

Lean manufacturing

Does it merit your consideration?

Lean manufacturing makes manufacturers nimble; react quickly to changes in customer demand with minimum inventory. It helps create a lean supply chain by streamlining the business and production processes to significantly reduce cycle time, decrease inventories, lower costs, and increase customer service... Do you think it will work for your organisation? Find out...

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The scenery of many businesses or shopfloors may look different to many eyes, yet they look analogous in many ways to the lean mind. An auto component manufacturer was thinking about giving up the supply of a particular part because he was neither able to supply the demanded quantity nor make money out of it. The order was lucrative because it gave their forging business a huge tonnage and turnover, but it was on the machining side that they had problems. The machinery installed to machine the part was imbalanced in cycle times and their thinking did not address the best possible process. The design of the special purpose machine (SPM) installed was poor as it could not provide the torque and

thrust required for drilling. The parts were sent to different vendors for machining. The bronze bush was reamed after fitting into the part, and this operation destroyed the surface finish on the bush and reduced the depth of the oil retainer groove. The result was a struggle to meet the demand, thereby allowing compromises in quality. When you map the processes in discrete organisations, this is not an uncommon scene. When they were helped with some lean thinking, they realised that the price they were paid was fair, but they were really losing money in the following areas:

- *Over-production:* Their discrete manufacturing process with its imbalanced cycle times, production

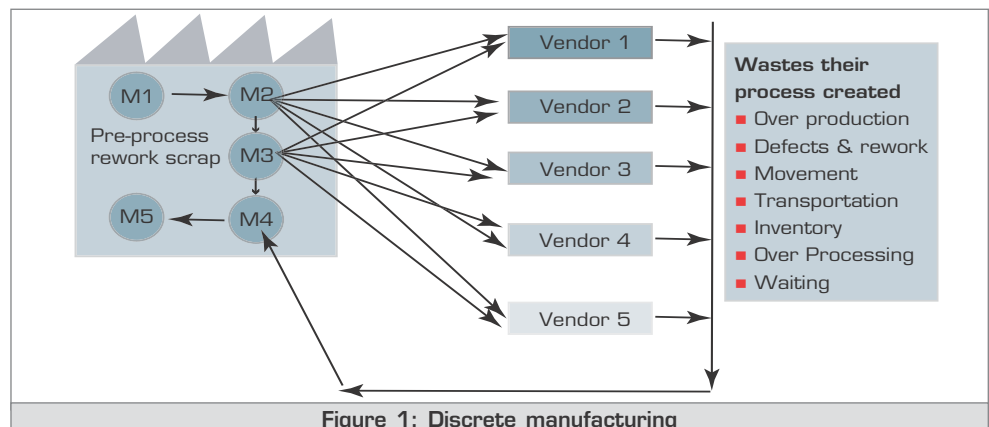


Figure 1: Discrete manufacturing

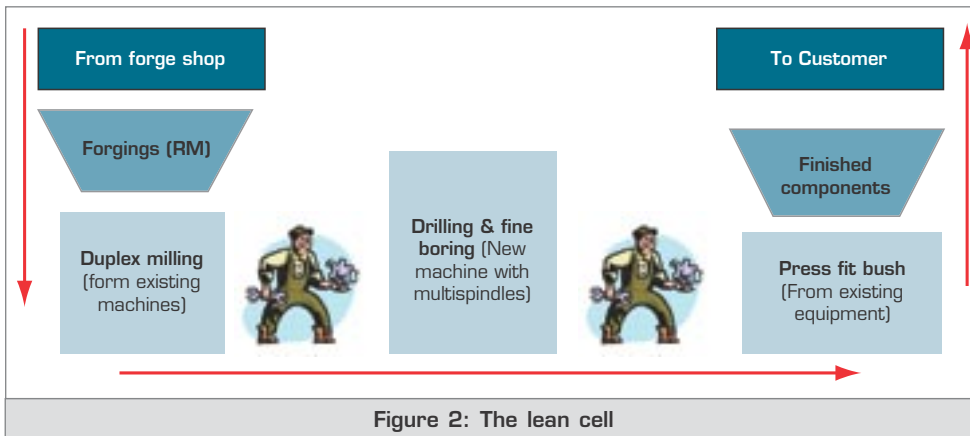


Figure 2: The lean cell

lines and uncertainties led them on the path towards producing more than the required quantity. They were pushing rather than applying pull

