

FAQs

Demand-Driven Manufacturing

1. What is Demand-Driven Manufacturing?

Demand-driven manufacturing enables a synchronized, closed loop 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 are **synchronization** and **flow**.

Demand-driven is associated with “Pull” manufacturing and supply chain methods. The two main continuous improvement approaches that advocate the Demand/Pull method are Lean Manufacturing and Constraints Management.

Lean Manufacturing, Constraints Management and Six Sigma believe that managing variability is of vital importance to any continuous improvement effort. You will see elements of these methodologies throughout the [Synchrono Demand-Driven Manufacturing Platform](#).

2. What are some of the key differences between the Push and Pull manufacturing processes?

The contrast between Push and Pull-based systems starts at the planning phase. In traditional, Push-based MRP/ERP environments, a plan is developed and pushed through the system. The assumption for planning in a Push environment is that everything remains constant; the company has the capacity on hand, along with the inventory and decision support staff to execute the plan. And while seemingly proactive, the plan often becomes obsolete before it is executed as it cannot easily accommodate changes in market conditions or adjust to variations or disruptions inherent in manufacturing environments.

Pull-based systems are driven from a high-level perspective that focuses on capacity and material planning based on actual customer demand. The assumption for planning is that the design of the system is balanced according to the demands placed on the company.

So while Push-based systems are front-loaded in planning and rigid in execution, Pull-based systems focus on the execution of the customer order and are designed to be agile enough to respond quickly to changes in demand.

This chart highlights the distinctions between Push and Pull -based systems:

Push vs. Pull System Comparison	
Push-based Characteristics	Pull-based Characteristics
Anticipate demand	Fulfill demand
Planning-centric	Customer-centric
Difficult to adjust	Dynamic adjustments
Forecast driven	Consumption/replenishment-based
Inventory decoupled from demand	Inventory demand specific
High inventory	Low inventory
Rescheduling sends waves of adjustments	Real-time adjustments w/minimal disruption
Machine/capacity efficiency-based	Flow centric
MRP/ERP - APS	CONLOAD™ – constraints

More on this topic is available in the Synchrono white paper, [Gaining Control: Exploring Push vs. Pull Manufacturing.](#)

3. What are the primary benefits of demand-driven manufacturing?

The primary benefits of demand-driven manufacturing are threefold and are exponentially realized when the enterprise is synchronized through planning, scheduling and execution software that embodies the tools of Lean, Six Sigma and Constraints Management:

- The ability to align the process, people, machines and methods around the demand signal.
- The ability to gain visibility to constraints across the entire supply chain and leverage them accordingly.
- The increased ability to focus on flow through the disparate factory systems and create value via global efficiencies.

4. In what types of environments does demand-driven manufacturing work best?

Demand-driven principles can be used in nearly every environment because the focus is on flow through the factory. In make-to-stock (MTS) environments, a demand-driven manufacturing platform can drive immediate improvements by right-sizing inventory, increasing flow and throughput, and resources using a kanban system. These improvements can be extended across the entire supply chain. In a make-to-order (MTO), engineer-to-order (ETO), and configure-to-order environments (CTO), a demand-driven planning, scheduling and execution approach delivers

increased flow, throughput, on-time delivery and clarity throughout the manufacturing process and the extended supply chain.

In any environment, a demand-driven system will synchronize process, people, machine, and method. During execution, work released to the shop floor is in full alignment with constraint capability, minimizing work-in-process and driving flow. Order statuses (and any associated disruptions) are visible throughout the enterprise --to the production team, supply chain management, customer service, sales and leadership. Everyone is working from the same factual, real-time information.

To examine how planning, scheduling and execution look in a demand-driven environment, read our white paper, [The Next Generation of Planning and Scheduling Solutions](#). There are also several [case studies](#) available that illustrate how demand-driven manufacturing systems work in various environments.

