



## PLM challenges and benefits

*Results of the IBM Online Diagnostic Tool*





## ***Time to market and innovation are top challenges for manufacturers***

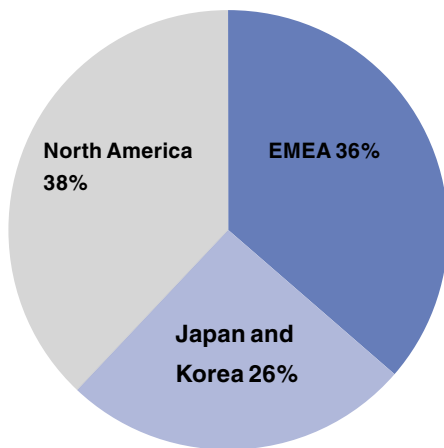
Last year, IBM introduced an online PLM Diagnostic tool, which has provided more than 600 manufacturing companies with a customised analysis of their PLM processes and practices. As these companies have sought to improve innovation and competitiveness in the marketplace, the online tool has helped identify their strengths and opportunities for improvement with self-directed diagnostics and industry benchmarks.

This PLM Diagnostic report is based on the results of more than 600 participating companies from manufacturing markets around the globe. It has been prepared by IBM to share the insights and trends that have been documented by the consolidated data of these companies. Insights that can help you set your own strategic PLM course.

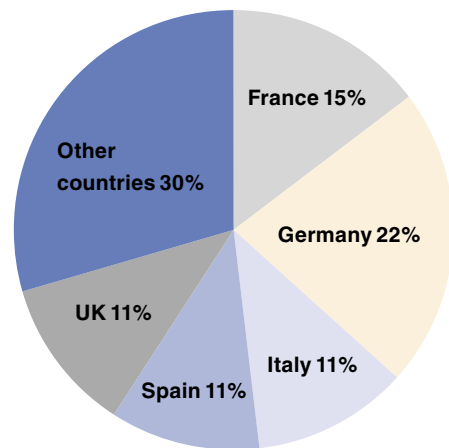
The geographic spread of these companies includes 38 percent North America, 36 percent from Europe and 26 percent from Asia-Pacific. Company size also varies widely, ranging from small manufacturing companies to large automotive and aerospace original equipment manufacturers (OEMs). Regardless of company size, however, the typical respondent is a key decision maker for PLM solutions and technologies.

**Split of the registered users per country**

**Percentage of registered users per geography**



**Percentage of users by EMEA based country**





## ***What is PLM?***

**Regardless of industry, geographic location or size, results from the IBM PLM Diagnostic tool found the same challenges repeatedly tend to plague modern manufacturers:**

- Meeting time-to-market goals is their top challenge. Not surprisingly, given their time challenge, lack of innovation rates a close second. As companies struggle to merge IT with business, the difficulties of managing a complex IT environment is also a top challenge.
- Improved design productivity and product data sharing are seen as the leading cures for these challenges. Also 90 percent of respondents have no or only partial integration with suppliers or customers, and data is so difficult to find that many start new designs from scratch rather than re-using existing knowledge.
- Competitive differentiators are difficult to come by. Time to market and quality generally are only at parity with the competition. Only 15 percent say they are ahead of competition.