- **Defects and rework:** Their discrete process was not 'mistake proofed'. The process and equipment used allowed deviations to quality requirements, and therefore had to be reworked for corrections where possible
- **Movement:** Men were moving to each vendor location to chase the parts, quality control (QC) inspectors were moving to each vendor location for inspecting the components, vehicles were moving to ferry the parts, not to mention telephone calls, documentation, etc
- **Transportation:** To and from the various vendors (people, materials and information)
- **Excessive inventory:** Maintained as raw materials and work in progress (WIP) with respect to each vendor, and owing to the uncertainty in their process
- **Over-processing:** Their discrete process did not have any capability. So they had to perform operations that were actually not necessary (such as reaming a fully finished bush after fitting it)
- **Waiting time:** They had partially finished goods always waiting for instructions or transport to be moved, material waiting for instructions (processing, rework, inspection or movement). The concept of 'takt' time or balanced cycle times was not used.

They decided to correct the wrong and

meet the demand requirements, which was doubling their existing production, and knowing that demand could quadruple too. They decided to invest in a new process through SPM that would combine different operations into one, eliminate the inventory and movement of material, eliminate the need to over process, reduce throughput time, control process capability and guarantee both the quality and cycle times. The result is their manufacturing cost is reduced by half; they are back in business and excited about it.

From an inventory turn of 15, this company is soon moving to 300. How did this company from a point of no return become tomorrow's industry example? What did they do? All they did was changed their thinking!

Similarly, another auto component manufacturer (with multiple lines installed for similar family of components), after understanding how lean manufacturing can help them add better value is embarking on the lean journey with their overseas parent. Over the next 24–36 months they will achieve 120–150 inventory turns as compared to the existing 16.

A product maker supplying assemblies to the auto industry told me that although they have managed to make money, their margins and profitability have been coming down every year. For the few parts they have per assembly, they have a surprisingly low inventory turn ratio of six. The reason is their present discrete manufacturing practices, scattered process layout, not addressing flow, allowing problems to remain hidden, perception of problem is only size variation,

imbalanced cycle times, absence of pull and dominance of push, imbalanced inventories, excessive people, etc. Commencing their lean journey with the help of a lean consultant, in the next 15 months they should achieve an inventory turn ratio of 18. About 24-36 months hence they should achieve 100 inventory turns.

A California company shifted its manufacturing operations to India. After commencing manufacturing, a couple of years later, the president of this company told me, "Sanjeev, we thought India will be cheaper, but it is proving to be more expensive." More often than not, your competitiveness is controlled by what you do and how you do it. Over the next 12 months, not only will they appreciate their decision to come to India, but will also be well on their way towards their goal of \$ 10 million.

From almost being a disaster in manufacturing what is going to make all these companies tomorrow's manufacturing examples of excellence? It is their thinking and their vision for tomorrow. But, more than anything, it is their ability to make decisions and take actions today, as no dream or vision can be achieved without actions. Remember, as you think, so you reap. Your tomorrow's results depend on your today's thinking – for your results will be based upon your actions, which will depend upon your thinking (Ref: *'Changed thinking: A Eureka moment'* MMT Oct-Nov 2005). So, does lean manufacturing merit your consideration? Is it really worth? Look at what the CEO's in these organisations are going to achieve over the coming months. It is for you to answer. "Innovation is everybody's job," says Gary Hamel, "but the engine at the top has to work to get it going." I have seen organisations revel in doling out comparative figures of performance improvements; few can quantify their increased value to the customer year-on-year.

Lean manufacturing is a high velocity order-to-delivery process that many manufacturers have successfully used to improve their overall business performance. In the lean environment they operate in, they pull the inventory and allow it to flow only when there is a need to satisfy

a customer requirement. This means the entire organisation must be configured for maximum flexibility and quick response to customer orders – standard or special does not matter. The demand-based pull these companies use is in sharp contrast to the MRP-based push used by companies that end up with unwanted inventories, slow response times and all other forms of wastes. The push system cannot respond quickly to changes that customers really want, resulting in high lead times, more inventory and lesser service to customer.

Lean manufacturing was originally conceived for low volumes and high variety. Today, we know it can be adapted to any environment – high or low volume or variety. It is not necessary to have high volumes or repetitive production environment to achieve a synchronised high velocity flow of information and material. Using lean tools and techniques and the right quality information it is possible to create a fast and flexible order-to-delivery approach and neither the complexity of the product nor its variability can pose a problem. As the market place mandates more high velocity and on-time delivery, customers can, and will change suppliers when they are unable to get the goods as they need them. The objective is to get today's orders ready and shipped without letting yesterday's order get in the way.

