ADOPTING AN ADAPTIVE MANUFACTURING STRATEGY

SIX SCENARIOS FOR SUCCESSFULLY ALIGNING THE BUSINESS WITH EVOLVING MARKETS

Whitepaper

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Six Scenarios for Successfully Aligning the Business with Evolving Markets

It's no longer just about change. It's about change at speed and scale.

Change has always been a factor in manufacturing, but traditionally, market conditions have evolved over several months or even years. By contrast, in today's global economy, incidents both local and thousands of miles away are shifting market demand quickly, impacting the availability of materials, and reshaping supply chain dynamics at breakneck speed. Manufacturers need to adapt to these changes immediately without sacrificing product quality, customer relationships, or valuable employees. And that requires an adaptive manufacturing strategy.

In the past, when market conditions evolved, most manufacturers could determine how to adapt their businesses using manual techniques, even if doing so wasn't ideal. Implementing an adaptive manufacturing strategy using manual processes is nearly impossible when critical market factors change in weeks or even days. So instead, companies need modern systems to gain the real-time insights necessary for defining and acting on the best possible strategy at the best possible time.

Many businesses have already implemented the technologies required to support an adaptive manufacturing strategy to drive their organizations. Typically, these solutions include a comprehensive enterprise resource planning (ERP) system that includes native functionality in the areas of manufacturing execution system (MES), supply chain management (SCM), customer relationship management (CRM), finance and accounting, computer-aided design, and manufacturing (CAD/CAM), and product lifecycle management (PLM), among others.

Critical to adopting an adaptive manufacturing strategy is creating a 360-degree view of the organization, its operations, supply network, and customers, since a change in one condition—for example, the temporary shortage of a particular material—can impact sales, design decisions, production, customer commitments, pricing strategies, and more. The most effective way to accomplish this is by ensuring that the systems supporting the manufacturer's operations and decision-making all operate against a common set of data, ideally through a shared database.

Let's look at six real-world examples of how the technologies already used by many companies can support an adaptive manufacturing strategy today.

1.Just-in-Time Manufacturing vs Make to Forecast
Just-in-time manufacturing is a winning strategy in periods of plentiful raw materials, equipment, and labor. The lack of scheduling constraints makes last-minute production fairly straightforward and matches expenses very closely with revenue.

By contrast, in more constrained situations where there are tight labor markets, higher material prices, material availability, and busy equipment, advance planning is necessary. Buying materials in advance, perhaps at more favorable prices, and the precise scheduling of equipment and labor, are necessary steps for ensuring the timely production of goods and the ability to fulfill customer demand.

In other words, manufacturers need disciplined planning and forecasting where they are building to forecast and meeting customer demands from finished goods inventory rather than last-minute production runs. By using an ERP system's capabilities for forecasting, scheduling and production planning, materials requirements resource planning, and master production scheduling, manufacturers gain the visibility and control needed to manufacture to forecast.

This disciplined approach can also extend to supply chain collaboration. For example, auto manufacturers have responded to processor shortages by sharing real-time customer demand forecasts with chip suppliers to help them reduce uncertainty and invest in more production capacity.

Key capabilities for supporting an adaptive approach to production include:
- Tight integration between the ERP and MES functionality makes it possible to transition from one manufacturing strategy to the next—down to the bill of materials (BOM) level and the work instructions at the workstation level—in hours instead of days.

- An effective advanced planning and scheduling (APS) module considers every aspect of a manufacturers' business, including identifying plant capacity and generating a detailed production schedule at the organization, plant, and work cell levels to meet delivery goals. An APS allocation and scheduling engine can run in minutes instead of hours, creating a real-time advance production schedule. APS engines are capable of factoring in complete material, capacity, and labor requirements for items manufactured internally, through third-party vendors, and via sub-assembly production.

- Automatic schedule adjustment functionality helps account for unplanned events, including changing customer requirements, machine downtime, slow machine performance, unavailable raw materials, or adjustments from other ERP and MES modules.

- A forecasting module provides a snapshot of current and projected orders and the impact on annual sales: past, present, and future. Forecasting is a powerful tool for analyzing sales trends, populating budgets, or conducting capacity planning with forecast demand orders—making projections quickly and easily so users can make informed business decisions.

