

INFORMATION WEEK

BUSINESS INNOVATION POWERED BY TECHNOLOGY

Jan. 14, 2002

Online Product Development

Groupthink Gets Smart

Online design collaboration is delivering the innovation and quick payback that manufacturers have been looking for from the Internet. It's cutting the time it takes to design and engineer products and letting manufacturers give more responsibility to their suppliers.
By Steve Konicki

When auto supplier Johnson Controls Inc. took on the job of building the dashboard controls, overhead computer console, interior lights, and seats for the 2002 Jeep Liberty, it needed ideas from its own designers and from a worldwide network of 35 major suppliers and dozens of smaller ones. "The philosophy is that we need the best input we can get on the design, as early in the process as possible, from every one of our design partners," says John Waraniak, Johnson Controls' executive director of E-business speed.

The 2002 Liberty was a step up for

Johnson Controls. The Milwaukee, Wis., company had been a top-tier DaimlerChrysler supplier but was now in the elite role of acting as a components integrator responsible for engineering and manufacturing a complete section of a vehicle based on the automaker's design. Johnson Controls would build the vehicle's cockpit controls, for example, as one unit that would be delivered to the automaker just in time to be bolted on a new car as it rolls down the assembly line. To make it happen, managers at Johnson Controls applied online design collaboration and product-development software to work with DaimlerChrysler as they designed part of the vehicle and with its own supplier network to engineer and build it.

Waraniak calls online design "a product innovation revolution" that's increasingly replacing face-to-face engineering-collaboration sessions. It lets companies like DaimlerChrysler create new products more quickly while also handing more responsibility to suppliers. The benefit: More frequent and detailed collaboration that lets companies cut by a third or more the time needed for some steps in the design process. When one design partner makes a change in an engineering plan, it no

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longer takes hours or days for the information to flow to the dozens of people inside and outside the company who have to update their own plans. When the change is posted to the Web-based virtual workspace, every party is informed of the change and can access the latest version.

Online collaborative development has begun to give manufacturers the kind of efficiencies and creative benefits that the Internet has long promised. And it's providing faster payback than complicated efforts to automate supply-chain transactions, which is one reason it's moving beyond early adopters in the aerospace and automotive industries. The technology is wiping away barriers of geography and time by letting engineers around the globe use the Internet to exchange files so they can work together on a project in real time. Or, often better, letting an engineer at an Asian supplier work during the day there and leave a marked-up document for a U.S. client when the day dawns here.

"This is a unique time in the history of technology," says George Ashley, who's using the tools as Ingersoll-Rand Co.'s manager of engineering business services. "There has always been some technology limitation to real-time design collaboration, but now there is not. Design collaboration really works, and the challenge now is letting people learn how many ways they can think collaboratively."

Gartner research director Marc Halpern estimates that design-collaboration and product development-management software, a \$720 million market in 2000, grew as much as 40% to more than \$1 billion last year, and will climb this year to as much as \$1.6 billion. Throw in services that help companies deploy and use these tools and the Aberdeen Group puts the overall market at \$18 billion in 2001. Aberdeen predicts the market will reach \$22 billion this year and keep growing at 16% to 20% annually for five years. System integrator EDS believes so strongly in the growing demand for collaborative design and manufacturing software that it's launching a new Product Life-cycle Management Solutions services business it expects will generate more than \$1 billion a year for the company.

There's a compelling reason for that optimism. Design-collaboration tools help companies cut the time it takes to finish a design, typically by about 30%, Halpern says. "That's very significant in a marketplace where getting a new product to market before the competition is a key competitive advantage," he says. The benefits are driving adoption beyond traditional aerospace and automotive markets into medical equipment, high-tech and electronics, and even consumer packaged goods, say MatrixOne Inc. and Parametric Technology Corp., two leading design collaboration software vendors.

Johnson Controls used both its own and DaimlerChrysler's Web-based design collaboration systems to create much of the interior of the Liberty that's closest to the driver—the steering wheel, pedals, instrument panels, heating and air conditioning, air bags, trim, and related interior wiring. Using a combination of Catia CAD/CAM software, i2 Technologies' supply-chain man-

agement software, and Dassault Systemes' Enovia product life-cycle management system, DaimlerChrysler worked closely with Johnson Controls as the carmaker developed the look, feel, and behavior of the driver's controls. Creating a design that provides a particular experience is what Jeep designers think they do best, leaving the engineering to Johnson Controls and other suppliers. Johnson Controls then takes over management of engineering all components, working with its suppliers using Web-based MatrixOne design collaboration and product-development software tools, some of which it co-developed with Johnson Controls, to help them build the actual parts. DaimlerChrysler doesn't evaluate or sign off on individual parts, which lets Johnson Controls complete its design work much more quickly. "When we agree with customers that we'll be responsible for a total assembly, we don't need their engineers looking over our shoulder or need to be co-located with them," Waraniak says. "We eliminate shadow engineering."

