As the pace of product developments quickens, manufacturers seek more innovative ways to speed time-to-market and lower the costs of expensive Product Lifecycle Management (PLM) systems. The latest software solutions increasingly offer lower-cost, easier-to-use cloud-based PLM solutions, not only for the traditional product data management of PLM but also for the digital manufacturing tools that form the core of engineering programs.

The digital manufacturing area, considered a subset of PLM by market researcher CIMdata Inc. (Ann Arbor, MI), is an integral portion of manufacturers’ toolkits that tie CAD/CAM, CAE and other 3D visualization tools of PLM directly to the shop-floor equipment. As with PLM’s product data management, it’s become more common for these systems
to be cloud-based offerings in order to leverage advantages in lowering up-front costs, speeding deployment, and easing maintenance and support.

“In general, traditional PLM has been recognized as achieving results for larger manufacturers,” said Ed Martin, senior industry manager, Manufacturing Industry Group, Autodesk Inc. (San Rafael, CA). “Many Fortune 100 manufacturing companies have, by and large, adopted PLM to varying degrees within their business processes. But I would say even the largest manufacturers haven’t broadly adopted PLM outside of their core engineering processes. This is particularly true outside of what I would call the product piece of the product lifecycle management realm. The ability of small- and medium-sized businesses to adopt traditional PLM is even more limited.”

Lowering Costs of PLM

Manufacturers are trying to extend the usage of PLM into more business-critical processes, particularly downstream into manufacturing, Martin said, where it’s less thoroughly adopted, even at larger companies. As the cost equation has improved with cloud-based systems like Autodesk’s PLM 360 announced in 2012, more small and medium-sized manufacturers are becoming more interested in deploying the technology, he added.

“The challenge for smaller companies, of course, is the expense, not only the software but of the services required to implement and maintain PLM being a barrier to adoption,” Martin noted. “One of the trends that I believe we’re leading is toward lower-cost, more flexible solutions that are faster to implement and can solve some of these problems effectively. One of my favorite sayings is, ‘You don’t want to spend $1000 to solve a $100 problem.’ When you add up all those $100 problems—there’s a lot of money out there.

“Prices are pretty well understood anyway in the marketplace, and we’re very transparent about what our pricing is,” Martin said. “But it’s not just the price for licenses—it’s the cost to implement, customize and maintain, because really what PLM is, it’s a business process. Excess complexity is not just an issue for smaller businesses, it can cause challenges for larger organizations as well. Companies in different industries, and even individual companies within an industry, have specific needs for their business processes that may or may not be matched by the out-of-box functionality that’s offered, so the ability to be able to customize that quickly and easily is something that’s very important.”

In Siemens PLM Software’s Tecnomatix digital manufacturing solution, the Jack virtual human is used to perform feasibility analysis of manual truck assembly operations prior to production.

Lower costs of entry will likely make cloud-based PLM much more attractive to smaller-sized companies that otherwise wouldn’t be able to afford the technology, noted Richard Mizuno, a partner at the consulting firm Kalypso (Houston, TX). “I think on the platform level that’s probably been one of the more innovative introductions in the PLM space in recent years,” Mizuno said of Autodesk’s PLM 360. “It provides a different price/value point for the potential adopters of PLM that may haven’t been in the market before. It’s opened up an opportunity for companies that hesitated to adopt PLM because of infrastructure and cost concerns.”

Security Worries Cloud the Picture

Concerns over the security of manufacturing intellectual property still nag some observers, although many software developers say it’s not really an issue anymore. “First, the main players need to get comfortable with the technology,” noted Steve Schuchard, CAD technical manager at PMC (Dearborn, MI), an authorized reseller for Autodesk’s Factory Design Suite solutions and also for Siemens PLM’s Tecnomatix digital manufacturing software. “There are a lot of cloud services out there now, including ANX. I think the [auto] OEMs will never fully put their product information in the cloud.”

Others say that the security issues on the cloud have been largely solved, with both hardware and software security mea-
sures at cloud service providers that match, or exceed, those typically available at many organizations.

“If you look at how a lot of work gets done today, if you really take a comprehensive look at what data is shared externally, in a lot of cases data gets shared via e-mail or other means, which is not necessarily secure,” noted Autodesk’s Martin. “Being able to provide a common point on the cloud that has physical security in the datacenter—and segregation of multi-tenants within the datacenter, plus layers of software security, as well as logging of who accesses that data, and from where, etc.—in some ways makes the cloud better.

