

The Demand-Driven Supply Chain



**Synchronizing
Planning, Scheduling,
and Execution with
the Supply Chain for
Greater Collaboration
and Visibility**

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It's All About the Supply Chain

Last year, Supply Chain Management Review published the findings from a [small study](#) that said 84% of manufacturers outsource at least some of their production processes. At those levels, outsourcing has become a nearly ubiquitous phenomenon and one that we need to start seeing as the norm, rather than an aberration.

When the public thinks about outsourcing, it brings to mind a manufacturer sending work to another country to take advantage of lower labor costs. That is sometimes the case, but it is only one of the reasons why manufacturers choose to outsource. When talking to a manufacturer about their decision, adding capacity or taking advantage of unique skills is just as likely to be the reason. Furthermore, the supply chain partner with which they choose to do business isn't always out of the country.

Even if the manufacturer keeps the entire process in-house, chances are good that the final product will pass through one or more facilities before it gets shipped to the customer. For example, another factory might supply components or be responsible for final assembly. Testing might occur in a separate lab. Distribution centers might be responsible for routing the finished goods to the appropriate channel.



The bottom line is this: What happens inside the four walls of your factory is only one factor when it comes to profitably providing the products your customers want to buy. True continuous improvement needs to be made at the supply chain level and include every aspect, from planning to scheduling to execution.

Assessing Your Supply Chain Maturity

Before you begin any journey, you need to know where you're starting from and where you want to go. Gartner research has developed an online Supply Chain Planning Maturity Assessment Tool to help their clients better assess supply chain maturity across several key dimensions. Gartner divides this maturity into five different stages.

Please note that the descriptions following each of Gartner's supply chain maturity levels are adapted to the way we see our customers experiencing each of these levels. For the original descriptions, you can refer to the Gartner publication: *Supply Chain Maturity Assessment for Demand-Driven Supply Chain*.

Stage 1 React: Pretty much everyone who's ever been in manufacturing can identify with this level. Whatever plans you had in place at the beginning of the day are out the window by the

time you finish your first cup of coffee. Every minute of every day seems to be spent adjusting the schedule to adapt to events or changes in demand.

Stage 2 Anticipate: At this stage, there's some effort to control the chaos by standardizing processes, but the effort is still single-site and internally focused. This can create conflicts across the supply chain. For example, one plant manager may be focused on utilization rates whereas their counterpart in another factory has a mandate to cut costs.

Stage 3 Integrate: Things get easier once the organization reaches stage three. Improvements are still sought inside the four walls, but managers understand that their domain is part of a greater whole. At the senior leadership level, the supply chain is treated as a holistic organism and synchronization between individual functions is prioritized.

Stage 4 Collaborate: Now that things are clicking internally, supply chain leaders have the breathing room to remember what the supply chain is all about: Delivering value to the customer. Supply chain partners work together to reorient from an internal focus to an external one.

Stage 5 Orchestrate: This is the level that almost all supply chain leaders envision, but few achieve. Collaboration is no longer one-off. It has now reached the ecosystem level where the entire supply chain works together to deliver value through channels geared to the needs of the customer.

70-80%

Plan to Increase Spending on Supply Chain Planning Technology in the Next 2 Years.

(Gartner, October 2017)

40%

Say the need to enhance decision-making is one of their top 3 investment drivers over the next 3 years.

(Gartner, October 2017)

For companies at all stages of maturity, the key drivers of their supply chain planning initiatives over the next few years include:

- Continuing globalization of supply chains
- New and innovative ways to serve customers
- Higher planner productivity, including automation of relevant planning decisions
- Timeliness in the planning decisions being taken
- New insights and value from exponentially growing data volumes
- Balance speed, responsiveness and agility with cost and efficiency
- Align and synchronize planning decisions horizontally and vertically across a supply chain ecosystem

Source: Gartner

What Stage are you in?

Click [here](#) to share anonymously – and see how you compare to other readers.