Lean manufacturing is about total flexibility and throughput, emphasising on reducing the order-to-delivery time to the bare minimum. As a result, far-reaching cultural and process changes are required to be brought in. This is necessitated by the need to substantially redesign the business processes in the flow of information and material in the entire order-to-delivery process and not just in 'some' such as inventory alone.

When inventory accumulates in buffer stocks, it is the cause of excessive cycle time with serious imbalanced and unsynchronised flow resulting in excessive and unbalanced stocks of raw material, WIP, sub-assemblies and finished parts. This is also the result of poor information flow. In such companies, scheduling and rescheduling is a common sight because doable schedules

Table 1: Goals to include in the lean matrix for performance evaluation

Performance improvement goal	Present	12 month goal	24 month goal	36 month goal
Reduction in manufacturing cost				
Reduction in manufacturing lead times				
Overall throughput time reduction				
Reduction in inventory				
Inventory turns				
Quality indices				
Reduction in floor space utilised				
Reduction in material cost (purchasing cost)				
Price reduction to customers				
On-time delivery performance				
Customer satisfaction index				
Reduction in number of vendors				

are never achieved. So you see, it is easy to identify a company that can benefit from lean manufacturing.

Manufacturers who can implement lean processes usually end up cutting their cycle times by more than 60 per cent. Imbalanced production schedules, WIP queues, and high fixed costs result in high inefficiency costs. Lean manufacturing drives out this inefficiency, and therefore those costs. In the *figures 1 & 2*, the manufacturer has cut down throughput time that varied from two to three weeks to single digit (less than 10 min), the working capital requirement has dropped dramatically, and the money can now be routed to other investments.

When too many variations and manual interventions are present, the problem is not only to cut out non-value-added activity, but should also be that of value-subtracting activity caused by errors everyday. Lean manufacturing mandates the necessity for faster flow and better balance of material through production. Companies will need to reconfigure their manufacturing processes from large lot and functionally oriented methods to more flexible and quick change-over smaller lot method for fast response and higher throughput. While improvements

can be made, most of the time, with existing equipment, sometimes easily justifiable investments may be called for. The objective of higher throughput and lower cycle time is to better customer satisfaction and not mere reduction of labour and inventory costs.

I have seen discrete performance evaluation matrix used in different organisations, some run into many pages. Few have their performance matrix linked to their goals, for these need to change every year. That is why this is one of the weak links in many organisations. At the same time, just changing performance matrix will not change the organisation to lean, although, they are critical to the transition. While managements can ask for anything, they will only get what is encouraged by the measurement system. Some goals that you can include in the lean matrix for performance evaluation are shown in *table 1*.

It is also possible to break this further into half-yearly and quarterly goals if necessary, but set an years' goal and get going, chances are you will exceed it with the help of a Sensei. For an indicative idea about the extent of improvement possible, refer '*Lean Manufacturing as a competitive strategy*' in *MMT April 2006* and '*The Lean Mindset*' in



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The advantages of lean manufacturing go beyond the productivity gains and cycle times as you can visualize from *table 1*. Yet, lean manufacturing is only as good as your weakest link. System enablers can link the entire enterprise and the supply chain. When redundancies are eliminated productivity improves. Orders can be processed without uncertainty, queues, or abundant paper work. The faster lean flow now will enable you back flush the cash, easing cash flow and payments to vendors. Lean also requires high information quality and close co-ordination with suppliers whose processes and systems need to be upgraded to get their performances synchronised using your new level of capability.

Getting started with an effective programme involves careful planning, design and execution of the business changes and the need to achieve the desired goals. Implementation should only begin when top management is championing the effort with an understanding that many processes

need to be changed. Decide to invest in lean manufacturing and set the direction for the future. Think of lean as a competitive strategy for gaining market share, generating more revenue, more profits and adding more value to your customer. Inventory and cost reductions are byproducts. Think, if your competitors get ahead of you in terms of response, delivery, profits, etc. You are in the worst position of always trying to catch up. Just look at Toyota – the leader always makes more money than the crowd put together.

So does lean manufacturing merit your consideration? You have known about some Japanese companies doing a 500-year plan for the future. Many Indian companies do a five-year plan. But, the answer really depends on your vision of tomorrow for your company. You think, you decide. Today, you know the industry examples of yesterday. Tomorrow you will know of today's industry examples. The question is do you want to be one of them? If your answer is yes, there isn't a better answer to the questions you have today. Go lean. **MMT**