synchrono®
manufacturing software

Gaining Clarity:
Drive Productivity, Flow and
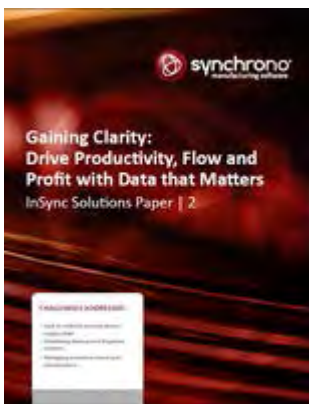# Profit with Data that Matters

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CHALLENGES ADDRESSED:

– Lack of visibility into the entire
  supply chain
_ Combining manual and disparate
  systems
– Managing inventory waste and
  obsolescence

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The Manufacturing Imperative: Enabling Greater Productivity Through Instant Insight

Manufacturers are under pressure to deliver high-quality products and services more quickly than ever before. To achieve velocity and gain competitive advantage, manufacturers need to better communicate and collaborate with the many individuals and organizations that make up the supply chain. Globalization of manufacturers' supply chains means that they have to work with suppliers across multiple languages, time zones, and currencies, while also working leaner and faster to deliver their products.

In addition to potential international barriers, there are also technical challenges in trying to gain real-time visibility into the supply chain. Manufacturers find themselves forced to integrate disparate systems, some of which are legacy or inherited through mergers or acquisitions.

"To address globalization challenges, advanced organizations are exploring the advantages of connecting people to the information they need in order to control assets and supply chain processes in real time," says Enrique Andaluz, Microsoft's industry solution manager, worldwide discrete manufacturing. Achieving success through better connectivity to a sensor-enabled supply chain also means that the amount of information collected today has grown exponentially. However, the extreme amount of data growth has not led to a parallel growth in actionable information.

The first white paper in this series, Gaining Control: Exploring Push v Pull Manufacturing covered the nature of Push- and Pull-based systems and, more specifically, manual and eKanban systems within a Pull environment. We explored environments that range from planning-centric push of inventory and data for execution to a customer-centric pull of inventory and data. We discussed both the manual and eKanban approaches, and how these pull techniques bring control to the planning and execution process in lean manufacturing supply chains.

In this paper, we continue our inquiry into the challenges of control, clarity, confidence, and competitive advantage in the complex discrete manufacturing industry. We will explore Pull-based/Kanban systems from a management perspective, while detailing the benefits of a more predictable environment with the decision-making power gained through deeper access to real time data and analytics.

Characteristics of Push-Based vs. Pull-Based Systems

Push-Based Systems	Pull-Based Systems
Anticipate demand	Fulfill demand
Planning-centric	Customer-centric
Rigid	Flexible
Machine efficiency-based	Consumption/replenishment-based
Relies on up-front planning	Relies on real-time data
Upstream-focused	Downstream-focused
Excess inventory is common	Little chance of excess inventory

The complexity of the discrete manufacturing environment

The objective of a lean manufacturing environment is to implement a streamlined, demand-driven manufacturing system so that the processes and the data align with the demand.

Globalization and resulting complexity in the supply chain are generating a crisis in clarity for manufacturing businesses. Executives who want complete visibility into the supply chain are demanding greater levels of support from their information technology (IT) departments.

The overwhelming amount of data in and out of systems must be sifted through and monitored. In an unchanging environment the hum is tolerable, but the "system noise" generated when the level of activity in an information system changes can be exceedingly loud. In environments where such changes frequently occur, management is pulled into the process and forced to operate in a reactive, rather than proactive manner. The compounding issues can quickly eat up more resources as organizations react to change and also try to manage the noise that percolates up to the management level. This noise then induces management to stop working "on" the system (their primary responsibility), and force managers to firefight and be pulled into working "in" the system. In short, this costs the business dearly in terms of efficiency of the system and productivity of the management team.
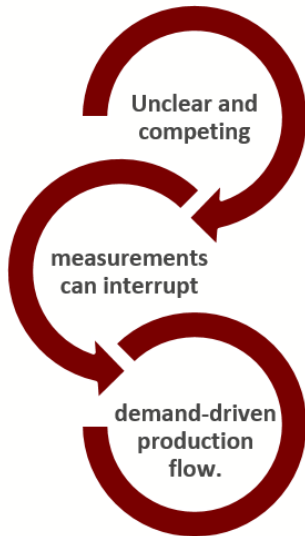
The objective of a lean manufacturing environment is to reduce the chaos (quiet the noise level) by implementing a streamlined, demand-driven manufacturing system so that the processes and the data align with the actual, not anticipated, demand. Simplified and streamlined accounting and production systems will provide clear priorities throughout the supply chain and provide clear cost information that allows profitability and areas of improvement to be quickly assessed. The number of exceptions will be minimized and understanding between normal and exceptional variability will be enhanced. Most important, managers will no longer be inundated with data after the fact, but instead will have real time information upon which to base their decisions.

