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Global success with TEAMCENTER

Smarter decisions, better products.

Aerospace sector

Automotive sector

Consumer sector

Electronics and semiconductor sector

Industrial machinery sector

Heavy equipment sector

Life sciences sector

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Teamcenter · NX

BAE Systems Global Combat Systems

Accelerating vital enhancements and urgent modifications to British Army's field units

Cover

Back

Forward

Industry

Aerospace and defense

Business challenges

Reduce risk of errors at proto-type stage

Avoid cost and time overruns

Eliminate ambiguity

Keys to success

Fast loading of model and data

Use of ISO-standard JT light-weight data

Results

Improved decision making

Conflicts identified and resolved earlier

Many more concepts and variations assessed in a fraction of the time, compared to previous process

Measurably reduced cost and time savings

Further strengthened reputation for meeting urgent operational requirements

Teamcenter drives 3D VR dome, enabling engineers and field vehicle crews to display life-size models; virtual collaboration results in greater innovation, faster validation and reduced costs

Comprehensive land systems

One of the biggest challenges for companies dedicated to supporting today's demanding armed forces is to deliver military capability on time and on budget. That's because modern-day land systems are more complex than ever before and must be capable of doing the job in the most demanding of situations. It is essential that the combination of vehicle, powertrain, systems and armaments work the first time, every time.

BAE Systems is a proven expert in this field

BAE Systems Global Combat Systems (GCS) provides land forces with platforms, systems and through-life capability management. In the United Kingdom (UK), GCS delivers enhanced military capability, urgent operational requirements and upgrade programs. The company manufactures, develops, markets and maintains smart weapon systems within the fields of intelligent ammunition, artillery systems, combat vehicle turrets, naval gun and air defense gun systems, as well as ammunition for small arms,

mortars, tanks, and land and naval artillery. Global Combat Systems also designs, manufactures, integrates and supports combat vehicles. Its primary products include main battle tanks, infantry fighting vehicles, armored engineer vehicles, armored all-terrain vehicles, military bridging and logistical support.

Applying advanced technologies

The Systems Integration Facility at GCS helps engineers and vehicle crews work together to develop enhanced capabilities and urgent modifications for the British Army's in-service fleet of main battle tanks, infantry fighting vehicles and armored personnel carriers. In addition, the facility

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is used to design and demonstrate vehicle concepts and systems integration capabilities for future requirements. At the heart of the facility, the 3D visualization laboratory (VR dome) is used to display three-dimensional, life-size, fully textured, virtual stereoscopic models using Vega Prime™ visualization software from Presagis and Teamcenter® software from Siemens PLM Software.

Driving out risk
The Systems Integration Facility comprises a number of laboratories: the Combat Systems Integration Laboratory (CSIL), the VR dome itself, two Electronic Systems Integration Labs (ESILs) and the Vehicle Systems Integration Laboratory (VSIL). The purpose of the facility is to drive risk out of the company's systems engineering processes. To avoid cost and time overruns, it is vital that errors are detected before the prototype stage, so that there are few, if any, issues during prototyping. The GCS Systems Engineering Management Plan provides the basis for this. David Vallis, manager of the GCS Land Systems Integration Facility, explains, "The plan dictates that we take the user requirement from the Ministry of Defence and analyze it to produce the requirements specifications. Then we produce the subsystems requirements specifications and architecture design. Once procured or manufactured, the subsystems are

integrated, tested and installed in the vehicle. Finally, we run tests to demonstrate to the customer that our vehicle meets their requirements."

Vallis adds, "Although there are stage checkpoints, the whole process is highly dynamic. There are frequent changes, upgrades and so on, and it may be quite late in the long process before everything is fixed. This is where the VR dome comes into its own."

Seamless, 360-degree panoramic view
GCS operates several VR domes. Similar in configuration, each VR dome consists of a 360-degree, octagonal arrangement. Each wall has two projectors that are offset to create a stereo image when viewed through passive polarizing spectacles. The projected images are blended across all eight walls, delivering a seamless, 360-degree panoramic view from the center-view position. A cluster of eight workstations is used to drive all eight walls. Each workstation has two outputs, which carry the eye-separation images (one for each eye to create the 3D stereoscopic effect) to the projectors. An additional workstation synchronizes the output-view perspective relative to the other workstations.

Visual comparisons of concepts and layouts
"Very early on in the process we can make visual comparisons of concepts and layouts in the dome," says Vallis. "It's an iterative process that loops back within each stage of the system engineering 'V' diagram. We bring the customer in to carry out an assessment as early as possible. We load the concept drawings – multiple concepts if applicable – and run them in the dome. Any changes are fed back into the design and the computer-aided design (CAD) file is updated. At the following stage of the 'V' diagram process, we load the design again and re-assess it." He notes, "We can do everything the CAD system does. We can remove layers to see

what lies underneath; we can add and remove equipment, personnel, weapons, armor and so on. In addition, we can animate objects, too – doors, turrets, etc."

Life-size, 3D stereoscopic models
"Immediately before cutting metal, we may run a photorealistic, high-fidelity visualization, complete with all services – wiring, piping and so on – for an assessment of maintainability and access, for example," says Vallis. "For major client presentations and reviews, we use the Vega Prime visualization system with the VR dome to display full, life-size, 3D stereoscopic models of our physical solution. We animate and render the vehicle model surfaces and provide a fully textured background. We get very high-quality results."

Immersive digital mockup for realistic design validation
Normally, the engineers and draftsmen work primarily at their CAD stations. "However, once there are more than two or three people involved, it's difficult to carry out a review around a desktop," says Vallis. "They can't assess things at full size, so it is possible to miss problems. We can load a model in the VR dome in JT format using Teamcenter software in an hour or so, compared to the days it would normally take (though the model surfaces are shaded rather than rendered and the background is omitted). We currently only use three screens, although we could expand to eight."

Vallis says that while they sometimes get CAD drawings where subsystems show clashes in the VR dome, they typically aren't identified until later in the process, when cost and time have already been incurred. "In the dome, we tend to find them quite quickly," he says. "We are looking at the whole model, whereas the draftsman at his desk may just be looking at single items – a chair, a display, a controller or a welded panel on the side of a component or assembly."

In these situations, Teamcenter is used to manage and drive the required multi-projected images into the VR dome. The Teamcenter concept desktop capability is used to add realism to the CAD model and enables users to leverage their existing International Organization for Standardization (ISO) JT™ data format to add greater realism to their digital mock-ups and surrounding scenes. (The JT file format is an open and widely used technology for 3D visualization, collaboration and data sharing in today's product lifecycle management (PLM) environments. The JT Open program and JT Open toolkit are part of Siemens PLM Software's PLM Components suite of software tools that support innovation and promote interoperability in CAD, CAM, CAE and PLM applications.)

The Teamcenter concept showroom capability enables the virtual product (prepared in Concept Desktop) to be reviewed in life-size, virtual environments for true 1:1 scale realism. Combined with the dome, this provides an immersive evaluation environment for formal and informal digital design reviews, especially effective with stakeholders who may not relate well to CAD images.

"Using the VR dome for collaborative design reviews allows us to assess many more concepts and variations in a fraction of the time it would take to build prototypes for each variation."

David Vallis
Manager
Land Systems Integration Facility
BAE Systems Global Combat Systems

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JT
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Customer's primary business

BAE Systems Global Combat
Systems designs, manufac-
tures and supports land
systems: weapons, munitions
and vehicles.
www.baesystems.com/
Businesses/LandArmaments/
Divisions/
GlobalCombatSystems

Customer location

United Kingdom

"This is a flagship facility
within the company and
with customers, and it has
strengthened our already
excellent reputation for
meeting urgent operational
requirements."

David Vallis
Manager
Land Systems Integration
Facility
BAE Systems Global
Combat Systems
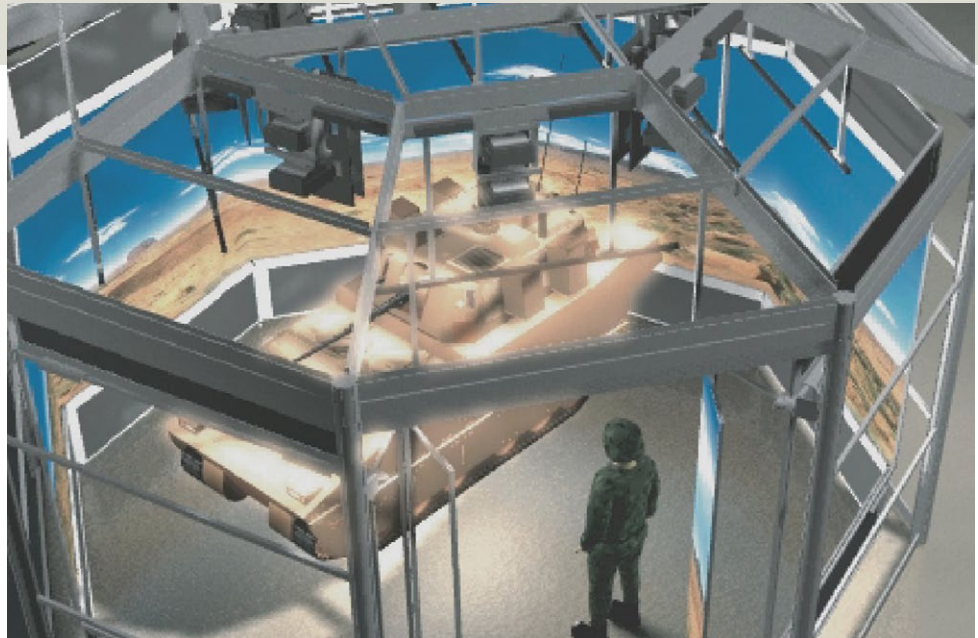
Improved decision making and conflict resolution

One of the main advantages of the VR dome is that it can directly read the industry-standard 3D JT files produced with Teamcenter, part of the overall production management system at GCS. Vallis notes, "All new work here is done in NX, managed by Teamcenter. We keep Pro/Engineer for legacy work and this is also managed by Teamcenter.

"By displaying NX designs in stereoscopic 3D in the VR dome, our engineers are able to eliminate the ambiguity associated with 2D drawings. Using the VR dome for collaborative design reviews allows us to assess many more concepts and variations in a fraction of the time it would take to build prototypes for each variation. We can also assess ergonomic factors such as sight lines, reachability and clearances. Using digital mock-ups in the VR dome helps improve decision making and helps iden-tify and resolve conflicts earlier."

A flagship facility, a worthy investment

"This is a big investment but it has been well worth it," says Vallis. "We used it on a number of military platforms and it has been hugely beneficial in identifying problems, integrating subsystems and selecting and agreeing on concepts at the design stage. We used the VR dome for the Terrier vehicle, which is in Teamcenter, and were easily able to transfer the data from Teamcenter into the 3D dome." He notes, "We have reduced risk down to manageable levels much earlier than had we waited until the prototype stage. This is a flagship facility within the company and with customers, and it has strengthened our already excellent reputation for meeting urgent operational requirements."

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Fokker Services

Enterprise-wide PLM backbone transforms service business, enabling growth in new markets

Industry

Aerospace and defense

Business challenges

Heavily regulated industry

Many engineering changes

Significant legacy data

Need to quickly turn innovations into certified products

Keys to success

PLM expansion; now enterprise-wide

Application integration

Digitally managed workflows for change management and electronic sign-off

Teamcenter helps speed the certification of new products and win new business by managing engineering data and processes according to aviation industry standards

More than maintenance

Fokker Services is more than just an aircraft maintenance company. As an "out-of-production" specialist, Fokker Services performs aircraft maintenance, modifications and repairs. The company is part of Fokker Technologies, which in turn is part of the holding company Stork BV, which also includes Stork Technical Services. Fokker Technologies, which has approximately 3,700 employees, is the group name for five specialized Fokker business units: Fokker Aerostructures, Fokker Aircraft Services, Fokker Elmo, Fokker Landing Gear, and Fokker Services. Fokker Technologies designs, develops and produces advanced lightweight structural components and electrical cabling systems for the aviation and defense industries, and supplies integrated services and products to aviation companies.

Fokker Services is an important partner for aircraft manufacturers. Typically manufacturers want to focus on developing new aircraft, yet existing aircraft need more attention the older they get. Fokker Services resolves this issue by offering out-of-production expertise on aging issues, the replacement of obsolete components,

remarketing on the basis of new and integrated concepts and, of course, inspection, maintenance and repairs.

Innovation and cost savings are core issues for Fokker Services clients. Historically, airplanes are one of Fokker's most important products. In addition to the Fokker platform, Fokker Services now also provides services for the Bombardier Dash-8, NH-90 helicopter and F-16. Fokker Services still holds all original equipment manufacturer (OEM) approvals and certificates and can thus offer more than traditional maintenance companies can. This complete service during the entire lifecycle of an aircraft secures existing clients and ensures future revenue.

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Results

35,000 engineering changes managed reliably (approximately 500 new engineering change requests issued annually)

Electronic sign-off certified

Faster product innovation and certification

Paper documentation (2.5 million pages a year) reduced to zero

Configuration management-based documentation

Watertight processes

First to market in a number of product domains, including LED lighting and Electronic Flight Bag on iPad

Growth in the number of new clients

PLM footprint

"Throughout the lifecycle, the aviation authorities insist on thorough processes and documentation," explains Andries Tieleman, information communications technology (ICT) director at Fokker Services. "The only way to achieve this is to use a company-wide backbone for process and data management: PLM (product lifecycle management). The data are produced and processed in a variety of tools characteristic of the market in which we operate. That's why we need an open PLM backbone to be used from the work floor right up to and including management. Teamcenter, as a single, secure source of product and process knowledge, fulfills that need for us."

Teamcenter® software from Siemens PLM Software has been used at Fokker Services for more than a decade, having replaced a previous mainframe application. Fokker Services currently uses Teamcenter across the entire organization. "In recent years, we have carried out focused projects to make the PLM implementation completely appropriate for our functional needs," Tieleman says. "We had already achieved legacy management and had digitized many processes in such a consistent manner that the Dutch aviation authorities even decided to recognize our working method." The legacy data in Teamcenter currently comprises 300,000 digital 2D

drawings. These are drawings of structural components and electronic diagrams. Another 300,000 legacy paper drawings have been scanned and added to Teamcenter.

IT award

Configuration management of an aircraft takes place entirely in Teamcenter. The configuration information controls many of the business applications Fokker Services uses. Aircraft maintenance manuals, illustrated parts catalog and wiring manuals are good examples. The authorities insist that these need to be entirely configuration-specific. In the old situation, Fokker Services used to send out 2.5 million pages of updates each year. The client had to incorporate every change into his existing documentation, which was quite a troublesome and expensive operation. Now, the client has direct access to the manuals associated with his tail numbers, via MyFokkerFleet.com.

"Manuals are generated by using the aircraft configuration from Teamcenter to guide the XML-based content management," Tieleman explains. "Illustrations from Teamcenter are linked to content and are merged into one book. The openness of Teamcenter offers a distinct advantage here. The manuals are published on MyFokkerFleet.com, where the modifications are also highlighted." That's

significant and literally led to information technology (IT) recognition. Tieleman explains, "This development took second prize in the IT Project of the Year award, which is presented at the TITM conference every year." TITM, which stands for Tijdschrift IT Management, is a Dutch magazine for IT executives and managers in the ICT sector. "If requested, manuals are also provided on DVD. For cost reasons, all manuals are encrypted and written to a standard master DVD. The client gains access to his own manuals using a code."

Electronic sign-off

Changes are introduced to the aircraft configurations during upgrade or maintenance projects. It is vitally important to manage these changes (via the process of engineering change management) and report the changes to the aviation authorities. "Where we previously used expensive and slow paper procedures, we have now implemented all the processes in a transparent manner in Teamcenter workflows," Tieleman adds. "It's an extremely formal process. There's a change proposal, which is evaluated, and the affected components are verified. The system also records that this is being done by certification engineers." The results of analyses are recorded in reports. Signing-off the reports occurs by checking into Teamcenter. "The process is solid enough to exclude any mistakes," Tieleman notes.

"The footprint we have now achieved with Teamcenter contributes directly to our company's success."

"Thanks to Teamcenter, we are able to introduce innovative new products to the market quickly."

