

Leveraging Inventory to Smooth the Supply Chain

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Your ERP is not taking you where you want to go. Calls continue to stream in from customers awaiting their orders, inventories creep steadily upwards, and the supply base is more and more vocal about the schizophrenic nature of the expedite and de-expedite messages they receive from your organization on a daily basis. Figure 1 illustrates a very typical outcome of an ERP running its own course. Sales (The blue line) shows a high degree of variability. Because production (The green line) is driven by ERP to match demand, it attempts to mirror sales. It is not quite able to do that because the supply

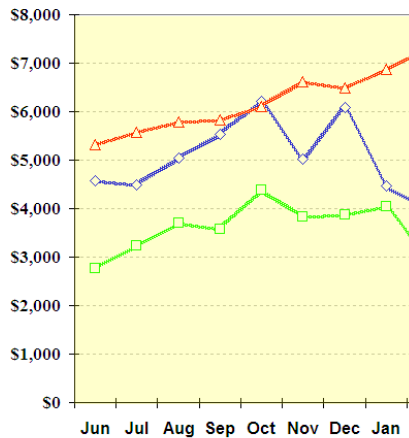


Figure 1: Typical Sales, Production, and Inventory progression

chain cannot respond to the volatility, so the line is a bit flatter. Inventory (The red line) continues to build as the supply chain produces that which it can rather than that which is needed. The net result is that customers are not getting what they want. Although it seems like a train wreck, these results are no accident. Neither are they deliberate sabotage. They are the outcomes of a complex system that processes the inputs it receives through the calculations that have been defined for it to use. It skips the rails and runs off the track when either those inputs have gone un-examined and un-managed, or the calculations are ill-suited to your needs. It is likely that your organization suffers from both. The upside is that,

although the calculations are pretty firmly fixed, the inputs *can* be tuned to make them work for, rather than against, you. The front-end attention to detail is a big task, but the results far outweigh the pain required to get it right the first time.

An old adage poses the question, "If you don't have time to get it right the first time, when will you have time to do it again?" Unfortunately, in this case, the pain is much more severe than just the time required to do it again, and *there will be* plenty of time spent doing things a second or third time: time for materials people to expedite parts; time for warehouse people to make multiple receipts on those parts; time spent on the phone responding to upset customers; time spent communicating and re-communicating schedules throughout your supply chain; time spent preparing for and presenting the explanations as to why corporate objectives have not been met. Although time truly is money, there are additional costs to compound the problem: costs of additional inventory throughout the supply chain; costs for premium freight; costs of lost chances with disgruntled customers; costs of missed opportunities for investing within your organization because cash is tied up in all of the above. In this case, the adage might be altered to, "If you don't have time to get it right the first time, you will have neither the time *nor the money* to do it again."

What then does it take to 'get it right'?

One of the core functions of your ERP is to match supply with demand through Materials Requirements Planning (MRP). Properly managing the input to this process is the most important, directly controllable factor in 'getting it right'. By design, the MRP module suggests planned supply orders that are offset by the replenishment lead time in order to synchronize supply so that it arrives just ahead of demand. In the computerized world of '0s and 1s' this all works very neatly at the speed of light. However, the unpleasant side effect of this raw calculation is that it transfers the volatility of demand directly onto the supply chain.

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While it is true that the accident of having, or not having, inventory does in fact accelerate or retard the supply order, the use of inventory to actively buffer volatility in demand and smooth the supply chain is not executed here. Rather, inventory is the result of hundreds, or thousands, of independent calculations of safety stock levels, lot sizes, and lead times - parameters that are directly tied to the item itself, but are de-coupled from the balance of supply and demand. It is important to recognize that inventory is an afterthought in these balance calculations and is assumed to be set at the right level and to remain constant over time. Again, that level is driven by the planning parameters attached to the part, not the needs of the customer, the capacity of the processes, or the financial health of the organization. In fact, as illustrated in Figure 1, the impact of these parameters tends to confound the balance between supply and demand and drive inventory levels ever higher.

Mature, stable and narrow product lines are largely a thing of the past. Transmitting the volatility of the market throughout the supply chain drives high cost and unacceptable performance. Because the calculations within ERP are neither designed to manage demand nor leverage inventory to smooth the supply chain, it pays great dividends to invest the time and energy to smooth the production process. This allows you to sidestep the limitation of the generic ERP and actively tune it to support your business. It takes responsibility for handling this away from the computer and places it back into the hands of the business where it belongs. The best mechanism to do this is found within the techniques of Sales & Operations Planning (S&OP).

At the conceptual level, S&OP is a sequence of working sessions that review past and projected performance to answer a few basic questions: “Can we sell it?” (Demand Review Meeting); “Can we make it/buy it?” (Supply Review Meeting); and, if we do both of the above, “Can we make money?” (S&OP Meeting). There are a number of works describing the details of Sales & Operations Planning. A couple of the more concise are listed in the bibliography. The focus in this paper is on leveraging inventory to reduce the volatility within your supply chain. The purpose is to convert your investment in inventory from a drain on cash into a strategic driver of both cost reduction and customer satisfaction. The modeling required to generate that smoothing would typically be done in the Supply Review Meeting in the S&OP meeting series.

