2018 TOP TEN TRENDS

in Modern Demand-Driven Manufacturing

2018 is shaping up to be a good year for manufacturers. Gross Domestic Product (GDP) is expected to come in at around 2.5%. *(That's right between the 2-3% range that economists consider "healthy.")* Manufacturing is expected to slightly outpace GDP and grow by 2.8%. The stock market is at an all-time high, indicating strong investor confidence and more money for investment. Oil prices are expected to remain low, reducing the cost of manufacturing and transportation of goods to market.

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In the “it remains to be seen” category, economists argue about whether the lower corporate tax rate passed at the end of 2017 will have any long-term effect on hiring and the economy, but within days of the passage of the bill, a slate of companies announced investments and bonuses to workers at all levels. Perhaps that is why U.S. retailers just saw the strongest holiday shopping season in seven years.

With signals pointing toward a good year, manufacturers have a decision to make. They can enjoy the strong economy while it lasts – and pretend it will last forever - or they can look to the future and invest in technologies that will help them build a stronger organization that can prosper even if (when) the economy loses steam.

To help you consider your options, we’ve compiled The Synchrono 2018 Top Ten Trends for Modern Demand-Driven Manufacturing. This list is based on interactions with hundreds of manufacturers and industry experts – addressing challenges, supporting innovation and introducing technologies. Before we jump into this year’s list, let’s revisit what we mean by modern Demand-Driven Manufacturing.

What is Modern Demand-Driven Manufacturing?

Demand-Driven Manufacturing is a method of manufacturing primarily used by discrete, custom manufacturers[1], where production is based on actual demand (orders or consumption) rather than a forecast. This is enabled through a synchronized, closed-loop process between customer orders, production scheduling and manufacturing execution - all while simultaneously coordinating the flow of materials and resources across the supply chain. The key components of Demand-Driven Manufacturing are synchronization and flow.

Modern Demand-Driven Manufacturers are today's truly Lean thinkers. While they are continuously improving, they are also innovating. Modern Demand-Driven Manufacturers realize that this combination not only gives them an advantage in the marketplace, but it drives their efforts to work smarter, more profitably and exceed customer expectations. Modern Demand-Driven Manufacturers embrace technology, but with a different lens. Solutions, not just systems, drive progress.

Last year, the common thread throughout our Top Ten Trends in Modern Demand-Driven Manufacturing list was digitization, synchronization and visualization. This year's trends revolve around the maturity – and execution – of these concepts.

1 | TRANSFORMATION THROUGH LAYERED TECHNOLOGY

Manufacturers continue to invest in technologies to transform their environment through digitization, synchronization and ubiquitous visibility. The trend noted here is the increasing number of manufacturers taking advantage of more flexible and highly configurable cloud technologies that allow them to more affordably layer on value-added capabilities, rather than "rip-and-replace" expensive enterprise systems.

A layered approach goes hand-in-hand with the Lean and continuous improvement principles inherent in modern Demand-Driven Manufacturing. Layering technology allows manufacturers to approach transformation pragmatically and achieve significant wins. Keep in mind that successful transformations are an evolution, not a revolution. Case in point: You need to get your internal house in order before expecting transformative value from your extended supply chain. That is, if you don't have real-time visibility into order priorities and status, how do you expect to effectively collaborate with your suppliers?

In considering transformation objectives - whether they be changing an ideology *(e.g., migrating to a pull/demand-driven method)*, impacting core metrics *(cost reduction, throughput)* or competing more vigorously in a healthy economy – think Lean. Layer technology to fix what's broken first *(manual processes, lack of visibility, inability to access the right data, etc.)* and address wasteful practices bogging you down *(unplanned downtime, excess inventory).*

Gartner research also advocates taking a layered approach to advancing through their 5 Stages of Supply Chain Maturity *(Gartner report, Supply Chain Maturity Assessment for the Demand-Driven Supply Chain)*, where reactive-mode Stage 1 environments use primarily manual processes and Stage 5 supply chains fully integrate the enterprise, leveraging algorithms and predictive analytics for continuous improvement. A layered-technology approach allows manufacturers to apply maturity-enabling technology at a targeted and affordable pace.

