TRANSITIONING FROM MRP TO LEAN-ROP: THE CHALLENGE

introducing a tool and a flexible process to optimize inventory management

THE ISSUE

Squeezing waste out of operations and processes is as urgent a mandate as ever for manufacturing companies who face the pressures of increasingly competitive times. Despite insights gained from TQM, JIT and various other acronym-labeled initiatives over the past several years, the search continues for more effective ways to impact the bottom-line. The reexamination of production management strategies and methodologies is a part and parcel of that search in manufacturing environments. After all, one of the most visible signs of under-utilized capital is shelf-loads of inventory items with nowhere to go on the production line, even while holding costs climb. A tremendous amount of time and effort is therefore spent on demand prediction and production scheduling to avoid holding excess inventory.

Materials Requirements Planning (MRP) is a closed system frequently used for production planning. Using the principal inputs of the master production schedule for the end item and the relationships between the various sub-components needed to produce the end item, it allows for the scheduling of production lot sizes in a logical and systematic way. However, there are a number of shortcomings in the underlying methodology relating to lot sizes, capacity, planned lead times and uncertainty. This latter issue of uncertainty is the nemesis of many a production planning effort. The MRP system assumes that inputs are known with complete certainty, an assumption that turns out to be quite unrealistic. While best efforts can be made to forecast sales, there are numerous factors influencing demand, and assumptions just don't hold for weeks and even months into the process. In a similar manner, while general standards may well be established for different phases in the production process, the day to day running of a manufacturing operation presents myriad problems that impact the process. This means that the production decisions established by the system are often inadequate by the time action is to be taken as a result of them.

INVENTORY ANALYTICS SERIES

The following case provides a closer look at how this problem plays out. An assembly-based manufacturer of high technology equipment utilizes thousands of highly specialized components to build its various models. An analysis of the company's inventory shows that over 42% of the items all into a medium variability of demand pattern where the standard deviation of weekly demand is some 75% or more of the average weekly demand. Another 17% of the items fall into a high variability of demand pattern, where the standard deviation of weekly demand is multiples of the average weekly demand. This is precisely the kind of environment in which an MRP-based system is highly inadequate.

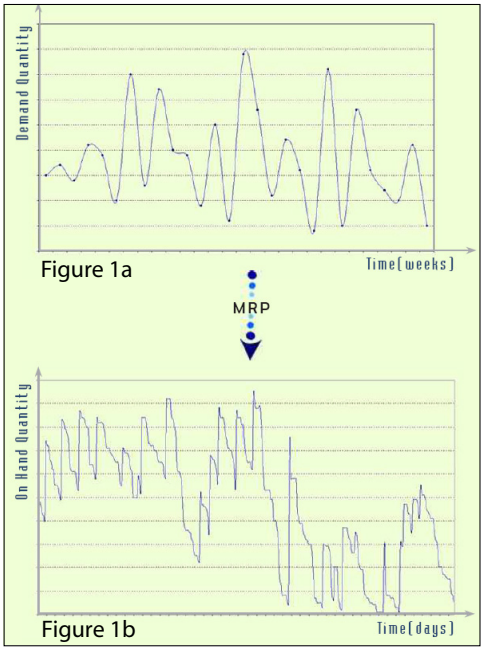

Figure 1a

Figure 1b

In a setting with such characteristics it is almost a norm to see a high variability in demand such as the one illustrated in Figure 1a for an actual component used by this manufacturer.

The failure of MRP to account for variability, particularly where there is great fluctuation in demand, is most visibly reflected in On Hand Quantity Figures. Inventory varies wildly, with the result being "feast or famine" – either an excessive amount of inventory on hand or too little of it to meet needs. This is illustrated in Figure 1b.

HIGHLIGHTS

Over 42% of the items fall into a medium variability of demand pattern, the standard deviation of weekly demand is some 75% or more of the average weekly demand ; and another 17% of the items fall into a high variability of demand pattern.

ALTERNATIVE

One alternative to MRP is a process where the buying logic depends on a Reorder- Point based system or ROP. In fact, there has been a recent trend in a number of industries to use lean methodologies based on Reorder Point based logic. Figure 2 illustrates the various inputs that ideally would feed into an effective ROP-based process.