Andries Tieleman
ICT Director
Fokker Services

Solutions/Services

Teamcenter
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Customer's primary business

Fokker Services is a specialist in maintaining, repairing, modifying and remarketing out-of-production aircraft. Its emphasis is on quality, speed and enhancing reliability, while reducing costs.
www.fokkerservices.com

Customer location

Nieuw-Vennep, Netherlands

"Manuals are generated by using the aircraft configuration from Teamcenter to guide the XML-based content management. Illustrations from Teamcenter are linked to content and are merged into one book. The openness of Teamcenter offers a distinct advantage here."

Andries Tieleman
ICT Director
Fokker Services

"The Dutch aviation authorities who have certified the working method also agree."

Quick to market

Innovative LED lighting for aircraft and digital airport charts in the cockpit were rapidly produced using Teamcenter workflows. "The LED lighting weighs less than conventional lighting and it's maintenance-friendly," explains Tieleman. "We were able to develop it and have it certified very quickly. That would not have been possible in the old situation. Now we are the first to market and are reaping the benefits."

The same applies to information in the cockpit. Charts of all airports must be present in the cockpit. "That's an expensive business," Tieleman says. Fokker Services created an Electronic Flight Bag. Tieleman explains, "With the help of our partners, we have made all the charts available digitally on an iPad. It's much cheaper than having to maintain paper charts, and it is creating some enthusiasm in the market. Here too, we were early, because the product could be certified quickly thanks to our Teamcenter workflows."

To make the production of components as efficient as possible, Fokker Services made Teamcenter available to suppliers

selectively. "Data security requirements are strict," says Tieleman. "With Teamcenter, we can make data available to our sister companies in the Fokker group in a secure way. This is done on an ad hoc basis for companies outside the group, which is easy to do with the technical solutions Teamcenter offers for this. In all instances, only the relevant data are made available."

Direct link to company's success – Teamcenter

Teamcenter has acquired the status of PLM backbone at Fokker Services. All processes and applications use Teamcenter to carry out critical operational tasks. "The footprint we have now achieved with Teamcenter contributes directly to our company's success," Tieleman says. "We are able to introduce innovative new products to the market quickly. Thanks to digitalization, the processes are watertight, and the integration of applications means data are stored and monitored in just one location. Success with aircraft from other OEMs is proof of the success of Teamcenter."

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SIEMENS

UK Ministry of Defence

Realizing defense logistics vision

Industry

Defense

Business challenges

Manage lifetime defense equipment support cost; including delivery of effective field support

Provide online access to up-to-date technical information across the Royal Navy, British Army and Royal Air Force

Influence equipment design for maintainability

Eliminate bulk printing, storage, distribution and updating of technical documentation

Reduce overlap and duplication in logistics IT systems

Keys to success

Partnership with HP Enterprise Services (HPES), Siemens PLM Software and the Design Repository team to fit Teamcenter enterprise knowledge management software for unique MoD environment

Managing business change; realizing user buy-in

Teamcenter enables UK Ministry of Defence (MoD) to transform, streamline and optimize logistics processes through Design Repository

Streamlined end-to-end logistics support chain

The lifetime cost of supporting defense equipment can exceed the cost of its initial procurement. When that cost is more than £10 billion per year, there is clearly a lot at stake, which is why the United Kingdom (UK) Ministry of Defence (MoD) turned to the current Defence Standard for Integrated Logistics Support (ILS), or 00-60, as the mechanism to manage this cost and influence equipment design for maintainability – both in selecting equipment and delivering effective support for equipment in the field.

As part of that initiative, the MoD is engaged in transforming the current complex web of logistics processes and systems into a streamlined, optimized, agile and effective end-to-end logistics support chain, fully integrated with the front line and industry. Operating within Defence Equipment and Support (DE&S), the Logistics Network Enabled Capability (Log NEC) Programme is providing a framework for logistics information services, programs and applications to facilitate greater coherence and communication between the MoD and its providers, as well as to ensure commonality and interoperability between separate logistics information systems. The Log NEC Programme is utilizing Teamcenter® software to support its Design Repository (DR) capability as a key component of its overall architecture.

Expansive defense equipment and support requirements

Within the MoD, DE&S manages resources for the UK's armed forces for current and future operations. DE&S has responsibility for Her Majesty's (HM) Naval Bases, the Joint Support Chain and British Forces Post Office (BFPO). Employing approximately 22,500 people, with an annual budget of £13 billion, DE&S acquires equipment and provides through-life support and services for it. Primary equipment/support services cover ships, aircraft, vehicles, weapons, information systems and satellite communications. DE&S also provides sustainment of ongoing requirements, including food, clothing, medical supplies and temporary

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Keys to success *(continued)*

Effective project teams

Leveraging of the MoD's Defence Equipment and Support (DE&S) Defence Storage and Distribution Agency (DSDA) to reduce storage and distribute hard copy technical information

Results

10,000+ Army Equipment Support Publications online

More than 500 Electrical and Mechanical Engineering Regulations online

40 integrated platform teams managing their publications online

Over 850,000 searches averaging 1,868 searches per day with a peak of 4,718 searches in one day

accommodations. DE&S utilizes its Defence Storage and Distribution Agency (DSDA) arm for storage, maintenance, processing and distribution of materials.

Design Repository – single defense reference solution

The Log NEC Programme manages a range of engineering and logistics applications used across defense, from equipment failure reporting systems to those managing engineering information. During the creation of what was then called the Support Chain Programme, in the early 2000s, it became clear there was significant systems overlap and duplication within the portfolio of over 400 logistics systems. These arrangements were complex, resource-intensive to manage and made it difficult to provide the information needed to transform the logistics operation. In a move to resolve and rationalize part of this application footprint, the Log NEC Programme re-examined the User Requirement for systems managing engineering and ILS data and chose the DR as the application of choice to best invest in what would become known as the Log NEC Defence Reference solution. The DR was created to provide a single secure location for the complete management of all key project data and complex technical documents, ILS data, logistics support analysis records (LSAR) and through-life management plans (TLMPs). In essence, DR provides the Joint Support Chain with a single Defence Reference solution.

No need to be an LSAR expert

In DR, all appropriately authorized users can see exactly the same comprehensive and up-to-the minute accurate data, including TLMPs, Tech publications, parts lists, BOMs, specifications and tenders, engineering changes, workflow definitions, etc. – throughout the life of the equipment. In the early stages of a project, the supplier makes a data drop of relatively immature LSAR information sufficient for initial provisioning. As the project matures into the assessment phase, there is a second drop with more

detail. The data drops are validated in Omega PS LSAR software, and the top-level LSAR data is then loaded into Teamcenter. DR provides an equipment configuration capability that manages the functional and physical structures in the equipment breakdown structure. LSAR data is highly complex, but with DR, LSAR or Omega PS expertise is not needed.

DR capabilities

DR has specific capabilities for TLMP, providing a potential home for DE&S Whole Life project information. DR provides a collaborative working environment, offers a single DE&S TLMP repository, allows sharing of best practices and enables the history of TLMP to be viewed and maintained throughout the whole life of a project. All project teams are now required to produce a TLMP for each project. If the project is then managed in DR, it offers TLMP visibility to all stakeholders, encourages data storage in a single location and permits publication from a single location.

In addition, DR provides support for ASD S1000D, the International Specification for Technical Publications used by the MoD for procuring and producing technical publications. In the future, DR will also provide a home for interactive electronic technical manuals (IETMs) and interactive electronic technical publications (IETPs), which means that through publications with embedded videos and 3D images, engineers can see explicitly how to carry out a service task or repair.

Efficiency and data integrity via Technical Documents On Line (TDOL)

The current focus in DR is on TDOL, which means making more than 50,000

Teamcenter tracks every single change throughout the life of the equipment and provides full control over all of the information.

technical manuals available electronically and creating a 'one-stop shop' for technical publications, including an online index of what is available. This has proved to be a massive step forward and offers the biggest short-term benefits – given how much equipment there can be in theatre, how many manuals would be needed, how much space they would take up and how difficult it would be to find what is required. There could be thousands of books, all of which must be kept up to date so everything can be repaired or maintained to the highest standards in the minimum time.

Log NEC Programme staff confirm a huge reduction in hard copy printing and now there is no longer any need for project team hard copy libraries. Originally, industry used to supply hard copy books that would be passed to a printer to provide enough copies to meet estimated demand. The books would be stored off site and dispatched when needed to wherever they were needed as required. There has been a huge saving in printing costs and the time it takes to access the information has been reduced from days to minutes. Some 10,500 books are available online whereas some 15,500 hard copy books were kept in storage. Valuable storage space has been released for other purposes.

Then there is the issue of data integrity. DR-TDOL is secure and permission-based. It has inherent version- and status-configuration management, making the latest releases of technical publications

available over the Restricted LAN Interconnect (RLI). Teamcenter performs the configuration management and allows for the first time identification of the document owners so that the responsibility of keeping them up-to-date can be assigned.

Every change tracked

Suppliers use Teamcenter to create the information and Teamcenter is used to manage that data, to maintain a record of it and to make it available during the life of the equipment. Teamcenter now tracks every single change throughout the life of the equipment and provides full control over all of the information. There are 50 read-only Teamcenter users who can view the latest version of the data, usually to support the print process. There are also 175 full licensed users of Teamcenter who are responsible for inputting the data to maintain the technical publications. In addition, British troops all over the world can access Teamcenter by using a web viewer written by HPES. This allows access to the latest version of the information requested, ensuring troops have the most up-to-date information when they need it, where they need it.

Cost-effective architecture

The DR architecture is tremendously cost effective as it uses the existing MoD network infrastructure. In principle DR is accessible to all UK Defence Fixed Telecommunications Secure LAN interconnect (DFTS-RLI)-enabled suppliers and sites. The front-line commands, industry (with controlled access), the

Solutions/Services

Teamcenter
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Customer's primary business

The Ministry of Defence equips and supports the UK's armed forces for current and future operations.
www.mod.uk

Customer location

Abbey Wood, Bristol
United Kingdom

The Design Repository, based on Teamcenter, is a key component in the Log NEC Programme and is a major step forward for the MoD in the way it manages tech information and has support throughout DE&S. DR is already playing its part, along with other systems and disciplines – such as Logistics Support Analysis – that the MoD is using to increase perfor-mance and reduce costs in this area.

DE&S procurement arm, print contractors and the storage division in Bicester all sit on the RLI as do the project teams responsible for the data. The Design Repository is working well and all equipment – current or future – requiring a hard copy output, is likely to be managed in it. There are now more than 10,000 Army Equipment Support Publications (AESPs) and more than 500 Electrical and Mechanical Engineering Regulations (EMERs) available online. Already, some 40 integrated platform teams are managing their AESPs online. And soon, with the addition of air publications (APs) in 2010, there will be over 30,000 books online. There have been over 850,000 searches since April 2008, saving a significant amount of time and cost in comparison with the way it used to be done.

Source data – entry reduced from weeks to hours

With DR, an end-to-end process has been developed where industry is actually involved in delivering and taking owner-ship of the data directly in Teamcenter. In effect, the MoD just becomes a viewer of the data once approved. Storage real estate has been dramatically reduced as there is no longer a need to store massive amounts of books. The process for getting electronic information from the source has been reduced from weeks to potentially hours and more than 5,000 obsolete publications have been identified and removed from storage. DR users are now certain they are looking at the definitive, most up-to-date publications because all technical information is now transparently sponsored.

Critical success factors: managing change, user buy-in and Siemens commitment

The successful implementation of enterprise systems such as DR is about

managing business change and winning the commitment of stakeholders and Siemens has provided extensive support to (FLIS) through effort, commitment and investment into this program. With Siemens' help, the Log NEC DR team ran a number of road shows that demonstrated the system capabilities, winning stake-holder commitment as early as possible by explaining the benefits to them. The functional needs of DR are influencing core Teamcenter development too, benefitting both DR and other potential users in the defense sector worldwide.

Shorter lead times, lower costs, greater performance

The Design Repository, based on Teamcenter, is a key component in the Log NEC Programme and is a major step forward for the MoD in the way it manages tech information and has support through-out DE&S. DR is ensuring that technical and product information is readily avail-able throughout the life of all the equip-ment. This reduces the lead time for the engineer to get the specific data he needs and reduces repair times. This leads to increased fleet availability and plays a part in reducing the costs of overhaul and maintenance. DR is already playing its part, along with other systems and disciplines – such as Logistics Support Analysis – that the MoD is using to increase performance and reduce costs in this area.

SIEMENS

Alexander Dennis

Single data source drives efficiency for marque bus and coach line

Industry
Automotive and transportation

Business challenges
Improve production efficiency

Maintain continual product innovation

Integrate teams across multiple sites

Keys to success
Access by all departments to the same accurate master information

Results
Less time spent on data management

Improved product quality and shorter lead times directly attributed to revision controlled design data

Overall increased process efficiencies as a result of collaboration across sites

Immediate access to all drawings versus previous process, which took between two days and two weeks

£10,000 per year saved on reprographic consumables alone by sharing design information with suppliers

Alexander Dennis uses Solid Edge and Teamcenter to fuse design and engineering with manufacturing; company improves product quality and time-to-market while reducing costs

Pioneering chassis and body design
There's a popular saying, "You wait ages for a bus, then three come along together." Preferably when your bus comes along, it will be made by Alexander Dennis Limited (ADL), which produces the famous brand names of Alexander, Dennis and Plaxton.

The sole manufacturer of full-size bus and coach chassis in the United Kingdom (UK), ADL produces innovative and fuel efficient, low floor single and double deck buses in the UK, continental Asia and North America.

ADL pioneered both "low floor double deck" and "midibus" technology; the company was first to market with a revolutionary hybrid drive system for single and double deck buses; and it launched the world's first high capacity hybrid double deck.

ADL uses Teamcenter® software and Solid Edge® software, both from Siemens, to design and manage its products, which are renowned for delivering fuel and CO2
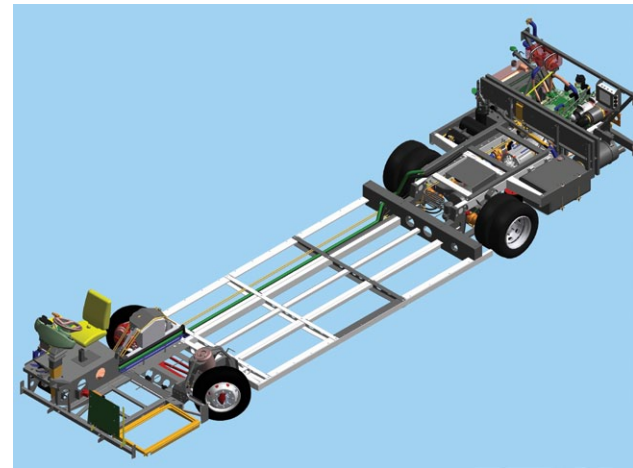
savings, durability, styling, comfort and space.

Quick win with Teamcenter
Alexander Dennis first began using Solid Edge CAD technology in 1997 and adopted it across all sites in 2002. According to ADL management, this opened up new possibilities as well as potential difficulties: "People wanted to access drawings electronically yet it would take two to three days to locate a drawing, print it off and deliver it to a supplier, and in some cases the distribution of electronic drawing files could take up to two weeks. We recognized that we were having problems managing the 100,000 CAD files generated by 60 engineers across the group. The worst incident was when one team overwrote the work of another on a shared axle component. It took three engineers a week to

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piece the overwritten design together again. We've always enjoyed the benefits of Solid Edge. So the decision to implement Teamcenter at the Guildford site was not difficult."

ADL began by keeping release drawings in the Teamcenter digital lifecycle management system, retaining separately stored images of the drawings open for viewing. ADL management points out, "Teamcenter was a quick win, because it gave our suppliers instant access to drawing information via the web. It immediately cut the reprographic costs of distributing design information, which was more than £10,000 per year for the consumables alone. Design information was available for the first time to anyone who needed it within a couple of minutes. This proved to be so useful we decided to go further. In particular, we wanted to ensure that only one person at a time could check out a design so that we could control revisions. The aim was to pull together isolated electronic or paper-based systems, avoid re-entry of data, improve network performance, increase our use of duplicate parts, and manage data exchange between sites and with suppliers."

Creating a single source of reliable data

It was clear that the Guildford site would need to rebuild its CAD database in order to create a CAD data vault, which the company considered its foundation for controlled access to CAD data. To do this, ADL used the Solid Edge embedded client as an interface with Teamcenter. "This is a comprehensive set of powerful tools, and we had excellent support from our technical account managers at Siemens who guided us through the implementation process," notes ADL management.