The Epic Fail of ERP in the Supply Chain

If you feel like you're stuck at stage one or two, you're not alone. Gartner treats stage three as the goal for which most manufacturers should strive, tacitly acknowledging that the clear majority of manufacturers are right where you are. To get unstuck, it helps to understand the underlying cause of your challenges. The systems you use to manage your supply chain may be a big part of the problem.

ERP systems were originally designed to be the transactional backbone of the enterprise. As such, they focused heavily on the financial aspect of the business. Many systems started out as a set of financial applications combined with a light level of inventory management and sales order processing to help capture transactions at their source. Material Requirements Planning(MRP) was added as an after-thought (or as a point solution) to address the needs of their manufacturing customers. Even today, many of the ERP systems designed to address multiple industries are focused more on the financial management of the business and less on the activities, such as manufacturing, that drive those numbers.

21%

Defined their ERP Implementations as Failures.

(Panorama Consulting and Mint Jutras Survey)

Though MRP systems were a step in the right direction, they had serious limitations. As the name suggests, these applications were focused on materials with little thought as to whether the facility had the available capacity to produce a product let alone whether it would be profitable to do so. Furthermore, they were plant-centric with few supply chain capabilities.

Finite capacity scheduling (FCS) was quickly introduced as a point solution to make up for the scheduling limitations of MRP. With FCS, the production planner could at least take into account the capacity of the plant even if they had limited ability to incorporate available capacity across the supply chain. But even though these systems could tell the planner what the factory could produce (capable to promise), they still didn't provide any insight into whether the order would be profitable (profitable to promise).

Advanced Planning and Scheduling (APS) took off in the 1990s as computing power made more complex calculations possible.

Now, the manufacturer could look at both material requirements and capacity to optimize their production schedule. Higher-end

ERP vendors started to add APS applications to their product suites. But APS also came with limitations in that it was designed

with push-based manufacturing in mind and focused on optimizing individual aspects within the four walls of the manufacturing plant and not across the entire supply chain.

\$2.8M to \$4.5M

Average ERP Cost of Ownership Increase in 2 years, from 2014 to 2016.

(Panorama Consulting and Mint Jutras Survey)

We can't necessarily blame the developers of these solutions for their inability to facilitate synchronized single- or multi-enterprise supply chain planning, scheduling, and execution. The technologies needed to foster collaboration just were not available when these applications

were in their heyday. After all, it's hard to do cross-supply chain planning when you're sharing data over a dial-up modem.



This brings us to where we are today. Computing power has grown exponentially until the power of the smartphone inside almost every factory worker's pocket is equivalent to the power NASA used to land a man on the moon. Furthermore, SaaS (software-as-a-service) delivery models and the web have redefined the scope of applications and put advanced functionality within reach of even modest budgets.

A Supply Chain Planning System of Record

So, what's the forward-thinking manufacturer to do? "Rip and replace" their ERP?

Thankfully, that's not our answer. Replacing an ERP system in one factory is a long and laborious process. In a complex manufacturing environment, even the choosing of an ERP system can take more than a year; the implementation even longer. Now imagine trying to find a solution to standardize on that will work across all your factories and facilities. Once you make your choice, it might be months before you go-live with phase one of the implementation and years before every facility is up and running on the full package.

That's assuming you ever get that far. According to a study conducted by [Panorama Consulting and Mint Jutras](#), 21% of companies defined their ERP implementations as failures. The average cost of ownership also rose from \$2.8M in 2014 to \$4.5M in 2016, making these projects rather costly failures at that.

Instead of the "rip and replace" approach, Gartner recommends adopting a phased approach that involves three levels of common supply chain planning functionality.

System of Record (SOR) – Establishing an SOR creates one version of the truth that everyone across the supply chain can count on. The SOR sits on top of your current ERP to manage your manufacturing operations and supply chain. It leverages the ERP for its intended purpose, transactional data.

Supply Chain SOR

The System of Record stacks on top of the ERP to access transactional data.

This is the baseline level that Gartner targets in their stage three maturity, and this technology must be functioning well and stable before the organization can get to the next level.