- Global visual scheduling provides a graphical view of the entire manufacturing production schedule, keeping production teams informed and coordinated across the shop floor and identifying the best machines and tools, stop/start, and any constraints.

2.Long-Term Fixed-Price Contracts vs Shorter-Term Variable Price Contracts

There are economic periods when long-term, fixed-price contracts can ensure revenue flow and capacity utilization. Long-term agreements are often necessary for winning business since buyers look for predictability with supplies and costs.

However, when the market is more volatile, the supplier is likely to have the upper hand in the buyer-seller relationship. The tables are turned, and suppliers who can fulfill demand also have a greater ability to dictate price. They can raise prices to maintain margins and dedicate production capacity to the customers they choose. These times call for the ability to optimize pricing and production capacity utilization. For the manufacturer, this is the time to be on the offense and grow the bottom line.

The functionality within an ERP system to play out what-if scenarios, guide the most profitable production strategies and even automatically adjust pricing as costs rise and fall becomes a powerful multiplier of a manufacturer's opportunity to take full advantage of high demand low supply macro-economic conditions. Moreover, when capacity utilization, pricing, and contract management systems share the same data, procurement teams gain the information and insights needed to manage fixed-price contracts more profitably.

ITEM#	Description	Standard	Actual	Variance
UB-649	Upper Bracket	10.25	12.920	2.67
LB-649	Lower Bracket	15.25	18.1	2.85

ITEM#	Description	Cost Type	Cost Component	Standard	Actual	Variance
UB-649	Upper Bracket	Material	650 Black	3.25	6.22	2.97
UB-649	Upper Bracket	Labor	IJ Operator	1.35	1.15	-0.20
UB-649	Upper Bracket	Machine	VH 500-54	3.50	3.50	0.00
UB-649	Upper Bracket	2nd Op	De-burr	1.40	1.45	0.05
UB-649	Upper Bracket	Packaging	Shop materials	0.75	0.60	-0.15

Key capabilities for supporting an adaptive approach to pricing contracts include:

- An ERP system's inventory module will include pricing functionality that automatically aligns product pricing with materials and production costs.

- Real-time production and process monitoring systems provide invaluable data on actual costs, which enable engineers to course-correct pricing and manage product expenses over the life cycles of each product in production.

- Business intelligence (BI) tools can leverage real-time data shared across the MES, ERP, and SCM solutions to quickly provide manufacturers with new insights from metrics and key performance indicators (KPIs) to conduct advanced analysis of what-if scenarios, pricing, and production allocation trade-offs to reach margin and production goals.

- When BI and analytics reporting relies on a single database of all manufacturing activity, every data-driven insight and report is consistent across manufacturing operations.
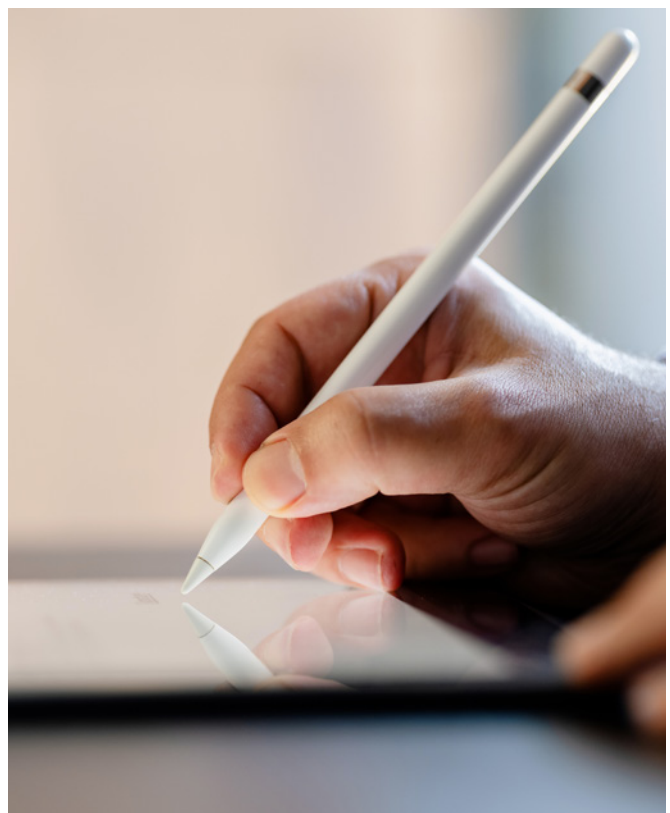
3.Build vs Buy Additional Plant Capacity