Compared with the old means of couriers, faxes, and face-to-face design meetings, DaimlerChrysler has cut 60% to 90% of the time it takes to communicate design changes to a supplier and get required changes back by using the Catia, Enovia, and i2 tools, says Karenann Terrell, director of its E-business operation, E-connect. "Any change to a design is immediately communicated to everyone, and the impact on their piece of the design is known right away," she says. The software has been so successful that DaimlerChrysler is using its collaborative system as it designs all its vehicles for the 2004 model year.

Global manufacturer Ingersoll-Rand is trying to create an approach to design and manufacturing that it terms "design anywhere, build anywhere." The idea is to use Parametric's Web-based Windchill software to connect the \$8 billion-a-year company so that designers and factories anywhere in the world can work together on new products. Already, Ingersoll-Rand designers in China, Europe, India, and the United States are collaborating on new refrigeration units, air compressors, paving equipment, and rock drills. The company is increasingly looking to its design-collaboration efforts to make engineering more a part of the supply chain by doing away with design as a business-process silo and getting the company's engineers and its suppliers working together, Ashley says. The company expects the result to be lower design and engineering costs and an easier way to leverage its buying power globally. "We can have an amazing impact on the cost of direct material purchases by using collaborative tools effectively," he says.

Yet, while the long-term prospects are bright for collaborative product-development software, the manufacturing recession is slowing its adoption. Parametric recently said its revenue in the quarter ended in December won't be more than \$200 million, slightly below the low range of its forecast and well below the previous year's \$234.9 million. Likewise, MatrixOne's growth—though doubling for its most-recent fiscal year—slowed in the third quarter, down 16% from a year ago. The vendors have

The Upshot

Online product development software is helping manufacturers develop new products faster

- The time it takes to share design changes with suppliers can be cut by a third or more
- Web-based tools allow designers around the globe to collaborate
- Major consulting firms including EDS have started practices devoted to design collaboration and project management

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attempted to overcome that slowdown with new products and services. For instance, Parametric is marketing to smaller companies with a rapid deployment service that lets a company with a single Parametric license invite its design partners to a virtual project workspace. During the past year, the vendors have worked to expand Internet capabilities so that design partners can view and mark up design drawings in real time. But some potential cus-

tomers only started showing interest after the Sept. 11 terrorist attacks. "The 9-11 disaster caused companies to recognize they couldn't just jump on an airplane and have a meeting like they used to," says Paul Gilmartin, VP of product management at MatrixOne.

"Design collaboration really works, and the challenge now is letting people learn how many ways they can think collaboratively," Ingersoll-Rand's Ashley says.

Reaching a critical mass of adoption is especially important for design-collaboration software for one major reason: If your partners don't use it, it's a lot less useful to you. That's the problem facing PerkinElmer Inc., a \$1.69 billion-a-year Wellesley, Mass., company that designs and sells optoelectronic and scientific instruments and components.

It's using Open Text Corp.'s Livelink, a Web-based collaborative product-development application, in its optoelectronics unit, but few of its telecommunications customers use it. PerkinElmer CIO Tom Gernon blames the slump in the telecommunications industry and predicts the software will catch on more quickly among its biotechnology and pharmaceuticals clients. "We want to improve our new-product intro-

duction cycles by getting closer to the customer, and you can't get much closer than co-designing products," he says. Whirlpool Corp. took a more conservative route to getting its primary design partners and suppliers to collaborate by using its clout as the world's largest maker of kitchen appliances to require those companies to use the same software and platform. Though Whirlpool's suppliers generally aren't included in the initial design process, the company uses the Internet to share designs ready for manufacturing. It has standardized on design software—Macromedia's FreeHand; Robert McNeel &

Real-Time Collaboration Doesn't Always Click

The concept sounds perfect: Engineers in different locations use the Web to work together on designs in real time. But some find that the effort to make real-time connections work isn't worth the trouble.

Whirlpool Corp. depends on hot new designs to fuel its \$10.3 billion-a-year appliance business, and uses the Internet extensively to share files among staff and partners in North America, Latin America, Europe, and Asia. But the company uses the File Transfer Protocol to share design files instead of a browser-based system. Partners and suppliers download the files from a server, work on the files, then upload them back to the server, which numbers the files to indicate the latest version.

