

## Digital Manufacturing: Extending the value of PLM



## Mastering the market with Digital Manufacturing

### Build better, faster and smarter

Manufacturing enterprises are faced with an increasingly demanding and challenging global environment. Today's highly competitive marketplace demands that innovation be achieved faster and cheaper. To survive and win, manufacturers must be smarter in their delivery by making product design easier, shortening development cycles and reducing costs.

## Managing your most valuable asset — information

To be successful, your company must manage its most valuable asset—information—and share it effectively among internal and external teams to produce new products. Digital Manufacturing solutions allow you to capture, share and reuse best practice information throughout your enterprise—from product design all the way to the shop floor—so you can deliver a more innovative product faster and at a significantly lower cost.

*"Our challenge is to preserve the know-how contained in our workforce. Capitalization and leverage of our expertise will enable us to increase value and consequently our margins."*

*Blai Felip, Engineering Director, Serra Soldadura*

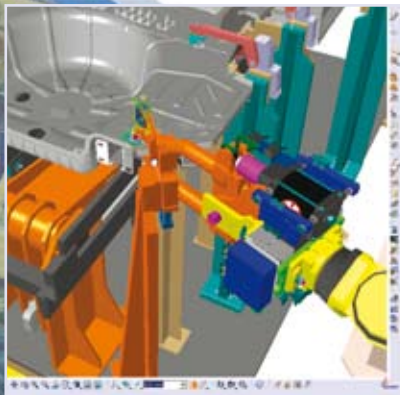
## Digital Manufacturing builds market leaders

CIMdata defines Digital Manufacturing as:

*"Solutions that support manufacturing process planning collaboration among engineering disciplines, from product design to manufacturing... Digital Manufacturing is, in practice, an integrated suite of tools that work with product definition data to support tool design, manufacturing process design, visualization, simulation and other analyses necessary to optimize the manufacturing process."*

*(Digital Manufacturing in PLM Environments — A CIMdata White Paper — January 2006)*

Digital Manufacturing solutions help define the steps necessary to build a product, test those steps for accuracy and then generate machine and work instructions for manufacturing the product. Utilizing a digital product model, Digital Manufacturing works with product definition data to support part and assembly planning, process design, visualization, simulation and other analyses to digitally plan, validate and optimize your manufacturing process. This can shorten time to production, dramatically reduce the need for rework and improve craft labor utilization and efficiencies.



## Building a bridge between design and manufacturing

Digital Manufacturing enables your business to manage and synchronize product and process information from the moment an idea is conceived, to the end of a product's lifecycle. It can also help your enterprise:

- Optimize design and manufacturing cycle time
- Reduce production schedule variances
- Avoid 'unmanufacturable' designs or ergonomically unsafe conditions
- Minimize change orders after design freeze
- Shorten the response time to changes and unplanned conditions
- Provide early assessment of designs for production
- Improve the efficiency of manufacturing processes
- Reuse parts, assemblies, equipment and processes
- Better comply with industry and government standards
- Increase return on production assets
- Reduce costs and accelerate time to market.

## Achieving 'manufacturing-ready' status

Companies need to ensure that their innovative new products are manufacturing-ready before actually launching into production. They are also challenged to reduce time to market, while boosting product quality across variable volumes and maximizing returns on investments. Ensuring this level of product manufacturability and profitability is difficult given expensive physical prototypes and delicate machinery. Production lines also can be a source of hold-ups, quality errors and human performance constraints.

Digital Manufacturing delivers to meet these challenges.

## Digital Manufacturing with DELMIA solutions

IBM's Digital Manufacturing solutions are based on Dassault Systèmes' DELMIA. It completes IBM's comprehensive suite of PLM products, which includes CATIA and ENOVIA also developed by Dassault Systèmes, to provide a true concurrent engineering environment from design to production.

DELMIA delivers a Digital Manufacturing process environment to optimize production systems before moving to physical implementation, all in the convenience of a desktop environment.

DELMIA solutions enable manufacturers in any industry to virtually define, plan, create, monitor and control a full range of processes. From early process planning and assembly simulation, through modeling welding lines, or robot and cell programming, to a complete definition of the production facility and equipment — DELMIA delivers.

DELMIA offers a unique suite of applications that puts the power to succeed squarely in your hands. The DELMIA suite enables concurrent engineering from the conceptual phase of product and process design, through simulation and monitoring of manufacturing processes, to shop floor operations.