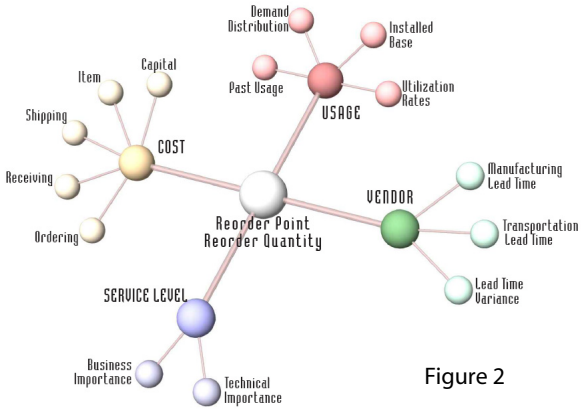

Figure 2

The Reorder-Point system however, brings its own set of limitations. Although sound in theory, its use for practical applications can be challenging, primarily because it relies on a number of input factors that are nearly impossible to measure (e.g. placing a dollar value on customer goodwill). This results in a gap between what it could ideally provide and what it actually provides in an operational environment. Nonetheless, its shortcomings are less severe than MRP's, since it is more of a "bufferbased" system allowing a higher margin of error and

INVENTORY ANALYTICS SERIES

simplistic, therefore more predictable, supplier relationships. Furthermore, the real-life limitations can be generally minimized with a more pragmatic outlook into all required inputs and with a technology platform helping in the measurement and monitoring of the selected inputs.

PROPOSED SOLUTION

The first step is to use the essence of the Reorder-Point System logic where that is feasible. From a practical standpoint, certain data inputs are measurable and quite readily available. Factors such as usage and lead time averages and fluctuations can be analyzed and target service levels can be set that allow for the development of an item-management strategy that produces Reorder Point, Reorder Quantity and Safety Stock levels (see Figure 3).

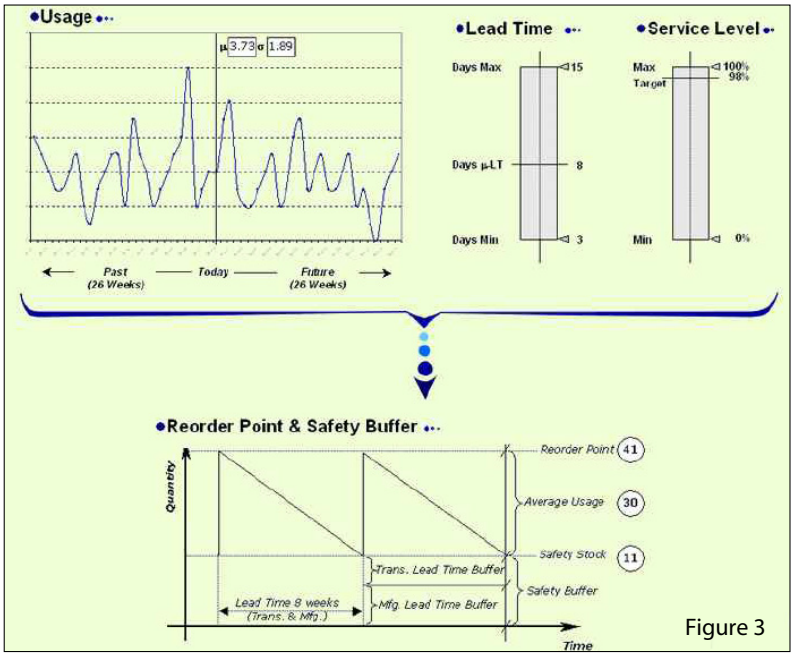

Figure 3

Once this initial phase has been completed, on-going activity can then be monitored (based on the ROP logic) to ensure that target levels are being maintained. At the heart of the strategy is a management tool that facilitates the overall process.

IMPLEMENTATION & THE TOOL

This was in fact the approach chosen by the assembly-based manufacturer previously mentioned. A customized intranet-based management tool, the Material Management Portal, was developed to provide complete inventory management based on the solution outlined above. Beyond the obvious technical challenges inherent in developing such an application for a company with the described characteristics, the system needed to meet standard expectations of user-friendliness and flexibility. It also needed to allow management to limit focus to critical items while offering the data required for detailed tracking and analysis when necessary.

INVENTORY ANALYTICS SERIES

The Material Management Portal provided the infrastructure to move the entire inventory management process through its complete lifecycle: from operational procedure determination to its execution, monitoring and adjustment.