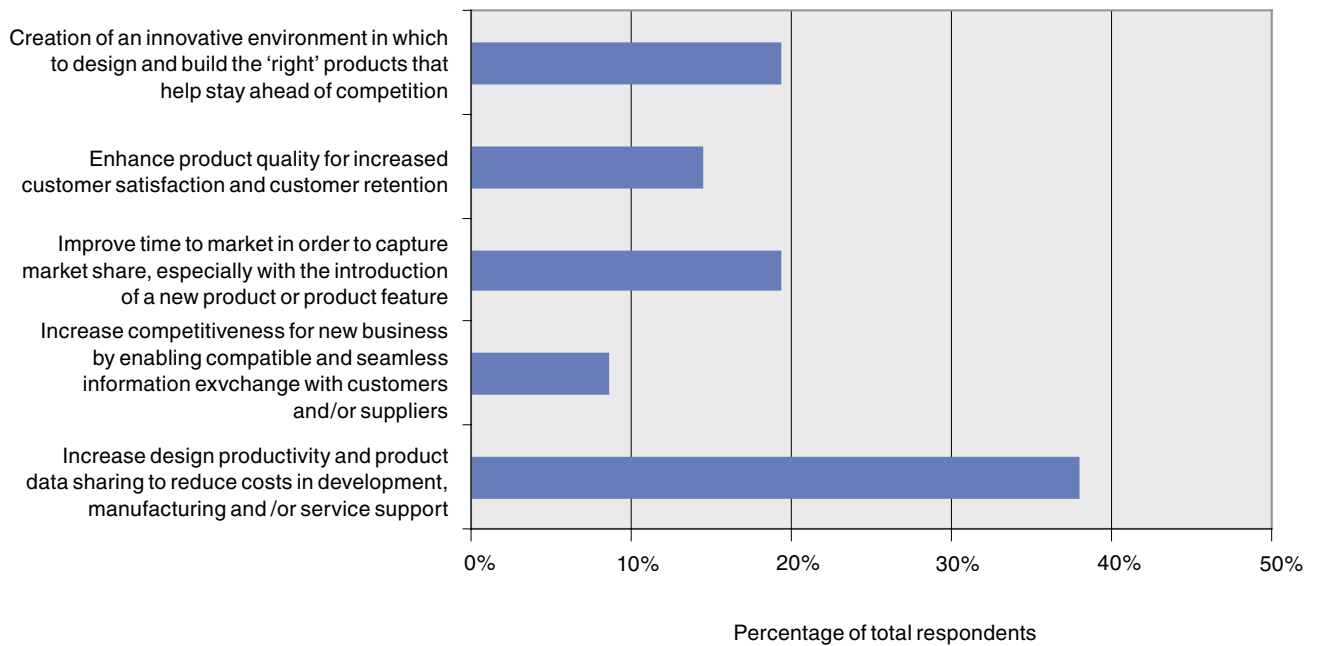
Product Lifecycle Management is a set of capabilities that enables an enterprise to effectively and efficiently innovate and manage its products and related services throughout the entire business lifecycle, from conception through recycling and disposal.

“PLM is, in a sense, an evolution of one of the most significant breakthroughs in manufacturing history – Henry Ford’s assembly line,” says Nick Donofrio, IBM Senior Vice President of Technology and Manufacturing. “But an assembly line stops when the product is built. PLM has evolved to be more like an assembly line on a continuous loop. It follows the product through the manufacturing stage into the after market, and then swings back around to the concept and production phase. This closed-loop approach gives our partners key insights into product performance which can, in essence, turn a once-mediocre product into a genuine category leader.”

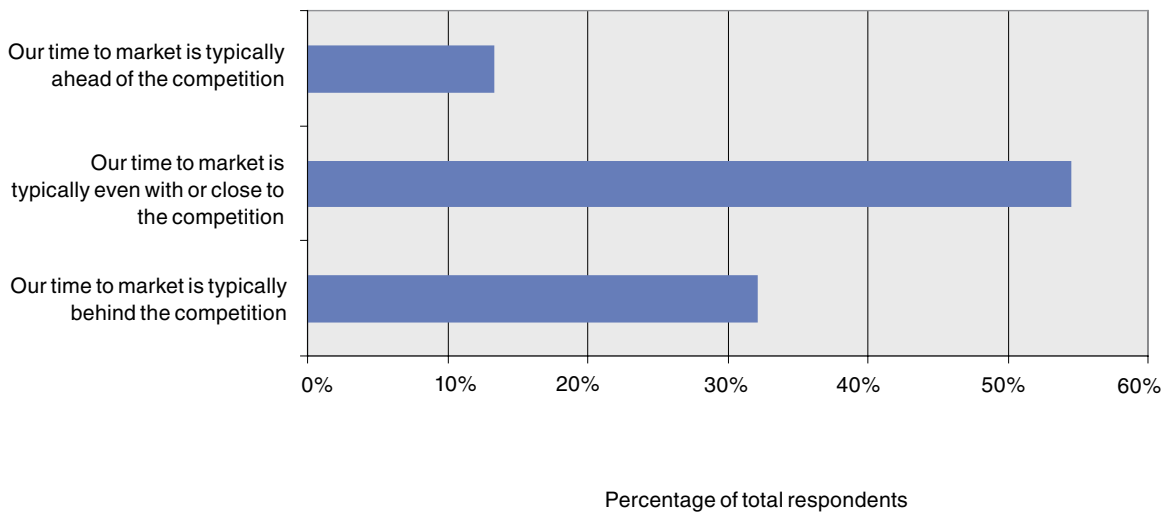
Nick Donofrio knows the truth of those words because IBM has used PLM to achieve innovation in its own product lines, driving profitability, growth and market share. IBM has received more patents and awards than any other company for 11 consecutive years, and PLM is a key element of that achievement. Dassault Systèmes IBM’s ISV partner for PLM, is the acknowledged global leader in PLM product design and collaboration applications.