## Revolutionize PLM with Digital Manufacturing *Be the first to market—not just with a better process, but with the best process*

DELMIA provides the tools you need to plan in advance and better forecast your manufacturing needs—to study the 'what ifs' and to avoid the unexpected. DELMIA combines knowledge sharing with resource planning to capture best practices throughout your enterprise, helping you realize your design vision with maximum efficiency and profitability. By leveraging all of the benefits of a proven PLM strategy with Digital Manufacturing tools, DELMIA delivers the competitive edge you need to succeed.



## Unique solutions for your industry

*Dedicated solutions for the manufacturing industry*

- Automotive
- Aerospace & Defense
- Fabrication & Assembly
- Electrical & Electronics
- Consumer Goods
- Shipbuilding
- Process, Power & Petroleum.

No matter the industry or size of the company, DELMIA has a flexible offering to meet your individual manufacturing needs. Manufacturers can virtually define, plan, create, monitor and control all processes: from early process planning and assembly simulation to modeling, programming and complete definition of the production facility and equipment.

And suppliers from various manufacturing industries, at all tier levels, including part suppliers, engineering firms and others, benefit greatly from DELMIA solutions that are detailed enough to meet their specific needs.

DELMIA has a proven track record as a mature and innovative core technology for companies seeking to establish a leadership position in the highly competitive worldwide manufacturing marketplace.

### **Empowering your workforce through innovation** *Motivate your workforce to unleash their potential without limitations*

Through the interactive nature of IBM's technology, simulation is the conduit for unleashing creative ideas from an already capable workforce.

Not only is simulation an effective way to visually plan, define, validate and optimize, it allows your employees to take innovation a step further: to explore forward-thinking ideas and experiment without physical constraints.

When engineers work in this simulated environment, they have the tools to not only save on cycle time and production, but discover groundbreaking improvements in processes and products. With advanced analysis easily viewed from their desktops, your key team members are empowered to express and expand on their expertise, while maximizing their engineering potential. Using our solutions, people who ordinarily excel deliver even more.

### **IBM's proven track record with DELMIA support is on your side**

As the saying goes, anything worth doing is worth doing well, and implementing IBM's Digital Manufacturing solutions is no exception. The adoption of Digital Manufacturing requires new business processes and cultural change. The solutions must be carefully and skillfully integrated into your entire company culture to ensure a smooth transition and successful program.



When you choose to work with IBM, you can rest assured that you will have a committed partner every step of the way. Our experienced teams will support all phases of your tailored program, as well as any future demands for expanded solutions. You can trust IBM to help your company achieve maximum production efficiency, lower cost, improved quality and reduced time to market, ultimately enriching your bottom line.

#### **Build on our experience**

IBM has worked with thousands of manufacturers of all sizes around the world to implement solutions designed to enhance product development, and streamline manufacturing processes.

- *PLM solutions from IBM have become the industry standard for OEMs, supply chain partners and suppliers.*
- *IBM has over 31,000 PLM customers worldwide in a wide range of industries — including automotive, aerospace, industrial products, electronics and chemicals and petroleum.*
- *IBM doesn't just install technology — we serve as your trusted advisor to provide the best-of-breed PLM applications, IT environment, integration capabilities and business strategy to help you meet your business objectives.*
- *IBM and Dassault Systèmes have one of the largest PLM practices in the world with more than 2,000 application engineers and consultants across the Americas, Europe and Asia-Pacific regions.*

## **Building a better business**

### **Planning ahead is good business**

***Experience a 5:1 or even 10:1 return on your investment.***

Reduce inventory. Optimize plant layouts. Improve labor utilization. Lower production costs. Increase production throughput. By investing in DELMIA Digital Manufacturing software, you can expect to achieve substantial savings and increase quality across the board. Organizations using Digital Manufacturing are also achieving a substantial return on investment (ROI). In fact, when implemented in combination with digital mockup, process re-engineering and as a component of an integrated PLM solution, it is not uncommon to experience a five or even ten to one ROI.

*(Digital Manufacturing in PLM Environments — A CIMdata White Paper — January 2006)*

### **A highly collaborative work environment**

Empowering your company with Digital Manufacturing as part of an overall PLM strategy can revolutionize the product lifecycle by creating new value and innovation at every stage of the process. Digital Manufacturing from IBM improves:

- *Translation of design data to manufacturing*
- *Process planning*
- *Production operations planning and machining process planning*
- *Assembly definition and sequencing*
- *Detailed line, cell, station and task design*

- *Quality measurement and reporting*
- *Manufacturing documentation, shop floor instruction and collaboration.*

Key benefits of IBM's Digital Manufacturing solution include:

- *Comprehensive process planning in the early design phase*
- *Validated and simulated production requirements*
- *Ability to train human operators and line staff more quickly and effectively*
- *Access to a collaborative environment for concurrent design and manufacturing engineering*
- *Reuse of best practices and enterprise knowledge*
- *Ability to anticipate and remedy potential problems in the pipeline*
- *Reduced production costs*
- *Reduced overall time to market.*

## The Digital Engine takes off with IBM PLM and DELMIA

IBM has helped many companies achieve or exceed their initial objectives and anticipated benefits from Digital Manufacturing, including Pratt & Whitney Canada (P&WC). The company is among the world's leading designers and manufacturers of turboprops, turboprop and turboshaft engines for regional, business, utility and military aircraft and helicopters.