An example of applying layered technology to advance supply chain maturity involves an automotive manufacturer looking to transform its extended supply chain into a more connected, collaborative ecosystem. While the recommended solution started with getting its internal supply chain in order (synchronization), it also included layering technologies onto its SAP ERP to connect and communicate with the extended supply chain. The layering technologies included an eKanban system along with software for connecting, sharing and visualizing information from disparate data sources.

For many modern Demand-Driven Manufacturers, transformation begins at the core of their business: Throughput. That is, how quickly and cost-effectively can you get your product into the hands of the customer. Toward that end – and the most common application of layering technology we've experienced – is the layering of a manufacturing system of record (next item on our list) on top of the ERP system to automate and - this is critical - *synchronize* planning, scheduling and production execution. Synchronization of all production-related elements is the key to eliminating costly downtime, driving end-to-end production flow and ultimately increasing throughput.

2 | Manufacturing System of Record

We are constantly amazed at the number of large, multinational manufacturers who are using spreadsheets and manual processes to manage their largest cost center – production operations. When speaking with these manufacturers, many reverted to spreadsheets and/or manual processes due to limitations or the lack of flexibility in the manufacturing systems packaged with their ERP.

While ERP software is a critical business tool for managing transactions – and translating that data into financial insights – it often falls short in managing the activities behind those transactions. Also falling short are MRP, APS and FCP systems for their singular focus, rigid transactional design and inability to support modern manufacturing methods including Lean, Constraints Management and Demand-Driven Manufacturing.

Modern Demand-Driven Manufacturers are adopting a manufacturing system of record $(MSOR)_2$ that stacks on top of their ERP to digitize, synchronize and visualize manufacturing operations and the supply chain.

(Gartner has a similar concept, referred to as a Supply Chain Planning System of Record or SCP SOR.)

The MSOR leverages the ERP for its intended purpose - transactional data - but its core function is to drive production flow. To do so, it leverages synchronization technology to align all elements needed to execute an order, utilizes constraints management, collaborates with the extended supply chain to automate replenishment and enables real-time, universal visibility.

One extrusion equipment manufacturer we worked with deployed such a system to reduce stock outs of stocked parts by 25% and returned to profitability for the first time in three years. In another case, and after only a month on their new system, a steel wire manufacturer achieved an all-time production record and attributed the performance increase to their new MSOR. Similarly, the largest wood products producer in the U.S. experienced a 20% bump in capacity and a 10% increase in throughput after implementing their MSOR. These quick ROI-producing improvements were made not by replacing large enterprise systems over the course of a year(s), but by layering on specialized, performance-producing software in a matter of months.

3 | The Digitized, Connected Shop Floor

Manufacturers are pragmatic people. They have to be when margins are as tight as they are in most industries. But, this means manufacturers are often slow to put new technologies into the hands of their employees. It's not that they don't believe in the power of technology, they just need to have a specific, *relevant* reason to invest.

Demand-Driven Manufacturing and capabilities such as those found in a MSOR is giving manufacturers that reason. Instead of collecting data for data's sake, the MSOR curates data from multiple sources then serves it up in ways that help the manufacturer achieve goals that are meaningful to them such as predictive maintenance, managing constraints, reducing lead times and improving inventory flow. As a result, we're seeing new intelligent devices springing up all over the shop floor.

As a side benefit (but not one to be understated), intelligent devices are not only making it easier to gather much-needed data, but they are also improving the productivity of individual workers on the shop floor. For example, instead of requiring a work center operator to decipher a spreadsheet-based production schedule (that is probably out-of-date within minutes of being released) and then adjusting work accordingly, an MSOR can dynamically adjust production schedules to reflect up-to-the-minute information on orders, delivery schedules and production flow.

One manufacturer we worked with had 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 process 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.

