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Mercury Marine balances freedom and structure in global design p 20

Patrick C. Mackey
president
Fred Bellio
director

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How Mercury Marine launched 48 outboard versions in just 60 months

By Roberto Michel
senior contributing editor

The leadership at **Mercury Marine** knows all about balancing seemingly contradictory forces. For one, the manufacturer of boats and marine engines, a $2.3-billion division of Brunswick Corp. headquartered in Fond du Lac, Wisc., must balance conflicting customer desires—for power on the one hand and fuel economy on the other—in the engines it delivers.

Mercury's Optimax line of two-stroke engines blends best-in-class fuel economy with top-rated performance. Its four-stroke engines are powerful, but run quietly.

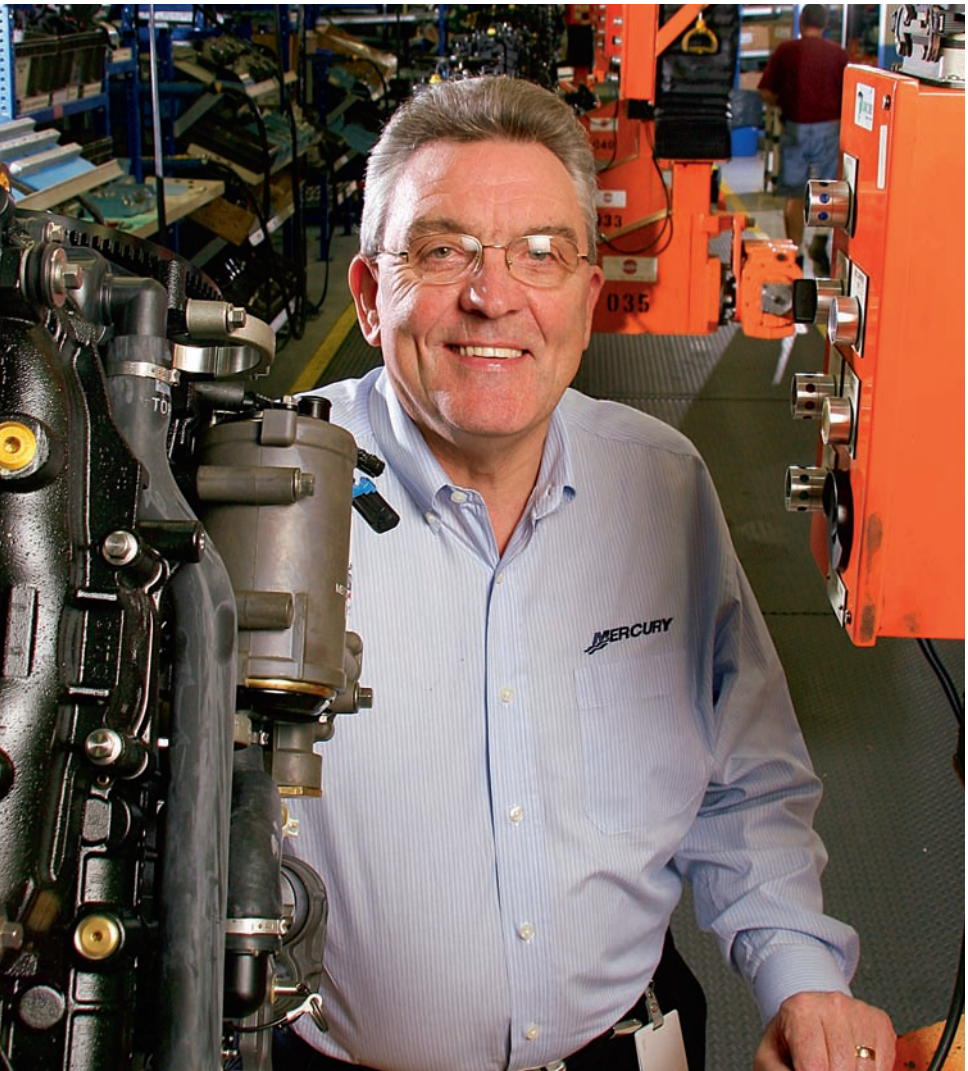
Maybe this is why senior managers at Mercury Marine see no inherent contradictions when it comes to what they wanted from a product life-cycle management (PLM) solution—a single source of product data truth that yet gives engineers flexibility to innovate.

Photography by Marc Berlow

"One of the keys to the whole strategy behind our transformation is what we call establishing a single source of the truth," says Fred Bellio, director, global product development, processes and systems, Mercury Marine. "We wanted to be able to say, if I have a certain piece of information, we will store that information in the appropriate system."

PLM systems excel at organizing product data, as well as supporting collaborative design processes. Bellio says Mercury Marine's PLM replaced its electronic file vault while giving development teams the flexibility to quickly iterate early design concepts. "We need that flexibility because we can't slow down innovation with a bunch of fixed systems and processes," Bellio says.