Systems of Differentiation (SOD) – Once you've established a SOR across manufacturing operations and the supply chain, you can move on to a SOD. Gartner characterizes these as applications that enable differentiating company processes or deep, industry-specific capabilities. In other words, any applications that help you provide differentiating value

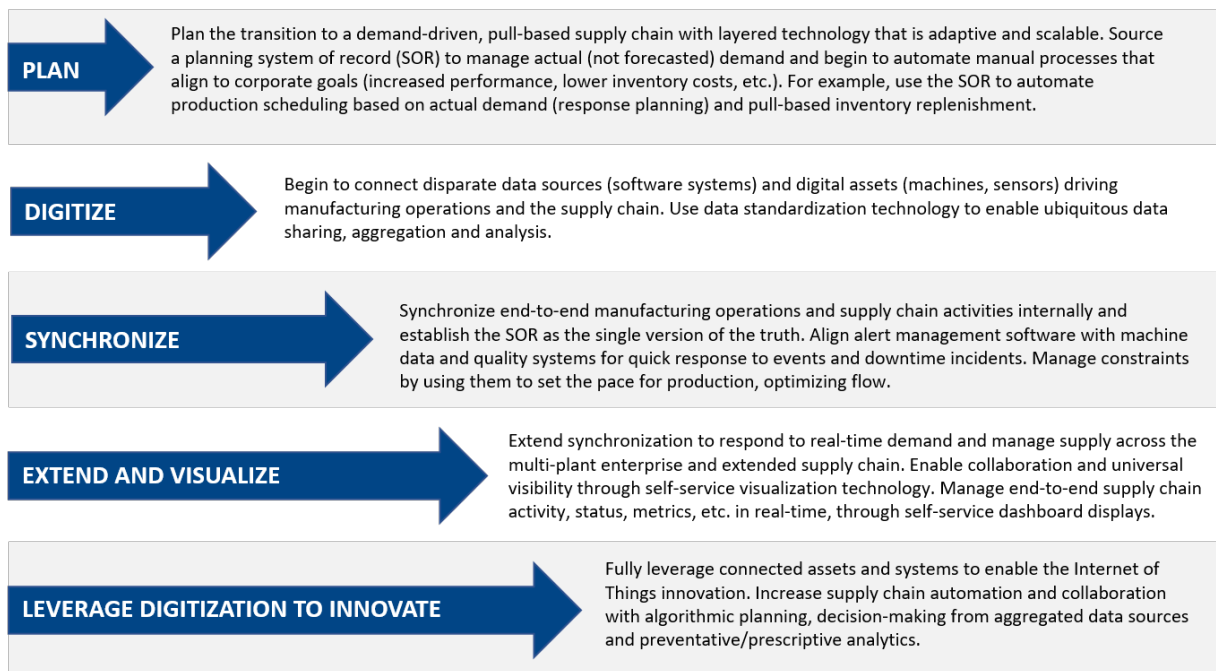
through supply chain improvements. In Gartner's maturity model, SODs are required to move from stage three to stage four.

Using their SOD, an aerospace and defense contractor client was able to increase their rate by 400% while reducing downtime and scrap to near zero levels. The efficiencies gained allowed them to win new contracts and, subsequently, grow market share.

Systems of Innovation (SOI) – SOIs move into the realm of prescriptive analytics. At this point, you're not just responding to events (however effectively); you are actually using data and analytics to predict what will happen. The Big Data and IIoT initiatives being bantered about in boardrooms everywhere often belong in this category.

In our view, the SOR, SODs, and SOIs aren't necessarily different systems. Often, it's more a matter of taking a phased approach to implementing a solution – and layering on value-added functionality. The following graphic suggests a path for applying technology to reach higher levels of supply chain maturity.