# PLM Diagnostic Executive Summary

**What do you perceive as the most significant benefit a product lifecycle management (PLM) solution could provide for your company?**



**How does your company's ability to bring product-to-market compare with the competition?**





## ***The IBM PLM Diagnostic tool***

But IBM is just one company<sup>7</sup> achieving impressive return-on-investment (ROI) with PLM:

- Maschio Group, an agricultural equipment manufacturer, has reduced time-to-market by 55 percent, improved design quality by 70 percent, and achieved impressive increases in product innovation through its PLM-driven ability to explore 50 percent more design options for each product. “By shortening the cycle time by ten months, we are now much more flexible and better adapted to the changing market demand,” says Paolo Cera, Marketing Director. “This benefit is priceless for our company.”
- Grand Soleil, a manufacturer of plastic garden furniture and toys, created 12 new products in only eight months after adopting IBM PLM solutions. “CATIA V5, six months after installation, has permitted us to save 8-10 percent of time in the technical design and 20-35 percent of time in design change management,” says Gianni Grazioli, Marketing and Research and Development (R&D) Director.
- Loewen, which offers 4.3 trillion standard product combinations for its luxury doors and windows, has cut its design times by a third, from 12-18 months before PLM to 8-12 months currently, with more reductions on the horizon. “IBM’s approach was a comprehensive, end-to-end PLM solution, which we did not see from other vendors,” says CIO Stephen Segal. “In our view, IBM had the best understanding of what PLM actually was and how it could benefit our organisation.”

The IBM PLM Diagnostic is a free, Web-based, interactive tool that navigates a user through 25 PLM questions (please visit: **ibm.com**/solutions/plm and look for the Diagnostic Tool icon). Upon completion, the tool provides each user with a customised PLM report based on their specific answers to the questions. Consultative commentary based on the answers and a graphical representation of the PLM adoption and maturity of the organisation are included in each report.

The queries allow users to characterise their companies’ performance on a series of key metrics, from planning, collaboration and design processes to engineering and analysis, interlocks with manufacturing and systems implementation. Although the process takes just a few minutes – most participants complete it in 15 minutes or less – it delivers a wealth of information about recurring problem areas in a company’s product development practices and processes.

Users walk away with insights into areas of weakness and opportunities for improvement. Users also receive a chart that measures their company’s performance against best-of-breed manufacturers in five key areas (manufacturing, PLM implementation, PDM and collaboration, design, and engineering and analysis), as well as providing a PLM benchmark.

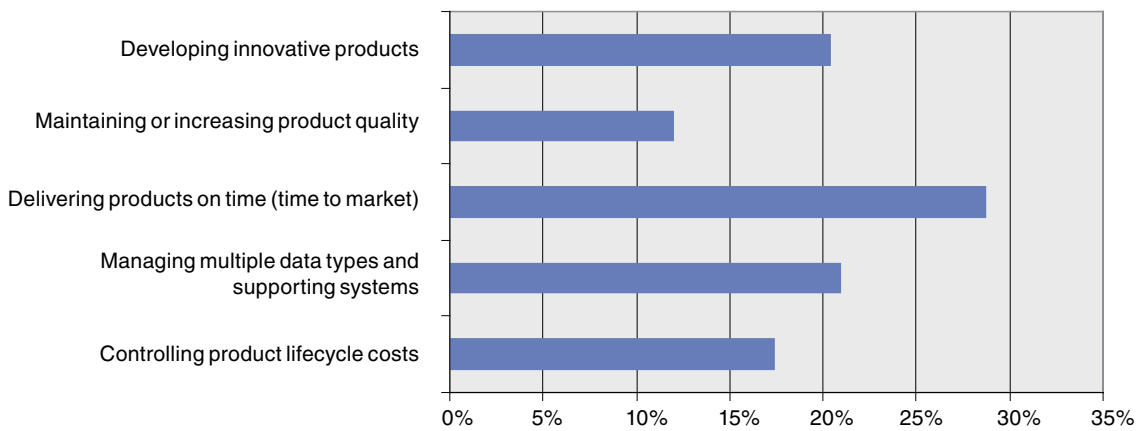
<sup>7</sup>To learn more about these companies, or other references, go to **ibm.com**/solutions/plm/transformation



