



Driving Both Flexibility and Quality into the Discrete Manufacturing Environment

WHITE PAPER

Discrete manufacturers produce and sell high-quality, highly complex products such as automobiles, technology and machinery. The manufacturing environment for these products is characterized by a need for flexibility in order to effectively link demand with production, improve quality and time-to-market, and lower costs. Goods are typically mass-produced, using standard assembly lines and require a means of managing mass customization. Best-in-class discrete manufacturers foster highly collaborative enterprises with in-depth visibility into supplier quality, performance, compliance, and risk.

Deep visibility enhances a flexible manufacturing environment

With a complete view into operations, supply chain value and product development, discrete manufacturers can fully connect across the value chain and more meaningfully link risk, compliance and quality.

- **Operations.** Most discrete manufacturers face inherently dynamic, complex and rapid product lifecycles. As a result, sales and operations planning must be expertly integrated across the enterprise and the supply chain. When discrete manufacturers can use data to forecast consumption, they can meet just-in-time production needs and shorten fulfillment cycles, producing components on an as-needed basis. For example, aerospace manufacturers rely on just-in-time production to reduce costs. However, final aerospace products can require hundreds of thousands of parts. Deep data insight helps these discrete manufacturers accurately forecast demand and adopt lean manufacturing programs across the supply chain.
- **Supply chain value.** With accurate forecasting, discrete manufacturers can rapidly respond to demand, especially when they share that data with suppliers. Consider the example of an automobile manufacturer: Its products contain thousands of distinct components provided by suppliers from around the world. The most recent market trend reveals manufacturers adopting customer-specific customization in the same production line. Subtle shifts in demand as well as black swan events—unexpected events that have massive impact on a supply chain—can cause dramatic material needs across the globe. The sensitivity of the supply chain can be evidenced by the case of the losses in production experienced by natural disasters. In a 2011 case in Thailand where flooding halted production for a number of prominent Japanese automobile manufacturers, including Toyota, Honda and Nissan, with Southeast Asia bases, daily losses amounted to approximately 6,000 units of production. When data is shared with supply partners, it can enhance operational flexibility across the value chain, allowing for production processes to be fine-tuned as necessary.
- **Product development.** The more flexible the supply chain is, the more the manufacturer can leverage prior-version data to accurately anticipate and meet changing consumer preferences and tastes. This flexibility enhances the manufacturer's ability to accommodate make-to-order or engineer-to-order demands. For example, computer manufacturers can charge more for PCs if the customer wants a customized product and a faster-than-normal delivery. To be able to re-plan and reschedule manufacturing on the basis of custom orders with delivery priorities, these discrete manufacturers require a flexible supply chain and total control of all aspects of the manufacturing process. Having access to real-time information from all of the manufacturing stages, beginning with incoming parts, makes it easier to assign a higher cycle time priority to a specific customer order and run it through the manufacturing process faster.

Supply chain visibility enhances collaboration

The most successful discrete manufacturers focus on two important goals in the manufacturing environments: improvement of supply chain visibility and supply partner collaboration. The key to meeting those goals is well-organized and clearly communicated data. By linking data entering the organization and extracting insights in real time, discrete manufacturers gain high visibility into the entire supply chain. Consequently, patterns in the data can be identified and used to better predict future demand, source more efficiently, and reduce lead times for production. This is especially important for discrete manufactures that want to push into emerging markets.

A unified information management system often means a manufacturer can more quickly respond to problems that emerge around product quality. That was the impetus for Boeing to invest in a three-dimensional software-enabled manufacturing process for its 777 jetliner¹. The initiative allowed engineers to simulate the geometry of an airplane design on the computer and perform digital assembly, collaboratively working with supplier and partner teams along the way. When a change needed to be made in the construction of the model, any other processes or parts that were affected by the change were automatically alerted. This instant supply chain communication improved the accuracy in part design and assembly, and reduced changes and rework. A physical mock-up was not required.

The Boeing example illustrates how enhanced supply chain visibility and supply partner collaboration enhances a manufacturer's ability to mitigate risk and manage mass manufacturing. In-depth supply chain visibility also allows the supply chain partners to provide differentiated parts or services that enhance relevancy in the marketplace. Consider the case of the BMW and SGL Carbon collaboration to produce carbon fiber—a lightweight material stronger than steel. Carbon fiber is the raw material for BMW's i-Series, an electric/hybrid vehicle family developed on a clean sheet platform with major structural use of carbon fiber reinforced plastic. By sharing data and collaborating within a solution-oriented atmosphere, the two companies developed a production system to enable BMW to effectively mass produce high performance electric hybrid vehicles that are efficient, light, modern, sustainable low emissions and high performance. Currently there is a city car (i3) and high performance sports car (i8).