Data Challenges Faced by Manufacturing: Management by Measurement

"Tell me how you measure me, and I will tell you how I'll behave. If my measurements are unclear, no one can predict how I will behave, not even me." Dr. Eli Goldratt

In the '90s, the quest for lean manufacturing drove discrete manufacturers to reassess the concept of "management by measurement." Manufacturers were facing quality issues, bloated inventories, long lead times, and poor customer service ratings. Executives, asked to look into the issue of why their metrics were not yielding the results they hoped for, found that line managers in their factories were oscillating between competing departmental metrics: Make the schedule? Maximize efficiency? Limit costs (overtime, expediting, etc.)? In the absence of strict operational objectives, confusion reigned supreme and the companies' poor profits and customer service ratings were at crisis levels.

Lean manufacturers also found that traditional managerial finance in ERP systems, including job costing, assigning earned labor, and cost center utilization—seen as the salvation of the modern supply chain—allowed for competing objectives and could not address the "Pull" driven process. The traditional job costing method of calculating operating costs not only allowed, but often drove the production floor to work on the wrong jobs.

Lean vs. Traditional Cost Accounting:

According to the Journal of Accountancy, a growing number of businesses are implementing lean accounting concepts to better capture the performance of their operations. Since standard cost accounting doesn't work in a lean operation, adherents propose a new way of looking at the numbers. Rather than categorizing costs by department, they organize them by value stream, which includes everything done to create value for a customer that the company can reasonably associate with a product or product line.

Lean accounting methods free companies such as Sonic Manufacturing and Technologies to make strategic decisions like lowering the equipment utilization rate more than its larger competitors might in order to emphasize speed, responsiveness, and on time delivery. This strategy is paying off in terms of larger revenues because customers overwhelmingly choose Sonic over their slower competitors.

"Factories of the Future: Building Fast Moving, Highly Automated Future Factories and Plants," Frost and Sullivan, page 7.
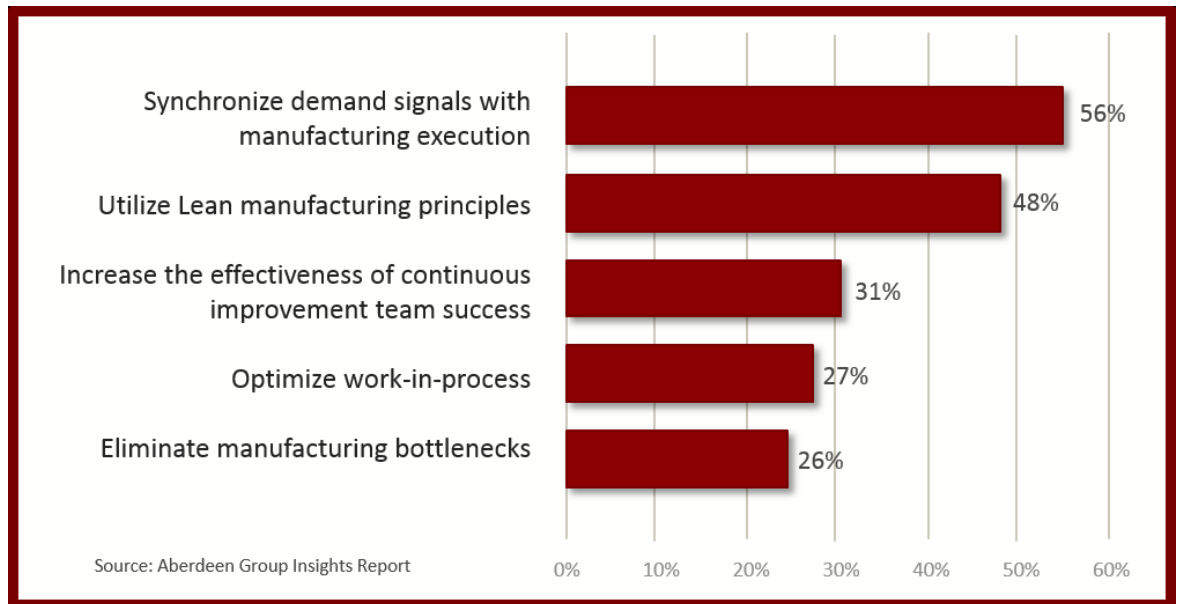
For example, to optimize the local production resources, a decision to better economize machine or work cell set up times, might appear to greatly improve local efficiency and reduce costs. Thus, if a work cell had three parts to be produced this week, parts A, B and C, the local set up optimization, being more efficient between parts A and C, might drive the production scheduler to alter the plan and produce the parts in the order ACB, even if the customer need was for the order ABC. This local decision would result in elevated work-in-process inventory levels on item C, increasing carrying costs and potential risk of obsolescence, and delaying a shipment on item B for the sake of set up efficiencies. This is just one of many instances of how unclear or competing measurements can interrupt the demand driven production flow.