***Drive time to market and business innovation***

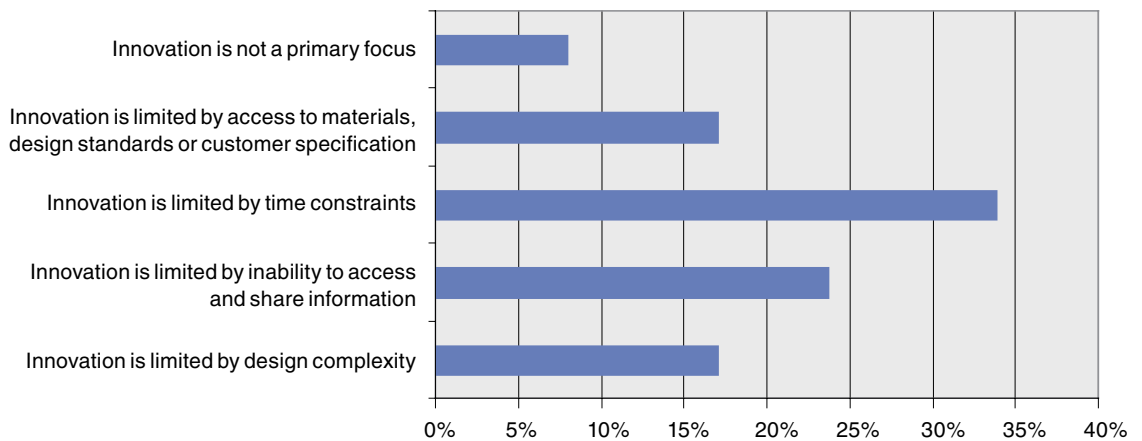
When asked to identify the most significant challenge in the lifecycle of a product, the largest number of respondents (29 percent) identified ‘delivering products on time.’ ‘Developing innovative products’ (20 percent) ran a close second.

**What is the most significant challenge in your product lifecycle?**



But both issues are facets of the same challenge. In fact, time-to-market challenges are cited as the leading constraint on innovation (identified by 34 percent of respondents). The second-most cited constraint is again a major contributing factor to the difficulties of meeting time-to-market goals – the inability to access and share information, cited by 24 percent of respondents.

**What primary constraint does your company face in product innovation?**



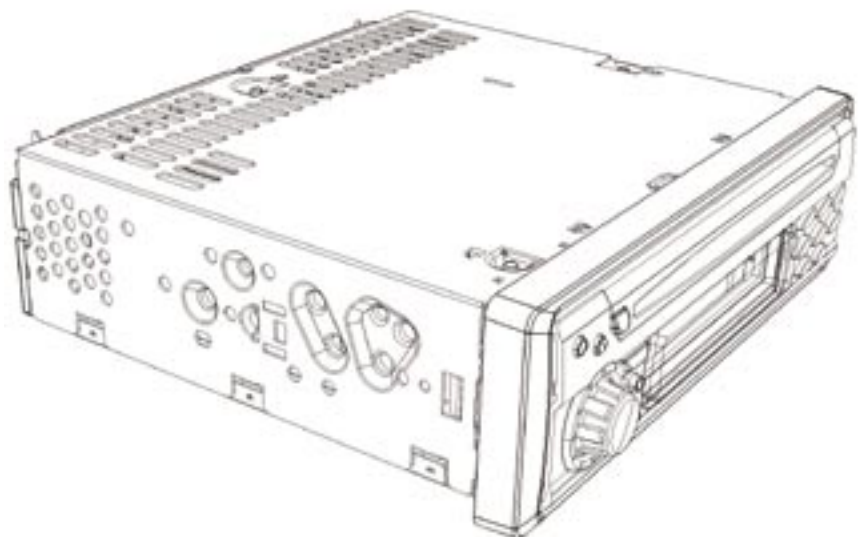
The truth is that managing complex products and processes makes it difficult to deliver product to market on time, and the need to deliver product to market on time cuts into the time available for product innovation. That is why processes for product design, manufacturing and support must be interrelated so they can proceed concurrently. Managing concurrent activities requires a collaborative working environment that ensures all participants have adequate visibility to the right information for making timely and accurate decisions.

A PLM solution can substantially increase productivity by providing a consistent set of tools, processes and methodologies to help reduce redundancies, leverage knowledge and share data across the business and product lifecycle value chain. A complete PLM solution will also improve quality, time to market and product innovation by enabling a collaborative design engineering environment.

With PLM, you can consistently go to market with the right product at the right time – and be a leader in innovation – with exciting new products that meet and even anticipate the desires and demands of customers while reducing risk and product development time.