“It’s hard to keep control of information once it leaves the four walls of your company,” he added of many typical on-premises scenarios. “By contrast, having something in the cloud, there are multiple physical and software layers of security applied to that, and you can also audit who is accessing what and when.”

A hybrid-type solution with some data stored on-premises behind firewalls may be the way some companies deal with the issue.

“What we see is everyone wants cloud capability, yet the security aspect in the enterprise world hasn’t yet completely been overcome, especially in aerospace/defense,” says Patrick Michel, vice president, Dassault Systèmes (Velizy-Villacoublay, France). “There’s a lot of talk, there’s less action, I’d say. People essentially consider whether to have private clouds.

“We can put a customer on the cloud. I even tested it myself,” he said. “The technology works on the product to store my data and do everything that you can on a centralized server, where you don’t even know where the server is. It’s just that the market’s evolving gradually on that topic and you’ll probably see it on the smaller customers first. It’s a bit like banking was 10 years ago, where people hesitated, now nobody thinks about it.”

**Linking the Shop Floor**

Digital manufacturing technologies that provide users with seamless links to the shop floor are making headway, with recent iterations of such tools from PLM systems developer Dassault Systèmes and its digital manufacturing
Delmia brand (Auburn Hills, MI). “We consider it an integral part of the solutions that we develop,” said Michel, “and it’s been the driving force just to have an integrated solution that covers all aspects of PLM.”

With its recent introductions of the 3D Experience platform geared toward specific manufacturing industries, Dassault is extending its technology to include more customers and real-time visibility of what’s happening on the shop floor, added Michel. “The 3D Experience platform is integrating all the stakeholders in the process,” he said. “In the past, it was reserved to an elite level, more the advanced guys, whereas with the 3D Experience platforms, we are trying to have a much more global reach.

“We’re also formalizing the value that we deliver to each customer per industry, rather than a generic ‘Here’s a CAD tool,’” Michel said. “We believe that having 3D capabilities that go all the way down through weld-point management to fabrication is of a tremendous amount of value to the industry as a whole, versus just selling a collection of products.”

Since introducing 3D Experience, Dassault has added about a dozen Experiences for various industries, with five in automotive and eight for the aerospace industry. “If you integrate the customers’ customer, meaning us the consumers, then you understand how this is larger than just PLM, which is focused on the engineering and manufacturing,” Michel noted. “How do I get the voice of the customer? How do I test the product in the hands of the customer, before it’s even built? So that’s where we’re going with a lot of this 3D Experience.”

The effort is part of an evolving use of digital manufacturing, he said, extending the tools more fully into operations on the shop floor since Dassault acquired Intercim two years ago. “That’s done through fundamental work at the architecture level, so that the two systems know what information needs to be pushed and the shop-floor worker gets the right information at the right time,”
Michel said. “There’s a lot of aspects that were done also on the usability of the solution for the shop floor—you can’t wait five minutes for a document to load or a 3D simulation to play, it has to be displayed in 10 seconds. It has to be punched with gloves, so the actual interface is a lot simpler on the shop floor. So it’s a mix of really robust architecture and a user experience on the shop floor that’s adequate. It’s very different than what you do on a process planning level.”

With its HD-PLM offerings, Siemens has taken a similar approach toward developing an immersive, more user-focused PLM reaching more effectively into the shop-floor environment. “From our standpoint, HD-PLM contains the pillars that will enable users to get the right data at the right time and within the proper context,” said Tom Hoffman, senior director of Tecnomatix product marketing, Siemens PLM Software (Plano, TX). “This is underpinned through our three pillars of intelligently integrated information, Future Proof Architecture and HD User experience. Each one of these carries properties that support the HD-PLM principle.”

Siemens’ intelligently integrated information deals with the extraction of data from large volumes of complex data to provide users only the information required to make accurate decisions, Hoffman explained, and with Siemens’ Future Proof Architecture, the company preserves investments customers make in solutions to minimize the total cost of ownership.

“The HD User Experience ensures everyone gets information in a form best-suited to their job, in the simplest and fastest way possible,” Hoffman said. “Additionally this becomes an immersive environment that provides transparency for all users; the ability to gather data not just from PLM, but from external sources as well; provides the apps that are needed to define and evaluate full product content—not just design—and the right knowledge in the context of the decision the user is confronted with to ensure that only the
right information is delivered, and delivered in the context of users’ job.”

