Creating a Competitive Advantage (Part II)

Broadening the Application of Kanban and JIT Techniques to embrace MRP, Consumer Service and Reduce Working Capital

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Conventional Materials Resource Planning (MRP) systems have significant cost penalties associated with their use. These mainly arise because of the inaccuracy of forecasting and the inability of the designed capacity of the plant to economically make all the product sold in any one month in the next month.

These difficulties have been ameliorated. The customer service can be improved at the same time as the inventory is reduced. The methods applied are based on the Toyota Production System. The planning and production period can be progressively reduced.

The application of this method has led to an improvement in profitability from a marginal loss of $0.5M EBITA to a gain of $40M EBITA per year after a 3 year program at Feltex Australasia. (as described in their IPO document). This improvement occurred at the same time as the on time deliveries improved from 32% to 99% and the working capital, (mainly inventory) was reduced by $20M and waste reduced by $2M per year.

1. MANUFACTURING VARIABLES AFFECTING CUSTOMER SERVICE

By examining the many variables affecting customer service, techniques developed enable the planning system to be optimized and the rules of lean manufacturing applied. Priorities can then be set to further improve the system and optimize run lengths, the mix of Made-to-Order (MTO) and Made-to-Stock (MTS) lines so that a lean demand replacement method using the new algorithms can be introduced. The production rate of different machines in the same value stream can then be more accurately balanced and efficiencies improved.

Cash flow improves dramatically. This can be reinvested in further improvement.

2. DEMAND PULL VERSUS PUSH SYSTEMS

This new pull system reduces waste and enables shorter planning cycles to be used and the forecasting errors eliminated. On time deliveries improve and costs fall. A sharper focus on further development is the result and value added for the most important products increases while the P&L and cash flow improves.

3. BACKGROUND TO PROFIT IMPROVEMENTS

The principles of lean manufacturing and lean thinking, which are synonymous with the Toyota Production System, are not well practiced outside the automobile, electronics and advanced manufacturing industries. Numerous attempts by US based analysts have generally misinterpreted the way the Japanese production systems work. Many manufacturers have been slow to see the benefits because of the complexity of manufacturing a large number of products on machinery and equipment that is not particularly flexible. However these problems have been solved.

As stated earlier, the new system has been successfully implemented in Australia and New Zealand adapting the Toyota Kanban system for multi-product short run production at Feltex (carpet manufacturer linked to retailers and wholesalers) where up to $10M has been taken from finished goods at the same time as the on-time deliveries were improved. 50% of the 5500 products are now being produced to the promised manufacturing date. Shaw (USA), owners of the Australian plants at the beginning of the project, had been trying to achieve improvements without success in the previous 5 years.

To the best of my knowledge, no one else has been able to achieve such outstanding results in such a complex environment. Lead times have halved (median), and as a result the gross margin has been increased so that profit has improved from a loss of $0.5M per year to an EBITA profit of $40M per year in 3 years. In addition, this has opened up many areas in the company for further innovation. The company has now floated and trades on the NZX30.

The techniques of adapting Kanban to non flexible equipment and Made-To- Order (MTO) and Made-To-Stock (MTS) lines developed and implemented successfully at Feltex already, offer wonderful opportunities for all manufacturers, especially from the point of view of inventory reduction, reduced time to market and improved and faster introduction of new products and processes.

The current methods employed by many companies in Australia and overseas have been analyzed and compared with the latest established manufacturing principles. These include lean and the innovations developed subsequently, and the results of personal experience in numerous plants in Japan, USA, Germany, France and elsewhere. The work is well documented in many studies particularly for the automobile and electronics industries. This experience includes work and visits to Honda (Sayama), Panasonic (Matsushita), Toyota (Tokyo), Mercedes-Benz (Dusseldorf),

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Braun (Melsungen), Alcatel (Annecy), and Carlo Erba (Milan), all world leaders in their fields of business.