Instead of replacing their ERP system, they layered our modern Demand-Driven Manufacturing capabilities on top of their existing systems, including the ability to capture data from the shop floor. With real-time information at their fingertips, they could see the impact of even minor changes to their processes, which helped them fine-tune their continuous improvement efforts. One area of special focus was moving from their current make-to-stock approach, which was inflating inventory levels, to a true pull-based make-to-order environment.

4 | Enterprise Synchronization Technologies

The Internet of Things (IoT) has been talked about in manufacturing circles practically since MIT coined the phrase in the late 1990s. At some point in the not-too-distance past, someone (or several someones) came up with the phrase, Industrial Internet of Things (IIoT), to refer specifically to the IoT in an industrial context, such as a manufacturing plant. Since then, IIoT visionaries and vendors have created compelling stories about how the IIoT can transform manufacturing operations and entire supply chains.

The key to understanding how the IIoT can benefit manufacturers lies in understanding that the "things" the IIoT connects include equipment, processes, data and people. The first wave of IIoT implementations focused on collecting data and analyzing it for insights. The next step is to synchronize sources to not only make the data collectively visible, but to apply relevant context to it to drive flow and take immediate, appropriate action when and where required.

This synchronization can take many forms and can be different for every manufacturing environment. (Another reason for a layered technology approach that addresses specific needs versus a one-size fits all monolithic system.) In addition to the planning and scheduling synchronization examples already noted, we have worked extensively to synchronize on-demand supplier replenishment; reducing inventories upwards of 50% and, for an aerospace and defense manufacturer, cutting their amount of scrap to near zero levels.

Another synchronization example is a global automotive industry supplier intent on improving quality and reducing downtime by synchronizing operators, maintenance and machines for a more immediate response to shop floor events. With a push of a button, operators can signal an issue to maintenance who has real-time visibility to the machine in question and knows how to respond. Taking this a step further, another manufacturer with thousands of pumps and compressors in disparate field locations needed to monitor and synchronize the data from this equipment to reduce random fixes and establish a more cost-effective predictive/preventative maintenance strategy. This case highlights the value of having context associated with data. For example, what are the environmental conditions associated with each pump/compressor location that could impact the need for repairs – e.g., temperature, humidity, sand particles, etc.? What is the age and maintenance history of the equipment? How accessible is the location? Imagine the value to this manufacturer in synchronizing these data elements with predictive algorithms, workflows and visualization systems.

Today we are responding to more enterprise-level requests for synchronization in order to provide a real-time, single version of the truth for order status, priorities, production schedules, replenishment and more across multiple facilities, supplier networks and outsourced/contract manufacturers.

RELATED RESOURCE: *Three Ways to Put Big Data to Work in Your Factory*

5 | Strategic S&OP and Business Process Planning

Simply put, Sales & Operations Planning (S&OP) is designed to align production with projected sales. Around since the 1980s, S&OP is especially helpful to organizations that deal with a lot of variability. In make-to-order environments, S&OP can help production gear up for potential orders. In make-to-stock environments, S&OP can serve as a reality check on the sales forecast, giving production greater insight into how realistic the forecast is and any variability they should be ready for.

Modern Demand-Driven Manufacturing changes the S&OP paradigm from a short-term outlook to a longer-term one (months to years). Modern Demand-Driven Manufacturers use S&OP tools to model, develop and compare scenarios for aligning supply and capacity against projected demand.

Analysts covering manufacturing have noted a sharp increase in inquiries around S&OP (as well as the digital supply chain). This may be manufacturers responding to the recovery (or recession based on how you view it) with the desire to be more strategic in planning investments for the organization. For example, last year we experienced more interest in S&OP solutions from multi-national organizations looking to roll up their projected demand for greater negotiation power with their suppliers - and to determine how and where to standardize on production technologies.

6 | Outsourcing

In manufacturing, the key to market leadership is to be faster, better or cheaper than the competition at what is important to your customers. As most manufacturers know, being cheaper is often a losing game long-term because there is always someone who can undercut your pricing, at least for as long as is necessary to eat into your customer base. Faster and better is usually more profitable in the long-run. Nevertheless, there are still strong pricing pressures, even for those with innovative products and short lead times.

