InfOrM – January 2008

ERP/DRP and lean manufacturing are not compatible

How many companies are finding their IT investments are a major blocker to releasing the benefits of lean manufacturing, and why a new planning approach is needed.

Introduction

Over the past 10 years a great number of businesses ranging from SME's to blue chip organisations have been rolling out or updating their Enterprise Resource Planning (ERP), Distribution Requirements Planning (DRP) and Advanced Supply Chain Planning solutions (APS). There are a variety of reasons for this intense activity, ranging from the need to consolidate IT following an acquisition, through to the desire to improve the IT capability in order to implement a particular supply chain strategy.

When the dust settles after the implementation, many businesses, having spent a lot of time and money, are left with a very inflexible IT solution whose core planning principles are routed in the thinking of the late 60's, and not compatible with the agile, flexible, supply chain processes required to be competitive today.

It seems that our understanding of what is required to build a competitive supply chain has evolved considerably over the past 40 years; however the range of IT solutions available to support our ambitions has not.

This paper examines the key elements required to build a successful and low cost supply chain, how the majority of IT offerings fail to support these key principles and how a new approach to planning can enable the benefits of lean manufacturing without throwing away your IT investment.

The problem with forecasts

Fundamentally, most ERP/DRP systems provide a very robust operational platform, on which the majority of a business processes are supported, from finance to HR. Where they are weak however, is in the provision of planning tools. Most come equipped with a basic MRP (Material Requirements Planning) engine, and the more advanced ones may supplement this with predictive safety stock planning or re-order point logic, usually under the guise of an Advanced Planning Systems (APS) module. Or to put it another way, your multi-million dollar IT super-car has a tractor engine lurking under the bonnet. The fundamental flaw with all of these MRP variants is that the starting point for all calculations is a forecast.

"Your multi-million dollar IT super-car has a tractor engine lurking under the bonnet"

"MRP forces wildly unplanned and unpredictable levels of inventory, effort and cost into the supply chain"

Most planners know that forecasts are 70% accurate at best. APS systems may buy a few percentage points of improvement in exchange for a hugely disproportionate monetary investment, but have categorically failed to deliver the advertised benefits. The real problem is that MRP then compounds the situation by using this imperfect forecast to precisely raise planned orders and set predictive levels of safety stock. What this does is push wildly unplanned and unpredictable levels of inventory, effort and cost into our supply chain.

Where 'push' meets 'pull'

At the same time as businesses are trying to tame their ERP/DRP systems, many have recognised that their customers are demanding higher levels of flexibility, responsiveness and reliability, and that these factors are becoming the differentiators in an ever more 'me too' marketplace. In order to compete and meet the challenge, many companies are leading a campaign to implement lean manufacturing principles.

Lean manufacturing is based around the principle of 'pulling' only the level of inventory through the supply chain that is required to satisfy an agreed customer service level. Lean manufacturing recognises that not all SKU's are the same, and that different inventory replenishment rules are needed, based upon the volume and variability of demand. There is an obvious incompatibility here with the ERP/DRP IT systems, which take a 'one size fits all' approach to planning.

"The interface between MRP 'push' and lean 'pull' generates a lot of 'heat and light' in the planning and purchasing department"

This is where the 'push' replenishment signals generated by ERP/DRP systems clash with the 'pull' signals required for lean. This interface typically generates a lot of 'heat and light', normally in the planning and purchasing departments. The interface between these two methodologies drives a lot more resource into translating and managing the incompatibility. This increased overhead can minimise or even eliminated any of the cost benefits desired from lean manufacturing.

A 'back to basics' approach

Many of the latest IT planning offerings contain ever more complex statistical and mathematical solutions, all striving to improve our ability to forecast, and therefore make the rest of the MRP logic work. From the software vendor's perspective this approach is understandable, given the amount of MRP based software currently in the market. Sooner or later we must face the truth that MRP planning logic is totally inappropriate for 95% of

businesses involved in batch manufacture. In fact not just inappropriate but damaging to their profitability and growth potential.

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We need to stop chasing the perfect forecast and take a step back. We need to consider the key elements required in best practice supply chain design. Only once we understand these can we then select and tailor our IT tools to automate and support the new process.