That's not state-of-the-art, but the Benton Harbor, Mich., company doesn't find real-time, Web-based collaboration very helpful. Time differences make it difficult for teams to coordinate meetings. Plus, many emerging markets and smaller companies in developed markets don't have the sophisticated telecommunications and networking infrastructure needed to work in real time. "I don't want to handcuff myself to only be able to do business with giant firms, because I may be overlooking 50 world-class, great design firms that have a lot to offer, yet happen to be in a place where they don't have access to the latest or greatest technology," says Charles Jones, Whirlpool VP of consumer product design.

Tom Morris knows that real-time meetings can be a headache, but he says the payoff is worth it. Morris is CIO of Aptec Corp., a 25-person engineering and design firm in

Daytona, Fla., that does online product development. To create a wireless headset for the backseat entertainment system of a DaimlerChrysler minivan, Aptec once linked people from the automaker with a car-stereo maker in Michigan, a Florida manufacturer, a South Korean tool and mold-maker, and a Philippine electronics company. Morris says a good online session is often better than a face-to-face meeting because the software creates an electronic record of the meeting. "In some ways, you get a more productive result than if you were all within the same four walls," he says. "It forces you to capture content changes and record how you came to a decision."

But it takes a lot of work. Aptec appoints a "pilot" to prepare each meeting—setting an agenda, collecting the right CAD files, computer simulations, or data, getting the right people on only when they're needed, and ensuring that everyone has the necessary Internet access and software to attend the meeting. Aptec uses CoCreate's OneSpace program to run Internet-based collaboration sessions in which people in different locations can look at and mark up shared CAD files, view data, and send each other text messages.

First impressions are tough to change, so Aptec spends time in one-on-one sessions with clients before the first time they go live with the technology, Morris says: "If you turn someone off to this process, it's really hard to get them back." —ANTONE GONSALVES (*agonsalv@cmp.com*)

AND CHRIS MURPHY

Associates' Rhino modeling tool; Ashlar-Vellum's design tools; and Parametric Technology's Pro/Engineer—and there's no room for variation, says Charles Jones, Whirlpool's VP of consumer product design. "You have to make sure that you will shoot at sunrise the design center that doesn't have the correct [software] release," he says.

Whether it's Whirlpool's cautious approach or DaimlerChrysler's aggressive outsourcing, manufacturers are using the

Internet to share design information with suppliers. With customers' constantly demanding new, innovative products, more frequently and at lower prices, the pressure is on companies to marshal resources all along their supply chains. As Ashley at Ingersoll-Rand puts it: "Collaboration is the No. 1 driver of business for us in the future, and we'll do all we can to leverage the technology available to help us." —LARRY GREENEMEIER AND ANTONE GONSALVES

Consulting Firms Promote Online Design Collaboration

Manufacturing companies looking to develop new products faster aren't the only ones that have become true believers in the potential of online design collaboration. Some of the largest professional-services firms are recent converts as well.

EDS spent more than \$1 billion last year on acquisitions to create a division for design collaboration and other product life-cycle-management services in October. Other consulting firms are making their own plans: Andersen is putting more emphasis on a partnership with Parametric Technology Corp. by making the company's Windchill collaborative-design software part of its pitches for manufacturing and collaborative-design services.

EDS bought Structural Dynamics Corp. for about \$950 million last year and bought out Unigraphics Solutions, which it had partially owned for 10 years. EDS sees a growing demand for engineers and product designers to exchange digital design plans and manufacturing information via local networks and the Internet, says Chris Will, a director with EDS's new Product Lifecycle Management group. And EDS doesn't think it will stop there. Once that information is available digitally, the firm envisions that data being used in many downstream processes, such as marketing or service and repairs.

EDS has made design collaboration a key ingredient in

its TeamCenter suite of applications. Companies such as Ford, Lockheed Martin, and Northrop Grumman have signed up. At the core of TeamCenter is an Oracle database that serves as a data repository that designers can access via the Web using open standards such as Sun Microsystems' Java 2 Enterprise Edition and Microsoft .Net. TeamCenter facilitates collaboration in model visualization, requirements, design, development, project management, and manufacturing.

Los Angeles aerospace company Northrop Grumman is using EDS's technology to help Lockheed Martin develop the joint-strike fighter, a project, worth up to \$200 billion, to create one jet-fighter model for the entire U.S. military. The company employs TeamCenter, called Unigraphics Metaphase before the EDS buyout, and Catia by French software developer Dassault Systemes to help designers worldwide make changes to designs and share them with co-workers and partners. "When you think in terms of return on investment, you've got to factor in what it means for a company to have design data available immediately," says David Torchia, Northrop Grumman's product data management practice manager. "I don't have to contact individual designers, and I'm not digging through microfiche files or playing phone tag." —LARRY GREENEMEIER (lgreenem@cmp.com)