This involved making a copy of ADL's existing database and creating a new empty database on a separate server. ADL management explains, "One of the Teamcenter guys wrote an SQL server query to strip out all the data we needed from the copied database, which sat in a Windows operating system folder on a workstation. As we were handling 100,000 files it took three months to copy the files, run all the tools, cleanse the data and transfer it into the new database. We then did a three-month catch-up, which took two weeks, followed by incrementally smaller amounts until there was only one Friday morning's worth of changes to upload over the

launch weekend. We had a day of user training, and then we spent the launch weekend loading new interface software for all engineers."

ADL began that process in November 2007 and the system went live in May 2008. "We received very good support from the UK and the US, both here on site and remotely," explains ADL management. "We worked very closely with our technical account managers who were always there at the end of a phone line, especially on launch weekend. We were not the first people to implement this interface, but we were uploading a huge number of files; at the time it was the largest number for any Siemens client. Those Siemens guys were determined to make it work."

ADL now has 20 full Teamcenter licenses at Guildford and 15 view licenses for 35 suppliers who are connected into the CAD data vault as well as 30 internal users within accounts, purchasing, manufacturing engineering, manufacturing, technical publications and customer services. Users have a set of tools and processes for the ongoing uploading of data into Teamcenter. "We always believed that Teamcenter was the right solution for us,"

says ADL management. "Its performance proves we were correct."

Certainty supports collaboration
ADL's data vault is a single source for CAD data, a single point of inquiry across the company. It provides automatic revision control. ADL management notes, "This certainty supports collaboration across sites. People are sure they are accessing the correct data and by flagging designs as 'released' and 'in work,' we prevent accidental overwriting of others' data, so there is no potential for any costly mistakes where different buses share elements of design. We also have easy access to old revisions, whereas previously it was too complicated to go back and store an old revision. In addition, we have been able to add a layer of security over and above our Windows structure."

Philip Wentworth, plant director at ADL Guildford, cites additional advantages: "Since the implementation of Teamcenter along with the Solid Edge Embedded Client, we have greatly benefited from improved efficiencies and a reduction in time spent on data management. The ability to allow suppliers 'managed view-only access' to revision-controlled design

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Solid Edge
www.siemens.com/solidedge

Customer's primary business

Alexander Dennis Limited (ADL) is the UK's leading bus and coach manufacturer, employing people at facilities in the UK, continental Asia and North America. ADL products offer real operator, passenger and environmental benefits, all backed by an unswerving commitment to world-class customer support.
www.alexander-dennis.com

Customer location

United Kingdom
(multiple sites)

data has also helped improve product quality, cut lead times and increase efficiencies. We look forward to further exploiting our use of Teamcenter at Guildford and throughout the group."

ADL is considering the next phase. According to ADL management, "This may be a group-wide implementation of the CAD data vault or it may be looking at processes on the Guildford site. For example, we may begin to incorporate engineering change and sales inquiries into Teamcenter. The ultimate aim is to manage all engineering data for Guildford in Teamcenter. Meanwhile, there are plans to roll out Teamcenter at our sites in Falkirk and Scarborough."

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Shenyang Brilliance Jinbei Automobile

Charting the optimal path to improved competitiveness

Industry

Automotive

Business challenges

Improve R&D process for new model introduction and facilitate product data re-use

Establish spare parts coding system and implement super lightweight data output format

Integrate PDM and simulation processes with product development

Keys to success

Collaborate with leading global automakers

Standardize coding system for parts implemented through PDM

Prepare PDM data for ERP

Results

Shortened new project's data collection from one month to two hours

Reduced printed copies of engineering drawings from 400 per day to 10 per day

Accelerated approval process by up to 50 percent

Independent R&D process using Teamcenter pays off with increased automotive success; company improves designer productivity, saves development costs and shortens product lifecycle

Establishing a common vehicle program platform

Located in Shenyang, China, Shenyang Brilliance Jinbei Automobile Co., Ltd. was well known in its native land. The company's Brilliance passenger cars and Jinbei Haise minivans are popular in China, the world's fastest growing auto market. But Brilliance Jinbei's executives had set their sights higher. They wanted to compete in the global automobile marketplace and decided to implement Teamcenter® software to drive the company's product development improvement initiatives. Brilliance Automotive Engineering Research Institute is affiliated with the Brilliance Automobile Group. The research institute is responsible for product development, engineering design and product improvement for all models in the group's key Brilliance and Jinbei brands. The institute also functions as an automobile research and development (R&D) center, addressing product development, production technology services, product quality and information management.

Product R&D is crucial to the success of automakers looking to seize a sustainable advantage in today's fiercely contested

markets. In turn, Brilliance Jinbei's product data management (PDM) solution, which is driven by Teamcenter, is the R&D system chosen to integrate and manage all of the data for all of the automotive company's product lines. In essence, the PDM system functions as an information technology-based R&D platform that drives the company's core initiative to improve its competitive position. Most importantly, by enabling the company to reduce its costs and minimize its new product development cycle, Brilliance Jinbei's PDM system was chartered with significantly improving the company's overall competitiveness.

In mapping out PDM's initial charter, Brilliance Jinbei's management identified a number of areas for improvement. In par-

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"Teamcenter has driven many improvement initiatives. Its value has greatly exceeded our initial R&D scope and it is now increasingly reaching across more and more company functions."

Guo Sihan
Director
Data Information Office
Brilliance Automotive
Engineering Research Institute

ticular, management wanted to streamline its R&D process. Company executives wanted to bring new vehicles to market sooner and hold down costs so that Brilliance Jinbei's vehicles could compete on price as well as quality. In addition, executives wanted better access to product knowledge to improve the quality of their strategic decisions for greater product innovation.

At the time, the company did not have a common platform for product information. Each vehicle program functioned mostly independently. A low rate of information re-use affected part sharing, extended the development cycle and increased costs. Other inefficiencies, such as a paper-based design review process and lack of a formal system for capturing knowledge, needed fixing before the automaker was ready for the global arena.

Management realized it needed to implement a product lifecycle management (PLM) solution with PDM capabilities to support its long-term development plan. "We needed a leading-edge information system that was not only powerful but also flexible enough to integrate with executive-level information, thereby helping us make better decisions in a highly competitive market environment," notes the senior management team of Shenyang Brilliance Jinbei Automobile. After evaluating different solutions, Brilliance Jinbei chose Teamcenter to drive these initiatives.

Teamcenter selected to drive R&D efficiency
The overall business growth of Brilliance Jinbei is a typical example of the success experienced by China's independently-developed automobile brands. This includes introducing Haise technology in 1989, starting R&D for the Brilliance sedan in 1997 and its production in 2002, launching Brilliance M2 in 2003, building the platform for Level-A vehicles in 2005, and launching Brilliance FRV in June 2008.

2001 was an extremely busy time at Brilliance Jinbei's R&D center. The company had generally been using Excel® spreadsheets for bill of material (BOM) management. All types of product data were managed through different table attributes. Not surprisingly, this approach had severe functional restrictions. As the company's business continued to grow, Brilliance Jinbei realized that it urgently needed an effective management tool to solve the problem. This realization triggered the company's initial requirements for PDM.

The PDM project came to Brilliance Jinbei quite naturally. The company's product engineering director once worked in the Pan Asia Technical Automobile Center (PATAC). As a result, he recognized the importance of using a PDM platform to improve R&D efficiency. With his support, the PDM project was put on the company's agenda. Initially, Brilliance Jinbei's requirements were rather simple: it needed a team with rich experience and a consulting vendor that had implemented PDM for European and American companies. In addition, the software for the company's PDM platform needed to be relatively mature in terms of functionality. With this in mind, Brilliance Jinbei asked Siemens PLM Software to quickly organize a dedicated implementation team for its PDM project and Teamcenter became the PLM platform that now plays a crucial and expanding role in the company's future growth.

JT super lightweight data format ensures multi-CAD compatibility

Brilliance Jinbei uses Teamcenter to share 3D CAD data across its product development operations. Guo Sihan, director of the Data Information Office at Brilliance Automotive Engineering Research Institute, explains how this works: "During the R&D process, we use 3D CAD software to design the mathematical model and then we can save the DA file in our PDM database through a 3D conversion application interface that comes with Teamcenter. The application interface automatically converts the hierarchical relations of the 3D file into a BOM structure. Meanwhile by converting the 3D DA file into a lightweight visual file using the open JT™ capabilities of Teamcenter, we are able to save this for future re-use."

Given the excellent compatibility of Teamcenter with other CAD software, the company's PDM platform is able to play a vital role across multiple Brilliance Jinbei operations. For example, during the original vehicle design process, engineers can either use 3D CAD software under the Teamcenter platform, or perform the design externally and then import data at key points.

Easy switch from eBOM to mBOM

Today, it is extremely easy for Brilliance Jinbei to switch from its engineering BOM (eBOM) to its manufacturing BOM (mBOM) using the configurable BOM management capabilities of Teamcenter. After completing its initial Teamcenter implementation, the company expanded the software's scope by using it to integrate enterprise resource planning (ERP) into the PDM environment. Here, Brilliance Jinbei uses an application interface between Teamcenter and the ERP system to facilitate its eBOM to mBOM switching. As a result, Teamcenter now manages materials, product structure and engineering conversions as configurable products and mBOM data sources for ERP. While transferring data/

BOM to the ERP server, Brilliance Jinbei only has to create a modified datum in the Teamcenter system and implement an automated workflow. The ERP data administrator controls the time for uploading. In this way, the data consistency between the two systems is maintained through a simple interface, thereby avoiding data mixing.

Significant improvement to dimension and quality management

Several years after implementing Teamcenter as its PDM-driven product development backbone, Brilliance Jinbei was confronted with a new challenge – how to control its manufacturing process. With this in mind, the company now uses data controlled by Teamcenter and its simulated analysis workflow to establish a process for strictly managing product size and quality and to ensure that the functions, assembly and appearance of each part meet established product requirements.

Working in conjunction with Siemens PLM Software, Brilliance Jinbei has established tools and processes for four key tasks: basic analysis, optimization analysis, manufacturing data simulation/analysis and PDM integration. In essence, these tools and processes established a set of dimension management capabilities for Brilliance Jinbei's product design and manufacturing operations. Since implementing these initiatives, the dimension and quality management aspects of Brilliance Jinbei's manufacturing process have improved significantly.

Great results and continuous improvement – a matter of choice

With the application of PDM, each of Brilliance Jinbei's business departments has gradually phased out its use of drawings. Before 2008, 400 copies of drawings were printed every day; today less than 10 are printed. In the early PDM implementation period, Brilliance Jinbei's

"Teamcenter enables us to centrally manage our product data, reduce our workload through design re-use and increase the efficiency of our data retrieval and application processes. As a result, we have improved the productivity of our designers, shortened our product lifecycle, saved development cost and strengthened our company's independent development ability and competitiveness."

Guo Sihan
Director
Data Information Office
Brilliance Automotive
Engineering Research Institute
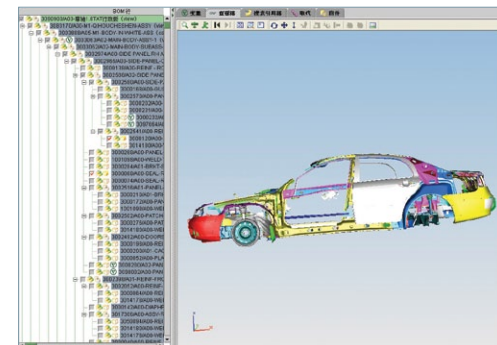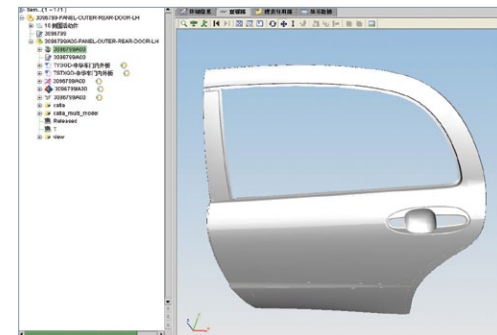
Solutions/Services

Teamcenter
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Customer's primary business

Shenyang Brilliance Jinbei
Automobile Co. is a large
Chinese automotive manufac-
turer engaged in R&D, design,
production and sales of com-
plete vehicles, engines and
core spare parts.
www.brillianceauto.com/main.
html

Customer location

Shenyang
China

Information Management group had to
persuade each department to try the PDM
system. Today, business departments vol-
untarily ask for more PDM clients.

In his role as director of the company's
Data Information Office, Sihan has been
deeply impressed by the changes PDM has
brought over the past six years. He notes,
"Teamcenter has driven many improve-
ment initiatives. Its value has greatly
exceeded our initial R&D scope and it is
now increasingly reaching across more and
more company functions."

Sihan recalls, "Brilliance Jinbei began its
Teamcenter implementation with a three-
month pilot program that was so success-
ful that management decided to extend
the benefits company-wide. Our gains
have been remarkable ever since. For
example, Teamcenter reduced basic design
time by 20 percent. This led to substantial
cost reductions and significant parts and
information re-use. Teamcenter enables
us to centrally manage our product data,
reduce our workload through design
re-use and increase the efficiency of our
data retrieval and application processes. As
a result, we have improved the productiv-
ity of our designers, shortened our product
lifecycle, saved development cost and

strengthened our company's independent
development ability and competitiveness."

Brilliance Jinbei now has one of the
largest PLM/PDM implementations in the
Chinese automotive industry. The compa-
ny's future development plans are to
incorporate suppliers and partners into a
digital collaboration process managed by
Teamcenter, as well as to create an enter-
prise-wide knowledge base. Sihan notes,
"We've only spent a few years doing some-
thing that foreign automakers have been
doing for more than a decade, so we feel
we have room for improvement. We plan
to use Teamcenter as the backbone for our
product development platform, wholly
standardized and systematic. Using
Teamcenter, continuous improvement is
simply a matter of choice."

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SIEMENS

Daesang

Increasing competitive advantage through PLM

Industry
Consumer products

Business challenges
Managing multiple products across the organization

Working collaboratively

Re-using data

Keys to success
Interface between project management system and product data management system

Management support

Successful implementation

Results
Measurably improved project coordination

Substantially improved knowledge re-use

Significantly reduced time-to-market

Tangible rise in personal productivity, collaboration and innovation

Greatly enhanced competiveness; stronger market presence

Use of comprehensive product data management tools helps Daesang increase innovation and significantly reduce time and costs

Korea's leading general foods company
Established in 1956, Daesang has grown into one of the world's top 3 professional fermentation companies and one of Korea's best general foods providers. In 1962, it became the first Korean company to successfully develop production processes for glutamate acids through fermentation technology, effectively opening the first chapter of Korea's biotechnology industry. Since then, the company has made its reputation as a globally competitive biotechnology fermentation company, developing the technologies to produce approximately 20 kinds of amino acids, including MSG, L-Phenylalanine and L-Glutamine, as well as nucleic acids.

With steadily growing sales, Daesang employs about 3,500 people. Chungjungwon, Korea's leading general foods brand, is at the center of Daesang's business success. Other prominent products include Sunchang red-pepper paste, Gamchimi, Matna and Matsunsang condiments, as well as a variety of fish sauces, flavors, western cuisine, frozen foods, coffee, healthy lines and meat-processed fare.

Extensive data and document management challenges
Like many general foods companies, Daesang produces hundreds of different kinds of products, including all sorts of foods and food ingredients. Thus, it manages an extensive range of documents for each product and its mass production. Each division, which includes sales, marketing, research, quality assurance and production, manages its own products; however, errors were increasingly entering into each organization's processes, especially in projects requiring extensive collaboration.

In an effort to address its product data management (PDM) and collaboration

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"Teamcenter from Siemens PLM Software has enabled us to standardize our work, and has allowed us to follow business processes that enable us to maintain overall consistency. Greatly improved data management, sharing and collaboration made possible using Teamcenter has not only helped us to greatly enhance project coordination – a huge benefit alone – it has also resulted in our achieving a higher level of competitiveness and stronger presence in the market."

