

# KEYS TO IMPROVING MANUFACTURING EFFICIENCY

White Paper



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## EXECUTIVE SUMMARY

To remain competitive, today's enterprises are looking for ways to drive efficiencies throughout their manufacturing processes. Extending Lean Manufacturing principles and practices while establishing a platform for continuous improvement is key to improving efficiencies. Smart businesses know that tight cycle times and quick time-to-market with strong product quality helps drive market share and customer satisfaction. Unfortunately, a disconnect exists between high-level businesses and manufacturing systems, causing product variability and waste—which will only become more acute as product complexities increase.

A main focus is to reduce costs, but improvements in cycle time should never come at the expense of quality. Creating efficiency calls for directed manufacturing that reduces production variability in cycle time, enforces best practices, and insists on error proofing. Processes must be imposed and monitored to guarantee execution against best practices. In addition, managers need a way to synchronize product volume and configuration with actual manufacturing capacity, which drives throughput and increases asset utilization while lowering inventory costs.

This white paper introduces the Apriso application suite from the Dassault Systèmes DELMIA® brand that helps to achieve enterprise-wide supply chain visibility, manufacturing synchronization, and control over efficiency through an integrated solution that directly addresses manufacturing competence. This innovative approach bridges the gap between the silos of information that encumber legacy systems and point solutions. As a result, global manufacturers can drive processes that create effectiveness within the full design-manufacture-distribution cycle—and create a process for sustainable, continuous improvement.

## **INTRODUCTION: MANUFACTURING ENTERPRISES FACE RISING CHALLENGES**

Manufacturers in the global landscape have more competition, more product variables, more regulations, and more cost pressures than ever before. To stay agile, enterprises must improve flexibility, visibility, and operational performance across their manufacturing operations. Furthermore, manufacturers must seek ways to reduce costs associated with producing and distributing products. They are competing for market share on a price basis, are trying to be price-competitive without eroding margins, and are launching into new, price-sensitive markets.

What is more, the bottom line depends on improving time-to-market and reducing cycle time by producing and bringing products to market faster. Today's products are very complex—and they have more options and require customization. Plus, manufacturing must be more agile and proactive to change management while scaling production volumes globally. The ultimate victory on the competitive landscape is to win the customer's loyalty. The first step on this path is to boost customer satisfaction. Efficiency, when implemented correctly, drives quality, which contributes to the customer's experience, thereby creating opportunities to upsell the next generation of products.

The customer directly benefits when manufacturing efficiency also drives quality and improves on-time deliveries.

## **LEAN MANUFACTURING IS A KEY FOR DRIVING EFFICIENCY**

To be successful calls for enterprises to manage their businesses proactively, instead of business issues managing them. To reach this goal, manufacturers must transform their operations by automating, executing, and managing the performance of uniform global business processes across their value chain. This means end-to-end integration of processes spanning supply chain, production, maintenance, distribution, quality, and labor operations—regardless of where these facilities and operations are physically located. The cold truth is that traditional reactive approaches cannot meet the goal of end-to-end integration—an essential ingredient for creating efficiency.

Lean Manufacturing is an essential component of manufacturing efficiency, a principle that most competitive companies have embraced for over 30 years. The drive to remove waste streamlines operations, eliminates idle inventory, and helps to achieve continuous process improvement—all elements of Lean Manufacturing and Six Sigma initiatives. However, all of these processes must work together to build an efficient value chain, a task not easily achieved using traditional siloed systems.

### **The Disconnection between Business and Manufacturing Systems**

Efficient manufacturing processes demand real-time visibility and flawless material movement driven by continuous, nonstop communication between warehouse management systems and production management. Within many manufacturers, accurate information is not flowing in real time and remains siloed and inaccessible across disparate systems and environments. Most legacy applications are niche solutions that cannot meet today's business requirements and tomorrow's needs.