5. What is a constraint and why are they important in demand-driven manufacturing?

The notion of a constraint is explained within the Theory of Constraints (TOC), a holistic management philosophy developed by Dr. Eliyahu M. Goldratt. It is based on the principle that complex systems exhibit inherent simplicity. That is, very complex systems - with thousands of people, parts and pieces of equipment - may have a very small number of variables (constraints) that inhibit the ability to generate more goal units (production throughput).

Because demand-driven manufacturing environments are more agile and adaptive, they are in a better position to manage and leverage constraints in the system. For example, in some environments, a particular machine or work cell may be a constraint. Demand-driven manufacturers know how many units the constraint can handle at a time and release work into the system accordingly. Doing so keeps flow at its peak throughout the production process, eliminating bottlenecks and aging WIP and inventory.

Demand-driven manufacturers use constraints to handle issues in localized, individual areas, smoothing the process and ensuring that they can ship out quality manufactured products to customers on-time.

6. What are some of the crucial key performance indicators (KPIs) that are monitored in a demand-driven manufacturing environment – and why?

The KPIs monitored in a demand-driven manufacturing environment track the demand signal through the entire organization. The results measured are those related to flow, velocity, throughput, and other measures of movement throughout the supply chain. These KPIs are often used to guide the organization to areas of focus for continuous improvement. Finally, the true key performance indicator for demand-driven manufacturers is on-time delivery.

High-performing delivery KPIs - coupled with customer satisfaction - open up additional business opportunities based on expanded capacity and enhanced resource utilization. To examine the KPIs met (and dramatic results realized) using demand-driven manufacturing systems, see [Synchrono case studies](#).

7. Are there other key metrics that change in a demand-driven manufacturing environment?

Factories change virtually all their metrics because previous measures were based on local efficiencies *and supply-optimized push philosophies*, not pull-based, demand-driven methods focused on *actual* customer orders. When a manufacturer synchronizes its processes to visibly follow the customer demand signal through the supply chain, the metrics drastically upend—for the benefit of the customer. These pull metrics are focused on three key items in a manufacturing company - throughput, investment and operating expenses.

An example of this would be resource and workforce utilization to measure capacity. The individual efficiencies of each resource by itself no longer matters. Recognizing that the resources are part of an interdependent system leads demand-driven manufacturers to realize that an individual resource's efficiency is only important in the context of its ability to support the throughput of the system as a whole. Yes, these organizations continue to measure the investment in their assets, but the true focus is not on the individual asset utilization, but now on the ways that the assets support order flow through each phase of production and how they align production to convergence points en route to the shipping dock.

Refer to the Demand-Driven Matters [blog](#) for more examples of metrics that change in a demand-driven environment.

8. Are there any best practices for transitioning from a traditional MRP/Push environment to Demand/Pull? (Phased approach or all in? Kanban as a first step?)

Many clients start where their low performance is most evident—wherever their current process damages the supply chain's ability to meet customer demand --both now and in the future. The old adage, “start where you are” holds true here.

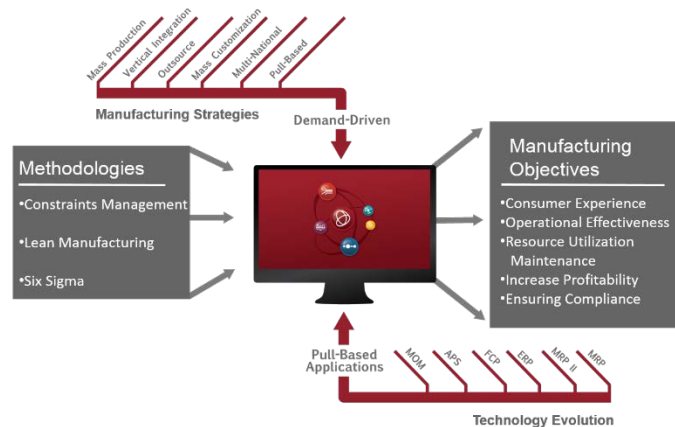
Synchrono experts can help guide you to a staged approach, for example, starting with an electronic kanban system ([SyncKanban](#)) to quickly address inventory replenishment issues. For many clients, the transition towards a demand-driven environment starts at the core - with a planning, scheduling and execution system ([SyncManufacturing](#)) that can be implemented without disrupting production. Whatever your environment, you can realize amazing benefits from instituting demand-driven practices in your factory. Deploying Synchrono technologies in support of these practices will accelerate your results.