The 10 key elements for a best practice supply chain

1. **Have a clearly understood and agreed service level agreement (SLA) with your customers**

   The SLA should be a detailed understanding of the service to be offered, particularly in relation to lead time, minimum order quantity and stock holding requirements. It should also articulate the parameters that define exceptional demand (e.g. a promotion) from normal fluctuations in demand that can be accommodated as "business as usual".

2. **There should be a robust, regular channel of communication with your customer, in order to measure and improve performance levels defined in the SLA**

   Most enlightened businesses now have some kind of Sales & Operations Planning (S&OP) processes. Many however are very inwardly focused and don't include sufficient or any direct input from the customer. This is the opportunity for the customer to communicate significant future demand changes for which the supply chain needs to be recalibrated.

3. **Proper supply chain planning must consider total business cost including demand, capacity, supply and inventory planning**

   Another common failing of many S&OP processes is that they do not cover all the elements of cost. Typically the debate can be around manufacturing efficiency and capacity and ignore the costs associated with poor customer service or resultant inventory. A good S&OP process understands the service model agreed and then determines the least cost way of delivering this.

4. **Know when and when not to use a forecast**

"A common mistake here is to confuse demand variability calculated entirely from the historical demand pattern with forecast variability, which is the variance between history and forecast. The former is correct the later is meaningless"

Forecasts, no matter how inaccurate, are the best tool that we have to determine future capacity requirements. Therefore we should have a toolset that enables us to easily access this information. Forecasts are typically not bad at determining how much of something we will need, i.e. is demand increasing or decreasing, but very poor at predicting exactly when the demand will occur. Therefore never use a forecast for order generation, to do so flies in the face of any demand driven lean approach.

5. **Segment SKUs based upon their demand volume and variability and then select the appropriate replenishment rule for each segment**

   The same service level and/or replenishment rule is rarely appropriate for all SKUs. Normally there is a range of items from high volume, low variability items that require a highly repetitive supply plan, through to those with sporadic requirements that should ideally be 'make to order'. This segmentation fits closely with the principles of lean manufacturing. A common mistake here is to confuse demand variability calculated entirely from the historical demand pattern with forecast variability, which is the variance between history and forecast. The former is correct the later is meaningless.

6. **Use the correct replenishment rule to calculate the correct stock level for each SKU level, to satisfy the agreed customer service level in the SLA**

   Once all the levers of cost are understood and the appropriate replenishment rule selected for each SKU, an inventory and production plan can be built that delivers the desired customer service levels. In order to get the correct balance of inventory and manufacturing cost, a new way of calculating inventory holding is required, that flies in the face of much of the conventional inventory planning wisdom.

   The traditional approach is to calculate a moving safety stock based upon a number of weeks forecast, sometimes 'refined' by using forecast variability against historical usage (in APS systems). This method is fatally flawed in two ways; it relies exclusively on forecasts in order to calculate the amount of safety stock required, and it actively plans in a level of 'dead' stock, with the anticipated on-hand levels moving between the safety stock level and safety stock plus the minimum order quantity.

   The new approach to inventory target calculation sets a maximum target level of inventory for each SKU. This is made up of an element of inventory for the replenishment time plus an element for demand variability, which is statistically

related to the required service level from the stocked item. This approach makes the entire inventory available for use, with on-hand levels fluctuating between the inventory target and zero. It also builds in some sound statistical probability of material availability based on historical demand variability. As long as your S&OP process flags up demand that falls outside of this agreed variability, you will have a lean level of stock that supports your customer SLA at least cost.

7. **Completely separate planning activity from execution activity**

   Another curse of MRP is its ability to blur the line between planning and execution. A planner is being asked to replan and chase orders daily or even hourly as the MRP "shuffles the order pack" each time it runs, requiring their constant attention. It is vital to separate the activity associated with planning from that of daily order raising and execution. Best practise requires that a plan be set, normally for a month, in line with the frequency of the S&OP or forecasting cycle, and then execution happens daily against this plan, enabling a set of lower skilled or automated actions to be taken daily. This normally means a key change to the skills required by a planner, meaning considerably fewer but more highly skilled individuals.

