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## Lean Manufacturing

This time we'll look at implementing a Lean factory layout.

Imagine you're at a set of traffic lights lying way back in the queue. The lights turn green and the front vehicle moves forward, then the next and so on. You notice there's short delay between each successive vehicle moving on until it's finally your turn. That brief delay between one vehicle and the next is a critical factor in any process and because it's happening with such great frequency each moment of the day, these small amounts of time soon accumulate to substantial delays. Imagine now a locomotive with a number of coaches, each coach linked to the one behind. Unlike the traffic light model, when the locomotive moves forward, so do the coaches except, without delay. The linking of sequential activities in any process is a key factor in Lean Thinking. Why, because it minimizes the span of time between your supplier, you and your customer and that's why we should all be thinking Lean. Calling Lean 'Linked Production' is an accurate definition.

After 20 years of preaching Lean Thinking, Jim Womack, the author of many Lean books says that the most difficult aspect in getting Lean to work is not the tangible stuff like process management but instead, getting people to understand the need to be disciplined in the disciplines of Lean. The 'soft' aspects are the 'hard' ones in the end. This is the starting point of a Lean initiative and it starts with the top executive. Probably the hardest nut to crack! When the top gun is behind the idea, things will keep moving forward. In a recent intervention, the MD gave the project the blessing it needed to launch and all the managers dutifully went to it. But, due to distractions, the MD handed the reigns over to another and with it went the weight of personal and invested power an MD would carry. Discipline for keeping on the straight and narrow wasn't there and time lines began to fade. So Lean initiatives do require the highest hierarchical weight.

### Getting the Team right.

Lean thinking will affect the entire organization one way or another so team membership should represent all or most functions. I often hear the argument that it's production needing Lean and this is partly true since production consumes more resources than any other. But.... any function providing a service to production should be included in the initiative. It's really a Lean organisation we're after. Typically the service functions assisting production would include Purchasing, Engineering, HR and Finance so these should have representation on the Lean Team.

Can the team manage the additional load? But more importantly, do they want to? Blanchard and Hersey created the *Able and Willing* model which offers some assistance in deciding who makes the team. Choosing the right team players goes a long way in

satisfying what the project will demand. This model looks at two factors, ability and attitude (willingness) and there are four conditions to identify. Only one will offer satisfaction.

Willing and able people are best suited. First choice.

Willing but unable people can be trained or coached. Second choice

Unwilling but able people need counseling and coercing. Third choice.

Unwilling and unable people might not be suitable candidates. Fourth choice.

### Team Leadership.

If you are the MD my recommendation is that you appoint yourself Project Sponsor, keeping in mind you may often be away.

Depending on the size of the organization, there may be a General Manager in which case, the position of Project Owner may be a good fit and the two top positions could be interchangeable depending on pressure.

A key position and one needing knowledge of Lean, the process and the customer's needs is the Project Manager. (We're calling this a project since there will be a definite start and a definite finish with work in between.) Then, reporting to project management will be the service function representatives.

It's a good idea inviting the union rep to join in if only out of good communication and courtesy. My experience is that they seldom accept but why not extend the hand anyway? This team probably consists of between four and ten members depending on company size and its time to do some work.

### Training the team.

There are a number of Tools used during a Lean project, so training in the use of these tools is essential and this knowledge will eventually filter down to the supervisors too.

I like to see everyone in the business receive at least a few hours input into project skills and tools; this allays fears of job losses which is not the point of Lean at all.

Besides empowering people with knowledge, perhaps the greatest spin off to awareness training is getting at least a 75% coalition from managers, supervisors and hopefully workers too. This buy-in will help enormously if and when the project ever hits a low point.