Unencumbered design innovation—coupled with efficiencies in transforming design concepts into engineering requirements, and, where possible, reuse of part designs—are all part of



Patrick C. Mackey, president, Mercury Marine, says the engine maker needed to process, consolidate, and perform design creation while simultaneously proliferating that design into different products.

the PLM transformation at Mercury, says Patrick C. Mackey, president. "Innovation is the lifeblood of any consumer durables company," he says. "It's what separates the winners from the also-rans."

In Mackey's view, PLM is more than a vault for the company's intellectual property (IP)—it's a way to organize IP within the context of the process. "We realized that we shouldn't just take jumbles of data and move forward quickly," he says. "We needed to be able to process it, consolidate it, and perform fundamental design creation—along with almost simultaneous proliferation of that design into different products."

The answer for Mercury was deployment of the Teamcenter PLM package from **Siemens PLM Software** (formerly UGS). PLM is one of the fastest-growing categories of enterprise software among manufacturers because it helps companies speed the pace of new product introductions while also bringing efficiencies in areas such as parts reuse. But as Mercury's experience shows, PLM ideally is approached within the context of a business process transformation that spans product portfolio planning, design creation, product launch, and service and warranty concerns.

PLM before ERP

Mercury's quest to revamp its systems began in earnest in 2003, when it sent out proposals to PLM vendors. But Mercury also was looking to roll out a new ERP package to replace its custom enterprise system, and looked at PLM and ERP as part of the same transformation. Indeed, says Bellio, besides establishing a single source of the truth, the other pillar of Mercury's approach was to establish strategy and processes first, then adopt appropriate technologies.

Setting the strategy entailed considerable effort, says Bellio, involving process-setting sessions with close to 200 personnel from different aspects of the business, who broke down Mercury's desired state of product development into 26 subprocesses.

Mercury found that its design engineers needed some flexibility to perform early-stage design work within CAD without getting bogged down by data-management procedures. However, once design concepts were formalized and further analysis or rapid prototyping in other tools commenced, Mercury wanted to exert more control over design data within PLM. It also wanted a solid, efficient change management process. To this end, the company laid out a template, and established a Change Proposal Council to decide which components of a product needed to be changed and when.

Mercury Marine continued using its PTC Pro/Engineer 3D CAD tool and additional engineering analysis packages. It chose Teamcenter as its PLM backbone partly due to the flexibility of its data-management structure, including the ability to automatically save design iterations as JT files. JT is a lightweight viewing format that allows nonengineers to view and manipulate design information without having the CAD package on their PCs.

Bellio says this foundation allows Mercury's engineering community to continue using familiar design creation tools, but still check needed data into PLM once designs start to firm up. "We don't see having a single source of the truth conflicting with flexibility in any way," he says. "We give our engineers the flexibility as they are creating new technology, but once we decide that technology is going to be made into a product, it's ready to be structured. At that point, we get a little more stringent."

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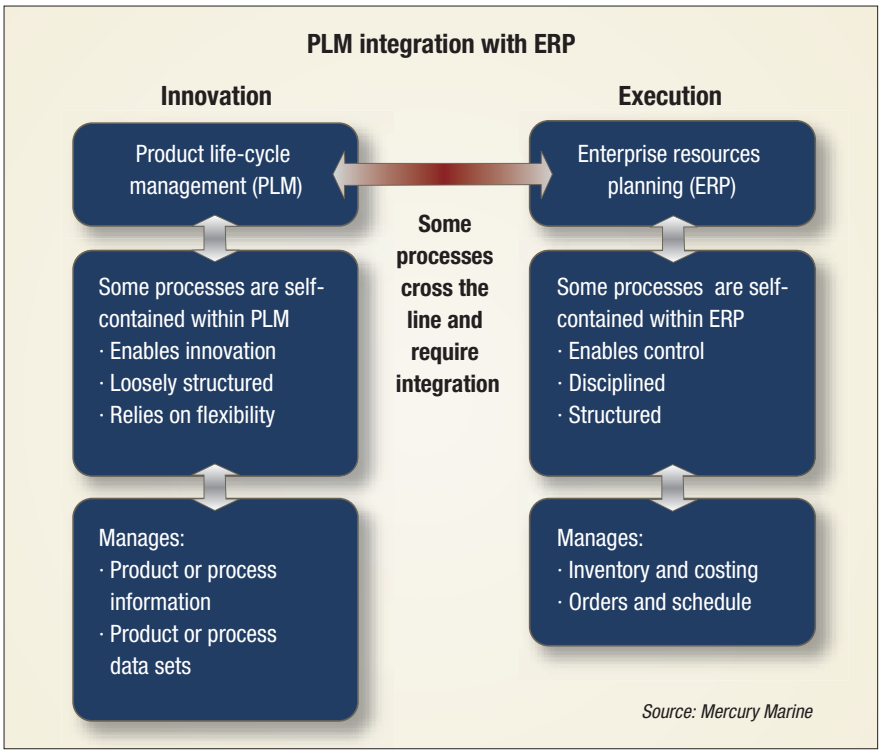


Mercury Marine is integrating PLM with ERP for processes such as product change management, but sees the systems as having distinct strengths and self-contained processes.

