

Can packaging plants become lean?

Over the past 10 years a considerable effort has been made to implement lean manufacturing concepts in the Australian Packaging industry. So why are packaging plants still too fat?

Tim McLean, director-TXM consulting, investigates.

IN THE PAST DECADE “Lean Manufacturing” has become a buzzword in Australian Manufacturing. With the bestselling book *Lean Thinking*, state government sponsorship such as the “Agenda for Manufacturing” in Victoria, and the success of recognised “lean” pioneers such as Toyota, slimline has become the preferred look of manufacturing across many industries.

So what is Lean?

Lean is another name for the Toyota Production System, a management configuration developed by Toyota over the past 50 years. The term “Lean” comes from Jim Womack and Dan Jones who popularised the techniques in their books “The Machine that Changed the World” and “Lean Thinking” in the 1990s.

Underlying all the lean tools are the concepts of lead-time and waste (or non-value added time). In the words of Taiichi Ohno, one of the fathers of the Toyota Production System: “All we are trying to do [through lean] is reduce lead time.”

Lead time in a lean sense is the sum of all the time involved in all the steps required to bring a raw material through a process to the customer. One way to explain would be if you date stamped a unit of raw material (say a roll of paper) when it was delivered to the plant and then recorded the average date when it was shipped to the customer as a finished product, that would be the lead time. This would include all the time that the paper sat in inventory, time it spent waiting to be processed, time spent moving it around the factory and, of course, the actual processing time to convert it into a box.

The Seven (deadly) Wastes

The lead time of any process is made up of value added time and non-value added time, or waste. Value added time is simply processing steps that a customer will pay for. For example, printing a roll of plain film, diecutting a printed sheet or blowing a preform into a bottle are all value adding. Waste is everything else that occurs in the



production chain. Typically lean practitioners will talk about seven wastes:

- Reject material or product – this is what we usually think about when we think of waste.
- Inventory – all inventory is waste.
- Extra processing – additional process steps that do not add value.
- Waiting time – time spent waiting for the next process to finish.
- Motion – the physical movement of people required to move product through the process.
- Transportation – the distance moved by the goods themselves.
- Over-production – making more product at one step than the next process requires or making it sooner than the next process requires it.

Of these wastes, overproduction is regarded as the worst. Overproduction leads to work in progress (WIP), waste material and obsolescence. It requires material to be moved around and people to move around to get it. Therefore, it has a multiplier effect on all types of waste.

When I look through packaging plants (which I frequently do), I see lots of evidence of overproduction in the form of WIP, lots of effort moving product around in and out of warehouses, an excessive amount of energy spent expediting orders

through the system and, in many cases, high levels of waste and obsolescence.

So why is there so much overproduction waste in packaging plants?

Cost accounting and building of the “Monuments”

Unlike many others around the world, Australian packaging manufacturers have invested handsomely in new technology and equipment. Much equipment sitting in plants today is breathtaking in its scale, speed and capability. Despite this, a constant criticism of the industry by the financial community is that the industry does not get a return on this investment. To paraphrase a Telstra executive, most of us wouldn't recommend shares in packaging companies to our own mothers!

The investment in big new machines has been justified on a set of cost accounting assumptions. Increasing the line speed of the machine and reducing the level of manning (through automation) leads to a unit cost saving. This is offset against the capital cost of the machine to give a suitable payback. Despite the attractive payback of individual projects, the sum of all these investments has not lead to improved shareholder returns at the overall company level, in fact, in many cases returns have gone down.

Very large, fast equipment can reduce apparent unit costs, but requires large batch sizes to be efficient and minimise waste. In many cases the average batch size demanded in the market represents only one hour production and complex campaigns are set up to minimise changeover time and waste. To manage this, many packaging companies have employed sophisticated production planning processes and locked customers into rigid minimum run length requirements, strict requirements on order lead times and long run out periods for products. Huge effort is put into obtaining detailed, but largely inaccurate product forecasts. Despite the forecasts, the restrictions on customers and the effort in planning, most packaging companies end up carrying significant amounts of custom made product and raw material inventory. This leads to significant issues with obsolescence.

Also, the purchasing power of customers means that fixed schedules and run length limits routinely get broken and waste levels are often large.

The reality in Australia is that packaging users are looking at innovative marketing and packaging to increase the differentiation of their products and improve the efficiency of their supply chain. This is leading to range extensions, increasing levels of promotion, rapid changes in product design and print and less inventory at the customer end, resulting to shorter runs and less stable forecasts. As a result, the big machines in the packaging industry are struggling to meet the dynamics of the Australian marketplace.

In lean terms we refer to these big, complex and highly automated machines with their mountains of upstream and downstream inventory as “monuments”. Lean encourages the use of smaller, nimbler and more flexible machinery capable of efficiently running smaller batches and responding to customer needs quickly.

If the whole picture is taken into account, any increase in unit costs will be more than offset by reductions in working capital and waste and the improved margins won from offering a faster and more flexible service.

The Dangers of “Point Kaizen”

Over the past 15 years excellent work has been done in many packaging plants on implementing lean techniques. Smarter changeovers, “5S” and total productive maintenance have been implemented successfully in many businesses. As a former packaging plant manager, I learned these techniques. So why has this approach not lead to lean operations?