Layering Technology to Advance Supply Chain Maturity



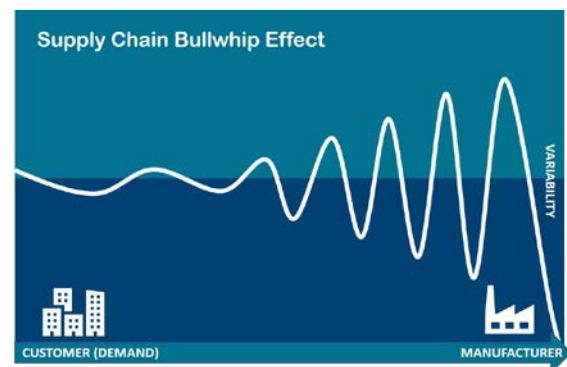
Furthermore, we believe that this approach can and should be applied to more than just supply chain planning. When planning is decoupled from scheduling and execution, it's easy for planners to lose sight of the variabilities that are part and parcel of any manufacturing environment. Supply chain plans, along with production scheduling and execution, need to be

able to adapt almost instantaneously to demand changes and events in order to provide the level of responsiveness needed in the modern supply chain. One of the ways to ensure this responsiveness is to adopt a pull versus push approach to supply chain planning.

The Demand-Driven Supply Chain

Demand-Driven Manufacturing is an increasingly familiar concept to manufacturers, although it's sometimes known by other names such as flow or pull manufacturing. In short, demand-driven manufacturing bases production on actual orders rather than forecasts. By implementing Demand-Driven Manufacturing, manufacturers can improve a number of vital performance metrics such as lead times, cycle times and inventory levels. These same concepts can be applied to the supply chain for similar results.

Let's take one common supply chain problem as an example of how creating a demand-driven supply chain can help. The bullwhip effect is a concept commonly discussed in courses on supply chain theory, and most planners have seen it in action. In essence, the bullwhip describes an artificial amplification in demand that creates increasing levels of variability the further you move up the supply chain. The result is too much on hand inventory (with its added costs and potential waste). In our experience, a key contributing factor to bullwhip disruptions revolves around min/max policies and min/mult lot sizing rules that trigger replenishment at static order points rather than when actual consumption occurs. If using min/max for inventory planning, work to decrease replenishment lead times, lot sizes, and the gap between min and max when using a min/max order policy (or transition to a pull-based eKanban system that signals replenishment based on actual demand). This will allow you to reduce lot sizes and stock buffers as much as possible – and the consequences of the bullwhip effect.



Our approach is to get as close to the demand signal as possible and synchronize all downstream activities and resources. This works to drive end-to-end flow across the supply chain and throughout production, improving other vital performance metrics such as throughput and on-time delivery while increasing capacity.

Like Demand-Driven Manufacturing, the Demand-Driven Supply Chain synchronizes everything to actual orders at every level on the chain. Forecasting may still be used for long-term decision making, but everything else is synchronized to customer orders, eliminating the bullwhip effect across the entire supply chain.



Synchro Demand-Driven Supply Chain Transformation

- Enterprise and supply chain collaboration and visibility for single version of the truth
- Demand-driven supply chain production planning, scheduling and execution
- Long-term demand and capacity planning
- Synchronization of materials and resources across the supply chain
- Automated inventory replenishment and inventory right-sizing
- Execute at the optimal pace for end-to-end production flow while maintaining on-time delivery
- Connect, aggregate and analyze data from multiple sources (systems and machines)
- Apply predictive and prescriptive analytics to minimize downtime
- Ensure compliance, traceability and fault detection
- Streamline with workflow automation and instructions
- Quickly mitigate and resolve quality and downtime issues

Visibility: The Key Ingredient of the Demand-Driven Supply Chain

There's an old saying in manufacturing: *You can't manage what you can't measure*. This is certainly true of the supply chain. If you don't know what's going on inside your supply chain, how can you adjust your production plans to respond to variability?

For example, let's say you rely on a component part provided by another manufacturer to produce your finished product. You can get this part from other manufacturers, but buying all of these components from one supplier allows you to take advantage of volume discounts. Since you also buy in significant quantities, this supplier often prioritizes your orders, providing you with shorter lead times than you could get from other suppliers. It's a pretty well-oiled partnership that works well for both parties. Most of the time.

One day, your top salesperson closes the deal of the decade by promising a delivery date that is a couple of weeks shorter than your standard lead times. (In his defense, the VP of Sales told him to close the business, saying they'd worry about delivery after the invoice was signed.) Now, you're scrambling to figure out which orders you can reprioritize to make room for this new order.