The initial stage involved the input of all the measurable data to determine the relevant policy outcomes (ROP, ROQ etc.). The development of usage data was broad-based, incorporating both historical and forecast data from three areas: manufacturing, service support and finally an unplanned area, the latter really a means of accounting for unexpected usage that could not be anticipated – e.g. factory scrapping. Figure 4a shows a "screen shot" of the input and resulting policy data for a particular inventory item.

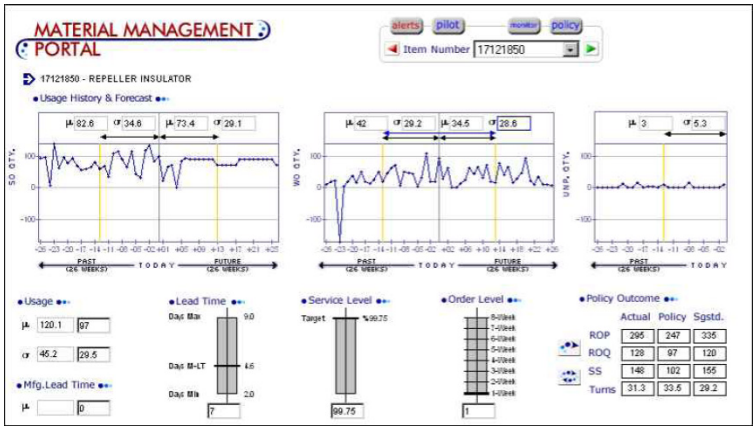

Figure 4a

Once policies were developed and being implemented, the focus then shifted to the monitoring capabilities that allowed management to continuously monitor the key input and output parameters (average and variability in usage and lead time,physical inventory and service levels) underlying the policy decisions and adjust readily on an "as needed" basis. When any of these parameters fall outside of pre-set control limits, the inventory item affected is placed in an alert status and the relevant users are warned of possible trouble.

Special summary reports were developed to provide ready access to critical data on all such items, allowing for quick action on necessary adjustments. Figure 4b shows a summary screen highlighting all the inventory items that have been placed in an "alert" status.

Figure 4b

HIGHLIGHTS

Any technology tool needs to improve the entire inventory management lifecycle : policy development, execution, monitoring and adjustment.

INVENTORY ANALYTICS SERIES

The user at this stage can do a deeper-dive and take a closer look at the moredetailed information provided by the portal, as illustrated in Figure 4c. Deviations from initial values of the input variables used for ROP-based policy settings can be measured and the policy values readjusted.

The weaknesses of the ROP based system are therefore significantly mitigated through the use of this powerful information management tool.

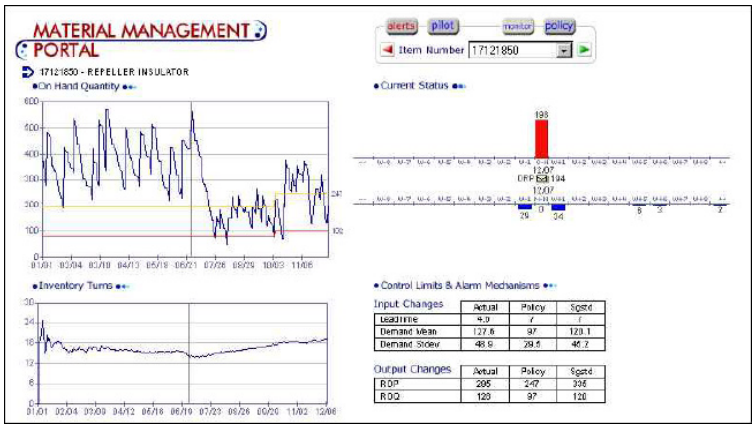

Figure 4c

HIGHLIGHTS

Effective transitioning from an MRP-based towards an ROP-based lean inventory management requires a process that is built on clearly defined and appropriate parameters and supported by a tool that incorporates a testing, validating and refining cycle.

CONCLUSIONS / IMPLICATIONS

Given the challenges of the current business environment, companies are always on the lookout for an effective application or strategy in an operations area as critical as inventory management. However, given the complexities and variability of the same business environment, companies must look to develop a customized approach that will be most appropriate to their characteristics and that will diminish the shortcomings of methodologies used .While hybrid systems naturally take additional time and effort, the payback is obvious for those willing to go the extra mile. Ultimately, the strategy chosen must enable ongoing adjustments critical to increasing efficiencies , while providing management with the tools to ensure that the anticipated gains remain on target. The Material Management Portal is an important means to this end.

CONFIDA

for more information, please contact us at info@confida.net or 914-333-0909