Ho Jung Kim
Manager
Daesang

challenges, the company developed several in-house systems. Their effectiveness was short-lived, with projects increasingly involving more complex data manipulation as well as well-orchestrated teamwork. "The need for a standardized software solution to address our ever-growing data and document requirements became obvious," says Ho-Jung Kim, a manager at Daesang. "Moreover, we felt we could gain a competitive advantage by driving our innovation process through advanced product lifecycle management (PLM) software."

PLM-driven innovation
When Daesang introduced PLM to drive its product development innovation, it also did so across business units, so that all data generated from product development and mass production processes was integrated. Information could now be easily shared not just within a business unit, but also across the entire company.

To that end, the company chose key personnel from relevant departments to form its task force team (TFT), which was responsible for assessing, selecting and implementing the new technology. After a thorough evaluation process involving a number of leading PLM companies, TFT

selected Teamcenter® software from Siemens PLM Software. TFT felt that the strong, fundamental features of Teamcenter combined with the extensive implementation experience of Siemens PLM Software offered the best solution to not only meet its goals, but to do so quickly.

Key link between product data management system and project management system
Daesang used the openness of Teamcenter to integrate its own project management system into the PLM environment to realize a transparent and effective product development process.

It took about five months to build the entire PLM-based solution. High-priority features, identified through gap analysis and a research and development (R&D) needs assessment, were addressed first. "One of the key factors to our fast and highly successful PLM deployment was management's company-wide commitment to making it happen," says Kim. "Their positive attitude was supported by a vision of 'what could be,' ultimately instilling confidence throughout the organization. People really got behind the system, whereas it's not uncommon in

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Client's primary business

Daesang Corporation, a bio-technology specialist, produces a variety of food lines, including Sunchang red-pepper paste, Gamchimi, Matna and Matsunsang condiments, as well as a variety of fish sauces, flavors, western cuisine, frozen foods, coffee, healthy offerings and meat-processed fare.
www.edaesang.com

Client location

Seoul
South Korea

such implementations to experience significant resistance to change."

Today, Daesang's product data management system and project management system are fully integrated, enabling single-source access to the organization's entire product development knowledge base.

Achievements

Daesang's fully integrated and highly transparent product development environment has resulted in the company achieving a mastery over its data. The result is highly productive collaboration between its divisions and a significant reduction in the time required to develop products. "With such clear product development processes, personal productivity is at an all-time high," says Kim. "Moreover, individuals are now more fully leveraging their own potential."

Kim notes that much of the success is the result of overall harmony across business units, made possible by standardized processes enterprise-wide: "Effectively shared data dramatically improved project coordination. Another huge advantage of Teamcenter is our ability to so easily leverage previously launched products. When we create products similar to those already

produced, we can do so quickly by immediately retrieving relevant information, which greatly reduces product development time and expense." He adds, "It isn't just a time and money advantage; we are gaining a quality edge, with significantly reduced failure rates appearing to demonstrate a real benefit as well."

Kim summarizes, "Teamcenter from Siemens PLM Software has enabled us to standardize our work, and has allowed us to follow business processes that enable us to maintain overall consistency. Greatly improved data management, sharing and collaboration made possible using Teamcenter has not only helped us to greatly enhance project coordination – a huge benefit alone – it has also resulted in our achieving a higher level of competitiveness and stronger presence in the market."

Next steps

Daesang plans to extend its use of PLM. The company plans to use Teamcenter to engage collaboratively with other enterprises. It also plans to link work results through PLM and fully extend its use company-wide. This PLM-enabled product development innovation will greatly help Daesang to grow into a world-class general foods company down the road.

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SIEMENS

Teamcenter

PZ Cussons

Teamcenter facilitates excellence in the fast-moving consumer goods market

Industry
Consumer products

Business challenges
Implement product development processes to meet needs of highly demanding FMCG market

Enable all business units to readily access all product recipes and all new products

Keys to success
Drive cross-functional project team success

Leverage Teamcenter to model and simulate new product development processes

Understand and master cultural and behavioral issues associated with rapid market change

Results
"Single version of truth" eliminates risk of product errors

Product developers are working in the same way, using similar templates

PZ Cussons' use of Teamcenter results in innovative new products being brought to market faster and globally; revenue is up

Excellent execution, anywhere in the world

PZ Cussons Plc develops leading fast-moving consumer goods (FMCG) brands in selected mature and emerging markets that have potential for future growth. The company's well-known brands include Imperial Leather, Carex, The Original Source, Charles Worthington, Morning Fresh and Radiant. PZ Cussons' distribution networks in Africa, Asia and Europe enable the company to deliver these brands quickly and efficiently to local consumers.

According to Nina Dar, founder and managing director of Cheeky Monkey Business Solutions, a change management consultancy that designs and implements transformational programs, companies like PZ Cussons that want to continue to be successful in this kind of highly competitive business need to find new ways to link processes and tools creatively around innovation, brand development and product delivery.

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"This has been a significant investment for PZ Cussons... As a result, many of our UK brands are now appearing elsewhere – much more quickly, earning more revenue and earning it faster."

John J. Pantelireis
Group Supply Chain
Director
PZ Cussons

Dar explains this requirement: "PZ Cussons works across geographic locations all the time, taking great pride in its ability to respond quickly and appropriately to consumer needs. A product might be developed in one place, part of the formulation might be made in another, the artwork elsewhere and then the product itself might be manufactured somewhere else entirely, after which the supply chain takes over."

Given this kind of business environment, PZ Cussons' vision is to make all product recipes and all of its new products readily available to any and all of its worldwide business units. However, to do this, the company needed the right business systems to make this possible. That is why PZ Cussons adopted product lifecycle management (PLM) technology, specifically Siemens PLM Software's Teamcenter® software.

A single "version of truth"
PZ Cussons already had a technical specification system in place to manage its product recipes. However, while that system was important, it was somewhat overloaded and could not be extended for use across all of the company's business units. PZ Cussons' IT director at that time, David Jones, envisioned a global PLM solution that would provide a single version of truth, while also being able to model and simulate new product development (NPD) on a virtual project basis.

Ultimately, the PLM solution was expected to facilitate product specifications, as well as drive the company's NPD processes. The goal was to enable all product developers to work in the same way and use similar languages and similar templates so that virtual project teams in different locations could collaborate without having to jet round the world. However, it was also understood that PLM was not going to be a "one size fits all" solution, since different country operations often work at different levels and in different ways.

Three PLM providers were asked to respond to PZ Cussons' technology request, including Siemens PLM Software. The company's evaluation process was professional and thorough. All three responders were invited into PZ Cussons to see how the organization worked. PZ Cussons established internal teams to evaluate each tender and visit various reference sites. Teamcenter emerged from the selection process as the clear winner.

The role of Cheeky Monkey
Since Jones saw this as a business project rather than an IT project, he wanted the PLM solution to be strongly driven by PZ Cussons' business needs and its deployment organized by someone who was conscious of the cultural and behavioral issues associated with market change. As a result, Cheeky Monkey was selected with these goals in mind.

Cheeky Monkey has a proven track record of thinking creatively about business programs and taking into account the impact of these programs on people and their emotional connections. Cheeky Monkey also had demonstrated its understanding of how these programs need to deliver a variety of benefits, ranging from facilitating strategic objectives to improving vendor relationships, supply chain interaction, manufacturing, outsourcing, and mergers and acquisitions results.

According to Dar, "We already had a trusted and proven working relationship with PZ Cussons. We had been delivering all of their change-related projects and new product development projects and had worked on integrating these programs within their different business units." Just as importantly, "The whole team at PZ Cussons was really excited – they were going to take on an innovative and leading-edge project and it was a natural step for them to ask us to manage it."

Implementing PLM's product-specification capabilities

PZ Cussons' PLM software options were evaluated and tested in 2005 with design and configuration of the product-specification side of the solution completed in 2006. Dar explains, "Up to then, the main user base of Teamcenter had been in automotive and aerospace. But at PZ Cussons, we were talking about very short runs, lots of projects and very short time scales – days or even less." In 2007, the Cheeky Monkey team trained 10 PZ Cussons users to go back to their respective countries as project champions. After that, the company went through the data migration process, which is a big issue in the consumer products industry – where the pace and number of components can change very rapidly. The first specifications went

live in the United Kingdom at the end of 2007.

Implementing PLM's NPD capabilities

"We implemented the product specifications side of the PLM solution first, because that was already highly structured, but the NPD side was quite different," says Dar. "The FMCG industry is creatively led by people who do not automatically take to structure in any shape or form and will fight that. We needed to get everyone to use a more organized and standard way of delivering NPD before we could implement it in Teamcenter. As a result, we had to rethink the NPD side and design the NPD processes."

She continues, "Our next step was to run joint applications development workshops, so we created internal design teams with representatives from all over PZ Cussons' global operations. We established NPD processes and designed workshops and training material. In fact, we designed the whole program as a precursor to implementing the software. The first NPD capabilities went live at the start of 2009."

PLM's initial benefits

Dar explains the program's initial successes: "Siemens PLM Software's team really helped to resolve our initial concerns through their ability, knowledge and experience. We established a really good relationship with them, which played a key role in facilitating a successful implementation. However, it was vital that this relationship, especially between the presales and post-sales teams, be maintained throughout the life of the project.

"It is important not to shy away from the fact that the Teamcenter project is an enabling project that will deliver returns elsewhere. With this kind of implementation, the biggest challenge is to get people to adopt it. You can tell them they have to use it, but getting them to actually use it in their daily work is a completely different issue.

"At PZ Cussons, the need to be dynamic is so important. Margins are very small and you can make a huge difference by just changing an ingredient at the last minute – or shaving a bit of plastic off a bottle. PLM is ideal for this. It's a lot more agile than the more dated stage and gate NPD process; it allows you to model the whole new product before committing real money."

Nina Dar
Founder and Managing Director
Cheeky Monkey Business Solutions

"There are some areas where you can really make big advances using PLM, but you need to understand that you have to do it right. For overall success, your business functions need to come together through the IT director, marketing director, sales director and supply chain director. And you have to remember that there is a real human side to the PLM implementation, especially in this very people-oriented industry."

PLM as an enabler for open innovation

The NPD landscape is changing almost daily as the principles of open innovation become increasingly established and attention is focused on the need to bridge the divide between the way creative minds work and the way the technologists work. Dar explains, "Ideas can now originate from social networking anywhere and everywhere and you need to think about what it means for your business before your competitors do. So you have to consider if this is an idea you want to use and keep for yourselves, or whether it is something you can sell or use for a joint venture.

"You then model this inside the virtual project, where you try to understand what it all means before you make a final decision. Then, you model the execution, since there can be many external factors at work that could influence the launch date, price, margins and so on. The post-launch evaluation then runs straight back into your open innovation process."

PZ Cussons' PLM vision is now a reality

Summing up, Dar says, "At PZ Cussons, the need to be dynamic is so important. Margins are very small and you can make a huge difference by just changing an ingredient at the last minute – or shaving a bit of plastic off a bottle. PLM is ideal for this. It's a lot more agile than the more dated stage and gate NPD process; it allows you to model the whole new product before committing real money.

"The huge advantage of Teamcenter is that it provides a single version of the truth. The last product specifications went live at the end of 2009 and the last NPDs will go live by the end of 2010, so yes, it's now up and running – and it works."

So how does PZ Cussons see it? According to John J Pantelireis, group supply chain director, "This has been a significant investment for PZ Cussons. Thanks to the efforts of our people in operations everywhere, a great project team, the super users and our project managers from Cheeky Monkey, we have a system we can trust, a standard version of the truth we can believe, transparency and a lot faster NPD implementation. As a result, many of our UK brands are now appearing elsewhere – much more quickly, earning more revenue and earning it faster."

SIEMENS

Kesslers International

PLM delivers significant competitive advantage and the winning way

Industry
Consumer products

Business challenges
Ensure finished product delivery in 3 to 8 weeks

Cut product development time

Enable customers to make design decisions late in the process

Keys to success
Improving customer service and reducing cost base by leveraging new people, plant and software investments

Implementing operational business model that takes advantage of PLM technology

Receiving training and mentoring in new technology

Results
Design changes per mold from 2.2 to 0.7

Sample parts delivered 30 minutes after design

Substantial re-keying and related errors eliminated

Teamcenter and NX enable Kesslers International to differentiate services and win business while making significant time, cost and quality improvements

Strategic PLM

Kesslers International Ltd. is Europe's leading manufacturer of permanent point-of-purchase display and merchandising units. Located in Stratford, London, on the edge of the London 2012 Olympic site, the company's state-of-the-art complex – including 110,000-square-foot corporate headquarters and manufacturing plant – houses design and manufacturing facilities that are run 24 hours a day by a highly skilled team of approximately 250 professionals. As part of its new fully integrated design, engineering and manufacturing approach, Kesslers International has introduced the latest technologies into these facilities, including large machines for laser cutting steel and plastics, fast metal presses, injection molding, wood processing, silk screening, new 3D CAD systems and computer-controlled machinery. These major investments are especially important for enabling the company to increase its export activities.

The nature of the company's business and its unique customer requirements play a key role in defining Kesslers International's technology needs. George Kessler CBE,

group director at Kesslers International, says, "We are a multi-material and hi-tech manufacturer. We process wood; we process metal; we process plastic. We are a project-based design and make-to-order business." Typically, customer orders range in size from 50 to 5000 units, with very little repeat manufacturing. Just as importantly, the company's clients do not decide exactly what features they need or how many units they require until late in the buying process." Kessler explains, "A client may take awhile to conclude negotiations with the store group where it is going to place the display. Once this is decided though, things move fast. We may only have between three and eight weeks to design, make and deliver the finished

www.siemens.com/plm

"Everything is designed in NX and there is one model – and only one model."

Paul Copping
Technical Manager
Kesslers International

article, so it is essential that we get development times down to a minimum and get the design freeze time as late as possible."

To meet such demanding challenges and optimize its operations, Kesslers International decided the most advantageous strategy would be to leverage product lifecycle management (PLM) technology from Siemens PLM Software.

Critical investments
A private company with £20 million annual revenue and customers such as Revlon, Christian Dior, the U.K. Post Office, Bosch Home Appliances and Sony Electronics Inc., Kesslers International recently won the award for being the Best Employer of Apprentices in Greater London – 2009. Over the last five years, the company also has won three Manufacturing Excellence awards. "We invest heavily in people; we invest heavily in plant; we invest heavily in software – all to improve our customer service and reduce our cost base," says Kessler. "We recently bought a Trumpf punch press solution for nearly £500,000. The additional run speed, flexibility and weekend lights-out running enables us to manufacture more cheaply than any of our competitors. Our customers benefit by receiving lower prices and fast turnaround; we benefit by earning higher profits."

Changes cut in half using 3D
"We started on this track over 20 years ago with Anvil 5000, a good 2D system with some 3D, and importantly for us, with a strong machining capability," says Kessler. "We decided to move over completely to 3D with then SDRC's I-deas™ software (now part of Siemens' NX™ software) ten years ago and received massive advantages. At the time, we had numerous projects that required 10 or more injection moldings. Prior to adopting 3D, we had an average of 2.2 design changes per mold. A year later, we'd reduced that to 0.7 changes per tool. That saved enormously on lead times and costs and proved the value of designing in 3D.

"We also were investing heavily in CNC machine tools and wanted to make sure our operating model took advantage of all the technologies that were available at the time. Teamcenter® software provided vital functionality so we could make the transition from I-deas to the NX system, so we decided to take the opportunity to integrate our MRP system with our CAD system at the same time – in effect, to share one database."

Integrated design and manufacturing
Paul Copping, technical manager at Kesslers International, continues the story of the company's evolution: "Over the past three years, we've made fundamental changes in the way we run the business. The top level is what we do for our customer. The next level down is an integrated design and manufacturing model using Teamcenter and NX."

He describes the impact of this approach: "We've gone over to a more project-based environment where my project managers actually control the design cycle and the design phases. Once an order is placed, project management kicks into action. The delivery date, which can be as little as five weeks or as much as eight weeks, is set in stone and the specification is partially confirmed. Forty percent of our work comes in at the concept stage through design agencies. For the rest, we typically produce three or four concept visuals before we move to further discussion or even prototyping. Then, we develop the detailed design. Everything is designed in NX and there is one model – and only one model."

The approach is key. Copping explains, "Our engineers understand about designing for manufacturing – so we don't have the additional delays, additional redesign or additional costs that people who subcontract manufacturing suffer. We can have a sample part within 30 minutes of designing it and if the customer decides to change it, we can respond immediately. That's another competitive advantage for us."

