Topic: Demand Driven MRP

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21st Century Supply Chains Require New Demand Driven Rules and Tools

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The Demand Driven Institute (DDI) was founded by Carol Ptak and Chad Smith, co-authors of Orlicky's Material Requirements Planning, Third Revised Edition in order to proliferate and further develop demand driven strategy and tactics in industry to enable a company to transform from "push and promote" to "position and pull."

For more information about our mission and how you might get involved, please contact us at:
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21st Century Supply Chains Require New Demand Driven Rules and Tools

Chad Smith and Carol Ptak

Globally supply chains are becoming more complex. Companies struggle with the increased difficulty to plan and manage. Consider this November 2010 survey from the Aberdeen Group:

"86% of respondents indicate that their management team has asked them to find opportunities to improve their companies supply chain planning processes and 71% of respondents have indicated the same for supply chain technology improvement."[1]

What is more alarming is that most are missing the biggest opportunity for a real solution.

What are we missing about Supply Chain?

Today, too many people think of "supply chain" tools as Warehouse Management Systems (WMS), Product lifecycle management (PLM) or logistics management packages. This is a huge mistake. What really drives supply chains?

The heart of any supply chain is an interconnected network of "islands" of manufacturing. At the heart of these islands is something called Materials Requirements Planning (MRP). MRP creates and connects the demand signals in the "archipelagos" that comprise most supply chains. A universal law in both manufacturing and supply chain is:

All benefits will be directly related to the speed of flow of relevant materials and information.

In order to improve flow and achieve more agility throughout supply chains, we must seriously re-examine the conventional materials planning and execution systems. This is not just about speeding up the antiquated rules and tools that we already have but rather causing a fundamental shift in how companies manage their supply chains.

Today almost every mid-range and large manufacturing company is using MRP tactics and tools that are not enabling this agility. **No matter how much money you spent on your ERP product, your planning system is antiquated and fundamentally broken!** Hard to believe? Read on and you will see just how large and prevalent the problem is.

A previous challenge within supply chain management was not having visibility into what is being moved and its status; now warehouse management and logistics tools have solved that problem. Now the problem is fundamentally which specific items are actually being moved, transported, located and made. What gets put on lathes, welding jigs, assembly lines, trucks, boats and airplanes is a response to a demand or supply order generation signal. Today, due to the increasing complexity of the global manufacturing and supply landscape **the supply order generation signals that move down through our supply chains have become more and more out of alignment with actual demand.** This is referred to as the "bull-whip" effect. The bull-whip effect is not a new term. However the problem is growing worse. The bull-whip effect kills flow and supply chain agility.

[1] Viswanathan, Nari, (Enabling Supply Chain visibility and Collaboration in the Cloud, November 2010, page 4)

Why does this bull-whip effect exist? The traditional planning rules and tools (including forecast based demand generation) employed by most manufacturers and distributors do not fit the highly volatile and variable world we live in. Those rules were constructed under a "push and promote" mentality fueled by production efficiency metrics and a market that was more tolerant of longer lead times and shortages.

The New Normal

The 21st Century is a highly volatile place. Customers demand shorter lead times, more variety and customization. The CFO demands reductions in working capital. The internet has reduced transactional friction and competition can now come from anywhere on the planet. Supply chains have become extended, more difficult to manage and vulnerable to disruption. The net effect of all of this is that today companies are dealing with more complex planning and supply scenarios than ever before! This is not a temporary phenomenon; it is here to stay. A recent report from Aberdeen Group indicates that companies are beginning to feel the pressure:

"Forty-eight (48%) percent of companies indicate that increased supply chain complexity is a top pressure."[2]

The traditional MRP rules that were conceived, codified and commercialized in the 50's, 60's and 70's under the old "Push and Promote" mode of operation are now breaking down. This includes the general industry love affair with better forecasting algorithms. Working to forecast has long been compared to driving a car by looking in the rear view mirror. Today, however, we are driving on a narrow mountain road in dense fog. The penalties for error are significant, even catastrophic. Paying large sums of money for more sophisticated forecast algorithms simply means you now have a more expensive rear view mirror. Any appreciable gains by these "smarter" algorithms are being more than offset by the rise of volatility.