It is recognized that in traditional highly capitalized industries, the application of JIT and Kanban is not readily seen since such principles are more readily applied in assembly plants. The reasons for this are not clear except that they were developed originally for assembly lines and concentrated on people as a resource not machines as capital investment. There is a strong resistance amongst MRP practitioners to change to an innovative system as described here, (demand-pull).

The principles however are universal and can be successfully applied to all complex manufacturing environments. However, they do require a new mindset and recognition that, despite product range complexities, the principles are still very powerful in reducing waste, speeding up production and reducing costs.

4. SCHEDULING

The scheduling system currently used in an MRP system is driven by a forecasting methodology and an ERP planning cycle. ***This forecasting system, like every forecasting system will always be in error.*** This is especially the case when it operates on a long planning lead-time. In addition, raw materials can be linked to a long lead-time for supply from overseas. As well, the forecasting system for production is usually based on invoicing, and since manufacturers are often at least one step removed from the end user creating the demand, then the invoicing is not a true reflection of the real end user demand and hence the errors are amplified. (The Demand Amplification or the Bull Whip Effect or Forrester Effect).

In summary, many companies are highly capital intensive with large amounts of inventory. They are forecast driven with a forecasting system that is not operating terribly well and as a result a significant amount of waste and inefficiency exists in the system with a planning system that is often changed in an effort to satisfy promotional strategies which may be initiated to respond to competitive pressures.

Changes to a planning system operating on a relatively long period will always increase the inefficiency of the system and create more waste. When this is added to the massive overproduction and large amounts of WIP, combined with poor response, the profitability of the company will be adversely affected.

5. DISCUSSION

5.1 General

Many of the principles are well established in auto manufacturing plants and a wide range of industries, particularly in Japan for automotive manufacturers (Honda, Toyota, Nissan) and electronic manufacturers (Panasonic [Matsushita], Canon, Sony, More recently, Porsche have attributed their return to profit 4 years ago to the Toyota System whilst Ferrari (F1) only became reliable after input from Honda.

5.2 The Rules of Improved Manufacturing Efficiency Using a Pull Model for Non Synchronised production.

- **Demand = Supply = Production**.

This is the number 1 rule of good manufacturing (Only make what you can sell).

Clearly, if the Customer Request Lead Time (CRLT) is shorter than the sum of the Manufacturing Lead Time (MLT) plus the Transit Time (TT) to the customer, then we must maintain Finished Goods Inventory (FGI). However, maintaining finished goods is expensive in terms of holding costs, rent, damage, obsolescence, double handling, and general waste.

Since the production cycle is normally set at one month, and it takes approx 2 weeks to settle the plan, then when this is tied to a forecast which is always in error, it is clear that the finished goods stock will be too high and the waste will be excessive. This is often compounded by highly inaccurate data.

Becoming a class A supplier with an MRP system will not solve this.

To optimize the system, the flexibility must be maximized. This means that downtime in all its forms must be reduced or eliminated.

- **Continuous Flow**

The second rule of efficient production is to aim for continuous flow. This means that once value has been added to a product, the product must continuously have value added to it and it must not sit idle in inventory.

Hence all processes must manufacture at the same rate and their statistical capability must be very high since any stoppage in one section of a continuous chain means that the whole chain must stop. Examples are as follows:

At Panasonic the injection molding process was linked to tape winding linked to cassette production linked to cassette tape loading and linked to packaging.

At Honda the press shop was linked to body welding. For assembly the injection moulding was linked to assembly. In particular, this latter linking is quite remarkable, since the steel pressing for the floor pan and the roof and frame were not inspected before welding into a body. Imagine what the cost would be if there was a fault in the pressed steel component. This is an example of the control that can be achieved when the continuous flow rules are practiced. The Japanese say the production should flow like water!

- **Initiate a Pull System**.

The principle of the pull system is that the customer pulls through the order from as far back in the supply chain as is compatible with the customer's acceptable lead time or Customers Requested Lead Time (CRLT). This is basically a made to order (MTO) system. However, as mentioned, the Manufacturing Lead Time (MLT), is greater than the CRLT and hence finished goods inventory must be held.