9. How does a demand-driven manufacturing environment promote/support Continuous Improvement?

Demand-driven manufacturing systems that offer end-to-end visibility provide unprecedented clarity for change programs like continuous improvement. No matter where you are in your continuous improvement journey, when all production systems are connected, everyone works from a single version of the truth based on real-time data. This data is, in turn, transformed into actionable information upon which to build solid change management policies to empower the people working within the supply chain. They have visibility and clarity to make adjustments in real-time; proactively based on predictive analysis gleaned from the system; and to track their results for true, continuous improvement.

10. How are the principles of Lean, Theory of Constraints (TOC) and Six Sigma included within demand-driven manufacturing?

Demand-driven manufacturing uses the principles of Lean, Six Sigma and TOC to maximize flow throughout the factory. The continuous improvement veteran knows which tools from each discipline to use at different phases of the transformation and how to overcome the multitude of obstacles that block the way of progress.



When employing TOC, Lean and Six Sigma to become more demand-driven, manufacturers should first use the tools of TOC to understand the system as a whole, with the dependencies, convergence points, and constraints. The constraints should be treated as the sacred resources that are the leverage points to turn up production when demand is high and throttle it back when demand rescinds. They are then enabled to look at the next level and understand their product flow through value stream mapping to identify the waste that obstructs flow. The tools of Lean are exceptional at fast and directed improvements, while TOC is exceptional at telling us where to take aim with our Lean tools. Finally,

when we need to really understand the capabilities and variation of a process, along with the correlation and causality leading to our issues, there is no finer tool set than that provided by Six Sigma.

Of course, on the continuous improvement path, you will often find yourself using these tools at the same time, depending on what opportunities you uncover. However, you need a certain level of detail and visible, valuable data to solve production problems. Using TOC first; Lean second; and Six Sigma third helps you tackle the big issues first and then work on new issues as they arise while managing additionally complex problems as well. As you move up this scale of issues, you will increasingly impact the entire organization rather than simply solving local efficiency problems to maximize specific processes. You can read more about this in the Demand-Driven Matters [blog](#).

11. How can I use my current ERP system to become more demand-driven?

Implementing a demand-driven manufacturing platform draws out value from your existing systems (including ERP) because it leverages the information from ERP and utilizes it in providing the demand-driven information you need to run manufacturing plant and extended supply chain. You are able to schedule, plan and execute in real-time, based on real demand.

When using a synchronized platform such as [SyncManufacturing](#), you can realize more functionality across every supply chain activity. You achieve end-to-end connectivity, and, when integrating with ERP, experience much more collaboration across ERP-modules from Finance, Customer Service, Sales and other business “silos.” Resource management and allocation—in machines, manpower, methods – are under a tighter rein and linked to customer demand, not forecasts. Each person who needs either ERP or platform information now has a holistic view that includes what is actually happening with customer orders.

Lean Manufacturing

In Lean manufacturing, the flow of production is accomplished by eliminating *mura* (unevenness), also known as production leveling. Pull is accomplished by the use of Kanban in concert with a scheduling process like [CONLOAD™](#), Heijunka (sequencing or smoothing), ConWip, or Polka. Lean philosophy believes that using resources for anything but creating value for the end customer is wasteful, and should be eliminated. In a demand-driven factory, pull-based systems provide less waste and allow the organization to move quickly to eliminate the normal flow challenges as well as preempt challenges uncovered by end-to-end visibility.