8. **Execution tools that allow orders to be raised in line with appropriate replenishment rule**

   There will invariably be the need to cater for a range of replenishment rules when placing manufacturing or purchase orders, from fixed repeating schedules, through kanbans and reorder cycle items, spares requirements, to pure make to order. Most ERP/DRP systems support some but not all of the required techniques. Therefore you will either need a new order generation tool that uses the required execution technique to compliment the chosen replenishment rule, or you will need to imaginatively configure your ERP/DRP systems to behave and raise orders differently.

9. **Forecasts must be completely eliminated from the ordering/execution process**

   Inaccurate forecasts are the major cause of cost in all supply chains, and forecasts are always inaccurate! The aim should be to never execute an order against a forecast. Forecasts can however be used as an indicator of forward demand volumes and linked correctly with actual demand variability from history can be used to set appropriate inventory policies and targets.

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10. **When planning, use the shortest possible planning horizon in order to minimise the likelihood of plan change and to minimise the number of orders that need to be controlled**

    There is a belief that by extending lead-times you increase your available capacity. This is a myth. Extending lead-times will upset your customers, particularly if this violates an agreed SLA, and increase the level of activity and cost required to plan. Wherever possible, drive down lead-time, which will in turn drive cost out of the supply chain. This approach fits exactly with the requirements of lean manufacturing.

Lean planning is required to compliment lean manufacture

Whilst the past 20 years has seen a lot of thought leadership and energy around the implementation of demand driven lean manufacturing, there has been a distinct lack of activity around the development of planning tools to enable the benefits of 'lean' to be realised. To the extent that MRP is still considered amongst the vast majority of companies to be leading edge.

What is required is 'lean planning'. Lean planning fills the gap between the legacy forecast driven MRP based ERP/DRP systems incumbent in most companies, and demand driven lean manufacturing. Without needing to discard the current IT investment, there is now a set of processes and software tools that provide the missing link. Lean planning will fundamentally support the 10 key elements of best practice supply chain.

The concept of lean planning encompasses the two key areas of planning, i.e. conditioning and execution. The principle being that planners should set a plan (or condition) and then execute against it. Workload and inventory increase when planners try to do both conditioning and execution at the same time, by the way, a characteristic of MRP logic.

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Conditioning – build and agree the plan

Conditioning is the range of planning activities designed to support the S&OP process. Conditioning is about building and agreeing a capacity and inventory plan. Lean planning requires a toolkit that will segment large numbers of SKUs along the lines of forecast volumes and historical demand variability. Depending upon this combination of volume and variability a lean planning tool should enable the correct replenishment rule to be applied and a target maximum level of inventory to be calculated.

Conditioning generates a capacity model that utilises the selected inventory rule and the anticipated replenishment pattern to give an accurate view of future capacity and resource requirements.

Crucial to conditioning is the ability to simulate the anticipated results from a particular inventory and capacity policy. This can be used to validate future plans both internally and with the customer. Furthermore, simulation can also be used to test and validate a particular supply chain configuration strategy, vital when agreeing customer service levels or planning future business strategy. The simulation should embrace the effects on all the drivers of cost.

The ultimate objective of fconditioning is to set up the supply chain for the next period (typically a month), to deliver the agreed customer service level at minimum cost. Lean planning should provide a set of software tools to enable this to be accomplished across thousands of SKU's with minimum effort.

Execution – generate and manage demand driven orders in line with the agreed plan

Once the conditioning is complete, the rest of the month should be spent raising and executing orders in line with the agreed plan. The conditioning process may have led to the need for a multitude of replenishment rules and techniques, from make to order through to cyclic replenishment. Once again lean planning should provide a software toolkit that interfaces into an existing ERP/APS system and enables the generation of orders in line with whichever replenishment technique is appropriate for the SKU concerned. Lean planning should provide for the configuration of current MRP systems so that they can mimic the action of a true demand driven planning tool where appropriate.

"A Lean Planning Tool must be designed from the perspective of the planner and not the programmer"

The alignment of approach through from the conditioning and S&OP process right down to the generation of orders to support a lean manufacturing campaign without the disconnect of push (forecast) driven MRP interfering with the natural flow will lead to a dramatic reduction in the level of planning resource required. Of course all the benefits of lean manufacturing i.e. lower inventory holding, improved customer service and greater schedule stability become readily available.