Clarion, for example, estimates that since implementing IBM PLM solutions, it has reduced design cycle times by 50 percent and tooling preparation time by 60 percent, helping to bring new products to market faster. Because PLM understands the relationships between each and every part and surface, it can automatically adjust every affected aspect of a design each time a change is made. Adjustments occur in seconds, and no needed change is overlooked. This enables designers to test ‘what if?’ scenarios quickly and easily, allowing them to try more variations before settling on the optimum design.

Because changes are propagated so quickly, aesthetic styling processes can be conducted in tandem with part design processes. “PLM fits nicely in Clarion’s development structure by enabling engineers and designers to check and re-check each design from both styling and parts design almost in parallel, and complementary to one another,” says Toshiyuki Nakazaki, Director of R&D. “They can do this without sacrificing the time available for the tooling stages. This reduces design mistakes and modifications due to styling errors. It also gives the designers more time to change their minds without eating into the actual parts design time.”





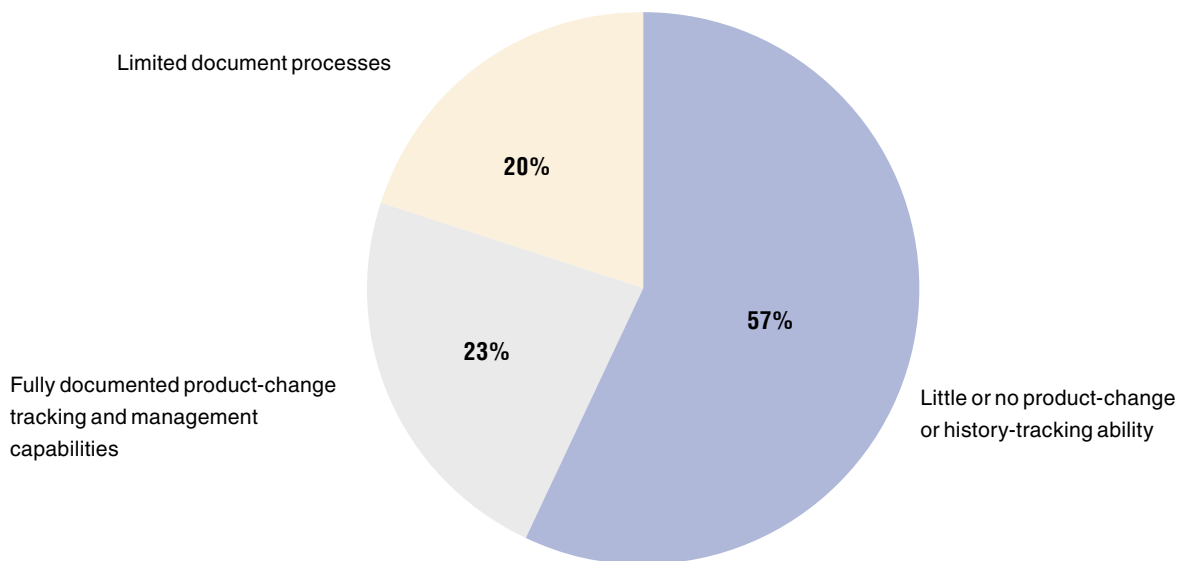
## ***Extract greater value from data***

Manufacturers know their data is their product knowledge and that it is valuable. But leveraging that data is a challenge for most respondents. For example, although 51 percent of respondents said that electronic data is their preferred medium, these same respondents said tools for accessing electronic data are limited and prevent full deployment across the value chain.

This implies that respondents are using time-consuming manual workarounds to achieve data sharing or do without it, which virtually assures errors that will drive up costs and create delays later in the development process.

Only 23 percent of respondents said they have fully documented product change-tracking and management capabilities. More than half (57 percent) said that some departments have some limited document processes to keep track of product changes, and 20 percent admitted that their companies have little or no product-change history-tracking ability. This implies that, at many companies, designers and engineers have no guarantee they are working off the latest versions of data, virtually ensuring wasted work, time and money.

**Does your company track and record the history of product changes that occur throughout a product's lifecycle?**





Product changes managed only through paper and physical communication between participants is a business risk. Without tracking the history of changes, critical product information is lost. Processes to track changes and developments must be documented and automated to ensure efficient process control.

The vast majority of companies also have no (25 percent) or few (54 percent) capabilities to manage product configurations. Not surprisingly, therefore, 59 percent of respondents said that they never or only occasionally use existing design knowledge as the starting point for new designs, primarily because data generally is not available. Therefore, each variation in a design likely requires an entirely new design to be created from scratch, a wasteful process that reduces the time available for innovation.