### Gathering data

With the ground work done, its time to get on with getting facts and figures. Generally, this information will already be available and known to some but it needs publishing as a milestone of the present position. Later on, this info will be a useful reference as a 'before picture' for comparative purposes. Typically, the range will include:-

- Overtime(Essential and non-essential)
- Through -put time from raw materials to dispatch.
- Process time for each operation.
- Labour count and staffing strengths.
- Rework levels. ( Define rework as anything in the process requiring adjustment)
- Waste.
- Customer demand rate and TAKT time.(TAKT time is the monthly or weekly customer demand rate divided by the number of hours in the period)
- Production downtime.
- Raw material re-order points or lead time.

What I find entertaining about data like this when assembled, it talks to you! Every fact relates to something whether apparent or not. It all results from cause and effect. What we do now has an effect somewhere down the time line.

### Record the actual present Process

There are a number of recording tools, most use symbolic shapes to distinguish between activities such as operations where value is being added and other activities that only attract cost like transports, storages, delays, decisions and inspections. There is also illustrative soft ware available like Microsoft Visio to chart the events through the process but the starting point in mapping is always on the floor where the action is with pencil and clip board. The soft ware and pretty charts are used later to tidy up for presentations. Record what you see, not what you think is happening or what you might want to happen. Common activities are double handling, intermediate storage of components, work piled up on floor between operations, work side lined for quality reasons and most common of all, work piled up around a work place so that it hides the operator! This all looks impressive and makes it appear a busy one but it is all a façade.

### Analyse the chart.

Use simple measures like distance traveled, space consumed and time taken for process and through put. Once every thing is down on paper, use critical questioning to ask 'why'. Why are we doing it this way? Why in that sequence? Why can't we eliminate this activity or combine it with another? Challenge every thing you do! This will help develop a new method of working. Critical Examination is an extremely probing tool and was used successfully as a problem solving tool during the space race to recover one of the manned capsules.

### Develop a new method.

This is creative work and provides an exciting challenge for the team and shop floor people too. Be imaginative, especially with new methods needing low cost or simple technology. All too often we look towards high tech to solve problems instead of being inventive and resourceful. It's great to apply our minds to problems such as this and amazing what simple but effective solutions we can produce.

Record the new method and make comparisons with the present. There ought to be radical differences between the two! Expect big results!

If it is possible, simulate the proposed way of working either by using dynamic software simulation or simply by constructing static models on spread sheets. These will confirm whether the proposals are workable or not. It is better to spend time here even erring in the planning stage than to implement a method and discover something has been left out. Talk to end users like operators and even customers if the changes impact on them in any way. Draw layouts showing material flow. Machine positions, pallet locations, walk ways, storage space.

Try not to use up space simply because its there. In the earlier part when we were looking at customer demand we would have established a balanced machine layout having calculated the number of machines required using the machine cycle time multiplied by the call-off rate. Did we look for opportunities to dedicate machines to specific product families? If so, can machines be laid out in such a way as to have them feed hand to mouth, i.e. no work in progress in between. This means of balancing lines is very effective as it saves space and increases actual through-put volumes. Remember the traffic light and locomotive analogy? Link as many operations as you can.

Simplest means of doing two dimensional layouts is to make templates of all machines and move them about on a scaled shell drawing. This allows the team to huddle over other possibilities. In the end you are probably going to compromise between a safe layout, one that allows a little more latitude for production and an adventuresome one where the purists want tight control. There will never be a perfect layout, always there is a better method and layouts should be revisited every year or so depending on the product mix and customer demand.

### Implementation.

The moment of truth has arrived! This exercise will tell how precise the drawing is and whether you took into account all the supports, stanchions and which of the machines need deep foundations. Unless it's a small layout, you have probably set aside anything from a week end to an annual shutdown as sufficient time to complete the layout. Moving equipment around the floor is generally left to Engineering to look after rigging and machine moving with the assistance from production and a layout specialist. This is the fragile part of the whole exercise but an exciting one too.

### Conclusion

Those of us who have done many layouts will know the law of three applies. Firstly, the layout you design, then the one you implement and thirdly, given the benefit of hindsight, the layout you wished you'd implemented. There is always a better method. Good luck

Next time we'll look at how best to control production in a lean environment.

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