In the words of Taiichi Ohno, one of the fathers of the Toyota Production System: “All we are trying to do [through lean] is reduce lead time.”

Most of the lean efforts in packaging plants have been directed at particular processes (usually the “big machines” described above). This approach has successfully made many of these machines more efficient by reducing downtime. In addition, set up time reduction has had some impact in reducing the problems of big batches described above. This approach is called “point Kaizen”, ie. applying process improvement techniques at a particular point in the chain rather than trying to improve the whole supply chain.

By focusing on individual processes we miss the opportunity to examine the whole supply chain from end to end. We generally focus on improving the “value creating steps” – printing, moulding, laminating, die cutting and try and improve these. However, this tends to ignore the enormous amount of non-value added time or waste that exists in between these value adding steps – extra processing, inventory, waiting time, transportation and overproduction. This is where the biggest opportunities to improve your business will generally lie.

So Where to now for packaging and lean?

The first step is to start looking at your total process starting from your customers’ needs and working back. A value stream map is an excellent tool to map your operations and identify waste and value adding time in your whole supply chain. A current state value stream map will normally reveal the size of the opportunity that you have in your business to reduce waste.

You then move to developing a future state map that will identify the changes you need to make to reduce waste and lower lead time. This can include combining processes together to eliminate steps, new ways to link processes to one another and will include tools to level production and match it to customer demand. This will ensure each process is aiming to meet the exact needs of the end-customer while eliminating overproduction and minimising inventory.

A lean action plan is then developed to achieve the future state map that will usually involve a range of process improvement activities to achieve the targeted

reduction in lead time. A lean action plan should include tasks that can be completed in no more than 8-12 weeks. Any longer and the project will lose momentum. Of course, once you achieve your first future state the challenge is then to find further opportunity to reduce lead time and implement a new future state action plan.

How to Get Started on Lean?

In my view the best way to learn lean tools is to learn by doing. Some companies have spent thousands sending their staff on short courses. In my experience this rarely translates to results. A better approach is to employ a lean “Sensei” or expert to coach you through your first project. If you have someone with this experience internally, great, otherwise, if you choose a consultant, make sure you select one with a proven track record implementing these tools, and check their record with their client referees.

The TXM approach is to assist the client to select a broad product family for a pilot of value stream mapping. Avoid the temptation to choose a “safe” pilot in an unimportant area of your business. Ideally you should target your largest product family. That way, once you have achieved a lean future state for that product range, it becomes very easy to fit your second or third tier products in behind it. Choose a team of people for the project that covers the full value stream, from raw material supply through to the customer interface. Make sure you select people who have detailed knowledge of the individual processes, but the ability to see the whole supply chain. Team members also need to have the authority to make and implement decisions about changes to the process. While many lean tools (e.g. 5S) are most effective at shop floor level, value stream mapping, by its nature, is a top down process.

Once you have a team, a product family to focus on and a “Sensei” to lead you, expect to have your assumptions about your business challenged. Dramatic improvements can be achieved. I have coached teams that have reduced lead time by up to 80% through relatively low cost changes to scheduling processes and plant layout.

Understanding Lean lingo:

- Kaizen Means “small steps” in Japanese. Kaizen is the process of continuous improvement.
- Kanban: A signal card used to tell an operator at an upstream process that the downstream process requires more materials. Material is by this method “pulled” from the upstream process to the downstream process.
- 5S: A system of workplace organisation and housekeeping based on the principle of “a place for everything and everything in its place” The 5 S’s are five Japanese words that translate loosely as “Sort, Shine, Set in Order, Standardise and Sustain”.
- Sensei: A lean teacher or expert able to teach the techniques to others.
- Smarter Changeovers: A set of improvement tools aimed at reducing the time it takes for a machine to changeover from one job to the next [also called “SMED” or Single Minute Exchange of Die].
- Error Proofing: A systematic method for designing out of a process the opportunities defects or errors to occur [also called “Poka Yoke”].
- Value Stream Map: A process map that shows all the product and information flows required to move a product from raw material supply to customer. The current state map shows all the current value and waste in a process. The future state map is then the basis of a plan to reduce the waste.
- Load levelling: A technique by which the volume and mix of product required at a particular work cell is levelled over time to match the average rate of customer demand or Takt time.
- Every Part Every Interval: A technique by which products are run sequentially in a repetitive cycle over a fixed period (ranging from every part every week to every product every ship interval).

Lean Accounting

To respond to the typical cost accounting drivers that lead to investments in “monuments”, the impact on lead time should be considered in evaluating new projects or investments. By considering the impact of an investment on the total supply chain – including inventory, upstream and downstream processes, customers and suppliers – a more complete picture will be obtained. I suspect the result will be smaller investments in smaller, more flexible, and probably less costly equipment – which should please the accountants!

Tim McLean is the Director of TXM Consulting, specialists in supply chain project management and process improvement. Prior to starting TXM Consulting, McLean had 15 years experience in operational leadership roles in the plastics, packaging and chemical industries. He has extensive experience in implementing lean and value stream mapping across a wide range of industries in both Australia and China. McLean can be contacted on 0404 480 517 or by e-mail on tim.mclean@txm.com.au.



1/2