Of course, achieving market leadership, or even a strong challenger position, doesn't mean you have to do it all. Long ago, manufacturers learned the value of subcontracting those parts of the process with others who could do it faster, better or cheaper than they could. The opening of economies and trade routes around the world and advancements in transportation technologies have overcome many of the logistical challenges to outsourcing.

According to Gartner research[3], the top five reasons for outsourcing manufacturing are:

1. To increase agility and/or flexibility
2. To improve costs and/or operational efficiency
3. To increase internal focus on specialized capabilities
4. To speed time-to-market or time-to-volume
5. To increase sales

An outsourcing study conducted by Peerless Research Group and Supply Chain Management Review found that 32% of manufacturers are outsourcing at least 50% of their processes - and attributed real-time visibility and collaboration as keys to success.[4] You may recall in trend #4, we talked about synchronization of equipment, processes, data and people across the enterprise. Manufacturers who outsource part or all of their processes to others – and have downstream dependencies - need to find ways to synchronize efforts between entities, most of which probably take a different approach to managing operations and almost certainly use different systems. The same outsourcing study reported the most used technologies to enable this interaction are web portals (54%), electronic data interchange (54%), a supply chain network (37%), XML messages (22%) or an industry-specific network (12%). Modern Demand-Driven Manufacturers are leveraging these and other Cloud-based technologies – including components of an MSOR - to enable real-time visibility and synchronization with their outsourcing partners, enhancing both collaboration capabilities and overall performance.

7 | Machine Learning

Humankind has been fascinated with (and a little fearful of) machines that could learn without human intervention since Isaac Asimov introduced his three laws of robotics in 1942. Fast-forward to 2018, and many are starting to see how machine learning can improve manufacturing operations at a time when resources, including qualified, trained people, are in limited supply.

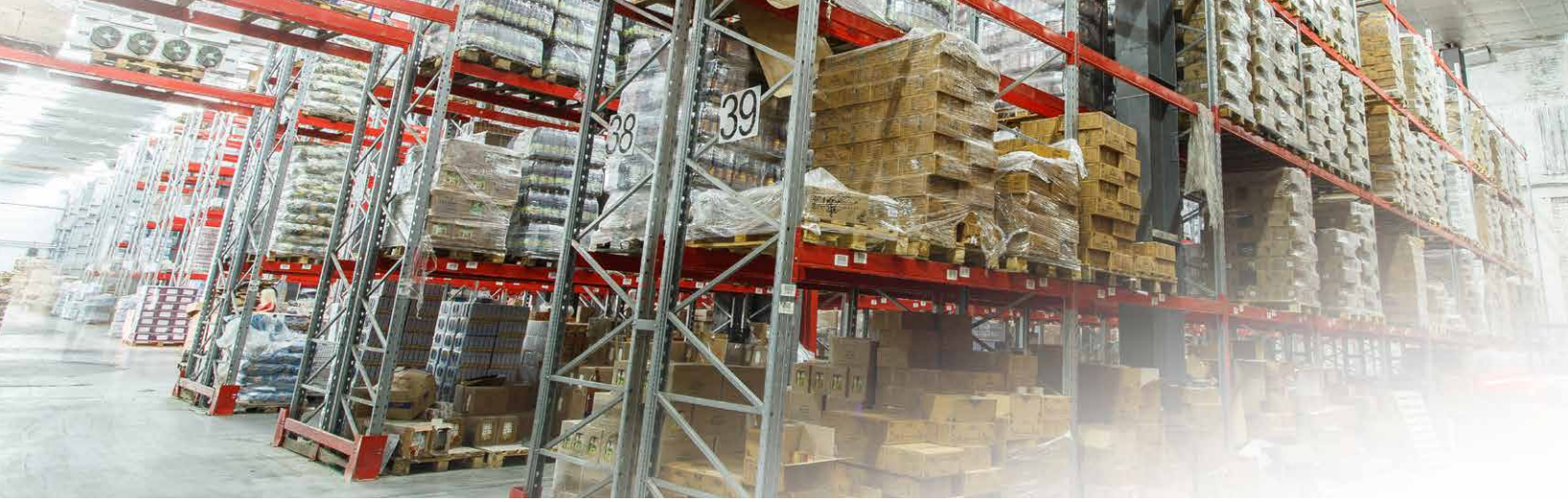
In our context, we associate machine learning with the ability to anticipate or pre-empt events. Let's say, for example, you are looking to reduce downtime and increase throughput. Investing in newer equipment is one way to do that, but the capital expense is out of reach for your organization right now. Your only option is to get the most you can from your current equipment and to do everything you can to avoid a breakdown.