The Compromises and Effects

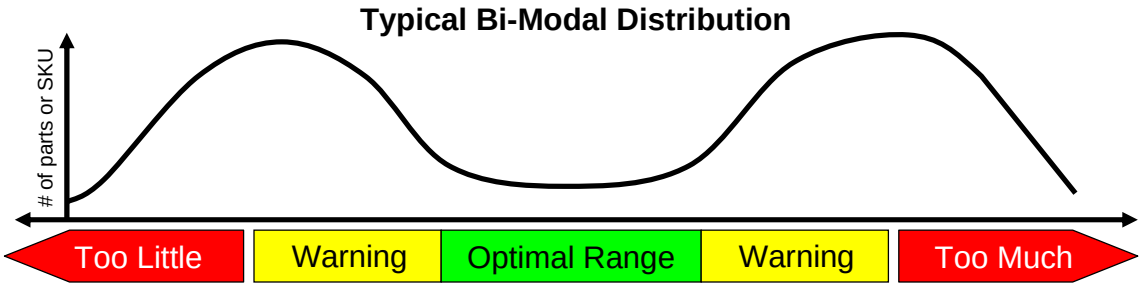
This incredible pressure has forced companies into less than acceptable alternatives. In November of 2009 the Aberdeen Group released a survey that showed that on average **71% of ERP users were using SPREADSHEETS** for demand management rather than their ERP's planning module.[3] Planners fundamentally distrust the signals they get from their integrated planning systems. Utilizing the ease to export data, planners have built work-arounds and ad-hoc mechanisms in order to get a relatively better approximation of real requirements. These tools have limited capability, scalability and transferability. Sound hard to believe? Ask your Planning personnel what would happen if your company's Excel® license was pulled. You probably won't like the answer.

These antiquated rules and tools and ad-hoc systems lead to a combination of three costly effects in today's environment:

Poor Inventory Performance. This is characterized as having too much of the wrong while AT THE SAME TIME having too little of the right. This can be illustrated by the graph below. This shows the bi-modal distribution that many companies find themselves in with regard to their most important parts. Inventory is waste under two conditions ONLY. First, when there is too little - it translates directly to missed sales and expedites. Second, when there is too much - it

[2] Viswanathan, Nari, (Enabling Supply Chain visibility and Collaboration in the Cloud, November 2010)
[3] Aberdeen Group, Demand Management, November, 2009

means that excess working capital and capacity is tied up in things that are not required. In many companies the parts or SKU that matter the most spend the majority of their time in one of these two extreme positions – or oscillating quickly between both sides!



Poor Service Levels. This is characterized by unacceptable fill rates and missed sales. Most companies recognize the high penalty associated with missed sales. They pay a premium in terms of inventory (too much) or expedites (too little) in order to prop up service levels with today's inadequate planning and execution and tools. Unfortunately, many companies still have high inventories, lots of expedites and still cannot meet their service targets.

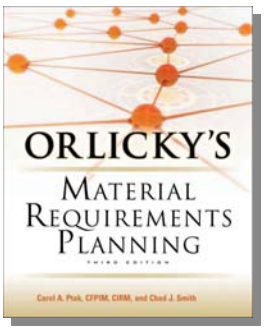
High Expedite Related Expenses. This is often under measured and under appreciated. This is all of the additional effort and money that we employ to make up for shortages in the face of critical service requirements or targets. This includes expedited freight. This is also additional freight because we could only ship partials. It is overtime employed after late components have arrived. It is schedule break-ins in high set-up cost environments.

We surveyed over 150 companies and found that **83% of companies reported one of these effects to a severe degree**.

Where do we go from here?

These problems are not going away. Large ERP providers are focused on infrastructure NOT business application development. Furthermore, the technical magnitude of the problem combined with the direction of the solution leaves a very small group of people with the relevant experience and knowledge to reconstruct the rules and specify the tools.

"Out-of-box ERP tools are too generic to address the complexity of the demand management in terms of representation of multiple levels of the bills of materials, collaboration with several internal and external entities, configuration options and outsourced manufacturing related complexities."[4]

