



# Improve the Agility of Demand-Driven Supply Networks

Utilize real-time production data to optimize the supply chain for a sustainable competitive advantage





# Introduction

Stiff competition in consumer product manufacturing and tightening profit margins mean manufacturers need to increase productivity and lower costs. While some manufacturers have been able to reap financial savings by implementing demand-driven supply strategies, many have not. The opportunity to fully exploit even greater cost reductions from within the supply chain is attainable using the wealth of information that exists within plant operations.

The missed opportunity is particularly relevant for businesses that predict their manufacturing capacity based solely on historical cost standards defined in their enterprise resource planning (ERP) systems. If they instead enabled stakeholders on the enterprise side of the business to access near real-time manufacturing data—connecting the “manufacturing side” and “enterprise side” together—they could potentially save millions of dollars in materials, scheduling, and logistics.

This white paper discusses where untapped information may exist in the plant and how manufacturing information should be managed through the implementation of Operational Excellence initiatives. It also provides examples of how this manufacturing information can optimize production and planning within the enterprise side of the business to significantly reduce costs.





# Real customer scenarios

## Scenario 1

**A day-to-night shift changeover planning meeting for production and planning staff at a brewery:**

During the day shift, the packaging area had several hours of downtime due to issues with the pasteurizer, resulting in production being several hours behind where it planned to be at the shift changeover. One of the brewery's key customers had a high priority order that was due to ship the next day, and even running through the night, it would not make the shipment time.

The scheduler was a little agitated as it was the first time that he was made aware of the delay, and no one had informed the logistics manager. Based on the fact it was 9 p.m. and the logistics manager had gone home, it was going to be the next day before he would be aware of the issue.

All that could be done the next morning was to cancel the pickup planned for that day and expedite a special shipment on the weekend so the delivery could be made without penalty to the brewer. Expedited deliveries, as anyone buying products online knows, are hugely expensive, and in this case both the cost to expedite and cancel the original pickup were outside the negotiated logistics contract—directly impacting the profitability of the sale.

## Scenario 2

**Friday morning shift meeting at a CPG manufacturer:**

Production had been running extremely well during the last few shifts with throughput held at 4% better than planned overnight, and seemed to be on track to maintain that pace into the weekend. Just as this information was shared, the materials manager walked in and reviewed the shift report and current inventory levels report, and then abruptly ran out of the room.

Later, he explained that the manufacturer had reached a level of reliability that allowed for very low buffers of packaging material stock, so with a 4% better-than-expected pace holding, it would have run out of roll stock for packaging by Sunday, which would have interrupted its overall schedule—putting other customer deliveries at risk.

The packaging supplier in Mexico could easily provide an extra replenishment, but if it was notified too late in the day on Friday, the contract rules about notice periods for replenishment would have been broken, triggering an “off-contract purchase” premium. Furthermore, if the shipment were dispatched too late, this would require logistics to be expedited (with extra costs there, too).

## There are two main takeaways from these real-world stories:

By having better production consistency and repeatability, manufacturers can minimize disruptions to their production processes.

By enabling better visibility into real-time manufacturing performance information, purchasing, scheduling, and logistics teams can make timely decisions to minimize additional costs to the business.

Many companies using production software may have the “parts and pieces” in place to increase the agility of their supply networks today but they have not yet fully exploited the capability, which requires making manufacturing information accessible to the enterprise side of the business. The latest Manufacturing Execution System (MES) solutions provide increased visibility and real-time insights into production for better business decisions.

The following section discusses how to drive better production consistency and repeatability by focusing on the manufacturing operations side of the business.



# Manufacturing operations: Baseline requirements

To optimize the savings that can be achieved in the supply chain, all the different elements must work together in harmony; any disruptions will have a “domino” effect, as described in the earlier examples. Factoring in the manufacturing constraints is a key element in managing the whole supply chain circle, and there are two main options: develop standard manufacturing performance metrics based upon historical data or implement Operational Excellence processes to accurately control and measure repeatable production.