Businesses that develop multiple product configurations but do not manage their product variants risk product quality and cost issues. PLM solutions can substantially reduce product costs and improve product quality by providing multiple product configuration views, including links between different product structures, thereby eliminating many engineering and support management issues.

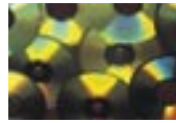
An Italian-based appliance manufacturer has used PLM to leverage the value of its product knowledge by quickly adapting old designs to generate innovative new products customised for the requirements of different markets around the globe.

“The company needed to be able to make changes internally without changing the external surfaces. For instance, you may make a coffee maker for many different customers, and you must modify a small number of internal parts for each customer.”

Digital mock-up, a key feature of PLM, allows companies to put its mechanical designs inside the proposed outer package and set it in motion on the computer screen. The system can detect collisions and other issues and resolve them without the need for a physical model. IBM estimates that the companies saved millions thanks to the reduction in physical prototypes made possible by PLM. With implementation help from its IBM Business Partner, this Italian company achieved a 50 percent reduction in the development schedule for new products, increased the number of products being designed by 30 percent and increased the design team’s productivity by 40 percent.

Similarly, Hansgrohe AG, a global manufacturer of elegant, high-performance plumbing fixtures, by capturing sophisticated knowledge about the complex shrinkage behaviour of cast products to reduce design time, improve quality and ensure manufacturability in line with code requirements in hundreds of different markets.

IBM PLM solutions, programmed with all of the relationships and constraints that relate one part to another, allows a designer to start with an existing design. It then automatically adjusts all aspects of the design to meet local requirements and still conform to the company’s manufacturing parameters.



## Optimise the value net

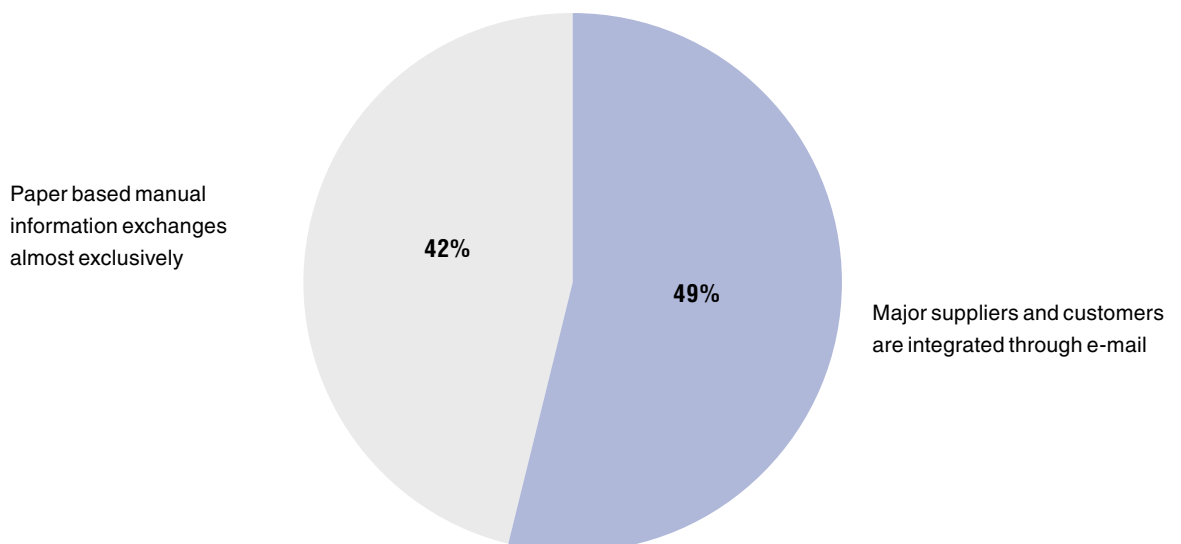
“We are now able to capture our internal know-how to create the product right the first time,” says Stephan Ginter, Manager for computer aided design/computer aided modelling (CAD/CAM) implementation. “We can now design our product set with more efficiency. That gives us the capability to define more product variants in the same time, which are by definition ready for manufacturing and in line with our in-house standards.”

As Hansgrohe demonstrate, capturing design intent within a digital product model protects the intellectual investment that went into creating the model. Reuse of existing designs can also significantly shorten design times for similar products while increasing competitive advantage by decreasing the time and cost of the design process.

