

# Lean Thoughts

Inspired People

Robust Processes

Lean Operations

**November 15, 2004**

For all **Consortium** events – Contact Richard for more information.. For other events – contact directly

*Important Consortium Dates to add to your calendar*

The **Team Time** schedule has been established for the coming year. Team Time will start at 1:00pm at the host company. This will allow for folks to work with peers in the host site to collaborate, facilitate and implement ideas to advance the implementation of manufacturing excellence. **Participants should be prepared to work on the shop floor and come equipped with proper PPE.** The host site will advise 1 week in advance Team Time Projects. Part of the Team Time activity will include a plant tour.

- Reschedule Due, Team Time, **CTS Corp.** contact Bob Garces., [Bob.Garces@ac.ctscorp.com](mailto:Bob.Garces@ac.ctscorp.com)
- October 18-22, AME Annual Conference, Cincinnati.** contact [www.ame.org](http://www.ame.org) for details
- November 11, Team Time, Morrison Lamthe.** contact Tony Vita, [tvita@morrisonlamthe.com](mailto:tvita@morrisonlamthe.com)
- November 17, Director's Meeting, CTS Corporation.** contact Richard Kunst, [Richard.Kunst@Kromet.com](mailto:Richard.Kunst@Kromet.com)
- January 06, Team Time, Alumabrite Inc.,** contact Richard Kunst, [Bob.Krouse@Alumabrite.com](mailto:Bob.Krouse@Alumabrite.com)
- February 10, Team Time, Kromet International.** contact Richard Kunst, [Richard.Kunst@Kromet.com](mailto:Richard.Kunst@Kromet.com)



## Consortium Practitioner Circles

- o **Creating Cells and Flow Synchronization, Host Kraft, TBA** contact Hanif [hjivrage@kraft.com](mailto:hjivrage@kraft.com)
- o **Creating the Visual Factory host, Eaton Cutler-Hammer, Sept 09** contact, Joe Fisher [JoeRFisher@eaton.com](mailto:JoeRFisher@eaton.com)
- o **Effective Health & Safety host Alumabrite date TBA** contact Bob Krosue [Bob.Krouse@alumabrite.com](mailto:Bob.Krouse@alumabrite.com)
- o **5S+1 Implement, Enhance and Sustain host, Nestle Waters** contact Mariela Castano [mcastano@perriergroup.com](mailto:mcastano@perriergroup.com)
- o **First Time and Sustainable Quality host, CTS of Canada** contact Bob Garces [Bob.Garces@ac.ctscorp.com](mailto:Bob.Garces@ac.ctscorp.com)
- o **Advance Part Quality Planning (APQP) or new part introduction Host, Kromet International** , contact Richard Kunst [Richard.Kunst@Kromet.com](mailto:Richard.Kunst@Kromet.com)

## Poka Yoke - it's everywhere...

**Except in much of our day-to-day thinking?**

*Here's a few of the simple ones...*

1. The door-jam prevents the door from opening in the wrong direction,
  2. The hole in your bathroom sink or tub prevents it from running over,
  3. A door key has a flute - it can only go in one way,
  4. Newer toilets are designed to flush when the person steps away
  5. Hand dryers turn off after a certain amount of time to save energy,
  6. The newer cars turn on "running lights" in case you forget
  7. Some office drawer cabinets prevent you from opening more than one drawer at-a-time, for safety's sake
  8. Portable heaters turn-off when knocked over, to prevent fires
  9. The wire on your gas cap prevents its loss
  10. A floppy can only be inserted one way
- Now...** when you decide to do something, **if one step in your process is mistake-proofing - you're good.**

## Theory of Constraints

The Theory of Constraints is not recognised by all lean practitioners as being a lean tool. However, it complements the superb lean tool, Value Stream Mapping. The Theory of Constraints is based on the teachings of Eliyahu M Goldratt and was introduced in the book "The Goal" by Goldratt and Cox.