A critical disconnect exists between high-level business systems such as Enterprise Resource Planning (ERP), Product Lifecycle Management (PLM), and manufacturing-level systems. In addition, plant automation and Programmable Logic Controllers (PLCs) are widely varied and disconnected from manufacturing-level systems. Many plants still use legacy applications that do not interface well with business-focused software or other legacy systems. This siloed approach to information forms a knowledge gap that leads to several challenges. Therefore, businesses must confront these issues whenever they attempt to go to market with new products or build iterations of existing brands.

## Silos of Data Create Inefficiency

The siloing of information creates walls between different departments at the micro level, and between plants and geographies at the macro level. Time is the enemy when departments are not coordinating efficiently, and when information is not consistent. This has a direct impact on the time to build, on resolving a quality issue, on a stock outage, or on the amount of downtime due to equipment malfunction. Lack of collaborating and coordinating in real time creates inefficiencies that directly affect cycle time, costs, and quality. As a result, plants must carry higher inventory levels and risk missing shipping dates, thus losing time-to-market and eroding margins.

Instead, manufactures must find a way to build a competitive “edge” into their core processes. Doing so demands a system for continuous improvement capable of identifying and sharing best practices for operational excellence. At the same time, this new system must also be flexible enough to manage the complexity of producing multiple products across geographically diverse facilities. New processes and systems must align with Six Sigma, Lean Manufacturing, or other initiatives and be reproducible across multiple plants, locations, and geographies. The new solutions, moreover, must deliver Key Performance Indicators (KPIs) in real time so management can proactively address problems and affect continuous improvement.

## THE SOLUTION: A UNIFIED SOLUTION FOR TRANSFORMING MANUFACTURING

The optimal Manufacturing Operations Management (MOM) solution for driving efficiency enables the integration of quality processes into the full design-manufacture-distribution cycle. The solution must have the breadth to remove silos, to support multiple manufacturing models and to provide a system that supports change. The solution must enable rapid global manufacturing deployments and support strategic planning and governance similar to that of other enterprise business systems.

With a unified solution, businesses can create an enterprise-wide approach to manufacturing efficiency at every level, including quality management, planning, execution, and containment. This approach provides the ability to coordinate activities within and across all departments—from production to warehousing to quality to maintenance. Businesses can build products right the first time, removing variability of processes, while improving:

- Manufacturing cycle time
- Manufacturing “touch” time
- Overall Equipment Effectiveness (OEE)
- Defect/scrap rates
- First pass yields

## Enable Repeatable Processes and Best Practices

For a large corporation, the focus involves the lifecycle of products in the marketplace, efficient design-to-volume stages, engineering change orders, iterations of product variation, years of field service and upgrades, and eventual sun-setting strategies. An example of such a product line is medical equipment. Medical equipment, for example, is a product line. Multiple hardware and software configurations exist, each with specific supply chain and quality requirements. Managing the entire product line with each variation is not easy. To win in a highly competitive market, businesses must exceed customer expectations by offering a higher quality product with greater competitive lifecycle value profiles.

Solving the problem means implementing and propagating best practices in supply chain, production, and quality management, while driving operational excellence uniformly through the organization. When products require iteration, change orders should occur without major disruption of the supply chain or the production line. Achieving this goal requires uniform process changes and best practices at each global location. Then, teams at every site can take ownership for the deployment of all new processes, driving consistency and cost efficiencies throughout the enterprise. The result is that locations that use cohesive, systematic approaches and solutions can rigorously apply the production procedures that optimize product quality and traceability—in a measureable, repeatable fashion.

## Drive Global Deployments

Global deployments require strategic planning and governance similar to that of other enterprise-wide business solutions. Manufacturers must have at their fingertips the ability to enforce corporate Standard Operating Procedures (SOPs) and product specifications with global deployment and configuration management. This ability allows manufacturing engineers and business analysts to configure and distribute processes as opposed to relying on manual programming and coding by IT at all plants. This solution affords KPI-level visibility into processes regardless of location and provides manufacturers the skill to monitor processes across multiple sites. It also enables revision control and management of the Business Process Lifecycle (BPL) for continuous improvement and support.