Christina Aguilera – By Night is one of 3 displays created by Kesslers International to have been nominated for a 2010 European POPAI Award.

There are other advantages. Copping notes, "For injection-molded parts, we include draft angles, injection points and so on. Then we give the toolmakers the real-world model electronically with full supporting information, including the runner balancing and machine to be used. The tools are high-speed machined in aluminium directly from the NX model. This method has saved money, improved quality and reduced errors. One recent Revlon design required 50 different injection molding tools, so you can imagine the benefits."

Complex business requirements made easy
"We are using the Teamcenter project planning modules and workflow modules, which the team loves, because they take all the heartache out of addressing complex business requirements," says Copping. "The shop floor can also interrogate Teamcenter. They can see how the job goes together and they can see where a component is used. That has given us some surprising savings. For example, say they have a scratched injection molding. They can decide immediately whether it

is scrap or whether it could be re-used where the scratch was not visible." Equally important according to David Pearson, the company's operations director, "The Teamcenter web interface will let you mark up and measure drawings on screen."

One company's pain is another's profit
The PLM systems – from Teamcenter software, which serves as a global portal, to NX software, which functions as a design front-end – are now in place. All are tuned to enable a rapid response to the company's customers. "The projects we undertake have to be very front-end oriented," says Kessler. "We need certain rules and protocols so that when we build on the screen, we build everything right down to the fastenings. This is because everything migrates through Teamcenter. If you miss one screw, it won't be in the product. So we have lots of checks and validation upfront."

Kessler notes, "Our CAD/MRP integration has worked very well. It has removed a huge amount of re-keying and eliminated a massive risk of error. We've reinvested the time saved into product and concept development. In turn, this gives our customers more opportunity to change the designs later (in the process). Up to two years ago, if the finished product was 90 percent of what they wanted, they would have gone for it. But today, it needs to be 99 percent. That's a huge pain for other companies, but for us it's a commercial advantage."

Driving design via configurator
"We were considering buying a separate configurator package until Siemens PLM Software pointed out how we could get the same superb functionality with Teamcenter and NX," says Kessler. "Using this for the ITL merchandising unit is a good example of why this matters. The Teamcenter configurator allows us to specify the width of the shelves. Then, it will add the side panels and work out the header and back panel parametrically. It

"We are using the Teamcenter project planning modules and workflow modules, which the team loves, because they take all the heartache out of addressing complex business requirements."

George Kessler CBE
Group Director
Kesslers International

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

NX
www.siemens.com/nx

NX training/mentoring
(Majenta PLM)

Customer's primary business

Kesslers International designs and manufactures point-of-purchase display and merchandising units.
www.kesslers.com

Customer location

Stratford, London
United Kingdom

"It is essential that we get development times down to a minimum and get the freeze time as late as possible. NX and Teamcenter are vital to making it all happen, so we win the business and our competitors don't."

George Kessler CBE
Group Director
Kesslers International

also will know how many fasteners, back straps and other features are needed. In effect, Teamcenter is driving the design while leaving the designer to concentrate on the more important design issues. This gives us some real commercial advantages."

Mentoring matters

Kesslers International recently upgraded its NX software to the latest version. "This went well," says Copping. "We did a lot of testing and a lot of training in all aspects of NX, particularly using the system's sheet metal capabilities, which are years ahead of earlier versions of the software. NX is very accommodating of all the new specialized tools that we've purchased."

NX training was provided by Majenta PLM, a company that also runs a six-month mentoring program for Kesslers International's technical department.

"Mentoring is very much about getting under the skin of the company and how it operates," says Copping. "They had to understand all of our processes and discover what parts of the new NX we didn't understand to make a difference to our operations. Majenta has done an excellent job in creating our Teamcenter and NX configurator coursework."

Proof of success – the customer experience

With Teamcenter and NX, business is very good. Kessler sums up the advantages of the PLM software combination: "We know it works because we measure success through order increases and complaint reductions. We have a very, very low level of complaints. We have a good level of customer satisfaction and our customers keep coming back. And we have important new customers. That is the best proof we can have."

Siemens Industry Software

Americas   +1 800 498 5351
Europe   +44 (0) 1276 702000
Asia-Pacific +852 2230 3333

www.siemens.com/plm

SIEMENS

Teamcenter

Hangzhou H3C Technologies

Pumping R&D into today's high tech electronics products

Industry

Electronics and semiconductor

Business challenges

Establish a unified product development and data management platform

Optimize and facilitate collaboration and stable support between different R&D centers

Deliver upstream product data to downstream partners and suppliers

Ensure product data security while standardizing data change management

Keys to success

Implement Teamcenter in two phases over planned stages

Establish measurable goals (for each implementation stage) to match unique company-specific business requirements

Integrating H3C's existing R&D management systems into a unified PLM platform

Complex product development process
Hangzhou H3C Technologies Co., Ltd. (H3C) is a leading global supplier of high tech and electronics equipment. The company's products and solutions include routers, Ethernet switches, wireless LAN, security products, IP video monitoring, video conferencing and IP voice products, SOHO products and network management systems. The research and development of these products requires multiple disciplines to work together in a rather complex process. Different disciplines and departments need to collaborate, including structure design, circuit design and embedded software design. Equally important, there are stringent requirements for managing and controlling the product data and documents that are created during the product development process.

From the very beginning, H3C employed a set of very strong IT systems, including relatively mature systems or platforms for mechanical design, electronics design, parts and components management, BOM management and document management. However, each system was relatively isolated, and the company lacked the technology for organically connecting partial systems together. As a result, H3C wanted to integrate the product development systems that resided in different departments into a single platform that would

enable these departments to collaborate on common product development projects.

A second objective involved the company's R&D centers in Beijing and Hangzhou, and its reliability test lab and product verification centers in Beijing and Hangzhou. Since H3C wanted all of its product-related data to be managed in a unified server, it was only natural for the company to want its regional R&D centers to be able to collaborate as part of a highly responsive, constantly stable process that supported multiple users concurrently.

A third objective was to facilitate close cooperation between the H3C's upstream and downstream enterprise value chain. Here, the company wanted to be able to purchase parts and components from its suppliers, as well as instantly exchange product data with them. Since these activi-

www.siemens.com/teamcenter

Results

Established a single integrated source of product data, enhancing enterprise data sharing and re-use

Integrated PDM solution with ERP system, facilitating automatic delivery and two-way data alternation from Part/BOM/ECO in PDM to ERP system

Established complete enterprise change management platform

Provided outsourcing partners with seamless and secure product data, thereby improving supply chain collaboration

Reduced both R&D and manufacturing costs related to new product development

"We not only need to consider the functionality of the PLM system itself, but its ability to integrate with our other IT systems. H3C has a whole suite of IT systems to support business development, including ERP, marketing, HR and sales systems."

Gao Xuepeng
Director
IT Applications
Hangzhou H3C Technologies

ties directly affect the quality and time-to-market of its products, H3C wanted an open PLM system to establish a platform that would efficiently and securely deliver product data and information to its downstream partners.

A fourth objective required applying more stringent security and confidentiality protections to the product data it created during the development process. This was important because today's technically advanced electronics products are highly coveted yet easy to copy. Specifically, it was vitally important for the company to control engineer/technician access privileges, while automatically retaining a record of data retrieval and facilitating traceability of all data changes.

Implementing PLM

Gao Xuepeng, director, IT Applications, Hangzhou H3C Technologies, notes, "We not only need to consider the functionality of the PLM system itself, but its ability to integrate with our other IT systems. H3C has a whole suite of IT systems to support business development, including ERP, marketing, HR and sales systems." With an eye to meeting the aforementioned objectives, and especially considering multi-system integration, H3C selected Teamcenter® software in late 2005 as the foundation for implementing the company's PLM initiative.

H3C decided to implement its PLM project in two phases.

During phase I, the company focused on implementing document management practices. Phase II consisted of three stages, including: Stage I, where the company implemented its core PLM functions and then integrated PLM with other systems; Stage II, which involved implementing engineering change solutions to address various industry-specific business problems; and Stage III, which focused on automatically delivering product data to the company's supply chain.

H3C chose to begin phase I with document management. On one hand, H3C needed to fully verify whether Teamcenter was able to meet its company-specific business needs; on the other hand, H3C wanted to give itself enough room to make sure that no adverse consequences would severely hurt its normal business. Now the document management capability of Teamcenter has been fully applied and major achievements have been made.

During stage I (second phase) of implementing Teamcenter, nearly all core PLM features were implemented. In addition, H3C integrated Teamcenter with its PLM, ERP and Lotus Notes® software systems. After completing stage I, most major PLM requirements had been met. This included establishing a PLM-centered unified product development platform, integrating all of the company's systems, optimizing existing workflows to the maximum extent possible, facilitating collaboration between different departments and R&D regions, and protecting H3C's original IT investment.

At the same time, by controlling the allocation of user access privileges, H3C used Teamcenter to significantly enhance the protection of the company's product data while further improving product confidentiality.

H3C focused on enhancing its PLM system's engineering change management capabilities during stage II (second phase). The goal was to extend the PLM system so that it could help H3C build an effective flow of products through the R&D process, accelerate the R&D process and enable the company to rapidly respond to rising user and market needs.

During stage III (second phase), H3C built an automatic mechanism for delivering product data to multiple downstream partners in its value chain. H3C wanted to improve collaboration between the upstream and downstream participants in its extended enterprise. Specifically, it

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

H3C performs R&D, production, sales and services associated with providing routers, Ethernet switches, wireless LAN, security products, IP video monitoring, video conferencing and IP voice products, SOHO products and network management systems.
www.h3c.com

Customer location

Hangzhou
China

"The development of a PLM R&D system based on Teamcenter provides our businesses with strong platform support and a dynamic driving force."

Gao Xuepeng
Director
IT Applications
Hangzhou H3C Technologies

wanted to streamline part and component purchasing while also facilitating instant data exchange with its suppliers.

Real-world advantages

Completion of the major phases and their underlying stages has enabled H3C to solve key problems that had been draining product development efficiency. The finished PLM platform provides the company with a comprehensive engineering data management environment that enables designers to review, authenticate and update spare parts and an engineering bill of materials (eBOM) in one single system.

It also established a single source of product data, thus enhancing data sharing and re-use. In addition, the company's PLM-driven engineering change process keeps the product data changes under control, thereby ensuring complete, proper and traceable data changes. This function is especially valuable because it enables the company to improve the quality of its product data and shorten the delivery time.

Such achievements were very important to the company's senior managers, particularly because of their impact on product R&D as well as in terms of HR investment, financial results and policy support. In addition, based on prior experiences and in consideration of its own business

requirements, H3C management notes that the company has chosen the right PLM product, which laid the critical foundation for the successful implementation and application of the whole project.

In terms of implementing best practices, H3C maintained preexisting workflows to the maximum extent possible. Moreover, it has built a unified product development platform that is now able to integrate and connect previously isolated systems. "The development of a PLM R&D system based on Teamcenter provides our businesses with strong platform support and a dynamic driving force," says Xuepeng.

Collaborative R&D is ensured and the company's original IT investments are protected. H3C's PLM implementation strategies and procedures are highly instructive. Instead of taking the PLM system as merely an IT system, H3C integrated the PLM system with its own business processes at the very beginning. Therefore, the system is selectively and carefully implemented to account for details that directly address the company's strategic business considerations. Moreover, the system is paying dividends in terms of significantly improved collaboration with suppliers, reduced costs and greater leveraging of PLM/ERP data.

Teamcenter

Seagate

Using environmental compliance as a competitive differentiator

Industry

Electronics and semiconductor

Business challenges

New product development

Regulatory and market requirements to avoid environmentally harmful substances in its products

Pressures of being in the middle of the supply chain

Reams of constantly updated substance information from suppliers

Keys to success

Scalable compliance solution

Trusted product lifecycle management (PLM) partner

Ability to leverage compliance data through entire product lifecycle

Results

Produced compliance reports in minutes (versus days to weeks previously)

Established environmental care as a competitive differentiator, while facilitating ability to be first to new markets

Seagate uses Teamcenter to advance green market opportunities

Industry leadership extends to the environment

Seagate is the world's leading manufacturer of hard disk drives. The company has been hugely successful in a competitive market segment by delivering industry-leading innovation and quality while aggressively managing product cost.

The same bold business vision drives the company's strategy for environmental leadership. Rather than a reactive approach to the ever-increasing number of regulations regarding environmentally hazardous content, Seagate has created a proactive product development process that integrates environmental care into the entire product lifecycle.

Based on the Teamcenter® portfolio from Siemens PLM Software, Seagate's environmental compliance strategy goes beyond enabling the company to establish and document compliance with standards such as the Restriction of Use of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE). Beyond delivering customer and market requirements, the strategy supports Seagate's commitment to corporate environmental stewardship.

"The basic compliance reporting required by the industry is not sufficient for us,"

explains Brian Martin, senior director, Product Environmental Compliance at Seagate. "From a business perspective, we see environmental care as a competitive differentiator, and we wanted a process to support that vision."

Cherryl McDougall, executive director of Environmental Health and Safety and Global Citizenship at Seagate, echoes these sentiments: "For us, it's not just about regulatory compliance. It's really about what our customers care about and how we deliver that in the most efficient and effective way. From a product stewardship perspective, we want to make sure that we are delivering the best products with the least impact on people and the environment."

Good environmental stewardship and product knowledge are now differentiating Seagate from its competitors. McDougall explains, "We are able to prove to our partners and customers that we care about people and the environment and we are

Results *(continued)*

Positioned to easily
accommodate future
regulations

Achieved ROI in 6 months
instead of estimated
24 months

"One of the benefits of
Teamcenter's environmental
compliance capabilities is
that we did not have to do
a lot of customizations.
We could just align with its
out-of-the-box solution
functionality. That reduces
our cost, not just in putting
the original solution in
place, but also in maintain-
ing and going forward."

Boris Chechelinitsky
Senior Director
Seagate IC

socially responsible. We are really looking
for full disclosure about what's in our
product. Some other companies don't take
that approach. They'll say, 'We don't have
any of the things that are on this list or
that list,' but for us, what we say to our
customers is, 'Here's everything that we
use in our products from start to finish.'
We began our strategy several years ago.
We made a conscious decision to collect
data on every piece, every material that's
in our product."

Teamcenter supports strategic environmental vision

Seagate chose Teamcenter to address its
environmental goals for a number of
reasons. One was that it could easily be
integrated with other Seagate applica-
tions. Also, the software is easy to use and
includes a significant amount of environ-
mental compliance functionality out of the
box. "In the evaluation process, we spent
considerable time and money making sure
the system we chose would satisfy our
known customer requirements and
support our future strategic efforts as
well," Martin says. "Most importantly,
Teamcenter supports our strategic envi-
ronmental care vision and satisfies present
and future customer requirements."

Boris Chechelinitsky, senior director at
Seagate IC, notes, "One of the benefits of
Teamcenter's environmental compliance
capabilities is that we did not have to do a
lot of customizations. We could just align
with its out-of-the-box solution functional-
ity. That reduces our cost, not just in
putting the original solution in place, but
also in maintaining and going forward. As
long as we can rely on Siemens PLM
Software's upgrades, we can keep our
costs low and we keep it easy for our-
selves. That's a big part of our strategy."

Seagate's position in the middle of the
supply chain makes environmental compli-
ance especially challenging. The company
requires the verification of the content in
every component it purchases from its
suppliers. But since Seagate is also a sup-

plier to the computer OEMs (as well as
markets products to consumers directly), it
must also be able to assure its customers
of its own compliance with regulations.

For the OEMs, for example, Seagate dem-
onstrates compliance by collecting and
producing lab work that proves the
makeup of its products. This information
can be no older than 12 months. This
involves tracking a tremendous amount of
data. "We collect current, detailed data on
every substance in every material in every
part in our product," says Martin. "For each
part there can be as few as one or two
documents associated with the part or as
many as two or three dozen."

McDougall adds, "When you start collect-
ing that data, you're building a database
and every time there's a new requirement
that comes from the regulations or our
customers, we already have the data. It's
just a matter of us going to our database
and pulling the information out. In con-
trast, every time our competitors have a
new requirement, they need to make
adjustments in the types of data that
they're collecting. This is an extra burden,
an extra cost. But for us, it's really just
going to the data and running a report
versus collecting new sets of data. We are
ahead of the game."