Siemens showcases the latest version of its Teamcenter collaboration suite

Sidney Hill, *executive editor*

Siemens PLM Software claims its Teamcenter 2007 product life-cycle management (PLM) suite will significantly lower the cost of owning PLM technology while also making teams that use it far more productive.

Automation giant Siemens announced the $3.5-billion acquisition of the former UGS in February and closed in May, seeing it, says Anton Huber, a Siemens Automation & Drives board member said to be architect of the deal, as "an opportunity to optimize production even as the product is being designed."

Initially, the plan was to rebrand UGS as UGS PLM Software, but instead, as of October 1, the name is Siemens PLM Software.

Siemens is so excited about Teamcenter 2007 that it chose to make its unveiling the centerpiece of the annual Product Development and Management Association (PDMA) conference that took place in Orlando the first week of October.

By hosting the conference's main dinner event, Siemens assured itself of having a large group of product development professionals—all potential customers—on hand for its Teamcenter 2007 announcement.

The program opened with a professional comedy troupe satirizing the business problems that Siemens says Teamcenter 2007 can solve. Among them:

- Having product-related information essentially locked inside the brains of a few long-term employees who may or may not be willing or able to share that information with colleagues;
- A lack of tools for clear communication among members of globally dispersed product development teams; and
- Users who constantly want systems customized for their own purposes.

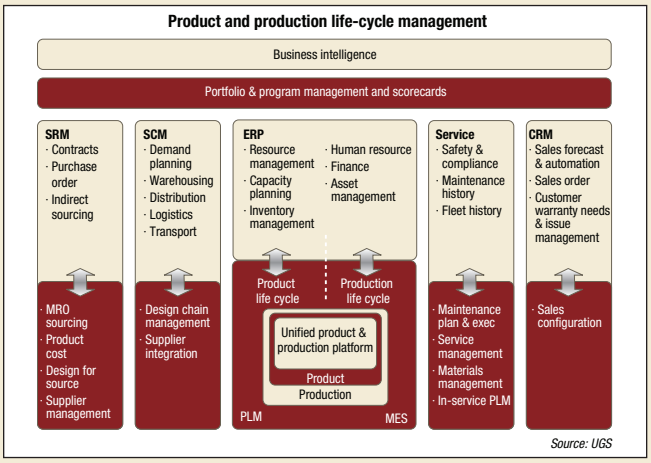
Siemens executives contend the first two issues were largely addressed in previous versions of Teamcenter, which offered a central repository of all of a company's product-related data, along with capabilities for multiple team members to view data at the same time.

Primarily through a series of acquisitions, Siemens also assembled a set of applications that addresses all facets of product development, from designing products to managing the machines that build them.

The primary focus of Teamcenter 2007, according to Siemens officials, was lowering total cost of ownership by making the system both easier to install and to use.

New Teamcenter 2007 features include:

- A service-oriented architecture that makes it easier to incorporate various pieces of the Teamcenter product set—as well as components from other applications—into new business processes;



Siemens PLM Software has committed itself to a strategy that ultimately is about a single data model for all information needed to both design and make a product, and perhaps even data related to every instance of the product.

- A richer user interface that offers the same viewing and navigational experience that users get in familiar Microsoft Office applications;
- A new data model that can support activities not traditionally associated with PLM, such as the management of production processes and supplier relationship management; and
- A new business modeler.

Jim Phelan, a Siemens PLM Software spokesperson, says the business modeler is the piece that does the most to boost productivity. It allows teams of workers—even if they are spread around the globe—to collaborate on how business processes will work with the Teamcenter environment. Once a process has been created, it can be tested inside the business modeler. If the test is successful, the process can be activated with the push of a button, says Phelan.

During the PDMA event, Siemens executives aired video testimonials from customers who adopted Teamcenter 2007 several months ahead of its release. One of those customers was Matt Bronowski, project manager of Next Generation PLM at **BSH**, a German consumer goods manufacturer that started a joint venture between Bosch and Siemens.

"We will be able to lower our total cost of ownership by reducing training cost simply because of the familiar, Windows-like user interface of Teamcenter 2007," Bronowski said. "This will help in regions like Asia where we are growing very rapidly and employing many new people. It's critical to bring these people up to speed very quickly." ■

Designers are still "freewheeling" at the conceptual stage, adds Bellio, yet PLM is able to capture iterations. Once concepts are ready for release to a development project, the system accommodates more stringent control over the data.