Even companies that have internal access to change management capabilities generally have no way to extend those capabilities outside the enterprise to customers and suppliers. This is an almost universal challenge. Half of respondents (49 percent) said that major suppliers and customers are integrated primarily through e-mail, which again creates the risk of data mismatches, errors and costly delays.

Another 42 percent admitted to using paper-based, manual information exchanges almost exclusively. Again, each iteration of data under such circumstances is subject to long lag times that reduce the potential for innovation, and introduces high risks of error. But most respondents have no consistent system or no system at all. According to the diagnostic, change management processes are not used consistently across the company or with external suppliers (56 percent of respondents) or fail to exist at all (23 percent).

### To what extent are your communications and data sharing with suppliers and/or customers integrated into your product development and manufacturing processes?



Lack of integration with suppliers and/or customers can impede overall productivity. If a company's data management systems are not used to control overall product definition, miscommunication can lead to product quality and time-to-market issues. Methodologies, processes and technologies to enable concurrent engineering with data sharing and project collaboration capabilities should be put in place for all major suppliers or customers. PLM solutions also are designed to eliminate the redundancy of multiple design configurations between companies, thus enabling faster reactions to rapidly changing markets.

Yantai Raffles Shipyard is one company benefiting from the ability to share product data with its customers and suppliers. Before implementing IBM PLM solutions, physical prototyping took so long that construction had to begin before the ship design was complete. Employees and partners often discovered they were working with different versions of the same data.

"PLM gave us and our customers many ways to pre-visualise our designs," says Brian Chang, YRS Chairman and CEO. "In our business, there are multiple parties involved in every project. It's critical they understand the design. We demand that vendors be involved early. They can better understand the requirements, and making modifications at the digital mock-up stage reduces rework later."

Web-enabled PLM solutions give YRS departments, vendors and customers access to both design information and engineering data, ensuring that everyone can work together in a realtime virtual product development environment. "Today, we are able to collaborate with owners, suppliers and designers in an exciting new way," Chang says. "Being able to envision a digital model of a ship before production begins is an unforgettable experience for our customers. PLM technology from IBM is shaping the way suppliers, partners and clients think about us."



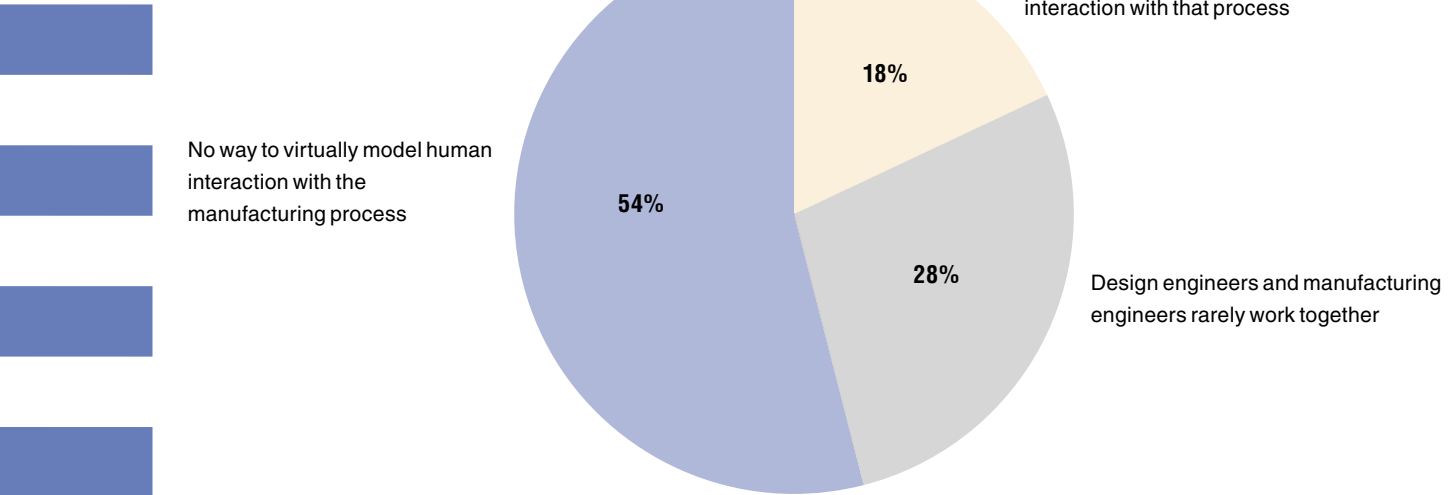


***Streamline processes, improve employee productivity***

Companies typically manage processes, including processes that extend throughout their own enterprise and beyond. Workflow control procedures and processes should therefore be consistent and automated especially for the critical development phases to reduce errors and shorten cycle times.