McDougall puts this advantage in perspec-
tive: "Seagate has been on the leading
edge. We've had other companies ask us
about our process and tell us that we are
two to three years ahead of them – being

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

Seagate is the world's leading manufacturer of hard disk drives.
www.seagate.com

Customer location

Scotts Valley, California
United States

"Our efforts regarding environmental care represent a competitive differentiator because in this industry compliance with new regulations can mean first to qualify, and first into a major market."

Brian Martin
Senior Director, Product Environmental Compliance
Seagate

"Seagate has been on the leading edge.We've had other companies ask us about our process and tell us that we are two to three years ahead of them – being able to collect and manage the data efficiently."

Cherryl McDougall
Executive Director
Environmental Health and Safety and Global Citizenship
Seagate

able to collect and manage the data efficiently."

Leveraging compliance data for maximum value, competitive advantage
By managing all of this information in Teamcenter, the company is able to leverage the data in such a way that it has value beyond simply establishing that Seagate's existing products contain no banned substances. Design teams can easily access information to consider compliance during the earliest development stages of new products – for example, to determine how the selection of a particular part might affect the supply chain. Martin has immediate access to the information he needs to perform strategic analysis and risk management. In addition, sales and logistics personnel can access the information to provide environmental reports for customers and suppliers. Marketing can access the system to look at requirements for various markets.

"Our prior process was very manual and disconnected," says Martin. Previously when Seagate had a reporting request, emails were sent out asking for information and then individuals would assemble the data for the report. It took hours to weeks to produce the data in response to a request. Now with Teamcenter the process is highly automated and can be done in a matter of minutes.

Martin points out, "Eventually our database will contain information on as many as 20,000 substances. To be proactive in collecting such information ourselves, we needed a solution that could satisfy our reporting capabilities on a global basis. Teamcenter does that. Teamcenter, in fact, makes the process both sustainable and cost-effective, as well as gives us the flexibility to react to future regulations and customer requests."

Ultimately, the Teamcenter solution helps Seagate in its effort to position itself as a green company, which is key to maintaining its leadership role in the highly competitive high tech and electronics market. "Our efforts regarding environmental care represent a competitive differentiator because in this industry compliance with new regulations can mean first to qualify, and first into a major market," says Martin. "Our view is that Teamcenter has played and will increasingly play a critical role in helping us increase our competitive edge."

Teamcenter

Teradyne

Engineering change-order cycle cut by 84 percent, $2 million saved yearly

Industry
Electronics and semiconductor

Business challenges
Increase business productivity

Improve enterprise project management and collaboration

Eliminate lengthy, largely manual process for engineering change management

Cut manufacturing costs while increasing customer satisfaction

Keys to success
Implement a centralized, automated process for engineering change management and collaboration based on Siemens PLM Software's Teamcenter and Microsoft Office SharePoint Server

Results
Faster access to more accurate data

Cycle times for engineering change orders reduced from 90 days to just 14 days, an extraordinary 84 percent reduction

Test equipment manufacturer employs Siemens PLM Software and Microsoft technology to deliver a centralized, automated process for engineering change management and collaboration

Executive perspective
For Teradyne – the U.S.$1.2 billion a year maker of automatic test equipment – the recession posed the same challenge that many other manufacturers faced: cut costs while boosting customer service, the better to weather the bad times and position itself for growth during the inevitable recovery. The company's multipronged approach to the challenge included the adoption of new processes for managing the requirements of product development projects, collaboration on project team documents and change orders, implemented through Siemens PLM Software's Teamcenter® software and Microsoft Office SharePoint Server.

Teradyne's thoughtful approach paid dividends. Today, personnel have faster and easier access to more accurate data, which has led to less manufacturing rework, lower scrap costs, faster change-order cycles, lower project scheduling slip rates, lower change-order processing costs and higher customer satisfaction.

When the recession hit, Teradyne hit back
Teradyne manufactures automatic test equipment for testing everything from

semiconductor chips and cell phone components to automobiles and aerospace systems. When times took a turn for the worse, the company took action on a variety of fronts. It outsourced manufacturing. It implemented new supply-chain systems. It moved into new markets.

The company also looked inward to wring excess costs out of its engineering and manufacturing processes, especially its processes for engineering requirements management and change management. Those processes varied from business unit to business unit within the company, con-

sistent with the relative autonomy that the business units had traditionally enjoyed. The lack of standardization hadn't been an issue when Teradyne was organized as separate business units and when engineering and manufacturing staffs were located together and could rely on informal communication to collaborate and expedite engineering change orders.

But as Teradyne grew and consolidated several business units, as engineering staffs were increasingly dispersed, and as manufacturing was outsourced, the lack of formal, standardized processes became an ever larger problem. Engineering and manufacturing teams might maintain their data in spreadsheets and word processing documents stored in hard-to-find locations on file servers and the hard disks of their members' PCs. An Oracle® database used mostly by operations staff hosted bill of materials data, but didn't support engineering documentation needs.

If a project team had a member versed in website design, it might host its engineering requirements and change management documents on an intranet site. If it had a member versed in IBM Lotus Notes® software, it might host that content in a Notes® database with workflow. Other project teams stored their information on file servers. All of these systems and storage locations meant that engineering documentation and project information could be difficult to find, especially if members were working on several projects.

Additionally, version control was nonexistent and historical information might be unavailable to those who needed it, when they needed it. Because engineering change management processes weren't automated and were mostly paper based, a staff of 15 was required simply to manage the flow of documentation and the review and approval of changes for project teams.

"Inefficiencies were baked into our processes and system," sums up Bill Duggan, engineering manager, Teradyne.

Inefficiencies were exacting a toll on the company's performance
Engineering change orders could take more than 90 days to implement into manufacturing – four times the industry average. That length of time had practical consequences for the company's manufacturing benchmarks. Scrap and rework costs were high because parts might be ordered after engineers had changed the requirements for a project or were driven to make changes based on the supply chain, but before those changes could work their way to the bill of materials system on the factory floor.

Managing product requirements and changes was also very manual and ad hoc, like the engineering change process. When a requirements change wasn't implemented in a timely fashion, it could lead to the need to rework a manufacturing process. That could cause a project schedule to slip by a month or more. Another big concern was whether the product met all requirements. A missed requirement could lead to delays and more engineering change requests to correct the product before it entered the volume manufacturing system. In fact, the slip rate in Teradyne's delivery schedules was about 10 percent. Project delays further increased costs and lowered customer satisfaction – the opposite of what Teradyne needed in order to weather the recession.

"We needed to write better requirements at the system and subsystem levels, trace derived requirements to test cases, and manage the requirements change process efficiently to ensure that products were built accurately and that project teams delivered on time," says Duggan. "That called for improved discipline in requirements management, standardized processes for engineering change management and greater collaboration among project teams. We had to look at every

The team scrutinized candidate systems for reliability and for built-in capabilities for requirements management, part, bill of materials management and engineering change management. In addition, the team looked for a solution backed by a company's professional services group that could optimize and install the solution for the Teradyne environment and that had a track record in working with large-scale, global customers.

On the basis of those criteria, Teradyne chose the Teamcenter solution from Siemens PLM Software, running on the Windows Server operating system with Microsoft Office SharePoint Server, Microsoft SQL Server data management software and Oracle. The integrated solution combines Teamcenter capabilities in end-to-end product lifecycle management with Office SharePoint Server capabilities in content management, collaboration and social networking.

"The Siemens and Microsoft solution directly addressed our need for structured processes for handling engineering requirements and change management, as well as our need to replace ad hoc collaboration in project teams with consistent, centralized, fully accessible collaboration tools and methods," says Duggan.

Implementation strategy builds grass-roots support

Rather than implement the full Teamcenter suite of product lifecycle management capabilities at once, Teradyne chose a phased-in deployment approach. The company's goal was to give the solution time to build grass-roots support from the functionally and geographically diverse personnel who would work with it, plus give the company time to fine-tune each aspect of deployment before moving to the next.

The company started by implementing the Teamcenter functions crucial to addressing its core concerns: requirements

aspect of how we handled product lifecycle management."

Integrated solution directly addresses company's need for structured processes; features strong support teams

Teradyne looked for a technological solution to replace the largely manual and impromptu processes that were hindering engineering and manufacturing performance. To help ensure that it was identifying and meeting as many requirements for that solution as possible, the company assembled an evaluation team comprising both engineering and operations personnel, and with members from the company's two major design centers, in North Reading, Massachusetts, and Agoura Hills, California. The team considered a number of solutions, including Dassault Systèmes' MatrixOne software, Oracle's Agile software, Parametric Technology Corporation's Windchill® software and Siemens PLM Software's Teamcenter.

One of the greatest concerns for Duggan and his colleagues was choosing a system with the most flexible, up-to-date technology and the closest alignment to the needs of high-tech industry. They also sought a platform approach to solving the process and application problems, rather than a best-of-breed approach.

management, followed by management of the engineering documentation (schematics, drawings and specs) used to build the product (also called "vaulting"). Next came the automation and standardization of parts management, followed by an integrated process for engineering change and bills of materials management.

This replaced six East and West Coast design center applications and processes with one standard process and tool. Teamcenter drove the process standardization of parts creation and management. Six part-revision schemas, including alphabetical, numeric and alphanumeric combinations, were simplified into one alphabetical schema. Some 300 part number prefixes were replaced by a simplified numbering system.

Several existing workflows for managing part models and commercial part specifications were also consolidated. Again, separate workflows and databases were consolidated into a single workflow and database that made part information consistent and easily accessible. All information on project requirements, parts, specifications, engineering changes, bills of materials and engineering documentation came to be centralized in and managed through Teamcenter, accessible to anyone in the company.

Teradyne then implemented Teamcenter community collaboration, with Office SharePoint Server workflow, content management and collaboration tools, to address the challenges of having a highly dispersed work force and diverse requirements for product development teams. Checking documents in and out of a central document repository for reviews and revisions replaced the flurry of email messages and variety of storage locations that formerly marked Teradyne processes.

Once all product and project information became centralized in Teamcenter and Office SharePoint Server, the integrated solution naturally became the logical

location for collaboration on project teams. Soon, setting up team SharePoint sites for the Program Management Office (PMO) became a routine part of kicking off a project, and that collaboration was reinforced through the use of SharePoint Server features, including wikis and blogs. The engineering PMO was one of the early adopters. This group is responsible for managing product development teams throughout the world. The social networking tools were added to the product development process to promote better knowledge management.

Training kick starts user engagement
Consistent with its phased-in approach, Teradyne began by initiating team sites for personnel directly involved in implementing and using the new Teamcenter engineering change management process. To use the new change process, users went to the SharePoint site, took the training, reviewed the documentation and completed a survey to obtain a user ID.

Searching for program documents had not been easy in the past. Now each team's own method for searching was simplified into one set of folders in Teamcenter, to which each team continues to add content. Recently, pictures were added as a new content type. This helps with communication between East and West Coast design teams and in program reviews. The pictures also can be shared with customers to help them to see progress and to provide evidence of that progress. The

manufacturing group also uses pictures to document the progression of a prototype build for later conversations on the build process.

Duggan anticipates that the collaboration tools will be extended over time to include support and marketing personnel, and even suppliers and others located outside of the company – all of whom can benefit from some degree of access to the same information that engineering and manufacturing personnel need every day.

Teradyne is seeing a variety of benefits from the move to the Teamcenter and Office SharePoint Server solution. Personnel now have faster and easier access to more accurate data, leading to less rework in the manufacturing process, less scrap, faster change-order cycles, lower schedule slip rates, lower costs for change orders and higher customer satisfaction.

Users get the data they need, when they need it
By adopting the Siemens and Microsoft solution, Teradyne has given its engineering and operational personnel faster and easier access to more accurate data. Redundant and potentially inconsistent data has been replaced by "a single version of the truth," which increases the accuracy and lowers the costs of processes and decisions based on that more accurate data. The result is an enhanced ability to search for, share and collaborate on information throughout the organization.

"Before, if you wanted to find an engineering document, you needed to know where it was physically stored, in which system, on which file share and in which folder," says Chuck Ciali, chief information officer, Teradyne. "Now, we're able to collect both the engineering information and the other unstructured data – which is usually tenfold larger in size – all in one place."

Adds Duggan, "We were able to ensure that our teams are always working on a

single document – the latest document, the right document – and are moving that document through our processes efficiently. When operations personnel need to access the current specifications for a project, they can be confident that the data they access is indeed current. When engineers make changes to a project design, they can be confident that their changes will be communicated to operations personnel in a timely fashion."

Teradyne uses the solution not only to give its personnel access to better data, but also to push data to them automatically, through software-based workflows. Personnel now commonly receive the information that they need when they need it, rather than having to take time to find and access information. Automated workflows also provide a faster, more accurate and lower-cost way to move information through the engineering change management process than the 15-person staff on which Teradyne formerly relied.

Teradyne also is able to use the information about the change management process that the solution produces to track and measure the efficiency of that process. The company has gained manufacturing statistics that it never had before and that it can use to further streamline and refine its engineering and manufacturing activities.

Change-order cycles cut by 84 percent
By automating formerly manual activities, streamlining the change management process and providing better access to more accurate information, the solution has helped Teradyne to cut the cycle times for engineering change orders from 90 days to just 14 days, an extraordinary reduction of 84 percent.

Engineering change orders aren't just implemented more quickly, they're also implemented more accurately. The rejection rate for such orders has declined from 70 percent to 26 percent. Together, the

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Chuck Ciali
Chief Information Officer
Teradyne

greater speed and accuracy of the change-order process have reduced the costs of implementing change orders by 60 percent. The faster, more accurate and more cost-effective change-order process has had a positive effect on a variety of measurements that Teradyne tracks. It has contributed to reduced scrap and rework costs as well as to decreased project slip rates – that is, the ratio of promised project milestone dates to actual dates, including project completion. As a requirement for completion, each project must release its parts, bills of materials and documentation-through-engineering. Some projects have several hundred such artifacts. Having a faster, more accurate change control process is one contributor to reducing project slip rates from 7.5 percent to -4 percent.

"That's right," says Duggan. "Now, we actually have a negative project slip rate. We're not just meeting our promised delivery dates – we're beating them, thanks in part to an improved engineering change management process. That's one of our most important improvements, because it makes it possible for us to hit critical market windows for our products."

Productivity dramatically increased, saving $2 million annually

Another benefit of the new process at Teradyne for managing engineering changes is reduced costs. The company has already wrung $2 million in excess costs out of its change management processes through the greater productivity, automation and accuracy made possible by the Teamcenter and Office SharePoint Server solution. The savings makes it

possible for Teradyne to support the same level of engineering and manufacturing activity with fewer change management personnel, so the company can redirect those personnel to more valuable functions.

Teradyne also expects to boost productivity further as it expands the functionality of the Siemens and Microsoft solution and rolls out the expanded solution more broadly. The result will be support for increased engineering and manufacturing activity without requiring similar increases in staff. Millions of dollars more might be saved as the new solution is adapted to processes throughout the company. For example, as Teradyne comes to rely less on its Oracle software, the cost of maintaining that software will likely decline by at least 40 percent, saving an estimated $500,000.

"Major increases in manufacturing efficiency and the corresponding reductions in cost are a win-win for us and for our customers," says Duggan. "Those changes are helping get us through the recession, and they set the stage for major growth as the economy rebounds."

Teamcenter

Changsha Zoomlion

Building a unified PLM system across a group of independent organizations

Industry

Heavy equipment, industrial machinery

Business challenges

Create effective oversight structure for the whole group company

Address IT challenges resulting from multiple regional and transnational mergers and acquisitions

Employ automation versus manpower to handle complex and growing enterprise issues

Keys to success

Implement an IT platform that enables optimum management and policy execution across organizations

Tightly integrate PLM with the company's business operations to establish best practices and maximum agility

Implement incentive mechanisms to promote effective business unit participation

Retain the strong autonomy and operational abilities of each business

Teamcenter and NX employed to bridge information across multiple business units; product data standardization fuels insight and innovation and enables knowledge-driven expansion

Leveraging PLM for sustainable development

Changsha Zoomlion Heavy Industry Science & Technology Development Co., Ltd. (Zoomlion) was founded in 1992. Zhan Chunxin, then deputy director of

Changsha Construction Machinery Research Institute, and seven other founding members started a brand new exploration for market-based reform of research institutes. Eighteen years later, Zoomlion became a multinational enterprise with more than 20,000 employees and total assets of RMB* 43 billion. Zoomlion is now listed among the top 10 engineering machinery enterprises in the world.