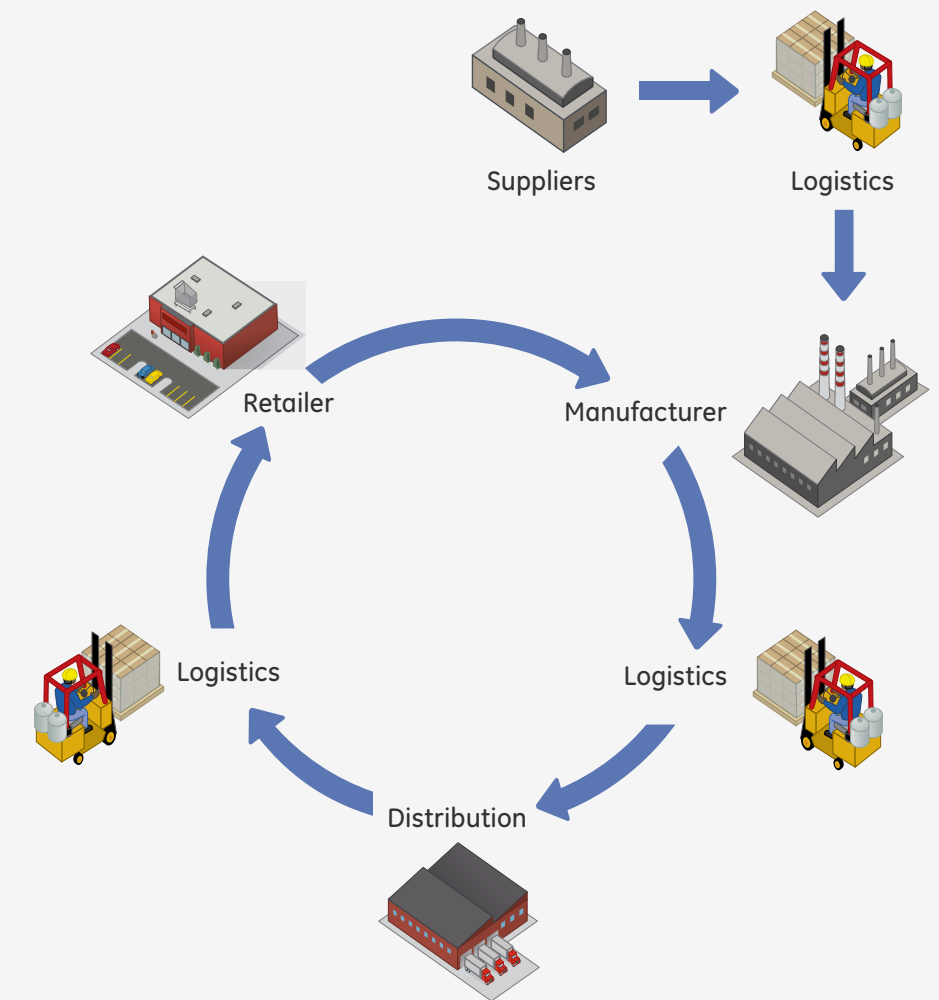
However, using historical data typically means developing a standard performance metric with a considerable error margin built in to avoid any possible disruption to the supply chain. This means the manufacturer is consistently underachieving the potential of its business; there are no major disruptions because the margin for error is so large, they are hidden.

In Scenario 1 above, the brewery’s ERP standard production metrics for a specific product did not align with the actual throughput achievable on the filling lines. There was always two hours of downtime per shift included in the number—a classic case of disguising the problem instead of fixing it. Based on the filler capacity of 1,200 cans per minute, even if the brewery only reduced downtime by 10%, every run would finish 12 minutes earlier than planned or have capacity for an additional 14,400 cans in the same runtime.

In another example, one global pharmaceutical company acquired a subsidiary and deployed an advanced batch software solution across its new plants to roll out its best practices. Using the software, it discovered 80% additional capacity at one plant, because the plant’s reported capacity measurement reflected what had been done in the past rather than what possible capacity could be achieved.

The decision to accurately control and measure repeatable production is key as this both maximizes the production capacity and efficiency of the plant while driving the repeatability and consistency required so as not to disrupt the supply network.

Food, beverage, and consumer product companies implement automation solutions to support Operational Excellence efforts, which helps drive production consistency and repeatability to maximize the cost savings from the supply chain. The other option, as mentioned earlier, would be to lower the performance expectations of the plant, which would mask the true manufacturing agility available in the supply chain.