Defining the best measurement system is not an easy task; this is particularly true if the goals compete between maximizing local optima versus global flow. Individual/local efficiency is easy if there are no dependencies in the system, but the moment there are convergent points or dependencies between resources, the resources need to focus on maximizing flow of the whole system and at times sub-optimize their work in order to meet the needs of the systemic flow. Said another way, some managers may think that keeping their employees occupied is the most efficient way to manage resources. From the point of view of keeping everyone as busy as possible, it is indeed efficient, but from a global flow standpoint, this is a flawed strategy.

Why Pull is Paramount - Focus on the Flow

According to the Aberdeen Group's report, Demand Driven Manufacturing: Synchronizing Demand with Production, 68% of Best-in-Class manufacturers have established executive sponsorship of demand-driven manufacturing initiatives. Without engagement from the top giving the clear edict that all priorities throughout the supply chain are Pull-based, the manufacturing systems will not succeed.

Resources need to focus on maximizing flow of the whole system and at times sub-optimize their work in order to meet the needs of the systemic flow.

Strategic Actions

Synchronize demand signals with manufacturing execution — 56%
Utilize Lean manufacturing principles — 48%
Increase the effectiveness of continuous improvement team success — 31%
Optimize work-in-process — 27%
Eliminate manufacturing bottlenecks — 26%

Source: Aberdeen Group Insights Report

68% of Best-in-Class manufacturers have established executive sponsorship of demand-driven manufacturing initiatives.

- Aberdeen Group

The lean manufacturing, Pull-based system starts with customer demand. To achieve demand-driven manufacturing, enterprises must focus on synchronizing demand with manufacturing execution. To accomplish this, two major sets of business processes must be improved: those defining the customer order process and those defining the material flow process. Focusing on the right metrics is important, and to improve these metrics, production schedules should be generated using real-time manufacturing data, bottleneck constraints, and actual consumption. Companies need tracking systems and metrics that help manage the risks associated with high levels of inventory and reduce carrying costs, while minimizing inventory obsolescence and spoilage.

In a 2012 report for the manufacturing leadership council, Frost and Sullivan state that the "to-order" production model will dominate the factories of the future. "There is a clear and powerful trend toward 'to-order' production models, whether assemble-, make-, or engineer-to-order: The percentage of manufacturers continuing to embrace build-to-stock production schemes continues to decline with only 13.3 percent embracing the traditional model as compared to 20.5 percent in 2011."

eKanban
The automation of the manual Kanban, Supermarket and K-Loop processes.

K-Loop™
The K-Loop is the replenishment model for a Kanban system. It determines how many Kanban Cards are in a process, where they are sourced from and how the demand signal will be communicated.

Supermarket
A grouping of K-Loops that provides immediate access to inventory (raw materials, subassemblies or finished products) at strategic points in the manufacturing process and extended supply chain.

eKanban moves the company from a forecast and inventory focused process, to a customer and consumption focused process.

Companies are organizing production networks close to demand rather than having a few large factories. They are adopting modular production platforms with customization of final products on demand and using pull production techniques to give them the needed operational flexibility.

As the research from the Aberdeen Insights report (page 18) has shown, manufacturers that have successfully optimized these key business processes have achieved demand-driven manufacturing and are enjoying, on average: 10% more on-time deliveries, 70% lower finished goods inventories, and 70% shorter lead times. This ability to produce on-demand helps to maintain existing throughput at lower cost or increase throughput and subsequent profits.

Benefits of a More Planned and Predictable Environment

The primary benefit of switching to the Pull-based process is the removal of noise and activity from the system that is represented by unsold inventory, or supply without actual demand, and the significant efforts taken by planning and execution resources to re-plan these activities. The result of all this continuous planning and re-planning is the creation of a negative reinforcing loop of activity within the planning and execution processes.

