

Velocity Manufacturing

by:

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Stop focusing on efficiency and focus on velocity to reduce lead and queue times, and to increase lead-time predictability, on-time deliveries, quality and cash flow.

Over the past decade, the USA manufacturing base has weakened.¹ However, it is still true that, “no economic sector contributes more to creating prosperity than American manufacturing.”²

“To remain strong players in a competitive world will require continued focus on innovation and productivity gains helped along by government policies that will smooth the path to success.”³

The challenge will be for USA manufacturers to understand that the actions that created productivity gains in the past, may NOT do so in the future. The traditional focus on efficiency and associated measures are old technology and do not serve the kind of manufacturing that we do in the USA today.

The manufacturing that has moved overseas was built on the old school thinking that focuses on efficiency. Moving jobs overseas makes sense...

- When millions or billions of the same item are needed.
- When these items will be supplied for an extended period of time.
- When the manufacturing lead-times are relatively short (because the transportation lead-times are long). The combination of the two determines the amount of inventory that will need to be held.
- When holding inventory of the items makes sense.
- When little to no customization is needed.
- When the items are not generally needed in a rush for an emergency situation.

And those are the jobs that have gone overseas. Large, long runs of the same stuff with little to no customization can be cranked out very efficiently. And because the items will not be obsolete for a number of years, inventory can be held to deal with the long transportation lead-times.

A New Manufacturing Trend is Upon Us

The jobs that are remaining in the USA are the toughest most difficult jobs, which need to be delivered in the most difficult of situations. These include:

- Items for which design and/or prototype manufacturing quantities or small quantities are needed. And by the way, they need them yesterday.
- Items for which there is fluctuating demand or unknown demand and despite that, delivery is ex-

tremely important.

- Custom high-precision items that require the best and the brightest.
- Items that typically have long manufacturing lead-times and cannot afford long transportation lead-times as well.
- Items that are too expensive to hold enough inventory to allow overseas shipping, or too heavy.
- Emergency repair items or replacement parts that are needed with no notice.

This means that we have to move away from focusing on mass production efficiency to focusing on flow, or what I call *Velocity* in this custom job-shop environment.

Velocity Manufacturing is the Future of USA Manufacturing

Our lead-times are too long and our due date performance is typically much less than perfect for these kinds of jobs. Don't get me wrong, we are the best in the world at this. We just need to get better to sustain our manufacturing base.

If we can get a job done on time, in half the time and we only have a fraction of the transportation lead-time of our overseas competition, there's no reason to lose work to an overseas competitor.

And if you can get a job done on time, in half the time with the SAME transportation lead-time, there's no reason you can't take market share from your USA competitors.

You Want Shorter Lead-Time & Better Due Date Performance? It's All About the Scheduling

There's no question that scheduling in this type of custom job-shop environment has its challenges. As I said, we're dealing with the toughest most difficult jobs, which need to be delivered in the most difficult of situations.

Every time we encounter one of the many challenges, our schedule is out of date, and we need to update the schedule. Here are just a few of the common scheduling challenges that cause us to have to continually update the schedule:⁴

- 1 Clients change their minds, their forecasts are

wrong and they have emergencies.

- 2 Vendors aren't always reliable.
- 3 Mix can vary wildly, and so our constraint moves.
- 4 Employees do not always have the right skill and their discipline is lacking.
- 5 Processes are not reliable.
- 6 Machines and tools break.
- 7 Quality is not near perfect.
- 8 Data is not readily available, nor accurate, nor communicated.
- 9 Communication between silos is difficult.

But there is also no question that scheduling plays a big role in our on-time delivery performance and our lead-times. And our on-time delivery performance, along with our lead-times, determines our competitive position within our industry.

Industry Week magazine reports that its 25 finalists for the "Best Plants" award reported an average on-time delivery rate of 98.7%. And it's no surprise that on-time delivery is a critical aspect in achieving customer satisfaction, loyalty and greater sales.

But Custom Job Shops are NOT 98.7% On time

Custom job shops usually don't have the luxury of making the same items over and over again. The mix of work and amount of repair/emergency work a shop has can change so dramatically week to week that their bottlenecks can move, making on-time delivery a real challenge.

It is no wonder, NONE of the 25 finalists were custom job shops or machine shops. So unfortunately...

- 1 It's very difficult to schedule a custom job shop.
- 2 It's very important that we do it well to be 99%+ on-time and to reduce our lead-times.