P&WC implemented an IBM and Dassault Systèmes solution based on CATIA V5, ENOVIA and DELMIA to develop aircraft engines using digital technology through the entire product lifecycle. As a result, they reduced time to market, improved collaboration with partners and saved millions of dollars per year. The solution helped the company:

- Reduce time to market to maintain competitiveness
- Manage seamless collaboration among an ever-growing number of partners worldwide
- Empower innovation with a PLM solution that covers the entire engine development process.

## The financial and strategic advantage

CIMdata, a leading, independent worldwide consultancy specializing in PLM strategy, performed an independent ROI study of P&WC's implementation of IBM and Dassault Systèmes PLM solutions. The study was based on P&WC data on the benefits of PLM versus the cost of implementation (software, hardware, training, maintenance and administration).

Although CIMdata took a conservative approach when measuring P&WC's ROI, the study findings show excellent ROI for a large PLM deployment in the first phase of implementation.

- Payback period is three years
- Net present value of investment (over six years) is more than US\$12M
- Internal rate of return is 54 percent.

## Digital Manufacturing drives excellence

Sanyo Machine Works, a leading provider of industrial automation systems, can access its 3D design data from CATIA V5 within DELMIA to simulate manufacturing processes in a virtual factory. This allows the company to validate equipment layouts, robot access and reach ability, cycle times and ergonomic factors like worker posture.

These analyses enable Sanyo Machine Works to propose high-performance, added-value solutions that distinguish the company from its competitors.

## Shorter development time

For development of the pallet sub-structure of its assembly lines, Sanyo Machine Works loads CATIA V5 mechanical assemblies into DELMIA to simulate the manufacturing process. As a result, the company no longer builds prototypes of its assembly lines' pallets, allowing it to halve overall pallet development time from eight to four weeks.

*"Sanyo Machine Works measures the true value of a full PLM deployment when we take the 3D design data from CATIA V5 and use it in the manufacturing process, using DELMIA."*

*Kenji Kozakai, General Manager, Information Technologies Department*

IBM PLM Solutions have permitted Sanyo Machine Works to build a groundbreaking 3D Digital Manufacturing environment. Through its Sanyo Digital Innovation, Initiative, Integration (SDI3) project, which uses PLM technology from IBM, Sanyo Machine Works is realizing its objective of "remaining one step ahead of the industry".



## Gaining an edge with IBM PLM and DELMIA

With customers demanding less expensive products more quickly than ever, automated welding solutions provider Serra Soldadura turned to CATIA V5 and DELMIA PLM solutions to strengthen its competitive position. As a result, the company has slashed design cycle times by up to 40 percent and improved quality through one-off, reusable designs. Today, Serra Soldadura has solidified its place as a leader in the assembly and welding industry and counts many of the world's major automotive manufacturers among its clients.

To become more competitive, Serra's management decided to completely reengineer its design-to-manufacture processes. Their aim was to be able to reuse existing designs and validate manufacturing early on to produce the right product more rapidly.

*"We were looking for a unified PLM solution that combined powerful 3D product development capabilities with Digital Manufacturing solutions."*

*Blai Felip, Engineering Director, Serra Soldadura*

*"The business value resulting from successful bids has increased over previous years when CATIA V5 and DELMIA were not in use."*

*Mateu Guiu, Sales Director, Serra Soldadura*

### Clear and tangible benefits

The advanced simulation capabilities of IBM's PLM solutions make it possible to produce an error-free product the first time. CATIA V5 and DELMIA operators can each access the same data. In addition, Serra's NC programming cost has decreased by 66 percent\* because this work is now done directly on the design models in CATIA. Likewise, assembly line layout costs have decreased by more than 60 percent\*.

*"We save mainly on feasibility and assembly. Four years ago, it took us 18 months to put a new assembly line into an OEM. We can now do it in eight months\*. This is only possible because we can now get it right the first time. Today we do not get, nor do we need, a second chance."*

*Blai Felip, Engineering Director, Serra Soldadura*

\* Findings based on an independent study performed by CIMdata (November 2003).





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