* RMB: The renminbi or the Chinese yuan (sign: ¥; code: CNY) is the currency of the People's Republic of China (PRC), with the exception of Hong Kong and Macau.

Results

"With Teamcenter, the business units of Zoomlion now have very strong R&D and development execution capacity, made possible by turning vast amounts of distinct and disconnected data into an organized portfolio of decision-making criteria."

Wang Yukun
CIO
Zoomlion

Following its previous stage of rapid development, Zoomlion now enjoys an annual growth rate of 50 to 60 percent. Moreover, with plans for continuous rapid expansion, Zoomlion focused on how to better utilize technology to support sustainable development.

Zoomlion is a group company consisting of 17 business units. Under the guidance of the company's development strategy, "fission + fusion = globalization," the business units operate relatively independently. The company wanted oversight supervisory controls and standardized processes in place across the business units. That is, maintaining sufficient broad-based supervision, while ensuring that each organization operates according to its own best business drivers.

To ensure this approach, to put teeth in its policy, management felt the company needed a highly effective and sufficiently transparent information-based method to manage each unit's business transaction data. This was considered especially important to minimize the risk of losing control as a result of rapid development. Zoomlion's internationalization process is aggressive and includes multiple regional and transnational mergers and acquisitions, including the restructuring and acquisition of Puyuan Group and Italy's CIFA.

Two key elements critical to rapid expansion success

Wang Yukun, Zoomlion's CEO, notes, "The key to integrating an acquired company into one's own corporate system is the unification of the management and organizational culture. In the past, we would send personnel to participate in training or directly dispatch management personnel to manage the acquired or merged enterprises to realize the integration of the two. With the increased scale of the enterprises now involved, such integration is likely to reach a critical point. For example, as we integrate ever larger enterprises, the business model becomes increasingly complex

and the development of the company may inevitably be confronted with barriers that no longer make it possible to meet the efficient integration requirements simply by injecting more manpower. We anticipate major management bottlenecks in the future without more effective methods to simplify, optimize, and integrate the acquired enterprises."

Yukun notes, "An essential aspect of unifying management and organizational culture is having an effective IT (information technology) platform. So it is culture and technology that must interplay effectively to enable our rapid expansion."

In fact, management was quite concerned that inadequate information sharing could stall its progress. As a company that manufactures multiple types of products, but in small batches, Zoomlion viewed the implementation of its product lifecycle management (PLM) system and enterprise resource planning (ERP) system as the IT underpinning for successful collaboration and growth.

In August 2008, Zoomlion finalized its PLM project implementation plan, choosing Teamcenter® software from Siemens PLM Software.

Teamcenter yields empowerment

"We chose Teamcenter in large part due to its many successes in the discrete manufacturing industry," says Yukun. "In addition, the integration approach of Teamcenter is clearly different than other systems. With Teamcenter, it is possible to integrate product data and product process management into one unified platform, which is significantly beneficial for coordinated development of product R&D (research and development), design and manufacturing."

Yukun notes, "With an interrelated diversification strategy, we don't just have numerous business units, but the units often have crossover characteristics. For example, the engineering crane branch,

concrete branch and road machinery branch are largely similar to each other. With such a high correlation among many units, our emphasis is on leveraging commonality." Yukun explains, "During the implementation of Teamcenter, while we were concerned with personalization or customization to the needs of each individual business, we focused on cross-business unification, employing the '80-20 Principle.' That is to say, we felt that 80 percent of the PLM technology – across all independent business units – should be unified, with the remaining 20 percent of the PLM system dedicated to the particular needs of each business unit."

Making the pilot project count
Zoomlion selected its two most important business units: the mobile crane branch and the concrete machinery branch, as pilot units for the implementation project. The strategy behind their selection was purposeful and long-range.

First, the two business units represent the most complex operations of the 17. The results of their implementations would likely serve as a learning opportunity, if not template, for rolling out Teamcenter across the other units.

Second, the two business units have 70 percent of the total sales of the company. Thus, the effects of a successful implementation would deliver high-yield results.

Third, the two business units have had some exposure to PLM technology and possess a relatively sound electronic base of product data, so the implementation process would likely be very efficient, if not shorter compared to the other units.

In October 2008, Zoomlion implemented Teamcenter.

Preparing and standardizing data
In executing its PLM solution, Zoomlion noted that the upfront need for product data sorting, entry and checking would be arduous, but management also saw its

completion as a significant stepping stone to breakthrough organizational and enterprise efficiency. The two business units were both experiencing information-sharing challenges. Specifically, data generated by the research institute and manufacturing department were not interconnected, even though both departments had some experience with digital product data management (PDM) and bill of materials (BOM) applications via Excel® spreadsheets.

"While the workload of data sorting is enormous," says Yukun, "within four months the mobile crane branch had entered approximately 100,000 data sets into the PLM system, and the concrete machinery branch approximately 80,000." He notes, "What is more difficult than entering the data is standardizing it. Like many other group operating companies, our business units operate independently; hence, the material codes and names of the parts and components vary widely among the units. After sorting, we began unifying our data encoding specifications across the entire group company and executed at both our mobile crane and concrete machinery branches."

The mobile crane branch was the first to complete data preparations and bring the PLM system online. At the end of 2008, after three months of trial operation, adjustment and optimization, the system was working quite smoothly.

Other business units of Zoomlion, i.e., the environmental and sanitation branch, hoisting machinery branch and road machinery branch, began preparations for implementing Teamcenter. "The business units are working relatively autonomously, yet leveraging shared processes and knowledge from our two key business units," says Yukun. "Moreover, at the group level we are now able to oversee complete enterprise operations through a unified IT platform. This is all in accordance with our original strategy and goals made by the management."

"We chose Teamcenter in large part due to its many successes in the discrete manufacturing industry. In addition, the integration approach of Teamcenter is clearly different than other systems. With Teamcenter, it is possible to integrate product data and product process management into one unified platform, which is significantly beneficial for coordinated development of product R&D, design and manufacturing."

Wang Yukun
CIO
Zoomlion

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

Zoomlion is a leading enterprise in the engineering machinery and equipment manufacture sector in China, and one of the first groups of innovation enterprises in China. The company specializes in the research, development and manufacture of major, new high-tech equipment necessary for important state infrastructure construction projects in the fields of construction, energy and transportation, among others. The company has more than 20,000 employees.
www.zoomlion.en.ecplaza.net

Customer location

Hunan, Shaanxi provinces, Beijing and Shanghai, China

Milan, Italy

The CAD factor

Computer-aided design (CAD) was also an important part of the PLM implementation. However, Zoomlion headquarters did not require its individual organizations to choose the same CAD technology Nevertheless, NX™ software, also from Siemens PLM Software, was adopted and used widely throughout the business units for product design and simulation analysis.

In June 2009, Zoomlion Environmental Hygiene Machinery implemented NX in a comprehensive manner and in late 2009, Zoomlion Construction Crane Branch adopted it as well. "Without question, powerful design and simulation analysis capabilities are the two main reasons the business units chose NX," says Yukun. "In addition, one cannot overlook the advantages of the seamless integration between NX and Teamcenter, facilitating a collaborative development environment." By the end of 2009, Zoomlion Group was using 400 Teamcenter licenses and approximately 50 NX software licenses.

The right choice

Yukun concludes, "For large manufacturing enterprises such as ours, effective data management not only ensures flexibility during the process of R&D, but also clarifies the business requirements for each project. Of course, it takes commitment to transform a business to a completely digitally driven enterprise. While we gave our business units a free hand during the PLM implementation, we also established reward mechanisms to facilitate speed and buy-in. I smile when I say there were also consequences for not assimilating. Our incentive program definitely delivered a stable and effective implementation process. With Teamcenter, the business units of Zoomlion now have very strong R&D and development execution capacity, made possible by turning vast amounts of distinct and disconnected data into an organized portfolio of decision-making criteria. For us, the standardization of data and process enabled by Teamcenter gives us the knowledge to drive successful growth."

Siemens Industry Software

Americas	+1 800 498 5351
Europe	+44 (0) 1276 702000
Asia-Pacific	+852 2230 3333

www.siemens.com/plm

Hyundai Heavy Industries

Using PLM to advance global leadership in electrical power transmission and distribution equipment

Industry

Machinery and industrial products

Business challenges

User demand for systematic management of designs and documents, especially revision control

Limitations of existing legacy system

Need for enterprise management of R&D for major products

Keys to success

Improving management and use of drawings, payment, design and production

Managing actual drawing/BOM throughout the product lifecycle

Enhancing product quality to increase revenues

Implementing Teamcenter software

Results

Cost saving of $9.8 million[1] (U.S. currency)

Shortened construction period to 10 days

Teamcenter and NX help Hyundai Heavy Industries save $9.8 million annually across product lines

Quiet fishing village transformed
Ulsan was a quiet, small fishing town before ground was broken on an empty stretch of beach by Hyundai Heavy Industries (HHI). The company, founded by the late Chung Ju-yung on March 23, 1972, wrote the first chapter of its ship-building history in June, 1974, by completing the construction of the world's largest shipyard and two 260,000 deadweight ton, very large crude carriers (oil tankers) all at the same time. A decade after its first delivery, the Hyundai Shipyard topped 10 million deadweight tons in aggregate ship production, and has maintained its leading position in the world shipbuilding industry ever since. Hyundai Shipyard's drive has mirrored the growth of modern Korea's heavy industry, and its success has allowed it to expand into other heavy industry areas, ultimately leading to the formation of Hyundai Heavy Industries, an integrated heavy industry company.

Electrical equipment for power transmission and distribution
The Electro Electric Systems Division of HHI was established in 1977 and provides cutting-edge products across all industries in Korea by employing advanced technology, continuously training personnel and

performing ongoing research and development (R&D). Recognized for its proficiency and expertise, the division offers turnkey solutions in the power industries covering design, engineering, manufacturing, installation and commissioning of major electrical systems in power plants, substations, locomotives, subways and marine vessels. The division's product line includes a wide range of electrical equipment: gas insulated switchgears (GIS), transformers, high voltage circuit breakers, motors, generators, instrument and control systems, power electronics and renewable energy.

The largest manufacturer of marine generators in the world and dominating the market with a 45 percent share, the division concentrated its efforts on exploring overseas markets from the beginning and established its presence in places such as

Results *(continued)*

Time savings of 68,000 person hours per year

Increased revenue of electric and electronic system

Business standardization

the United States, Canada, Asia, the Middle East, Europe, Australia and Africa. Now it proudly stands as the most comprehensive global heavy electronic machine manufacturer.

Teamcenter delivers a designer-friendly environment

HHI first introduced Siemens' Teamcenter® software in 2000, specifically its enterprise knowledge management functionality. The Electro Electric Systems Division of HHI was implementing hundreds of designs simultaneously and experiencing increasing user demand for revision unification as well as the need for systematic management of designs and documents. HHI tried to respond with its existing legacy system, but experienced limitations due to a lack of manpower and technology. There was a need for enterprise management of R&D information for major products, from bills of materials (BOMs) through product lifecycle management (PLM). The staff of HHI considered various options including deploying ERP products and systems from other vendors but decided that Teamcenter was the most optimized tool and best met the division's needs.

HHI went through a series of trials in introducing the solution and building a design BOM system. Ultimately, the Electro Electric Systems Division realized that a production-centered BOM management and enterprise approach were necessary. The premise of the BOM system was that designers' workload should not increase and user convenience should be maximized by delivering the simplest system possible. In other words, the highest value was placed on the perspective of the designer.

Cost savings greater than $9.8 million

The Electro Electric Systems Division of HHI was able to achieve enhanced management utilization of drawings, payment, design and production as well as product quality. Management of actual drawing/BOM and the product lifecycle enabled

such achievements. The BOM system maximized designer convenience by providing a much more integrated environment than before. The minimized repetitive input by designers prevented errors in operation and resulted in significant improvements to product quality. This in turn increased BOM data reliability. The automation of simple repetitive tasks reduced designers' workload and dramatically slashed the time required to complete the work process. The work process improvements are resulting in saving more than $84,000 per annum. Also, NX™ software is used for early simulations of product performance (structural and motion analysis), and human modeling software permits ergonomic optimization. Digital mockups are used for design review. Complex design tasks are much easier now that interferences can be detected virtually.

Solutions/Services

Teamcenter
www.siemens.com/teamcenter
NX
www.siemens.com/nx

Customer's primary business

Hyundai Heavy Industries provides electrical equipment, including gas insulated switch-gears (GIS), transformers, high voltage circuit breakers, motors, generators, instrument and control systems, power electronics and renewable energy.
www.hhi.co.kr

Customer location

Ulsan
Republic of Korea

"HHI Electro Electronics System Division deployed Siemens' Teamcenter to systemize overall design tasks. The system is very easy to use and convenient for our designers. In addition, product data is totally reliable. The completely integrated environment has resulted in improved product quality and increased profitability."

Ahn Chi Sung
Section Chief
Hyundai Heavy Industries

HHI achieved a total cost savings of $9.8 million. Increased productivity also led to shortening the average build period to 10 days, which is equivalent to saving 68,000 person hours per year. This ultimately led to an increase in revenues through enhanced product quality. "HHI Electro Electric Systems Division deployed Siemens' Teamcenter to systemize overall design tasks," says Ahn Chi Sung, section chief at HHI. "The system is very easy to use and convenient for our designers. In addition, product data is totally reliable. The completely integrated environment has resulted in improved product quality and increased profitability."

Future plans

The Electro Electric Systems Division of HHI plans to leverage the enterprise and engineering process management capabilities of Teamcenter and the product development tools of NX to further consolidate its global collaboration and strengthen its leadership position. This includes goals of achieving 100 percent reliability of BOM data, absolute seamless information sharing and integration of the quote system.

1 Exchange rate of 1,185 won per U.S. dollar (as of October 27, 2009)

Siemens Industry Software

Americas   +1 800 498 5351
Europe   +44 (0) 1276 702000
Asia-Pacific   +852 2230 3333

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SIEMENS

Mercury Marine

PLM propels innovation

Industry

Industrial machinery, shipbuilding

Business challenges

Competitive industry requires fast time-to-market and ongoing innovation

Global operation increases collaboration challenges

Keys to success

Strong PLM vision and executive commitment

Process transformation rather than simply deploying technology

Single repository for all product information including Pro/Engineer data

Single engineering BOM

Identical PLM implementations at five worldwide sites

All five sites have design changes synchronized daily; participate in single product change management process

Eliminating three different systems by deploying a single change management process within Teamcenter

Process transformation built on Teamcenter speeds new product introductions

Marine industry leader

Mercury Marine is the world's leading manufacturer of recreational marine propulsion engines. A $1.5 billion division of Brunswick Corporation, Mercury provides engines, boats, services and parts for recreational, commercial and government marine applications.

Mercury's strategic vision is to be "the most respected and revered global marine industry leader," which requires product development processes that are flexible and fast enough to support constant innovation. And with manufacturing/supplier facilities in 11 countries and engineering activities in six, these processes must operate seamlessly across multiple sites.

Duplications and delays

"Before the business process transformation, product design data and project data was stored and managed in multiple systems, which led to longer lead times in our product development process," explains Balakrishna Shetty, systems architect for CAD, CAM and PLM Systems at Mercury. "With the defined release processes in Teamcenter to capture the development- and milestone-specific design builds, all stakeholders in the product development process are ensured of using the same information to make the right decisions."

In the past the company also had multiple systems and places where people could take out part numbers. The engineering bill of materials was maintained in spreadsheets by all the stakeholders involved with product development. The engineering change process used multiple systems and it was not automated. "All this resulted in extended lead time in the design and development phase and didn't help the downstream users," says Shetty. CAD data was managed in a PDM environment, preventing the company from leveraging it in cross-functional collaborations.

www.siemens.com/teamcenter

Keys to success *(continued)*

Daily PLM-ERP synchronization

One system that manages part numbers throughout the company

Ability for procurement, manufacturing, quality and costing departments to see latest product information in real time

Results

Faster product development process due to the established guidelines on storing and managing product and project data

Increased part re-use by engineers and designers because of a single source for all product data

Choosing a PLM solution

In the search for a PLM solution, Mercury evaluated software from Parametric Technology Corp. and IBM/Dassault Systems in addition to Teamcenter® software from Siemens PLM Software. Mercury's PLM solution must manage all of the company's product data, including geometric data created by its Pro/Engineer® CAD software. It also needs to be able to automate and manage processes such as engineering change as well as support multi-site collaboration.