## Being Efficient Means Building It Right the First Time

True manufacturing excellence means building products right the first time, even against rapidly changing demands. Businesses must contain and eliminate waste—in real time—removing process variability. The optimal solution drives efficiency by addressing the following seven forms of waste:

- 1. Inventory**—Synchronize material and ensure the right product or inventory is at the right place at the right time.
- 2. Wait or delay**—Leverage a BPM-based system for manufacturing operations that contains a Unified Data Model (UDM), enabling visibility across the plant so management can proactively address issues.
- 3. Motion (Human)**—Use directed manufacturing and material synchronization to help reduce excess inventory moves and unnecessary worker activity, and to direct activity to eliminate errors.
- 4. Transport (Goods)**—Reduce excess transportation expense (expediting) by providing visibility to actual inventory and part consumption rates across the value chain.
- 5. Overproduction**—Support pull-based production and real-time KPI monitoring to lower overproduction, while KPI monitoring ensures equipment activity and manufacturing activity follows tighter tolerances.
- 6. Defects**—Integrate quality-directed manufacturing, interlocking traceability, and containment management for reduced scrap rates, rework, human error, and equipment-related quality defects.
- 7. Extra processing**—Identify and eliminate any processing that does not add value to the product or is the result of inadequate technology, sensitive materials, or quality prevention as waste.

## Improve Profitability and Protect the Brand

When businesses implement a unified manufacturing operations system, they can improve global profitability, protect the brand for unmatched customer satisfaction, and accelerate cash flow. This flexibility supports manufacturing transformation by shifting from manufacture-to-stock to manufacture-to-order. It also supports multiple order types, helping to create an efficient, more proficient organization while fulfilling customer orders. Additionally, businesses can realize lowered total Total Cost of Ownership (TCO) of enterprise production, of material, and of a quality management IT system by sharing a single execution solution. The results are real-time visibility of all operations, including Work in Process (WIP), inventory location, and quality issues. Breaking down the silos of information creates a unique Single Source of Truth (SSOT)—so enterprises can focus on true manufacturing efficiency.

A unified solution for transforming manufacturing is not an unachievable “we hope it works” vision, but a reality today. The following global manufacturers have implemented and achieved the vision of high manufacturing efficiency.

## SUCCESS STORY: LEADING SPECIAL STEEL SOLUTIONS MANUFACTURER

### Goal

With companies and divisions spread across Europe, and nearly 40 machines producing stainless steel wires at each site, a leading manufacturer sought to simplify production and supply chain processes. The ultimate goal was to increase productivity without affecting quality. Meeting the vision called for increasing visibility and standardizing operations across the organization. These objectives reinforced the company's Lean Manufacturing program to reduce waste, while maintaining the highest levels of customer service. However, legacy processes relied on manual tracking with paper documents. With multiple orders fabricated on a single machine, or with a single order fabricated on several machines, traceability was cumbersome, time-consuming, and inefficient.

### Results

The company chose a platform-based MOM solution that integrated seamlessly with SAP ERP. The system complemented ERP, processing 4,000 items of data daily and over 400 manufacturing orders each week. The software managed inventory through production, noting when an operator removed material from stock. Bar codes and PLCs eliminated manual data collection, improving productivity. Most importantly, the solution standardized various types of purchase orders so that individual machines no longer had their own protocol. A major benefit of standardization was that the company effectively developed, deployed, and managed best practices to other facilities. Users configured business processes to local parameters to accommodate machine differences.