After you spend several hours calling other customers and making concessions in return for their flexibility, the order is entered into the system, and a purchase order is sent to your supplier for three times the number of component parts you usually order.

This order sits in the supplier's inbox for about twenty-four hours before an employee plugs it into the system, not noticing that the quantity far exceeds your usual monthly order. Even if they did notice it, their systems don't provide enough visibility into the capacity of their facility to raise a red flag. It's not until the next morning at the production planning meeting that the team realizes they can't possibly fill the order in the time requested unless they reprioritize their schedule and move orders around. Then they spend several hours calling their customers...

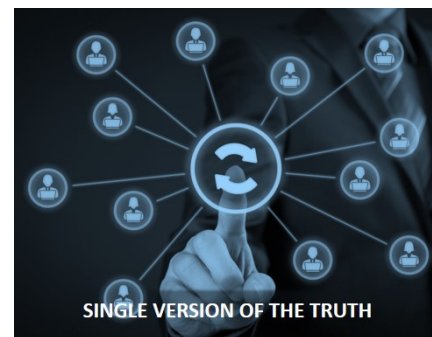
A demand-driven manufacturing SOR that synchronized all order requirements and provided better visibility would have helped all parties involved in this scenario. Let's take a look at how:

Salesperson – A SOR that showed factory-level capacity could have given the salesperson capable-to-promise information. With a better idea of what was possible, they might have been able to negotiate a more realistic date with the customer. (Also note: A synchronized SOR may also result in increased capacity, possibly negating the issue.)

VP of Sales – At the very least, capable-to-promise insight would have allowed the VP of Sales to better understand the firestorm they were releasing by telling the salesperson to do whatever it took to close the business. It would also have increased their accountability to the organization since "I didn't know" would no longer be an acceptable excuse.

Production – With a Demand-Driven Manufacturing SOR implemented at the plant level, the entry of the order would have automatically adjusted production. Few, if any, concessions would need to be made because the system would determine how best to adjust the schedule to eliminate, or minimize a late delivery. For orders where a late delivery was unavoidable, alerts could be sent to key personnel who, in turn, could determine how best to handle the delays.

Customers – Overall customer satisfaction is increased as potential issues are mitigated before any customer impact.



Supplier – When the order was entered into the system, and triggered a replenishment order for triple the quantity of components, the SOR could have sent another alert letting them know that the impending order would exceed existing capacity. They could also be notified through a supplier portal where they receive real-time demand signals and have instant visibility into order information. No need to wait until the next production meeting to raise the red flag.

In a Demand-Driven Manufacturing Supply Chain environment, everyone has access to the same real-time information, or a single version of the truth.

The Multi-Enterprise Supply Chain

Today, most attempts at real-time supply chain planning, scheduling, and execution understandably involve a single enterprise. Until recently, anything more would have required supply chain partners to create, at a minimum, a standardized format for data exchange if not actually to standardize on the systems used.

That's no longer the case. In the Demand-Driven Supply Chain scenario, we've given the production planner insight into capacity at the supplier. To do this, they do not need access or integration to the supplier's system. They simply need a Supply Chain System of Record (or System of Differentiation or Innovation, based on your perspective) that will allow them to aggregate data from multiple sources and an agreement between the manufacturer and the supplier to provide access to the data.



Case in point: We recently worked with a microchip manufacturer that received parts from OEMs and supplied them to contract manufacturers. Both the OEMs and the contract manufacturers gave the manufacturer forecasts, but the formats were different, and like all forecasts, not always reliable. As a result, they were constantly in reactive mode (Stage 1), manually standardizing data from multiple sources in spreadsheets while juggling variances in supply and demand.

The SOR solution was to consolidate the data into a single screen view showing real-time, aggregated replenishment, inventory, and order status information. OEMs and contract managers would not need to change their processes or the format of the data submitted (as long as it was in a structured database or spreadsheet format). Finally, the SOR would allow them to provide similar views to their OEM and contract manufacturing partners for even tighter collaboration (Stage 4).