An effective eKanban system provides a great reduction in non-value added work in both planning and in execution. eKanban also moves the company from a forecast and inventory focused process, to a customer and consumption focused process. This change in approach allows a company to gain much better control of the planning and execution functions. Here are some of the specific benefits of the consumption-focused process.

Reduction in inventory, overtime, expediting costs, etc.

• No calling a vendor to pull up and push out current POs.
• No more re-dating work orders, printing, or re-displaying dispatching reports.
• No need to continually realign shop floor priorities.
• The end to empty threats with the vendor, and empty promises to your customer.

Better utilization of labor

• Reduce the countless emails, phone calls, and status meetings to determine where this is or where that is.

• Reduce the number of escalation meetings with the division GM.

• Keep the very important customer happy even when they expect you to jump through hoops.

Ability to improve supplier partnerships, processes and technology

• Spend much less activity administering purchase orders and the replenishment cycle.

• Dependence on fewer vendors.

• Calls to the vendor are constructive, not placating, pleading, begging, or yelling.

Reallocation of resources to higher value projects

In the realm of things to do, there is that list of projects and fixes that are the things you do, "When you get around to it." These Round Tuit items can be valuable when you actually have time to take on new tasks, as these are the items that can put the business on a different trajectory rather than just maintaining the status quo. All the time you spend constantly realigning activities and reacting to noise in the system could be re-directed to systematically and proactively focus on Round Tuit work such as improving the long term effectiveness of your operation and meeting the organizational goals.

What would you do if you had more Round Tuit time? Look into vendor performance? Closely monitor trends? Run Kaizen Events? Work on the Value Stream Map "To Be" configuration? Conduct cross training on critical processes? Work on the ROI for the machining process that would allow your company to compete in new markets?

In manufacturing, it is often hard to see the forest through the trees. There are numerous activities that can distract even the most ardent managers. The effort of moving from working "in the business" to working "on the business" may be seen as a leap of faith if you have never had that luxury, but it can make a big difference to productivity and profitability.

Gain time to manage "getting around to it" initiatives

How to Enable a More Effective and Predictable Pull/Kanban Environment.

A good eKanban system will automatically realign to the demand based upon what is actually taking place.

Many of us earned our stripes in manufacturing in the "whack-a-mole" problem-solving mode we utilized when we were on the line or serving as first-level supervisors. We became familiar with the latest problem resolution process, including how to gain support in our efforts to eliminate the recurring problems. We learned how to report progress to senior management, and to build consensus with our supply chain and procurement peers to accomplish improved performance.

While all this type of activity had its place, it is mostly busy work that adds little value to the long-term performance of the organization. Fortunately, this type of activity is greatly reduced when you switch to eKanban, because the eKanban system only requires action when there is an exception. If enabled to do so, a good eKanban system will automatically realign to the demand based upon what is actually taking place. And as mentioned in the previous section, this change in perspective gives something very precious back to management: the ability to work on the business instead of just in the business. Of all the resources given to a manager, the gift of time can prove the most beneficial.

So how do we best gain clarity when working in a Pull-based/eKanban system? Here are a few suggestions.

1. Take the variability out of the environment using electronic polka-yoke (error-proof) processes.

With more to track and a higher rate of change, companies are looking to automate the manual systems they have in place and reduce the risks of the manual "gotchas" like missed or latent signals, lost cards, and misalignment between demand and supply. Although real-time visibility is high with cards and floor tape queuing areas, it only takes one lost card or misplaced pallet to thwart the whole system.

2. Don't hide problems under buffers of materials, equipment, tools, and people.

Instead, systematically remove these buffers on an iterative process of reducing the buffers, identifying the issues, eliminating the issues and then repeat. As the buffers go down, cycle times will decrease, lead times will decrease, costs will decrease and most importantly, profits will increase.

3. Set up automatic replenishment signals.

When the system receives a Kanban replenishment signal, the appropriate supplier or work cell is automatically notified of the quantity, time, and destination. This is one of the hallmarks of an effective Pull-based system.

4. Let the data dictate.

The objective is to discover and mine the value in the data to actively monitor variations in demand and automatically resize and adjust inventory levels and K-Loop™ sizes across your organization.

5. Extend visibility throughout the supply chain for increased clarity.

A supplier portal can offer your suppliers extraordinary visibility so you can proactively coordinate orders and automate re-orders for more efficient supply chain management.

By taking these steps and others suggested in the Synchrono white paper series, you will not only help your manufacturing organization gain clarity, but also control, confidence, and competitive advantage.   Most important, you will be embarking on a continuous improvement process that has enormous short- and long-term benefits.