Web and mobile-based applications, such as Teamcenter mobility and Engineering Work Instructions (EWI) will provide the ability to work anywhere, including the shop floor, with access to the managed data live, Hoffman stated. “This will provide access to necessary data that is configured to the user and task at hand,” he said. “Imagine taking Process Simulate and running it on a tablet device such as the Microsoft Surface while you are out on the shop floor during a production run, noticing a problem, loading the data, fixing the problem and then uploading it back into the manufacturing system without missing a beat.”

**Speeding Simulation via the Cloud**

In addition to its PLM 360 solution, Autodesk also offers its suite of CAE applications through its cloud-based Simulation 360 suite with Autodesk’s Simulation Mechanical and Simulation CFD (computational fluid dynamics) software for fluid dynamics and thermal simulations. Another powerful digital manufacturing tool is Simulation Moldflow, a manufacturing solution that addresses the manufacturability of a product, Martin noted. “Ideally, it’s used up-front in the product engineering process to help optimize manufacturing, but it’s critical in a lot of ways to optimizing the performance, cost and quality of plastic-injection-molded parts,” Martin said.

A key trend today is that customers expect their suppliers to bring more capability to the table in terms of their engineering expertise, and the types of tools that they bring to bear to solve problems, Martin added. “There’s a need for companies to be able to perform these analyses differently as these analyses get more complex. The amount of computing power that it takes to execute some of these very large Moldflow simulations can be substantial. By providing the ability to do these analyses on the cloud, you remove one of the constraints—you’re not having to purchase a powerful workstation that you
use infrequently, then when you do use it, it takes a consider-
able amount of time to do the analysis. Instead, by using the
cloud, customers are able to run many analyses simultane-
ously and are able to off-load analyses from the desktop with
an asynchronous workflow. You can get the results faster, and
economically it’s more cost-effective.

“If anything, the cloud lowers the barriers to entry, be-
cause you have access to more simultaneous cores and a
larger memory space in the cloud than is practical for most
companies,” Martin said. “Obviously, there are companies
that have invested very, very high in workstations that could
replicate that, but that really isn’t a suitable solution for the
majority of customers.”

Realism in CNC Simulations

At the NC machining level, realistic 3D simulations ensure
that manufacturers are cutting at optimal efficiencies. With
the newly updated NCSIMUL Machine 9 simulation solution
from software developer Spring Technologies Inc. (Cambridge,
MA, and Paris), users get a next-generation Windows-based
64-bit system offering process and application-oriented
models that automate creation and distribution of technical
content accessed by operators on the shop floor. The updated
NCSIMUL will push the digital experience even further into
the workshop, said Silvere Proisy, Spring Technologies general
manager, bringing data from programs, tooling and other
documents directly to the machine tool.

“Ultimately, the big word I use is automation,” added Brian
Basiliere, Spring Technologies account manager. “Automation
doesn’t mean eliminating paper, eliminating people. It’s really
about refining what you do every day, and basically producing
best of process—whether you’re machining or designing, it
really gets back to how you automate the process.

“Secondly, it’s about the combination of automating the
shop floor in conjunction with controlling the data that flows all
over the shop, because if you’re a government entity, a medi-
cal device company, or a small shop, there’s all kinds of stan-
dards you have to adhere to. How do you know you adhere to
them? This is part of that process—shop-floor documentation,
CAD/CAM simulation, and automation.”

The NCSIMUL Machine 9 offers usability improvements
to the user interface, up to four times faster processing using
both multicore and multithreading on Intel’s latest processors,
and optimized algorithms to decode G code, probing, material
removal using 3D tools and optimized cutting conditions. The
system includes tighter integration of tool libraries and new
CAM software interfaces including CATIA V6. ME

Want More Information?

Autodesk Inc.
Ph: 415-507-5000
Web site: www.autodesk.com

Dassault Systèmes/Delmia
Ph: 248-267-9696
Web site: www.3ds.com

PMC
Ph: 313-441-4460
Web site: www.pmcorp.com

Siemens PLM Software
Ph: 800-498-5351

Spring Technologies
Ph: 617-774-7464
Web site: www.springplm.com