Figure 2 illustrates a simple method to leverage inventory to smooth the production requirements placed on an organization and to propagate that leveling throughout the supply chain. It extends the Figure 1 illustration an additional 12 months, but with a difference. As with the previous depiction, the blue line represents sales. In this case however it charts *projected* sales. For the next year these sales show the same degree of volatility but at a slightly higher level. The obvious difference is in the green line illustrating planned production. It is purposefully flattened at two levels, \$3M and \$3.5M

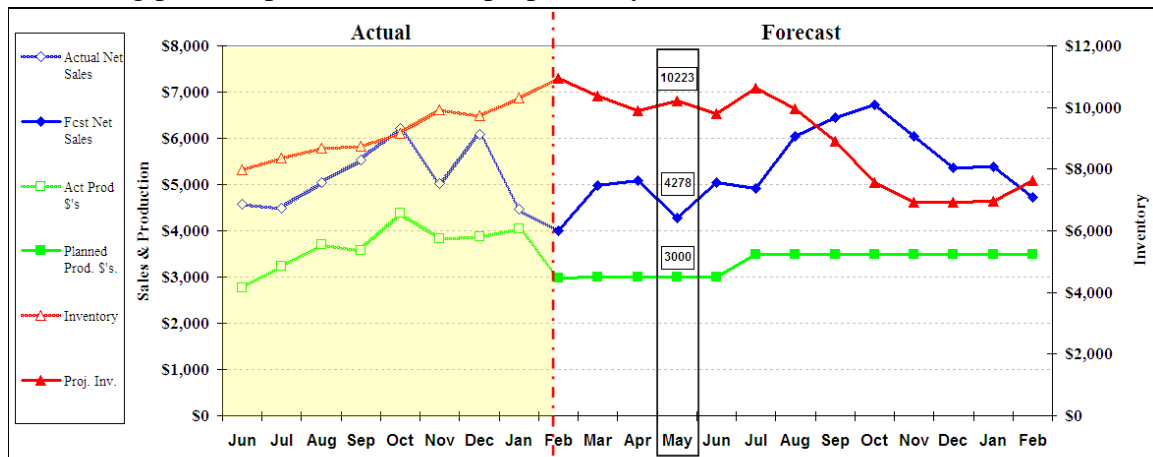


Figure 2. Leveraging inventory to smooth production

per month with the step up beginning in July. Projected inventory is plotted with the red line against the right y-axis and, contrary to typical ERP deployment, is an integral part of the calculation. Using this simple modeling device, projected inventory is consciously ratcheted up or down by the difference between sales and production. If sales exceed production, inventory drops. If production exceeds sales, inventory steps back up. The purpose of this modeling technique is to directly utilize inventory to level production while maintaining excellent customer service. This is done in an iterative process by testing different production levels across a variety of durations and observing the impact on inventory. The optimum solution minimizes fluctuation in production rates while maintaining sufficient inventory to meet customer delivery expectations. The result buffers the supply chain from the variations in sales, creates an achievable production plan, and drives inventory to a strategic level.

In order to be effective for both the organization and for the supply chain this process needs to take place at three levels:

1. First, work the model at an aggregate level encompassing all product line sales, inventories, and processing flows. Done correctly, this will define the strategic direction and budgetary objectives of the organization in terms of capacity and inventory investment.
2. The second pass should concentrate on individual product flows, focusing on understanding and managing the capacity of those flows. It is at this level that the model will be most effective in setting the boundaries for smooth, achievable production levels that can be broadcast to the supply chain.

Care should be taken to assure that the sum of these models rolls up to the overall objectives set in the first pass.

3. Finally, the analysis must be executed at either the stock keeping unit level or within very small groupings with minimal product variation. As an example, those small groupings might include items that remain the same throughout much of the sub-assembly and assembly process but are packaged or configured differently at the end. In turn, these must sum to match the product line model. Most importantly, these serve as the Master Schedule input into the Materials Requirements Planning module of your ERP system, which is the mechanism to propagate the leveling throughout the supply chain.

Wrap Up

There are a variety of both operational and financial benefits that can be expected.

Operational benefits:

- Stable, confident workforce
- Higher average level of capability among employees
- Less disruption from layoffs and hiring stints
- Better confidence that the management team ‘knows what it is doing’
- Less erosion of effectiveness as a new group ramps up through the learning curve
- Supervisors able to spend more time in problem identification and resolution
- Fewer product changeovers
- Fewer POs cut and fewer receipts
- Fewer stock-outs on raw materials and purchased components
- Lower expediting requirements leaving more time for strategic sourcing
- Better ability to negotiate freight rates
- Ability to confidently hedge on commodities
- Better service, relationship, and reputation with your customers
- Creates the stability from which to press into ever better performance and more advanced operating models

Financial benefits:

- More predictable spend, at a lower level on:
 - Layoffs and hiring
 - New employee training
 - Raw materials and purchased components
 - Finished goods inventory levels
- Less premium freight (inbound and outbound)
- Value of productivity increases from fewer product changes and less erosion due to learning curve
- Better ability to hit budgets and monthly or quarterly objectives

There is a significant amount of effort required to accomplish this at the correct level of detail. Some creativity may be required to divert resources into this important undertaking. One common option is to utilize the materials infrastructure to manage the process. The role of Master Scheduler is central in this effort and in most situations will require additional support from shop planners and/or buyers. Because existing resources may well be already stretched, an extra measure of effort will be required, at least initially, to get underway. The leadership of the organization will likely need to identify and forego some 'nice-to-have' tasks to free up planning resources. With the prospect of smoothing the requirements on the supply chain in the offing, the trade-off is well worth it.

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