That's probably NOT new news. And I'm sure you've tried a number of things to improve your on-time delivery and reduce your lead-times. You may have updated your ERP or scheduling software, or used some Lean⁵ techniques, or maybe you've hired an expeditor. But, whatever you've tried, my guess is that it may have helped some, but not substantially. And that's because the typical solutions address the various symptoms, but don't address the root cause. So now you might be thinking—okay, so how do we address the root cause, what's the secret? How can we dramatically improve our scheduling?

The Secret Is...

STOP focusing on efficiency. And when you are willing to do that, and put a better scheduling system in place, you create a buffer to better absorb all those sources

of variability (those nine challenges we talked about earlier, because we can't totally remove them).

I know it sounds like heresy, but that's the secret and that's the direction we need to go to increase our competitiveness. The days of mass production are long gone. The cool thing is that if you're willing to give it a try and your competitors continue to cling to efficiency—you can create an incredible competitive advantage.

What Does it Mean to be Efficient?

The definition from *Dictionary.com* is, "Performing or functioning in the best possible manner with the least waste of time and effort." And I'd probably add money/cost to that.

One of the ways we typically apply efficiency in a job shop is by keeping all equipment and people busy so that we don't waste any capacity and have highest possible utilization.⁶

Now to keep our key resources busy, they all have to have a job to work on. And to increase the likelihood that all resources have work, we typically make all jobs in house available to be worked on.

"Available to be worked on" means included in our work-in-process or WIP. This max's out your WIP and increases the pile of work at every work center. That way, ALL key resources have a very high probability of having something to work on. This is particularly relevant in job shops where the mix of work can change from week to week.

That's one of the things we do in the name of efficiency. Now let's discuss the negative effect from the actions that result from just this one thing we do in the name of efficiency.

The Negatives from "Being Efficient"

According to *Little's Law*, there is a direct correlation between the amount of work-in-process we have and our lead-time. The higher our WIP, the longer our lead-times. The illustration on the next page shows the relationship between WIP and lead-time. The more jobs that wait for their turn, the longer the average queuing time, leading to longer production lead times. Example 1 in the illustration has the most WIP and longest lead-time. And, conversely, Example 3 has the least WIP and the shortest lead-time. So as you increase WIP, you are also increasing your lead-time, not to mention the amount of cash you have tied up in raw materials.

But Wait, There's More: On-Time Delivery Decreases

The illustration does NOT include the effect of variability. However if it did, it would show that the variability of production lead-time is increased as the

queue grows.

So the effect of high WIP just gets more dramatic the more variability you have—the more you battle the nine challenges. This directly reduces the on-time delivery, because it is more difficult to predict the exact production lead-time and to confirm orders accordingly.

And... Quality Decreases

High WIP can also impact quality. Many production failures occur early in the routing, but are detected much later in the production process (usually at final inspection).

If WIP is high, the average lead-time is also high causing a long lag time between the production steps and the final inspection. That means that the final inspection step occurs a long time after the step that caused the failure.

And because so much time has passed, it can be difficult to determine and correct the root cause of the quality problem, making improvement very difficult. Thus, the higher the WIP, the harder it is to detect and correct quality problems. All of this brings me to the conclusion, that you must...

STOP Focusing on Efficiency

As you stop focusing on efficiency and reduce WIP (and focus on Velocity instead), queue time reduces, lead-time reduces, lead-time predictability increases, on-time delivery increases, quality increases and cash flow increases.

As a result of these improvements, your production lead-time becomes MUCH shorter (if you do it right) than your quoted lead-time. This difference can be used in two ways.

First, it creates a buffer allowing you to absorb a fair amount of variability and further enhance your on-time delivery performance. And second, the difference is so big that you can also afford to reduce the quoted lead-time to customers.

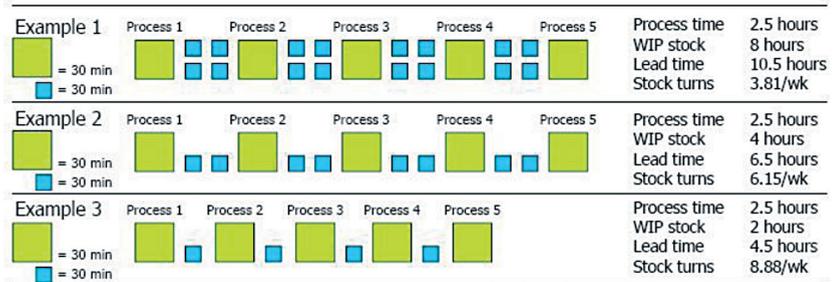
The combination of these things—a shorter quoted lead-time AND 99%+ due date performance creates that competitive advantage that will help you stay globally competitive as well as increase market share here at home.