Mercury chose Teamcenter because it was the "best fit" solution that met these requirements. Another factor in the decision was the willingness of Siemens to work with Mercury to ensure a successful implementation. "A PLM implementation requires a close partnership with the vendor," says Shetty. "Siemens works with us on an ongoing basis to improve the technology mapping of our processes as well as its software."

Process improvement before PLM

Prior to implementing Teamcenter, Mercury followed a three-tiered process designed to ensure buy-in at all levels. "When organizations embark upon a major software implementation, they tend to jump straight into the technology without first aligning around cross-functional goals and processes," explains Lenny Grosh, the Mercury project manager in charge of the Teamcenter implementation. "That typically results in either a much longer, more expensive deployment due to mismanaged expectations and misunderstood processes, or an implementation that is deemed unusable by the rank and file, and therefore considered a failure."

Tier 1 involved understanding the top executives' view of the existing processes, capturing the voice of the customer and establishing metrics for success. "This managed the executives' expectations going forward," says Grosh. Tier 2 was a
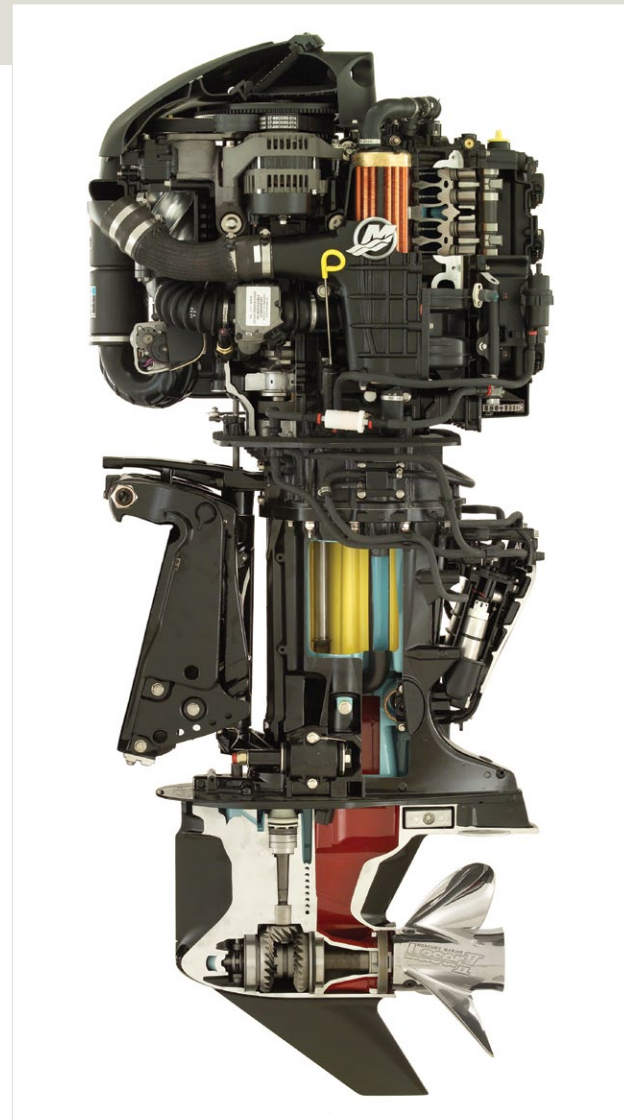
process-definition step in which existing processes were refined at the user level, evaluated and streamlined in preparation for Tier 3. This final tier was the actual aligning of the defined processes to the technology. Once this was completed, an extremely rapid implementation was possible thanks to the groundwork done in the tiered approach. "Over the course of five months, we rolled out identical Teamcenter implementations in Wisconsin, Oklahoma (Stillwater and Tulsa), and Mexico; adding a fifth site in China within a year," Grosh notes. Currently more than 800 Mercury employees around the world use Teamcenter.

Data and processes under control

A key element of the company-wide Teamcenter implementation is the use of a single repository for all product information. This includes Pro/Engineer CAD data, design specifications, design standards, material specifications, supplier data and specifications and any other dataset types relevant to the product data. It also includes 600,000 items of legacy product data that were migrated into the Teamcenter database.

Mercury's Teamcenter sites are synchronized nightly, enabling the company's global engineering team to work collaboratively. Mercury uses the community collaboration capabilities of Teamcenter for managing project data where teamwork is essential. These capabilities are based on Microsoft SharePoint® server. "With the use of Teamcenter the people in areas such as costing, procurement, quality and manufacturing now have access to design data, even though they don't use Pro/Engineer," says Shetty. Mercury uses various workflows and statuses to manage the lifecycle of an item from concept to end of life. As part of the drawing sign-off workflow, Teamcenter pushes the released and approved drawing in a PDF format to Mercury's intranet website for those who need it. Teamcenter is integrated with Mercury's ERP system; the two programs are synchronized daily.

Teamcenter manages project-related information such as documentation, scheduling, team meetings, individual tasks and feedback. Since implementing Teamcenter, Mercury now has just one place where part numbers are created and managed and one place where engineering bills of materials are stored and managed. In addition, a single, automated change management process is now in place, replacing multiple systems.

Innovation boost

The most telling result of Mercury's process transformation is the way Mercury manages its High Performance Product Development process today. The product development process, along with data management/change management processes, enabled Mercury to introduce more innovative products in short duration using the same or fewer engineers.

This innovation boost is due to a number of factors. "One is design re-use, which is happening to a much greater extent now that Teamcenter searches can quickly identify appropriate parts and designs in the database," says Shetty. With less time wasted creating duplicate parts, there is more time for innovation. Design re-use also reduces costs.

Mercury's accelerated innovation rate is also the result of fewer delays caused by errors. With single source product information and one engineering bill of materials through the entire development process, people now work within one system where they get all the information they need. Also, design modifications are captured through a disciplined and automated approval process.

Process automation is another area where time saved goes back to innovation. Mercury's engineering change process offers an excellent example. "Having a single engineering change management process that is managed by Teamcenter throughout Mercury Marine produces significant yearly savings," says Grosh. "Since implementing Teamcenter, the average time for an engineering change at Mercury has dropped from 56 days to 22. These benefits are just the beginning."

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Lenny Grosh
Project Manager
PLM Implementation
Mercury Marine

"People in areas such as costing, procurement, quality and manufacturing now have access to design information, even though they don't use Pro/Engineer."

Balakrishna Shetty
Systems Architect
CAD, CAM and PLM Systems
Mercury Marine

"When you see this happening – people seeking you out to ask if you can put a workflow in Teamcenter – you know PLM is a success for the organization."

Lenny Grosh
Project Manager
PLM Implementation
Mercury Marine

Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

Mercury is the world's leading manufacturer of recreational marine propulsion systems.
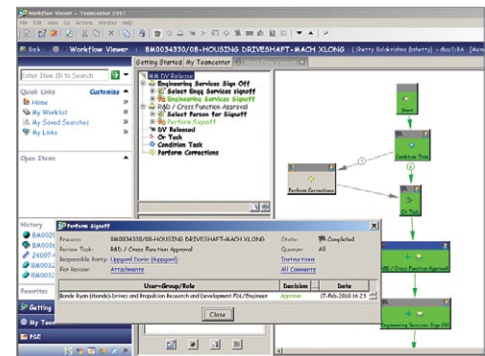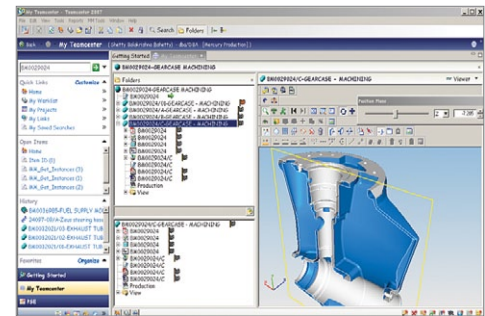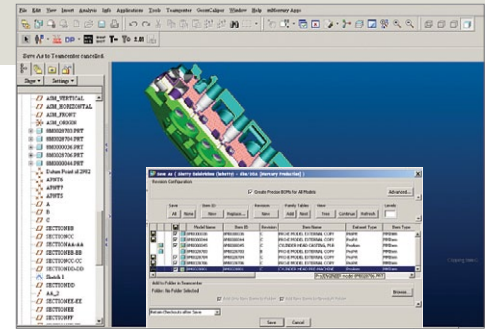www.mercurymarine.com

Customer location

United States, Mexico, China, Japan

"A PLM implementation requires a close partnership with the vendor. Siemens works with us on an ongoing basis to improve the technology mapping of our processes as well as its software."

Balakrishna Shetty
Systems Architect
CAD, CAM and PLM Systems
Mercury Marine

Mercury plans to add additional Teamcenter functionalities because end users continue to find ways to take even more advantage of the software. "When you see this happening – people seeking you out to ask if you can put a workflow in Teamcenter – you know PLM is a success for the organization," says Grosh.

As director of strategy and program management, John Bayless believes that Mercury chose an excellent foundation for transformation when it decided to go with Teamcenter. "Connecting people, processes and systems is critical to supporting the speed of innovation at Mercury Marine," says Bayless. "Creating connectivity with PLM has increased our ability to launch new products. As you can see from what we've done in terms of product launch cadence and program metrics in recent years, Teamcenter and our partnership with Siemens have been a great success."

Siemens Industry Software

Americas	+1 800 498 5351
Europe	+44 (0) 1276 702000
Asia-Pacific	+852 2230 3333

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SIEMENS

Teamcenter

Wright Medical Technology

Medical innovator achieves its fastest-ever product launch

Industry

Life sciences

Business challenges

Business model innovation

Secure information tracking and sharing

Compliance with strict HIPAA regulations

Compliance with strict FDA regulations

Speed to market

Keys to success

Proven Wright orthopaedic technology

Prior experience with Teamcenter digital lifecycle management

Siemens' ability to commit and deliver on fast timing

Results

Successful pilot of breakthrough knee replacement methodology – PROPHECY®

Compliance with Title 21 CFR Part 11 and other applicable regulations

Wright's fastest-ever launch

Improved patient outcomes

Improved surgeon trust in Wright

Teamcenter helps deliver breakthrough PROPHECY® Pre-Operative Navigation Guides for total knee replacement

Another step on the innovation trail

Wright Medical Technology, Inc. (Wright) is an innovator.

"We've been first to market 21 times in 15 years, making key investments in niche markets, which eventually create brand new opportunities for the entire orthopaedic industry," says Cary Hagan, sr. vice president, Commercial Operations – EMEA.

Wright, a global orthopaedic medical device company, specializes in the design, manufacture and marketing of reconstructive joint devices and biologics. Wright's product line includes large joint implants for the hip and knee; extremity implants for the hand, elbow, shoulder, foot and ankle; and both synthetic and tissue based bone graft substitute materials.

"Our goal here at Wright is to create motion and to help our surgeons create motion for their patients," says Alex Winber, senior director, Ortho Recon Marketing, Wright. "One of the best ways we have to do that right now is PROPHECY® Pre-Operative Navigation Guides."

PROPHECY® Pre-Operative Navigation Guides are a new technology designed to solve problems that have had lasting, often debilitating impact on patients and their families. PROPHECY® Guides were developed as a solution to the obstacles surgeons often face using traditional surgical instrumentation. The PROPHECY® Guide creation process uses advanced imaging technology to help surgeons review implant alignment before they enter the operating room. Once the procedure begins, patient-specific PROPHECY® surgical guides help the surgeon to place and align the implant to its predetermined placement.

Anatomic alignment – key to success in knee replacement surgery

Good knee replacement is dependent on the proper alignment of the implants.

PROPHECY® can help make that goal a reality. PROPHECY® Pre-Operative Navigation Guides can be aligned by

www.siemens.com/teamcenter

> **"One of the things Siemens PLM Software has helped us create is a very strong platform for PROPHECY®. It's helped us integrate manufacturing, engineering and our surgeons."**
>
> Alex Winber
> Senior Director
> Ortho Recon Marketing
> Wright

mechanical axis or surgeon preference. "PROPHECY® allows pre-operative planning for the surgeon, who can view the anatomy and be familiar with it before going into the operating room," says Richard Obert, manager, R&D PROPHECY/CAS, Wright.

Moreover, sizing is a critical element of surgical planning, with visualization essential to effective sizing. Using PROPHECY®, the surgeon can see the results of the virtual procedure and view how the implant fits on the bone.

Best in engineering meets best in medicine

"One of the things Siemens PLM Software has helped us create is a very strong platform for PROPHECY®. It's helped us integrate manufacturing, engineering and our surgeons," says Winber.

That platform has led to a smooth-running process from beginning to end.

PROPHECY® Pre-Operative Planning starts with a CT scan or an MRI scan that's converted into a solid computer model. The engineers at Wright Medical then use that model to perform a virtual surgery based on surgeon preferences, which is made possible by Siemens' Teamcenter® software.

Virtual surgery enables the engineers to reference the ankle, the hip and those landmarks that are hard to see because they're covered by soft tissues. Winber explains, "The engineers at Wright Medical receive the scan and have a program that erases all the soft tissue so they can see an image of the bones. Once the surgeon approves the pre-operative plan, then our engineers make guides to match the surface of the patient's bones."

Product management technology

Siemens and Wright had already established a successful business relationship, and good partnerships can lead to great

things. The PLM faculties of Siemens were critical to Wright's latest discovery.

With Teamcenter software, Wright was able to get off to a brisk and successful start. "As we developed PROPHECY®, we knew we needed a secure location to store all the information to make sure the changes were tracked," says Obert. "And Teamcenter was already validated for use with requirements met for our current products."

In fact, Teamcenter enabled Wright to immediately comply with Title 21 CFR Part 11of the Code of Federal Regulations, which deals with FDA guidelines on electronic records and signatures in the United States.

While tracking and compliance are essential, secure information sharing outside the company, likewise, is vital to the process. "We needed an external user to be able to access our system and have certain abilities to understand how their cases were being processed and organized, and we also needed the engineers on the inside to have even more freedoms and the ability to organize the information and see which data was available," says Paul Stemniski, senior product development engineer, Wright.

For Wright, Teamcenter enables comprehensive data management and collaboration. For example, from a production perspective, the edge gained is clear. "We have the surgeon's signature on the surgical plan before we make the guides," says Winber. As he had noted, Teamcenter
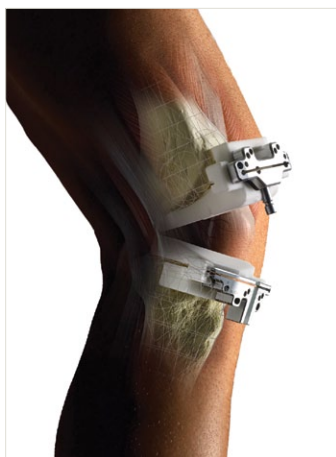
Solutions/Services

Teamcenter
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Customer's primary business

Wright Medical Technology, Inc. is a global orthopaedic medical device company specializing in the design, manufacture and marketing of reconstructive joint devices and biologics. Wright's product offerings include large joint implants for the hip and knee; extremity implants for the hand, elbow, shoulder, foot and ankle; and both synthetic and tissue-based bone graft substitute materials. Wright's common stock is listed on the Nasdaq Global Select Market under the symbol "WMGI." www.wmt.com

Customer location

Arlington, Tennessee
United States

"We've been first to market 21 times in 15 years, making key investments in niche markets."

Cary Hagan
VP Ortho Recon
Wright

helped Wright integrate manufacturing, engineering and surgeons.

Built on innovation, delivered with speed

Where many companies talk about innovation for marketing purposes, Wright delivers it in real-world product and process. "Our business is built on innovation and our entire campus is built on new technology, new ideas," says Hagan. "And all that means better technology, more innovative delivery of the technology and better impact not only on the patient, but on the overall economic benefit of that particular procedure and service. In many ways I think PROPHECY® actually encompasses the spirit of innovation and the create-motion culture."

"This technology, as it becomes more widespread," emphasizes Hagan, "is going to enable a level of sophistication and skill that would probably not be attainable through any other opportunity or technology."

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