- **Maximizing Value Added.**

There are six parts of a process. These are:

1. Set-up
2. Clean-up
3. Run (at optimum speed)
4. Preventive Maintenance
5. Breakdown
6. Idle

Only two of the above are adding value, Run and Preventive Maintenance. Both of these should be optimized. The objective should be to maximize value added (VA), and minimize non-value added (NVA). Every pickup or put down is non-value added or waste.

The influence of the sum total of the improvements in operational effectiveness is summarized in Table 1

Table 1: Cash Flow and Profit for a Continuous Flow Model

			Before	Model
Sales	**S**	**Revenue**	$130,000,000	$130,000,000
Purchases	**P**	**RM Purchases**	$60,000,000	$40,000,000
Inventory Start	**InvSt**	**RM+WIP+FG**	$40,000,000	$40,000,000
Inventory Finish	**InvFin**	**RM+WIP+FG**	$40,000,000	$20,000,000
Gross Margin	**GM**	**GM=S-P-InvSt+InvFin**	$70,000,000	$70,000,000
Direct Labour	**DirL**		$28,000,000	$28,000,000
Ind Man Exp	**IndManExp**		$35,000,000	$35,000,000
Expenses	**Exp**		$63,000,000	$60,000,000
Net Profit	**NP**		$7,000,000	$10,000,000
Cash Flow	**CF**	**CF= NP+ Inv Change**	$7,000,000	$30,000,000
Flow		**InvSt + P - InvFin**	60000000	60000000
Ratio Flow		**FlowL/FlowM**		1.0
Ratio Sales		**SalesL/SalesM**		1.0

Table 1 illustrates the improvement in cash flow and profit that could result from implementing the ideas expressed in the model recommended here. The GM was assumed to be a constant. You can see that potentially there will be a release of an extra $23M in cash (CF) composed of a reduction in inventory and waste, and rent and interest.

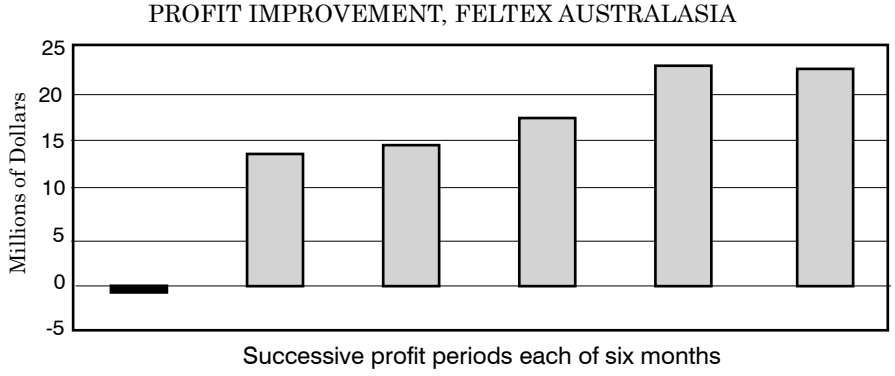
- **Innovate Continuously**

Good business practice aims for continuous and never-ending innovation and improvement. This means a continuous emphasis on new ideas in all parts of the business both in product and process.

The methodology promoted above has already been tried in a complex multi-product environment which is far more complicated (5500 products, 7 plants. 16 machine types, 20 different processes) than many plants The results of one of these programs (Feltex Australia have been posted on the web in their IPO document. The results are given below.

6. THE FUTURE

The improvements postulated here can be quantified in any company once the appropriate measurements are taken.



The results of a 3.5 year program at Feltex Australasia showing significant profit improvement at the same ime as on-time deliveries improved from 32% to 99% and working capital was reduced by $40M ($10M from finished goods successive profit period each of 6 months. (ref see www.Feltex.com, IPO Document). The company floated this year and the business pundits headlined the float on the NZ stock exchange as "EX Junk to join NZX 30" (ref NZ Herald Thursday May 6 2004 Page PCI).