### **Bottlenecks and Constraint**

In a simple process , one of the machines will normally produce fewer parts per time period, than all the others. This machine is called the 'bottleneck'.

The middle machine is the bottleneck, as it can only produce twenty-one parts per hour.

If we now consider several separate production lines in the same facility, all simultaneously making components for one major assembly; each of these lines will also have a bottleneck. The true production rate of the factory will be based on the slowest machine in the slowest production line. This machine, the bottleneck of bottlenecks, is the *constraint* machine in the factory.

# Lean Thoughts

## Definitions

A **BOTTLENECK** operation is an operation, which **restricts** the output of a department, manufacturing cell or process. There can be several bottlenecks in a general factory.

A **CONSTRAINT** operation is the operation, which **limits** the output of the whole factory. There can only be one constraint operation in a factory.

**Bottleneck machines are the most important machines in the plant.** These are: -

- the machines that must have the highest priority for maintenance. If maintenance technicians are working on other machines in the plant and a bottleneck machine breaks down, they should move straight to it!
- the only machines where manufacturing engineers should develop new, more productive tooling and methods. To increase the throughput of other machines is a fallacy!
- where we should continually reduce the Set Up time to create more manufacturing time.
- where we need to put **strategic buffers** of material in front of them, to ensure that if any of the preceding operations break down, the bottleneck can still keep producing. (*Many people think of buffers as being a number of components, but in the Theory of Constraints, buffers refer to a period of time*).
- machines that should have 'bells and whistles' fixed to them! They should be painted in a different colour and have searchlights shining upon them, so that everybody in the plant understands their importance and notices them
- the machines on which our plant's success depends.

## Efficiency

The aim of running any line, cell or plant must be to keep the constraint and bottleneck machines running as effectively and as efficiently as possible. Unfortunately, a point not yet understood by many production managers is that **only** the efficiency of the bottleneck and constraint machines is critical

to their plant's performance and it is only these efficiencies that need to be monitored. Efforts to increase the productivity of the other machines are often wasted.

Increasing the production rate of the first machine from 26 to 28 parts per hour is a total waste as the bottleneck's rate is 21 parts / hour. Similarly, the bottleneck machine will only feed the last machine at the rate of 21 parts per hour – thus its efficiency will never be better than 25%.

This small example demonstrates the fallacy of believing that every machine can be efficient and that new plant and machinery can be justified on an efficiency level.

## Bottleneck Improvements

The five steps to improving productivity are: -

- 1. Identify the Constraint.**
- 2. Exploit the Constraint** – meaning off load any work that can be processed on another machine - effectively to create some additional capacity. Introduce TPM, set up reduction and other techniques to maximise the available capacity.
- 3. Subordinate to the system constraint** - suggests that all machines within the plant in our example operate at the rate of 21 parts per hour.
- 4. Elevate the Constraint to a new level of productivity.** Concentrate all production, manufacturing and maintenance resources and effort on this machine to increase its throughput rate from 21 parts an hour to even more!
- 5. Start again at step one!** By elevating the constraint to a new level of productivity we may have created a different bottleneck – so we need to address it.

## Schedule Adherence

Schedule Adherence is one of the most critical measures for a modern manufacturing facility.

Assuming that a good and achievable manufacturing schedule has been prepared and agreed by the team who are expected to achieve it, then 100% Schedule Adherence is achieved when all components have been completed on time and in the quantities required. Less than 100% Schedule Adherence leads to disappointed customers and production that would give greater than 100% Schedule Adherence is a waste.

# Lean Thoughts

Dear Richard,

**As you probably know, I try to walk through as many processes as I can because I learn something new on every walk. Recently I was walking through a manufacturing operation and found myself wondering about the principles of lean information management, in particular with regard to production control & fulfillment.**

The facility in question was typical in having a central brain – its computerized Materials Requirements Planning (MRP) system – telling each operation what to do next. It's what I call a cognitive system, in which all feedback goes into a central processor that thinks through the optimal next step for everyone, using complex algorithms.