Theory of Constraints (TOC)

A holistic management philosophy developed by Dr. Eliyahu M. Goldratt that is based on the principle that complex systems exhibit inherent simplicity, i.e., even a very complex system made up of thousands of people and pieces of equipment can have at any given time only a very, very small number of variables – perhaps only one (known as a constraint) – that actually limits the system's ability to generate more goal units.*

Six Sigma

Six Sigma is an improvement methodology used to reduce errors, waste and variations, and increase quality and efficiency in manufacturing. Six Sigma-driven companies use data to examine, manage, and enhance operational performance by eliminating and preventing flaws in goods and related processes, such as design, management, production, consumer satisfaction and service delivery.

*TOCICO Dictionary 2nd Edition

12. Why is Demand-Driven Manufacturing closely coupled with concepts like the Internet of Things, the Factory of the Future and Industry 4.0?

The terms, *The Internet of Things*, *Factory of the Future* and *Industry 4.0* describe particular elements of what has become known as the Demand-Driven Manufacturing enterprise.

- The Internet of Things, and, more specifically, the Industrial Internet of Things (IIoT) refers to the connectivity of processes along the supply chain via machines, products and systems that are now technologically enabled to send signals about their status. This term is associated with Demand-Driven Manufacturing because synchronized technology systems deliver more information to the business—and give manufacturers visibility into each node of their supply network. The IIoT enables the Demand-Driven Manufacturing vision and creates “a single version of the truth” about what is happening in the factory.
- The Factory of the Future (FoF) describes a visible, clear and connected factory system where everyone works together to contribute to maximized processes that meet customer needs.
 - Supply chain professionals, no matter where they are in the organization, have increased visibility to where product orders are in the process—and their efforts and activities are aligned around flow and in delivering orders on time. They use software and systems that emphasize dynamic data displays to support decision making, increased usability and empower every employee with information that drives flow and real-time information visualization at every point in the supply chain. Demand-Driven Manufacturing software technology is a key (perhaps the central) component in the Factory of the Future because it contributes to the effectiveness of the people, processes, machines and methods involved.
- Industry 4.0 is essentially the same thing as the FoF, but often refers to entire industries consisting of these factories. Industry 4.0 also describes industries where the workforce is empowered by advanced technologies, allowing them to meet customer needs as well as form relationships and partnerships with every organization in their supply chain.

13. How can I start becoming more demand-driven and what do I need to succeed as a demand-driven manufacturer?

You need a trusted technology partner to enable your demand-driven manufacturing efforts. Experts agree that Lean, Six Sigma and Theory of Constraints can make you more demand-driven on their own as manual improvement efforts; however they insist that technology is the driving factor in demand-driven manufacturing success.

Your supply chain probably employs several activities that focus on customer demand—however, paper-based processes are not available in real-time to everyone; spreadsheets need to be updated and disseminated—there is always a lag time. These processes are time-consuming and wasteful.

Demand-driven manufacturing empowered with synchronized systems cuts through this waste and delivers clarity and actionable information based on flow; allows you to control variability; and gain

a more fluid, transparent environment through real-time access to information across your operations and extended supply chain.

Demand-driven manufacturers make instant, informed decisions that improve flow at every stage of the manufacturing process – and get everyone on the same page with clear priorities. On-time delivery, improved predictability and greater overall performance will follow.

[Synchrono experts](#) can help you explore our [Demand-Driven Manufacturing Platform](#) solutions and guide you in deciding where to start on your demand-driven Manufacturing journey.

14. Where can I get more information on demand-driven manufacturing?

Contact us at Synchrono.com or download one of our demand-driven manufacturing [white papers](#). We also have a Demand Driven Matters [blog](#) where our experts discuss various aspects of demand-driven change and how to practically address them.

Also reference the [case studies](#) on the Synchrono website to see how real customers have attained true demand-driven transformation using the Synchrono platform.