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*"The system has greatly simplified the process of manufacturing orders, since supervisors and technicians no longer have to track each order personally. Operators like the new system because it's easy-to-use, reducing time spent on repetitive and administrative tasks."*

—European special steel solutions manufacturer

## SUCCESS STORY: LEADING CORRECTIVE LENS MANUFACTURER

### Goal

A world leader in the design and manufacture of corrective lenses explored ways to extend its competitive advantage and improve its manufacturing system's flexibility. Faced with rapidly changing business needs, the company's applications were disjointed, and provided no way for management to have visibility into production processes and material flows or to track and trace them. It was clear that the company required a new system to improve agility, provide real-time visibility, and support continuous quality and process improvement. Operating from a global perspective, the system also had to identify and share best practices and be flexible to manage the complexity of producing 450,000 products across 15 facilities.

### Results

The company selected a platform-based MOM solution to improve agility, visibility, and operational performance across manufacturing operations. The company managed and executed lens production at a plant in Mexico with globally integrated warehouse and distribution functions. The solution's applications were operational at 12 corporate locations across the globe, including five manufacturing sites and three distribution centers.

One of the first benefits the company realized was the power of having real-time visibility into operations, which helped to enhance operational performance and efficiency. The application spanned operations to provide real-time visibility and actionable intelligence, offering improved performance and faster decision making. Access to detailed production data helped to advance baseline performance for higher quality and reduced cycle time by 50 percent.

## VISIBILITY, SYNCHRONIZATION, CONTROL DRIVES EFFICIENCY: INTRODUCING DELMIA APRISO

The path to achieving high manufacturing efficiency is now available. Dassault Systèmes DELMIA brand Apriso solutions using the **3DEXPERIENCE**® platform eliminate the information disconnection between business systems and manufacturing systems, enabling businesses to achieve and sustain high manufacturing efficiency across operations—regardless of location. The DELMIA Apriso manufacturing operations solution is unique with proven large enterprise

deployments, with a unified technology approach that extends the value of ERP and PLM systems, while leveraging Business Process Management (BPM) technologies for configuration and flexibility in managing business processes. As a result, companies can realize the following goals:

- **Global standardization and visibility**—Drive process consistency within the enterprise and the supply chain network while providing actionable KPIs throughout the production lifecycle.
- **Global synchronization**—Align quality processes with warehouse, maintenance, and other production operations, while facilitating material synchronization to ensure that the production line builds the right products at the right place and time.
- **Best practices**—Create continuous process improvement through a global solution and a process management infrastructure.
- **Collaborative approach**—Enable managers to plan and to implement quality processes that span the entire operation and product lifecycle, reducing the risk of releasing poor quality products to market.
- **Track and trace for brand protection**—Manage the status and path of products from source, make, and distribution to end users while providing quality containment of product defects.

## CONCLUSION: EFFICIENCY AND CUSTOMER SATISFACTION GO HAND IN HAND

In today's competitive market, driving efficiency and continuous improvement deep into companies' manufacturing operations is critical. Globalization of the supply chain and operations makes Lean Manufacturing a crucial requirement for maintaining competitiveness. Enterprises can eliminate the disconnect that exists between high-level business and manufacturing operations systems at the plant levels by leveraging the power of a platform-based MOM solution.

Built upon a foundation of MOM, the DELMIA Apriso application suite provides a demand-driven product supply network with full operations visibility and control across regions, divisions, partners, and vendors. Businesses can realize improved asset utilization, increased agility, reduced costs, and improved service rates by increasing the flexibility and coordination within functional departments. DELMIA Apriso supplies precisely what global manufacturers require to optimize processes within the full design-manufacture-distribution cycle. With efficiencies built into every process, enterprises have the solid foundation and nimbleness necessary to capture new markets and to drive customer loyalty.

### About Dassault Systèmes in Manufacturing

DELMIA is a Dassault Systèmes brand that empowers companies to connect the digital and real worlds of manufacturing to plan, execute, and optimize their production processes. Using applications and solutions powered by or available from the Dassault Systèmes **3DEXPERIENCE** platform, these capabilities help global manufacturers to improve responsiveness, increase quality, and accelerate new product introduction across their enterprise and extended product supply network.

For more information, visit [www.3ds.com/DELMIA](http://www.3ds.com/DELMIA)



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