That's Counter Intuitive!

Now, all of that is fairly easy to say and much harder to do. It's not physically hard to do, but mentally challenging because we don't have intuition around this approach.

To really help the concept stick and to fully explain how to focus on Velocity, I've put together a 47-minute

High WIP = Long Lead Time



Graph adapted from Incremental Improvements in Australia

The Theory of Constraints

Science of Business utilizes the Theory of Constraints (TOC), which is an overall philosophy developed by **Dr. Eliyahu M. Goldratt**. TOC is usually applied to running and improving an organization, and consists of Problem Solving and Management/Decision-Making Tools called the Thinking Processes (TP). TOC is applied to logically and systematically answer these three questions essential to any process of ongoing improvement:

“What to change?”

“To what to change?”

“How to cause the change?”

More specific uses of the Thinking Processes can be used to significantly enhance vital management skills such as win-win conflict resolution, effective communication, team building skills, delegation and empowerment. TOC can also have benefits in returning business to the USA that has been lost to overseas competitors.

TOC postulates that the goal is to make (more) money. It describes three avenues to this goal:

- Increase Throughput
- Reduce Inventory
- Reduce Operating Expense

To achieve the goal, there are also five Focusing Steps:

- 1 IDENTIFY the system's constraint.
- 2 Decide how to EXPLOIT the system's constraint.
- 3 SUBORDINATE everything else to the above decision.
- 4 ELEVATE the system's constraint.
- 5 WARNING: if in the previous step the constraint has been broken, go back to Step 1.

TOC is being used by thousands of corporations, and is taught in over 200 colleges, universities and business schools. Dr. Goldratt's books have sold over 4 million copies and have been translated into 23 languages.

Additional TOC topics include:

- Operations & Scheduling (Velocity Scheduling System)
- Finance & Measures (Throughput Accounting)
- Pricing
- Cash to Cash Cycle Time
- Cash Velocity
- Critical Chain Project Management (CCPM)
- Distribution & Supply Chain (Replenishment)
- TOC on Sales
- TOC on People Management
- TOC on Marketing (Mafia Offer)
- TOC on Strategic & Tactics
- Thinking Processes

For more on TOC, visit the website listed below.

www.ScienceofBusiness.com

webinar that explains the whole process—specifically HOW to do this. It’s called, *How to Get More Jobs Done Faster*, and you can sign up at the website listed below. There are two dates to choose from. This IS the future of manufacturing!

www.VelocitySchedulingSystem.com/webinar

WFTI

References:

- ¹ According to the National Manufacturing Strategy Act spear headed by Rep. Dan Lipinski and Sen. Sherrod Brown.
- ² *Securing America’s Future: The Case for a strong Manufacturing Base* by the National Association of Manufacturers in 2003.
- ³ *Manufacturing Resurgence: A Must for U. S. Prosperity* by Joel Popkin and Kathryn Kobe, January 2010.
- ⁴ Taken from *The 9 Challenges to Scheduling Your Job Shop and Why Your Schedule is Dead On Arrival*, available at www.VelocitySchedulingSystem.com/ebook.
- ⁵ According to an industry study, most machine shops rely on Lean to “improve”. But Lean Doesn’t Work for Many Shops. According to Taiichi Ohno (inventor of the Toyota Production System from which Lean is based), for Lean to improve on-time delivery, the processes, products and load must be stable for a “considerable length of time”. And while this is true in the car industry -- who only allow model changes once a year -- this is not the case in machine shops.

⁶ Some shops focus on keeping people busy, some on machines and some try to do both. It doesn’t really matter which you tend to do.

Author Profile:

“Dr. Lisa” Lang is President of **Science of Business**. She has worked with **Dr. Goldratt**, the father of Theory of Constraints and author of *The Goal*. Science of Business specializes in increasing profits of highly custom job shops by applying Theory of Constraints, Lean and Six Sigma to operations with Velocity Scheduling System and Project Velocity System and to marketing with Mafia Offers. Email Dr. Lisa at: DrLisa@ScienceofBusiness.com



Company Profile:

Science of Business is about maximizing profitability and offers Goldratt’s Theory of Constraints (TOC) consulting, speaking, books, training, assessments, videos and self learning programs. The Science of Business is a TOC consulting business specializing in the application of scientific principles to business. We help you maximize cash flow and profitability with science applied to your bottom-line. If you focus on what’s important and leverage your resources where they can have the largest impact, the results are quick and substantial.
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