But as is also typical, the instructions being sent by the central brain often seemed nonsensical to the managers and operators on the plant floor. When the system told them to make some item for which they lacked parts, they simply overrode the system and made some item for which they did have the parts. Needless to say, this further confused the central brain and at the time of my visit it appeared to me that there was an official scheduling system from the MRP and a real scheduling system conducted manually by managers on the shop floor. The results were not impressive. What could be done? Here are six principles:

**1. Simplify every process to minimize your need for information management.** For example, the simple act of moving activities from departments to a continuous flow layout – in which an item goes automatically from one step to the next – eliminates all of the information needed to tell each department and step what to do next. And compressing your value streams by relocating sequential process steps from across the world to across the aisle eliminates the need for a world of information.

**2. Make every step in your process capable and available.** Breakdowns, turnbacks, and materials shortages generate the need for managers to manage more information. Instead of automating this task, try to eliminate the need for it. (On another recent walk, I was given a full explanation of the information management systems in a logistics company. The management proudly explained that their system permits them to determine exactly where they have lost a package, in fact thousands every night. My question was, "Why do you keep losing packages? If you had a truly capable process you wouldn't need this expensive safety net. Even worse, the existence of the safety net removes the pressure to make your process capable. Think of your IT system as a different type of 'just-in-case' inventory.")

**3. Schedule each value stream from only one point.** Taking this simple step will make information management easier throughout your operation.

**4. Use reflexive production control upstream from the scheduling point.** Lean Thinkers call this approach "reflexive" because it is like your reflexes. When the

downstream process uses material, an automatic order is placed to replenish the same amount from the next upstream process. Like your reflexes when you put your finger on a hot stove, no thinking by a central brain is required.

**5. Send information in small batches.** Amazingly, many MRPs are still run on the weekend to produce a weekly schedule. And many sales and order management systems still work with weekly or even 10-day batches while many organizations seem to be moving toward overnight runs to produce a daily schedule. What managers really need to know is what to do in the next 15 minutes based on what happened in the last 15 minutes. Piling up information in a large inventory is as bad – maybe worse – than piling up large inventories of products.

**6. Make your information management transparent and intuitive.** Perhaps the saddest thing to see is good managers working furiously to override IT systems with opaque algorithms, making the situation even worse through their frantic efforts. Simple information management methods like kanban cards and webbased electronic kanban, plus simple heijunka algorithms, seem too simple to many managers. Yet they are intuitive. And anomalies quickly become obvious. Why spend enormous sums to keep yourself in the dark?

**I'm not naïve about getting the world to embrace lean information management.** We're not quite yet at the end of thinking that more information is always better and that if we just had all possible information, perfect algorithms, and lightening fast central processors, life would be easy. For example, despite 50 years of evidence that this isn't true, we are now embarking on a **new experiment with Radio Frequency Identification (RFID) in which every item in every process can be tracked individually.** The managers of a gigantic retailer that I recently visited — whose stores average four inventory turns per year, with no fixed storage positions for any item, multiple storage points for every item, and a high level of out-of-stocks — told me that an RFID tag on every carton will eliminate current "treasure hunts" and insure a high level of customer service. My question was, "Why do you need so much inventory with so many storage locations? If you have only one storage location for each item — on the shelf where the customer puts the item in the cart — and replenish every item every night from a central distribution facility serving many stores, the information you already gather from bar codes at customer check-out will tell you everything you need to know."

**My prediction is that as the amount of RFID information available overwhelms our ability as managers to figure out what to do with it** (even as our fundamental value-creating processes deteriorate), **many managers will finally realize that simple is best. In the meantime, smart Lean Thinkers can save themselves enormous sums and frustration by avoiding the latest IT wave and implement instead six simple principles of lean information management.** Best regards, Jim Womack, Founder LEI [www.lean.org](http://www.lean.org)