Insight and Inventory Improvement from an eKanban Implementation: Dynisco Plastics

Dynisco Plastics is a leader in plastics extrusion processing and the manufacturer of Vertex™, an innovative mercury-free pressure sensor. By applying design for manufacturing and assembly (DFMA) best practices, Dynisco was able to simplify new product designs, better understand related cost drivers, and standardize while maintaining flexibility. This in turn supported more strategic supplier management.

However, upon addressing lead times and process and quality issues, inventory management surfaced as a bottleneck.

The Synchrono eKanban platform proved an ideal fit for the complexity and variability of the Dynisco portfolio. Using Synchrono SyncKanban software, Dynisco scaled the Kanban process to include nearly 800 SKUs for products built across multiple facilities and geographies. Upgrading to SyncKanban streamlined the manual Kanban process from 66 to 6 steps that reported accurate inventory and supplier data in real time.

SyncKanban provided forecasting insight crucial to improving cost management and easily integrated into the company's existing ERP system. The tool also provided the data required to support greater strategic oversight of supplier relationships. The implications of this approach for factory performance are impressive. At one site alone:

- Inventory was reduced 51%
- Nearly 94% of materials are now on eKanban
- Inventory turns have improved from 9.6 to 17.8 (91%)
- Inventory reduction cost savings of 50%

Dynisco's Lean efforts have led to dramatic improvements in performance and the bottom line. Over 12 months of implementation, right-sizing inventory alone has saved more than $985K in inventory costs.

Summary

Discrete manufacturing environments can be complex and confusing, especially when dealing with disparate Push-based systems. The new manufacturing imperative is to overcome this confusion and gain greater productivity with instant insight. Much time and effort is wasted on problem resolution that can be obviated if better systems are in place.

Implementing an eKanban/Pull-based system that provides clarity "from the shop floor to the top floor" is the key to overcoming these challenges, but smart manufacturers know that clarity is more than just the ability to quickly react to issues. Visibility is both a view into the current status as well as the ability to look ahead and anticipate issues so that you can fix them before they become painful.

Takeaways:

1. There are large advantages to Pull-based eKanban systems.

2. Focusing on the right metrics is critical.

3. eKanban focuses on throughput and flow, with a resulting reduction in costs and inventory.

The ability to gain clarity through an effective eKanban system has profound benefits that will lead to greater productivity and profitability, including:

• Better communication throughout the supply chain means better relationships with suppliers and customers.
• Automated replenishment signals increase efficiency and eliminate accidental manual entry errors.
• The ability to instantly respond to changes in demand means that you can maintain minimal and optimal inventories, reducing obsolescence and improving cash flow.
• The data can dictate—as discussed earlier in this paper, you want to be able to monitor and mine the data to actively track variations in demand and automatically resize and adjust inventory levels and K-Loop sizes.

About Synchrono and the Authors

Synchrono® LLC is a leading provider of demand-driven manufacturing software and services that simplify complex manufacturing environments and transform business results. The company's planning, scheduling and execution system and eKanban inventory replenishment software are powerful on their own, and when combined with manufacturing operations capabilities under the Synchrono Demand Management Platform, clients gain a real-time graphical window into their 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 Management Platform displays data in real-time through dashboards that can be positioned around the plant to signal alerts, escalations, action plans and more for complete transparency.

Synchrono helps clients manage constraints, improve flow, drive on-time delivery and maintain a competitive edge. Look to Synchrono for software that meets your demand. Sync with us at www.synchrono.com.

About SyncKanban

SyncKanban software from Synchrono keeps instantaneous supply chain signals moving through your organization at lightning speed. This automated, Pull-based inventory replenishment system sends signals to suppliers to deliver materials, helping to reduce the costs and waste associated with excess inventory and replenishment process administration. For many, that means up to a 50% reduction in inventories, on-time production, improved cash flow and a distinct competitive advantage. See for yourself – try SyncKanban for free at www.synchrono.com.

John Maher

John Maher has more than 20 years of experience working in manufacturing environments and has been with Synchrono since the company's inception. John's subject matter expertise in ERP, MRP, APS, supply chain, manufacturing planning, and scheduling systems and constraints management drives continuous refinement of the company's Lean and constraints management-based software and services. John is responsible for providing strategic direction for the Synchrono product roadmap and oversees the technology and delivery functions within the organization.

John earned his BBA in production/operations management from University of Wisconsin, Whitewater, and an MBA from the University of Minnesota, Carlson School of Management. He has APICS CPIM certification in production and inventory management and Jonah certification in Theory of Constraints from the Goldratt Institute.

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