[Related resource: White paper: E2E Supply Chain Visibility Technology is Here](#)

Orbital ATK offers another example of how the technology to consolidate data from disparate sources and provide visibility across the supply chain is here today. We worked with this ETO manufacturer of carbon-fiber composite components for the aerospace industry to help them curate data from over 100 sources (61,000 machine tags), layering technology to implement their vision for a fully integrated environment where everyone is working from one version of the truth.

[Related Resource: Video: How Orbital ATK is Leveraging the IIoT and Visual Factory Technology to Drive Continuous Improvements](#)



A Faster ROI

As we've been emphasizing, this layered approach to creating a Demand-Driven Supply Chain Planning System of Record doesn't require any replacement of existing systems either at the manufacturer or throughout the supply chain. This means you can add capabilities as needed and realize a return on investment much faster than through the implementation of a traditional ERP system.

Another client was working with a monolithic ERP system that was just too cumbersome to use on the shop floor. Instead, they had workers on the shop floor writing down everything they did and feeding it back to a data entry clerk for entry into the system. Needless to say, the system wasn't foolproof. Data could be easily misrecorded or misinterpreted. When workers got busy, they might not have the time to record anything at all.

While searching for an MES to manage production, this manufacturer of transportation equipment was introduced to Synchrono® and decided that demand-driven or pull-based manufacturing made a lot of sense for their business. Originally, their senior management team had assumed they wouldn't see a return on their investment for at least a year. But within four months, they had replaced their old processes and manual systems with Synchrono® as their manufacturing SOR. The impact could be seen throughout the organization almost immediately.

The Controller at the manufacturer described their experience this way. "With Synchrono®, we are quickly able to capture the operational information we need, allowing us to make the correct decisions 100% of the time. It's been easy to teach the guys on the shop floor. We are analyzing the real-time information that Synchrono® gives us – something that we never had before – and realize that we've gotten more efficient already. Synchrono® is also pointing out that we're building too much to stock and is enabling us to move to a true pull-based process of make-to-order. This will help us reduce and eliminate this stock in the near future."

While this manufacturer was focused on internal operations, they could easily expand their efforts across the supply chain by providing that same level of visibility to their supply chain partners.

3 Steps to Building a Strong Foundation

Before they can create a Demand-Driven Supply Chain and collaborate more effectively with supply chain partners, most manufacturers need to get their own house in order (as in the previous example). Here are the three steps to building a strong foundation.

#1 Digitize. The Demand-Driven Supply Chain runs on data—the right data in the hands of the right people at the right time. As the examples we’ve shared show, it’s not unusual for an organization to have two or three ERP systems in addition to several point solutions for functions like maintenance, time management and so on. You need to implement a platform for curating data from multiple sources and making sense out of it.

If your current systems leave something to be desired, there may be some data cleansing measures you may want to take as well. At the very least, you’ll need to have a discussion about which sources of data are good and which are questionable. As the case of the transportation equipment manufacturer shows, data issues can sometimes be resolved with the implementation of a system of record. Our customers often bring us in to help evaluate data sources because we can help them separate those issues they need to resolve from those that they don’t.