If a new lean planning tool is going to fulfil these expectations, it must be designed from the perspective of the planner and not the programmer. A planner needs all the key daily and weekly tasks to be highly automated, requiring their input by exception, releasing time for real planning.

Who has benefited from the new approach?

Case study 1

A lean planning project was initiated in June 2005 with one of the world's leading healthcare manufacturers and retailers. The project initially covered inbound material replenishment from key packaging suppliers.

The objective was to reduce resource in the planning process, improve supplier schedule stability and performance while reducing inventory. The results were conclusive:

- Stock becoming obsolete reduced from 28% to 8%
- Inbound planning team reduced by 50%
- Stock turns have improved by 63%
- Supplier schedule stability has increased from 60% to 95%+
- Over £2.5m P&L benefit delivered in the first year

Since the then the lean planning process has been rolled out to all inbound and factory planning, taking a further £1 million out of finished goods inventory in the first three months of implementation. The business is continuing to generate an annual P&L benefit in excess of £3 million per annum.

Case study 2

Lean planning was implemented to support a vendor owned inventory initiative within a world renowned industrial manufacturing and innovation business. The objective was to plan and control inbound inventory into the factory in such a way that the supplier base would be able to fund the cost whilst at the same time ensuring near perfect material availability to production.

Within four months of implementation vendor owned inventory had reduced by 25%. On the back of the success the programme was extended to non-vendor owned suppliers reducing this inventory by 43% over a six month period.

The lean planning process has now been running 18 months with no more than 10 stock outs in that time across many hundreds of thousands of material issues.

Inventory turns have moved from 4 to 15, meaning most inventory is stored, ordered and consumed before the business has to pay the supplier.

Once again the client has seen the value of the lean planning process, and is now rolling out to all finished goods inventory in Europe, in support of a global lean manufacturing initiative.

About the author

Mark Robinson has 20 years experience working in the field of supply chain management. Past employers include Lucas Engineering and Systems, Computer Sciences Corporation and World Class International. Mark co-wrote the winning submission for the 2002 Supply Chain Council award for Technology Excellence and co-founded Orchestr8 Limited later that same year.

About Orchestr8

Orchestr8 Lean Planning

Lean planning is the answer to all those companies struggling to implement a demand driven supply chain in an ERP/APS dominated environment. Lean planning web-based software tools are now available through Orchestr8 Limited.

> "Orchestr8 is the world's first and only supplier of lean planning tools"

Orchestr8 is a UK based supplier of software and consulting services to support the implementation and operation of Lean planning techniques.

Orchestr8 offer a 5 module solution:

Orchestr8 – supporting Lean planning – conditioning and the processes required to generate an inventory and capacity plan, achieve SKU segmentation and inventory target calculation. It also contains a suite of tools and reports necessary to run a successful S&OP process. It also contains some of the best tools available for lifecycle management and seasonality.

Oper8 – supporting lean planning – execution and the tools needed to generate and manage orders in line with appropriate replenishment rule identified through conditioning**.** Oper8 is an order management environment designed by planners. Orders are controlled by exception allowing one planner to handle three times the number of SKUs normally possible with traditional ERP/DRP systems.

Simul8 – a software workbench that enables complete business cost simulation models to be built in order to analyse the impact of any number of planning strategies, rolled up to any level within the organisation. Simul8 can extract data from one or many planning locations.

Collabor8 – a web portal containing comprehensive reporting, metrics and issue logging tools, designed to provide a multi-faceted view of supply chain information for all supply chain partners involved. Collabor8 links multiple instances of the other lean planning modules to achieve a complete cross company view, spanning multiple sites or even continents.

Configur8 – a dynamic configuration tool allowing any configuration of the other four lean planning modules to be achieved. This allows for the support of any client supply chain, no matter how complex. In addition Configur8 interfaces seamlessly with all of the **Communic8** web services designed to import and export data with all of the major ERP/DRP products.

For more information, email: sales@orchestr8.com Web site: www.orchestr8.com