In the past, a manufacturer often would build additional plant capacity on adjacent properties in the local business park when forecasts showed the need for additional manufacturing space. At the time, the resources to build were readily available, and the close proximity made management oversight of the additional capacity straightforward. Moreover, the cost of capital was low, so building a new plant was a low-risk decision.

Today, construction resources are constrained, and regulatory hurdles for new construction, including compliance with environmental standards, are higher than ever. This is leading more manufacturers to consider purchasing or leasing existing properties, which are broadly available in many regions. However, these properties are often too far away from current operations to be managed by the local team.

Fortunately, ERP systems with multiple-plant management capabilities allow headquarters operations to easily embed established operating procedures in new plants regardless of their geographic location. A business's operating practices are effectively encoded in the setup and configuration of its ERP system. When adding a new plant to an existing ERP system, the new location effectively inherits the parent location's operating practices. Through this mechanism, manufacturers can add locations without reestablishing business practices at the new site from scratch. The ERP passes on the business's operational DNA.

Single plant, multiple plants, and corporate-wide visibility and control are established and enabled by a multi-plant capable ERP system. Senior leadership can knowledgeably manage from a single location and are not required to be onsite at all locations. The need for plant proximity to headquarters to maintain good management and control is significantly reduced, and the choice of business locations greatly expanded.

Key capabilities for supporting an adaptive approach to plant expansion include:
- Modern ERP systems can produce unit volume forecasts and financial analysis to determine when adding additional plant capacity makes financial sense for a manufacturer.

- ERP systems that fully support multi-plant operations automatically create control, visibility and operating procedures at the new remote location.

- Multi-plant ERP functionality provides individual plant reporting and control, as well as unified views of the entire network of plant operations.

4.Adding a Manned vs Lights-Out Third Shift
Running a manned third shift is not easy, but it is a straightforward extension of established operating practices. Today it is more difficult because of labor shortages, but it's still a linear adjustment compared to a leap in operating practices.

Lights-out (or very lightly staffed) shifts are a leap in operating efficiencies that typically require an investment in automation and manufacturing execution software. However, the payback is large in labor savings and the burden of staffing and managing a three-shift operation, particularly in seven-day-a-week operations.

ERP systems with native MES capabilities naturally fit with lights-out operations. They have the real-time production and process monitoring capability necessary to maintain production records and visibility without onsite personnel. They can also alert management and supervisory staff of issues that arise so corrective actions can be implemented as issues arise during unmanned periods of operation.
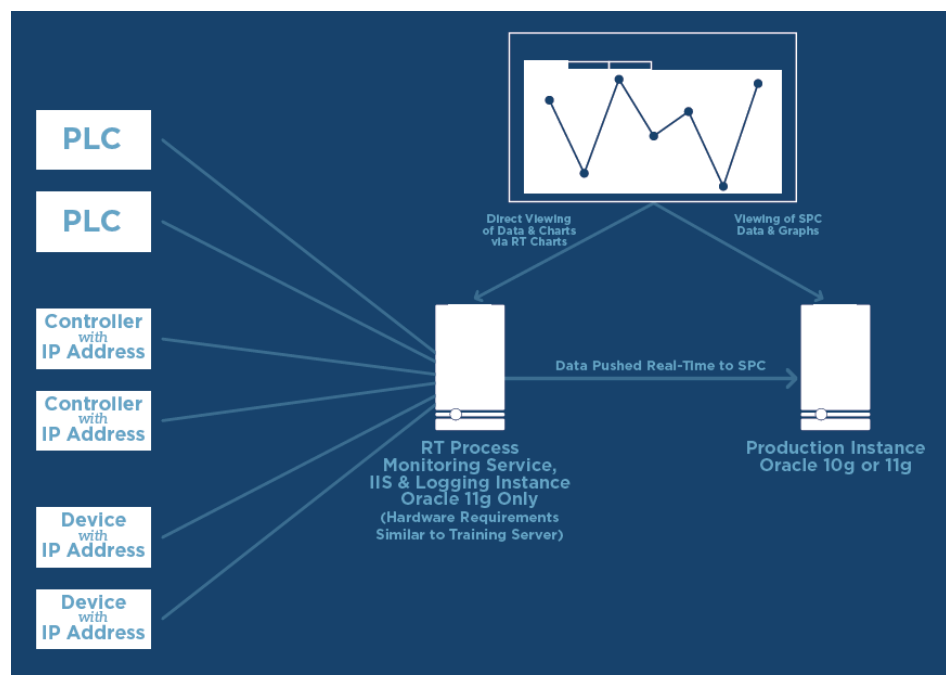
Key capabilities for supporting an adaptive approach to staffed and lights-out operations include:
- Effective real-time process monitoring captures, tracks, and reports data from machinery on the shop floor, allowing remote monitoring and analysis of machine operations. Core metrics include temperatures, pressures, weights, measures, and event durations by machine.