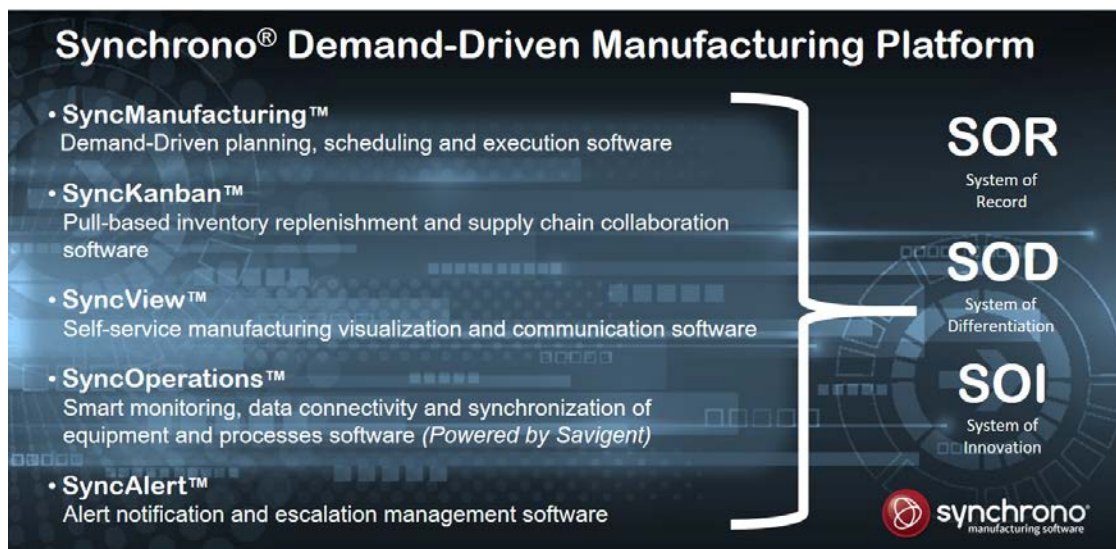
#2 Synchronize. The next prerequisite is to synchronize everything in your factory (people, processes, materials, machines, methods and data) at the order level. If production flow isn’t aligned to customer orders inside your own facilities, you can’t synchronize your entire supply chain to orders.

This synchronization alone can have a dramatic impact on performance. We worked with a KSB Company, GIW Materials, a manufacturer of heavy-duty centrifugal slurry pumps, to help them lower cycle times and improve on-time performance. The crux of the solution was to optimize production flow and control cycle time by synchronizing everything to orders: pattern information, flasks, combination equipment, engineering revisions, and capacity. The impact was so noticeable to their customers that GIW doubled their revenue in two and a half years.

[Related Resource: Case Study: GIW Adds Capacity to Enter New Markets](#)

#3 Visualize. Once you've digitized your data and synchronized production flow to customer orders, you need to put the right data into the hands of the right people, starting with your own employees, but eventually extending to your supply chain partners. In the example we cited earlier, SyncView™ manufacturing visualization and communication software would enable the microchip manufacturer to provide visibility to both their OEMs and contract manufacturers.

[Related resource: White paper: E2E Supply Chain Visibility Technology is Here](#)



Synchrono Demand-Driven Manufacturing Platform software modules are available individually or collectively to enable Smart Manufacturing, Industrial Internet of Things and Industry 4.0 transformation.

Conclusion: Demand-Driven Manufacturers Make Better Supply Chain Partners

We've shared a few examples of how implementing Demand-Driven Manufacturing inside your facility allows you to achieve your supply chain performance objectives. However, there wasn't room in this paper to talk about all of the KPI targets Demand-Driven Manufacturing can help you achieve. Improvements such as increased inventory turns, lower scrap rates and inventory carrying costs, and improved customer service levels are everyday achievements for those we work with. To learn more, we invite you to peruse the many [case studies on our web site](#).

Extending demand-driven principles throughout the multi-enterprise supply chain accelerates these types of improvements and increases your value as a supply chain partner. While many industry gurus treat the multi-enterprise supply chain as a futuristic ideal, the tools to make it happen are available today. Even better, they are easy to use and implement, putting them within reach of manufacturers of all sizes, regardless of their level of IT advancement.



About Synchrono®

Synchrono® LLC is a leading provider of modern demand-driven manufacturing software and services that simplify complex manufacturing environments and transforms how its customers do business. Based on Lean and constraints management methodologies, the Synchrono Demand-Driven Manufacturing Platform enables the real-time visual factory of the future. By combining the power of demand-driven planning, scheduling and execution with eKanban inventory replenishment and the capabilities of a manufacturing operations system, the Platform synchronizes data to provide a graphical window into the entire manufacturing operation, enabling flow from order inception through production and delivery. Gathering and analyzing information from its own applications as well as from both machine-level and disparate enterprise systems, the Synchrono Demand-Driven Manufacturing Platform automatically generates alerts, escalation and action plans to address issues and displays real-time data through dashboards that can be positioned around the plant for complete transparency. Synchrono systems are focused on helping clients manage constraints, improve flow and drive on-time delivery. Look to Synchrono for software that meets your demand. Visit www.synchrono.com to request a private demo.