Your maintenance team has a regular maintenance schedule for the most-used equipment or resources that are the least reliable, but that team is under its own time constraints with the manager retiring. Despite your best efforts to hire replacement talent, it's hard to find someone with his level of experience.

22% of skilled manufacturing workers will be retiring over the next decade.

(Deloitte/The Manufacturing Institute, The skills gap in US manufacturing.)

Modern Demand-Driven Manufacturers know real-time data from the shop floor is a prerequisite to solving this challenge. Through synchronization and visualization technology, they instantly know which equipment is acting up and can quickly dispatch maintenance to repair the equipment, limiting the amount of downtime. Machine learning takes that a step further. By tracking contextual data such as temperature, humidity, run rate, length of run, etc., the system can analyze what conditions most commonly lead to a malfunction and trigger an order for preventative maintenance, further reducing downtime incidents.



8 | Digital, Demand-Driven Supply Chain

Like Demand-Driven Manufacturing, the Digital Demand-Driven Supply Chain synchronizes everything to actual orders/consumption (i.e., demand) at every level on the chain. The goal of the Digital Demand-Driven Supply Chain 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.

In our 2017 Top Ten Trends Report, we talked a lot about supply chain collaboration and visibility – and the fact that these initiatives go hand-in-hand with manufacturing digitization. Clearly the most efficient and affordable means of implementing and scaling a Digital Demand-Driven Supply Chain strategy (that includes collaboration and visibility initiatives) is through Cloud-based technologies. Yet, in The Economist Intelligence Unit report, Ascending Cloud – *The Adoption of Cloud Computing in Five Industries* (2016), researchers found that Cloud adoption in the manufacturing sector is lagging behind the more readily digitized industries of banking and retail. This is attributed to the challenges of digitizing manufacturing. The same report, however, predicts a rapid expansion of Cloud penetration in manufacturing across the globe – with over 90% of survey respondents indicating that the Cloud will play a significant role within three years. This speaks to the current strength of the manufacturing industry and the rapid need to digitize to address demand, reduce cost, and scale to connect with a global network of suppliers.

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The benefits of cloud computing, such as lowering capital expenses, reducing maintenance, reducing security risks, etc., certainly appeal to manufacturers as much as business leaders in other industries. But, we believe the benefit that will bring the manufacturing industry into the fold is visibility – throughout the enterprise and across the supply chain. The technologies that provide this level of visibility are here today and are compelling forward-thinking manufacturers to leave their more earthbound peers behind and move to the Cloud.

RELATED RESOURCE: ***White Paper:*** ***The Demand-Driven Supply Chain***

9 | Robotic and Human Interaction

Robots have been a valuable manufacturing tool for years. They can do repetitive and dangerous work that put humans at risk. But the model of the robot behind a cage or partition designed to reduce interaction between humans and robots may be changing. Researchers at Berkeley are looking at a future where humans and robots will work side by side to accomplish more in less time. The challenge is that these two colleagues (human and robot) have decidedly different personalities and work styles.

Today's robots are best at working in structured environments, whereas even the most structure-loving humans appear random by comparison.

