and sending them back to the engineers. This type of collaboration session can accomplish in hours what might take weeks using tools that don't permit real-time design change.

DesignKNet will serve as the infrastructure for a line of public Web collaboration sites that Unigraphics Solutions will make available starting in 2001. The first site will permit the type of design collaboration discussed above, in which participants work with multiple views of multiple Unigraphics and other parasolid models.

"We are delighted with the Microsoft and UGS announcement of DesignKNet," says Kirk Gutmann, global develop product information officer for General Motors. "The Windows 2000 platform has already been successfully deployed in GM Canada and has proven to be extremely robust and scalable. We applaud Microsoft and UGS for working together to provide DesignKNet for the Windows 2000 environment."

The eventual goal of DesignKNet is to use Web technologies such as eXtensible Markup Language command messaging and XSG graphics sharing to bring models created in other vendors' CAD systems into collaboration sessions. But for now, future sites will focus on collaboration between original equipment manufacturers (OEMs) and component suppliers, OEMs and service/repair sites, and OEMs and sales personnel. ■

Siemens Medical Systems Inc.

The Electromedical (EM) Division of Siemens Medical Systems Inc. offers leading-edge technology and clinical solutions for the critical care, cardiac care, and anesthesia market segments. It is perhaps best known for its INFINITY Patient Monitoring System, a product EM launched in response to hospitals' need for flexible and cost-effective patient monitoring systems.

The INFINITY System consists of a series of modular and configured monitors designed to give hospitals "infinite" functionality in monitoring patients. INFINITY monitors, such as the SC 9000XL, move with a patient throughout the hospital, providing continuous patient data collection. When a patient is in transit, a monitor operates through an internal, rechargeable battery. When the monitor is placed on the INFINITY Docking Station, power and network connections are immediately restored while the battery is recharging.

INFINITY patient monitors enable monitoring of dual chest-lead ECG, respiration, dual temperature, dual invasive blood pressure, noninvasive blood pressure, and arrhythmia.

The design of such sophisticated equipment requires talented engineers with top-flight tools. For years, Patient Care Systems (PCS) engineers within EM had used a combination of CADKEY and Matra Datavision's Euclid CAD (computer-aided design) software for product design. However, the group was under pressure to shorten product development time and reduce prototyping costs, and the engineers needed a new design tool to help them accomplish those goals.

Designing Better Products, Faster

ESCAPING THE WIREFRAME FOG

PCS engineers realized they needed an intuitive, easy-to-use CAD system to streamline the design cycle for this advanced patient monitoring system. "We were getting more and more frustrated with the CAD software we were using. We needed a solution that would allow us to do solids and surfaces in a unified environment and better visualize what we were trying to accomplish," says Per O. Hoel, a PCS senior mechanical engineer. "The software we were using was driving the operators, expecting them to jump through so many hoops and be cognizant of so many workarounds that focusing on the job was taking a back seat to managing the software."

Specifically, PCS engineers needed to reduce prototype costs and tooling modifications, both of which save time and money. If the engineers were able to gain a better, more-detailed, on-screen understanding of components and assemblies, they could expect the transition from the virtual world to the physical reality of the plant floor to be a cost-effective and seamless cross-over.

After evaluating several different systems, PCS selected SolidWorks, a CAD system designed on the Microsoft® Windows® operating system, one of the foundations for the Microsoft .NET for Manufacturing platform. Wasting no time, the PCS engineers immediately deployed the software on the design of the new patient monitoring system.

"The reliable data translation tools in SolidWorks have simplified the conversion of

many of our existing CAD-based parts for use in new assemblies," Hoel says. "SolidWorks was developed from the ground up with the Windows user interface in mind, which makes it easy for anyone familiar with Windows and part design to jump right in and make some real headway."

With SolidWorks installed, PCS engineers not only achieved their objective of streamlining the design cycle, but also discovered that SolidWorks' ease of use gave them more freedom to experiment with, refine, and stylize components. For example, the INFINITY Docking Station and SC 9000XL monitor include a junction box that connects sensor cables from the patient with the system's internal electronics. "If not for SolidWorks, that junction box could have been pretty blocky," Hoel says. "But because of the ease of organically modeling in SolidWorks, we came up with something much more elegant."

PROBLEM:

The Electromedical Division of Siemens sought to develop a monitoring system that would provide hospitals with ultimate functionality. The result is the INFINITY Patient Monitoring System. A key component of the system is the SC 9000XL patient monitor, a high-end, large-screen, transportable, and modular patient monitor. Engineers needed an intuitive, easy-to-use computer-aided design (CAD) system to streamline the design cycle of the monitor and accelerate time to market.

SOLUTION:

Siemens chose SolidWorks CAD software, running under Microsoft technologies, because of its superior ease of use. By deploying SolidWorks, Siemens introduced a breakthrough product, cut component design time by 25%, reduced prototyping/tool modification costs, and empowered its engineers with the freedom to visualize, experiment, and refine product designs.

REDUCING COMPONENT DESIGN

By deploying SolidWorks on Microsoft Windows, PCS met its goal of bringing the INFINITY Docking Station and SC 9000XL monitor to market faster, providing Siemens with a breakthrough product that is growing its worldwide market share.

"We've seen a 25% time improvement in the design of individual components," Hoel says. "But the real advantage is the reduced prototype costs we've had because so much more can be done virtually. Interference checking capability has given us the power to avoid unforeseen tooling modifications, thus shortening lead times and lowering total expense."

Hoel points out that before PCS implemented SolidWorks, an engineering change request could require an extraordinary amount of CAD work. "With SolidWorks, changes don't bother us anymore. Because it's so easy, we've started taking its capabilities for granted and what used to be extraordinarily time-consuming and tedious can now even be fun to deal with." ■

Collaborative Engineering and Design: How Agile Are You?

CAN YOUR ORGANIZATION…

Shorten product design cycle time by working seamlessly and efficiently between high-end engineering systems and office productivity applications?

Increase product quality by running complex model analysis faster and providing richer simulations, while decreasing costs?

Increase productivity and reduce costs by taking advantage of best-of-breed solutions and hardware performance components?

Improve quality and reduce errors by communicating product data securely and immediately with users, customers, partners and suppliers on a global scale?

Reduce product design cycles by collaborating with your partners through a personalized online portal, in real time, and with 3D visualization?

Improve customer satisfaction by building support and maintenance tools and documentation directly from product design data?

Meet the demands of mass customization by translating customer product requirements directly into the drawings, models, documentation, and supply sourcing information necessary to manufacture customized parts?

Speed-up custom product designs by combining existing components with unique customer requirements to produce a finished product?

Shorten time to market by efficiently managing and coordinating complex projects involving multiple divisions and multiple partners, allowing for real-time changes, synchronization of mission-critical product data, and integrating directly with manufacturing?

For more information about
Microsoft .NET for Manufacturing, visit

www.microsoft.com/business/manufacturing

also visit:

Dell Computer Corp., www.dell.com

MPI Software Technology, www.mpi-softech.com

SolidWorks, www.solidworks.com

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