EQMS and the discrete manufacturer

Discrete manufacturers understand that a reliable exchange of information across the enterprise helps to improve manufacturing operations management, supply chain efficiency and product development. An integrated Enterprise Quality Management System (EQMS) connects external parties to the manufacturer's internal quality processes, providing that exchange and visibility. When a supplier has secure access to participate directly in quality-related interactions such as supplier onboarding, supplier communication, and compliance and quality management, an EQMS provides a way to keep them in the loop and notify them of changes and issues in near real-time. With suppliers becoming increasingly more integral to the process, this visibility allows the manufacturer to gain control over quality and compliance and better manage operational risk.

In order to ensure and validate that suppliers conform to manufacturing and quality requirements, an EQMS system can put early warning triggers in place. When these triggers are established as part of a supplier non-conformance procedure or as a leading indicator threshold, key people can be automatically notified and/or an action can be initiated to create a streamlined workflow for this specific action.

For example, Tesla Motors is the smallest auto manufacturer in the world. Yet, Tesla has big plans to revolutionize the industry with its innovative electric vehicles and manufacturing process. To do that, the manufacturer developed an entirely new base of 300 suppliers and re-engineered the typical automotive business process to be more collaborative and vertically integrated, much like software companies². Because Tesla sees its supply chain as a key differentiator, it makes sure that close-to-real-time-access to information is available to its suppliers. This is to be sure that there is no latency in using leading indicators instead of trailing indicators to initiate critical tasks.

For companies as small as Tesla, recalls can be especially costly. Many larger auto manufacturers have seen bottom lines and brand perception suffer greatly as a result of safety recalls (see sidebar), but for a smaller company with an even more highly specialized product, the surface costs and hidden costs of a recall could be particularly crippling.

How quality management protects against recall fallout

A major concern of discrete manufacturers is that defects can take years to surface. With the need to continually release new models to stay competitive and satisfy customer demands, managing defects plays a significant role in the ability to stay competitive and profitable. Auto manufacturer General Motors is a prime example. Just this year, GM has made 54 separate recalls, affecting nearly 29 million vehicles worldwide³. GM estimates that those recalls will cost the company \$2.5 billion.

Having deeper supplier visibility and integrating that knowledge across its entire enterprise may have helped GM identify the problems with its ignition switches sooner. It might also have closed some of the information gaps that exist in the supply chain when trouble struck.

Integrated Enterprise Quality Management Systems (EQMS) are key to a discrete manufacturer's ability to identify and deal with defects. EQMS can help isolate problems to a particular production line, batch or pallet. It can also connect suppliers across the manufacturer's enterprise—an imperative for automakers like GM that have hundreds of original equipment manufacturers that supply parts and components from all over the globe.

An EQMS is also key to a manufacturers' ability to respond more effectively in product recall situations, ensuring consumer safety and mitigating risk and litigation exposure. In GM's case, it took them a decade to recall 2.6 million Chevrolet Cobalts, Saturn Ions and other vehicles over an ignition-switch issue. If supplier data had been properly managed and shared, GM could have more effectively reached out to consumers. By poorly handling the recall, the threat undermines the company's economic viability: its share price has dropped and the company is burdened with the costs associated with investigation, product replacement, remarketing and a loss of brand equity.

While leading companies like Tesla, Boeing and BMW stand as examples of companies using near real-time information to drive and inform its supply chain, discrete manufacturers of various sizes and myriad tiers of suppliers can benefit from implementing an EQMS. With an EQMS in place, discrete manufacturers can:

- Forecast consumption in order to meet just-in-time production needs and shorten fulfillment cycles.
- Enhance supplier accountability for quality and drive a collaborative supply chain.
- Identify problems before (proactive) they become public issues through effective use of insightful data and shared across the supply value chain.
- Validate the right supply partners and identify those who are able to meet increasing demand for lean/just-in-time production.
- Identify and contain non-conformances before they make it into the production chain through predictive analytics.
- Gain deep insight into all aspects of production and make better business decisions.

An EQMS system like TrackWise® allows discrete manufacturers to centralize and automate quality management processes while integrating with existing enterprise systems such as enterprise resource planning (ERP), customer relationship management (CRM), product lifecycle management (PLM) and manufacturing execution systems (MES). When coupled with a product like Stratas, the web-based software-as-a-service (SaaS) application that extends TrackWise supplier quality management, discrete manufacturers gain an added layer of insight into the supply chain and can easily fold third parties into a holistic quality management platform, while keeping the EQMS secure.

Sources:

1 [Boeing web site, 777 Family, "CATIA Development"](#)

2 [Sikich, "Supply Chain Strategies: Learning from Tesla Motors", J. Moran, September 2013](#)

3 [NBC News, "Nearly Every GM Model Touched by Recalls This Year", P. Eisenstein, July 2014](#)

Sparta Systems, an industry pioneer and leading provider of enterprise quality management software (EQMS) solutions, enables businesses to safely and efficiently deliver their products to market. Its TrackWise® EQMS, a trusted standard among highly regulated industries, is used by quality, manufacturing and regulatory affairs professionals to manage compliance, reduce risk and improve safety across the global enterprise. Headquartered in New Jersey and with locations across Europe and Asia, Sparta Systems maintains an extensive install base in the pharmaceutical and biotechnology, medical device, electronics manufacturing and consumer products markets.

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