- Real-time production and process monitoring provide production engineers with the data needed to identify potential anomalies in production machinery performance and output, alleviating line delays or shutdowns while reaching output goals. Real-time insights into production machinery performance contribute to higher product quality, better cost visibility, and control and assure remote engineers that a production shift will achieve its output goals. For example, this approach enabled one manufacturer to run two staffed shifts and one lights-out shift to keep production running 24/7 and meet growing customer demand.

- When real-time production and process monitoring automatically updates the ERP, MES, and related modules, employees working remotely can gain insights from machinery and process-based data in human-crewed and lights-out operations to drive continuous process improvement.

A completely integrated, real-time production and process monitoring system provides instant feedback on critical production parameters. Having visibility and control through each production stage is essential in any lights-out operation. Manufacturers running lights-out shifts find real-time production and process monitoring delivers continuous process improvement with actionable business intelligence data, including machine utilization, scrap, and downtime reporting.

5.Producing vs Not Producing Highly Regulated Products

Long and short-term trends favor producing more highly regulated products, such as medical devices and advanced transportation components. Demand is growing rapidly due to short-term influences (notably COVID-19) and the longer-term factors, including an aging population and the increasing scope and sophistication of medical devices and vehicle safety and power train components.

Additionally, regulated products drive higher profit margins than unregulated products, and production capabilities in this market segment are in shorter supply. As a result, customers are willing to pay extra for documented, controlled, and traceable production life cycles than they are for commodity-level production.

However, expanding production into regulated products carries some significant investments. These include modern ERP systems, clean rooms, and employee training to enable the controlled, documented, and quality-assured production cycles that manufacturing regulated products demand.

Manual systems and legacy ERP software lack the control demanded by regulated production. Instead, manufacturers will need ERP systems to support regulated production through document management, track and trace, production and process monitoring, quality assurance, and statistical process control (SPC) applications.

Key capabilities for supporting an adaptive approach to serving regulated and non-regulated markets include:

- Having ERP, MES, and other business functionality rely on a single database brings greater accuracy to every regulatory compliance audit and ensures that every customer's unique reporting requirements are also met.

- A track and trace module, combined with ERP and MES functionality, gives manufacturers the data, insights, and intelligence they need to easily and accurately provide documentation and product tracking to react and respond to recalls and meet industry regulations and quality audits.

- Through BI tools, manufacturers competing in regulated industries can understand how they are progressing relative to key production, quality, and compliance-driven audit goals—both internally and with external organizations.

- An ERP system is ideally suited for highly regulated manufacturing industries when it provides ease of customization for up-front risk assessments, electronic signatures, document control, a complete audit trail of manufacturing processes, comprehensive support for corrective action/preventative action (CAPA), and non-conformance and corrective action (NC/CA) product review and tracking.

- When combined with automated reporting, an integrated quality management module can streamline responses to audit requests by both customers and regulatory agencies. For example, one manufacturer cut the time to complete regulatory validations from six months to days and sometimes hours.

- A device history record (DHR) module supports the medical products market by allowing manufacturers to cost-effectively eliminate time-consuming, paper-based tracking systems, streamline product development, ensure quality standards compliance, and gain total visibility and control over the manufacturing process.