**Figure 1**

*In a demand-driven supply network, an information-rich manufacturing environment plays a key role in supply chain effectiveness and agility.*



# Information needed at the supply chain level

Assuming that Operational Excellence programs are under way in the plant, below are the foundational building blocks for providing the information needed to stakeholders at the supply chain level.

## Tell me what we did

In almost all manufacturing plants, plant management starts the week, day, or shift by reviewing the prior period performance to set the direction for the upcoming manufacturing period of time (shift, day, or week). Plant managers then use the past performance to set continuous improvement tasks, production adjustments, and resource allocation. Understanding the physical constraints of the process by product (SKU) type requires having a detailed, accurate history of manufacturing performance. The foundation for this is a process historian, which allows for the storage and retrieval of hundreds of thousands of raw data points, combined with dashboards that provide context to the data—delivering historical analysis by process order, SKU, unit, line, shift, and crew.

## Tell me how we’re doing

Knowing where the manufacturing operation is currently performing against goals is another key information element required. Software is needed to transform real-time machine data into actionable production metrics so that personnel can reduce unplanned downtime, maximize yield, and increase equipment utilization. The ability to track the current run status of a process order across multiple areas and lines in real time provides valuable information—enabling machine-to-machine, line-to-line, and site-to-site comparisons by product run.

## Tell me what we’re going to do

Historical and real-time data can be combined with analytics to predict adverse events and downtime before they occur. Software capabilities like in-process scheduling that tracks the current production status and calculates forward the predicted material consumption and completion time based on current data (from the control system) and historical data (from the process historian) can provide an early indicator to any disruptions that occur mid process and could impact the supply chain.

The combination of the three elements above provides the base information that managers need to know to achieve Operational Excellence, improve agility, and avoid supply chain issues. With an understanding of how and where the information should be managed from the manufacturing side, the next section investigates how this information provides value to the enterprise side of the business.



**Figure 2**  
GE Digital's Operational Excellence Journey: Manufacturers need to implement Operational Excellence programs to drive manufacturing process stability and repeatability—providing the foundation for supply chain optimization.

## Bringing it all together

Companies need to understand the types of information available in the plant and how they can be used to increase ROA. Typically, corporate ERP systems such as SAP contain performance metrics for the theoretical run rate, production counts, and yields per product type (SKU); these are used by the stakeholders to form part of the inputs for their predictive planning processes.

The real impact is going to be adjusting the action plan based on the differences between the historical performance metrics that most materials managers and schedulers have to use today and the real-world data from the manufacturing systems—enabling additional accuracy and agility for supply chain excellence.

## Scalability and going global

The importance of impacting the supply chain goes beyond a single plant to multiple plants. For example, manufacturers that have the latest MES software deployed across multiple plants have gained agility across their operations in global sites—fully realizing cost savings in the development and manufacturing of products, which can have an even more significant impact on ROA.

## Conclusion

To add true value to a demand-driven supply network, reliable and predictable manufacturing practices are the baseline requirements, which Operational Excellence programs can help achieve—not only to drive production consistency but also to uncover capacity and improve efficiency. Advanced software solutions can help companies achieve Operational Excellence for continuous improvements and deliver cost savings in the supply chain.

Once manufacturing operations are stable and repeatable, the coordination of the real-time status of orders, inventory changes, and overall process performance with ERP systems can significantly increase the agility of a manufacturer's supply network—using the “what we're doing” data rather than the “what we think we can do” data—to optimize production and planning for a sustainable competitive advantage

## GE Digital's solutions for Brilliant Manufacturing

GE Digital is a leading provider of technology solutions for manufacturing organizations worldwide. Our [Brilliant Manufacturing](#) suite is the synthesis of two decades of working with the world's most recognized brands in manufacturing, including our own GE plants.

Our [Plant Applications](#) solution offers powerful MES capabilities to help process manufacturers maximize Overall Equipment Effectiveness (OEE), improve production scheduling, and ensure product quality. Enabling you to use real-time production data, it can help you drive Operational Excellence for continuous improvements and optimize your supply chain.

Connect with us to learn how our solutions can help you move forward on your Operational Excellence journey.





## About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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