Advanced robot and human interaction (HRI) could provide the answer to the people resource challenge that plagues manufacturers today. According to the Manufacturing Institute, there will be a projected shortfall of 2 million skilled workers in manufacturing over the next decade. Another change to the manufacturing labor landscape will be the demand for workers with skills to program their robotic partners. HR professionals around the world might want to start revising their hiring profiles to include individuals who work well with robots.

10 | Supply Chain Responsiveness

Even manufacturers who do a great job managing operations within their four walls can struggle with their supply chain. There are too many variables outside of their direct control. Customers are unpredictable – they want what they want when they want it. Forecasting short-term demand can be practically futile in industries with high variability. This sentiment correlates with Gartner research which found "Developing a more responsive supply chain" was the top challenge supply chain leaders wanted to address over the next year.[5] On the other end of the supply chain, suppliers would like to be responsive to unforeseen changes in demand, but they have their own issues to contend with.

Modern Demand-Driven Manufacturing is changing that paradigm and allowing manufacturers to improve supply chain responsiveness for lower lead times and higher service levels. That's because modern Demand-Driven Manufacturing is first and foremost built on responsiveness to the customer. When new orders come in or there is a change to a current order, production schedules are automatically adjusted in real-time, applying constraints management principles to drive flow and synchronize resources to the new schedule. Other technologies like eKanban synchronize inventory replenishment to actual demand, keeping raw material and work-in-process (WIP) inventories from the over-inflation that happens so often in manufacturing.

Last year, the top three supply chain-related challenges we heard from manufacturers were:

1. Stock outs disrupting production
2. Variability in demand
3. Frequent expediting

We helped address these concerns and more for an aerospace and defense manufacturer who wanted to reduce the amount of on hand inventory, simplify their replenishment processes and gain real-time visibility into the status of replenishment and material expirations. They also had expeditors running from one end to another of their 650,000-square foot facility. Through a system of record, we helped them consolidate 16 different material ordering methods into 1 where they are able to respond in real-time to demand variability (providing needed relief to their expeditors), significantly reduce scrap due to material expirations and eliminate downtime on the assembly line associated with waiting for materials.

Modern Demand-Driven Manufacturing technologies are easily extended to suppliers. For example, Supplier eKanbans can send replenishment signals directly to vendors for raw materials or component parts. Cloud-based demand-driven tools also provide real-time visibility into the supply chain and enhanced collaboration capabilities for both supplier and manufacturer.

RELATED RESOURCE: ***White Paper: E2E Supply Chain Visibility Technology is Here***

It's never too late

The year may have just begun, or it may be half over by the time you read this. Either way, it's never too late to prepare your organization for a better future. By synchronizing resources to demand, modern Demand-Driven Manufacturing technology can help you reach your most important KPIs, such as reducing lead times and lowering inventory levels.

To learn more, visit us at our website www.synchrono.com or reach out to us at info@synchrono.com, +1 651-228-1772.

[1] Custom manufacturers include engineer-to-Order (ETO), make-to-order (MTO), build-to-order (BTO), make-to-stock (MTS) and hybrid environments.

[2] Manufacturing System of Record (MSOR). In the context and examples provided in this report, a MSOR is comprised of components and capabilities such as those provided in the Synchrono® Demand-Driven Manufacturing Platform.

[3] Key Factors to Consider for Manufacturing Outsourcing, Gartner, 2017.

[4] Outsourcing Manufacturing: Visibility and Collaboration are the Keys to a Successful Partnership, Peerless Research Group and Supply Chain Management Review, 2016.

[5] Gartner, Inc., 2016.

Manufacturing System of Record (MSOR)
In the context and examples provided in this report, MSOR capabilities are enabled through components of the Synchrono® Demand-Driven Manufacturing Platform.

About Synchrono®
The Synchrono Demand-Driven Manufacturing Platform digitizes, synchronizes, and visualizes the enterprise and extended supply chain, bringing the Internet of Things to life. Combining end-to-end planning, scheduling and execution with automated inventory replenishment, manufacturing operations, self-service visualizations and more, Synchrono synchronizes people, processes, machines, materials and data orchestrating flow and enabling real-time visibility.

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