For example, by allowing design engineers and manufacturing engineers simultaneous access to the same data, PLM stimulates valuable interactions that lead to superior products produced at lower cost. But only 18 percent of respondents said their design engineers have the full understanding that PLM affords of the manufacturing process.

**To what extent are manufacturing processes and techniques considered in the design and development of your products?**



A combination of department and enterprise-level workflow can enable optimised processes that dramatically reduce errors and shorten cycle times. Be sure to consider PLM workflow tools that are flexible enough to adapt to your model and capable of handling multiple data formats.

At ARC International, a manufacturer of glass and tableware, industrial and mechanical designers now work with the same tools, eliminating interface and data conversion conflicts. Since implementing IBM PLM solutions, ARC has realised a 20 percent increase in design productivity and a 50-80 percent reduction in the time required to modify a complex design. “CATIA® V5 and SMARTEAM® provide us with a complete set of tools that enable us to cover our end-to-end product development process from styling to manufacturing,” says Anne Moyaux, CAD Manager.

Similarly, Magna Steyr, a strategic partner to vehicle manufacturers, has improved its process for evaluating design alternatives during sub-assembly clash analysis by adopting grid technology that reduces the time required to capture, compile and analyse data. With PLM and grid computing, Magna Steyr can analyse components of an entire vehicle in a few hours instead of days, giving employees more time to improve product quality. “Grid technology from IBM and Platform Computing reduced the time required for our clash testing from 72 hours to four hours and contributed significantly to enhancing our design quality,” says Dr. Heinz Mayer of Magna Steyr.





### ***PLM: A clear competitive advantage***

In-depth research with a small sample of prospects that used the IBM PLM Diagnostic tool led to another interesting revelation: Most of those studied were unaware that a solution to all of their challenges and more already exists – Product Lifecycle Management from IBM, IBM Business Partners and Dassault Systèmes. Although the term was somewhat familiar to many who participated in the IBM PLM Diagnostic, most discovered through the diagnostic that PLM does far more – and is far more affordable – than they had ever dreamed.

As the PLM Diagnostic clearly demonstrates, manufacturers that fully understand and exploit the capabilities of PLM have a significant advantage over their competitors in the marketplace by:

- Making data more readily available
- Giving engineers the power to try various approaches to a design challenge quickly and easily
- Re-using existing design knowledge in the production of new designs
- Accommodating and managing design changes automatically
- Streamlining the interface between design and manufacturing; and realising a host of other advantages, these companies are getting to market faster with more innovative products delivered with higher quality at lower costs.

Thanks to these advantages, such companies are getting to market faster with more innovative products delivered with higher quality at lower costs.

The value of PLM is real, provable and being realised daily at hundreds of companies, including those cited in this report. And no one is better positioned to help your company achieve those benefits than IBM, its long-lasting and strategic development partner Dassault Systèmes, and the IBM Business Partners. External business and IT analysts consistently cite IBM and Dassault Systèmes as the revenue leaders in PLM. The two companies have been partners in this space for more than 20 years.

In addition to experience and stability, we offer a total PLM solution, including hardware, middleware, services and application software. Our solutions are available globally and backed locally by a network of dedicated Business Partners fully supported by IBM. The R&D that backs our solutions supports continued leadership in the field, helping to ensure that the investment you make today remains on the cutting edge well into the future.



## **Appendix**

No one understands how to make innovation drive profitability and growth more than IBM. We understand your needs because, as a manufacturer ourselves, we use end-to-end PLM to enhance innovation in all of our product lines. Large or small, regardless of industry, IBM and IBM Business Partners can deliver PLM that works for you while helping you to achieve ROI quickly and effectively.

Getting started is easy. Set aside 15 minutes and turn your Web browser to **ibm.com/solutions/plm** to access the IBM PLM Diagnostic tool and determine the potential for IBM PLM solutions to re-shape your company into a streamlined, productive engine of innovative products – the right products delivered to the right markets at the right time. While you are there, read up on other examples of companies in your own industry that are using IBM PLM solutions to transform their processes and achieve competitive advantage. Then contact your IBM Representative or IBM Business Partner to begin the process of putting IBM PLM solutions to work for your business.

To obtain the detailed results of the 25 PLM Diagnostic questions, please visit:

[ibm.com/solutions/plm/diagnosticssummary](http://ibm.com/solutions/plm/diagnosticssummary)



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