As important as product innovation is to Mercury, the company decided it needed new systems for innovation *and* execution. PLM, in Bellio's view, enables innovation, while ERP enables control and structure for activities such as inventory management and order fulfillment. To achieve all this, Mercury followed up its Teamcenter selection with the **Oracle** e-Business Suite.

Bellio says Mercury's system transformation vision includes tracking as-built data in ERP, as well as using it to track warranty-related data, feeding back any needed information to the PLM system.

The first phase of the worldwide ERP rollout included basic transactional functionality and human resources, says Bellio, though one Mercury plant in China has a more in-depth ERP implementation, including manufacturing functions. PLM is the master system for engineering bills of materials (BOM), but the final manufacturing BOM will reside in ERP.

The change management process is handled through Teamcenter. The reason for making PLM the master system, says Bellio, is that Teamcenter's structure accommodates additional product and engineering information compared to Mercury's legacy system, or for that matter, the ERP package.

Mimic the actual

The next wave of Mercury's ERP deployment will include integration of Teamcenter with the Oracle suite to automate release of BOMs for manufacturing. "The whole idea is to get a virtual plant that can mimic the actual physical plant, and that we go start to finish, managing product configuration as well as the logistics of [customer fulfillment]," Bellio says.

Best-in-class finds new uses for 3D design data

Best-in-class	Average	Laggard
Manufacturing creates deliverables from 3D design data		
100%	77%	63%
Quality creates deliverables from 3D design data		
50%	40%	29%
Manufacturing starts authoring process prior to design		
88%	67%	46%
Quality starts authoring process prior to design release		
69%	44%	17%
Planning part manufacturing or assembly		
84%	75%	52%

Source: Aberdeen Group

The transition from 2D drafting to 3D modeling has been arduous, but new uses for 3D design data are being found based on an emerging technology infrastructure that includes capabilities for real-time updates automatically generated as a result of design changes.

Bellio sees concrete benefits in the new change management process. "If we can manage [a product change] in a shorter cycle time, that benefits us in multiple ways," Bellio says. "For one, we don't create more stock for a product design that is out of date because there is a change ongoing. Second, it ensures that any requirements coming out of service or warranty will be put into new product iterations as quickly as possible."

At Mercury Marine, says Fred Bellio, director of global product development, processes, and systems, PLM is the master for bills of material due to the the wide range of product and engineering information that the solution houses.

Just as PLM is more than a product record, it also has functionality for Web-based design collaboration and project management. Mercury uses core data management functions in Teamcenter—such as storing product-related requirements—while other modules address project management and collaborative visualization.

For example, says Bellio, Mercury uses the visualization module, which gives nonengineers a Web-based means of viewing and manipulating CAD models in the JT format. Teamcenter Community—based on Microsoft's SharePoint portal technology—is used to enable project management. There are nearly 1,000 "outlying consumers" of PLM information across quality, manufacturing, marketing, and procurement disciplines.

"We collaborate around not just product information, but project information," says Bellio. "That seems to be one of the glitches that our senior executives experienced at other companies: they can manage product information, but the project information is scattered in various formats. The end result is people don't know what's really going on."

Mackey sees the Web-based collaborative capabilities of PLM as enabling global design. "There are great engineers in the U.S., European countries, China, and India," he says. "We have to be able take in views from all over the world."

The JT format—supported by numerous vendors—is vital to the interoperability between CAD and PLM for Mercury, says Bellio, as is the relevant interface software. While integration of some CAD data—such as detailed hierarchical data known as nested family tables—remains a challenge, Bellio says interoperability between CAD and PLM hasn't been a major issue.

At the end of the day, the benefits from PLM stem from both its collaborative as well as data management functions. According to Bellio, parts reuse rates about as high as faster change management in terms of benefits from PLM.

"One of the main things we wanted to do was find better ways to commonize the parts we use from product line to product line, versus going and recreating things from scratch," says Bellio.

Mackey, who began his career as a manufacturing engineer, also sees parts reuse as a major area of benefit. PLM's ability to align requirements and specifications with corresponding parts history makes it easier for engineers to leverage prior work. "I don't want engineers spending their time doing the same things over and over again," he says.

Mackey says he's already noticed the quicker pace of development enabled by the revamped processes, and supported via PLM. He estimates the "cadence" of product development has increased by roughly one-third over the last few years thanks to new processes and systems.

One yardstick of the transformation, says Mackey, is that Mercury has launched 48 new outboard versions in just under 60 months. At a recent boat show in Miami, Mercury was showing five new products at a time when some competitors were showing only two.

"I'm doing that [number of introductions] with the same number of design engineers," Mackey says. "But they work differently. They do the right things at the right time. We are designing from a position of strength." ■

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