6.Linking vs Not Linking Finished Goods Prices to Raw Material Prices
In stable supply situations, most manufacturers prefer not to link finished goods prices to raw material costs contractually. Instead, they would rather rely on their buying savvy and procurement management skills to meet or perhaps even undercut original raw materials cost estimates.

However, in today's more volatile and constrained supply chain, many manufacturers are negotiating the variability of raw material costs into their production contracts. This strategy comes with the need to document raw materials cost at the lot and batch level. These agreements also pose a raw material deflation risk. If prices drop, the finished good prices have to drop commensurately. So, while prices are on the rise, manufacturers are protected, but if they start to drop, companies have to be acutely aware of their raw material inventory cost and its potential impact on revenues.

Managing the link between raw materials cost and finished goods pricing requires a comprehensive inventory control and procurement system operating in conjunction with production planning and execution that is tracked at batch and lot levels. This allows raw materials costs to be precisely matched to finished goods production pricing, ensuring that profit margins are protected during rising costs, and the revenue expectations are managed during periods of declining material prices.

Key capabilities for supporting an adaptive approach to linking material costs and finished goods pricing include:
- Pricing functionality in an ERP system's inventory module can automate much of the work to align pricing for different customers with fluctuating materials costs. For example, using this functionality, one manufacturer cut the time to manually update customer-specific pricing from the 100 to 120 hours down to 2 hours with the automated process.

- An ERP purchasing module automates workflows that streamline accounting, purchasing, and procurement functions, helping manufacturers attain greater visibility and control over acquiring direct and indirect materials.

- A purchasing module also tracks raw material prices to the purchase order level and analyzes them by lot and shipment to further provide manufacturers with the data they need to link and analyze raw materials versus finished goods pricing by product or a specific production run.

- An effective manufacturing inventory module provides separate inventory master records for each manufacturing location, supports lot number tracking and traceability (including supporting documents), has serialized inventory control, and offers eKanban and conventional Kanban control support. The real-time visibility into current inventory levels of raw materials, work in process, and finished goods are essential for analyzing the link between raw material prices and finished goods prices.

- When ERP purchasing and manufacturing inventory modules share the same database, it's possible to create customized financial reports that specifically focus on identifying raw material deflation, including the relative financial impact on financial performance to the gross and net contribution.

Conclusion

The key to implementing an adaptive manufacturing strategy is hidden in the data that manufacturing operations produce every day. Parsing and analyzing this data in new ways and creating greater collaboration will enable manufacturers to make strategic decisions, adjust their production, and update their policies to align with current market conditions to drive profitability and growth.

The comprehensive DELMIAWorks manufacturing ERP system provides the integrated front-office, back-office, and shop floor modules—all running on the same database—to provide the 360-degree view, automation, and insights needed to implement an adaptive manufacturing strategy today.

For more information, please visit **www.goengineer.com/delmiaworks** or call **1.800.688.3234**

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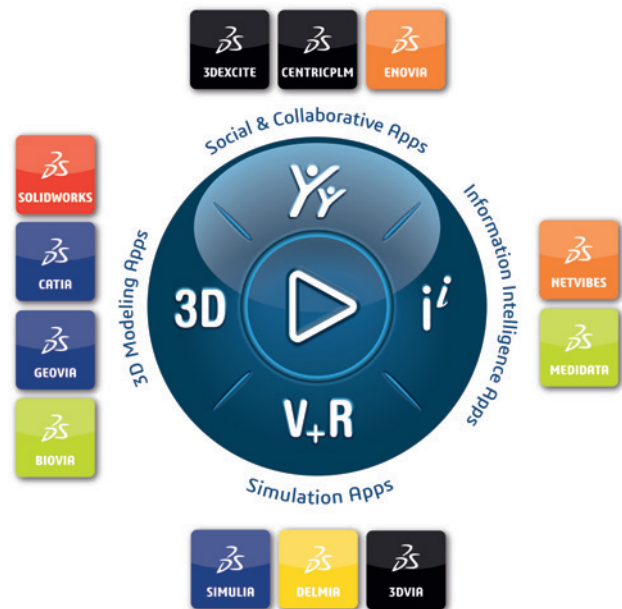
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