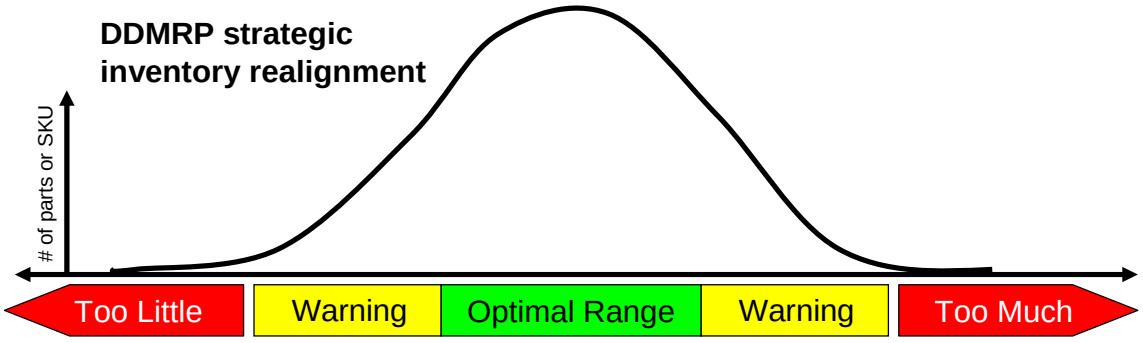


In our upcoming book, Orlicky's Material Requirements Planning, Third Edition (McGraw-Hill, 2011) we lay out the blueprint for fundamentally and practically migrating MRP and DRP from the world of "Push and Promote" to the world of "Position and Pull." This is called Demand Driven MRP (DDMRP). You can download a sample of the book at:

[4] IBID

www.demanddrivenmrp.com.

DDMRP is a multi-echelon demand and supply **planning and execution** methodology. Multi-echelon means that DDMRP integrates multiple tiers (including the bill of material) in the supply chain in order to provide end to end planning and execution visibility so that flow can be improved and better managed. DDMRP ends the typical bi-modal distribution for the parts/SKU that matter and brings it into the desired alignment.



Early adopters are getting significant results with DDMRP without compromises.

Oregon Freeze Dry
Consider the case of Oregon Freeze Dry, the largest diversified freeze dryer in the world. Prior to implementing DDMRP tactics Oregon Freeze Dry used traditional MRP tactics with standard minimum batches.

Mountain House Division:
- Sales increased 20%
- Customer Fill Rate improved from 79% to 99.6%
- **60% reduction in inventory**

Industrial Ingredient Division:
- 60% reduction in make to order lead time
- 100% On-Time-Delivery
- 20% reduction in inventory

Raw Material
No out of stock
Reduced inventory $2.5M+

In their Mountain House division sales increased 20%. Why? Because fill rates went from 79% to 99.6%. Perhaps the most amazing thing is that this increase in sales and service level was accomplished with 60% less inventory.

In their industrial ingredients division there was a 60% reduction in make to order lead time, no stock-outs and a 20% reduction of inventory.

Finally, with regard to their raw materials, they have had no out of stocks and a reduction of over $2.5M in inventory.

Since OFD started with DDMRP tactics sales of those SKU has grown by over 1300% while inventory related to those items grew by only 200%. This happened with almost no amount of capital investments in capacity.

LeTourneau Technologies, Inc. (LTI)
LeTourneau Technologies is one of the world's leading innovators in products and systems for mining, oil and gas drilling, power control and distribution, and forestry.

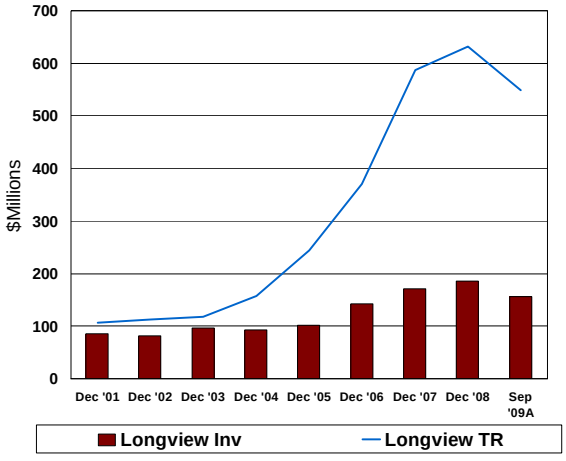
LTI has two main manufacturing facilities (Longview, TX and Houston, TX) that are similar in terms of capability, product complexity and size. The Longview facility used DDMRP tactics while the Houston facility used traditional MRP tactics.

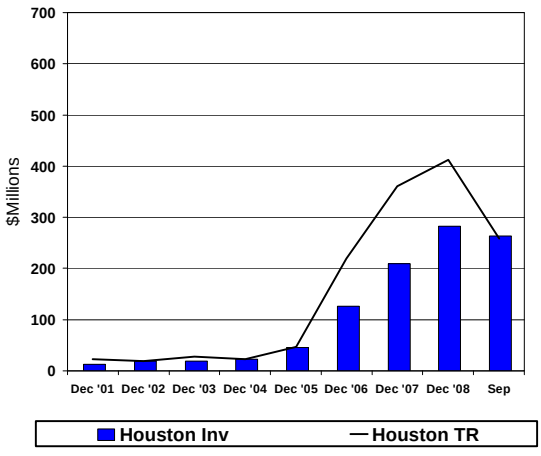
When comparing the revenue versus inventory picture between the two facilities the staggering difference between traditional MRP and DDMRP can be seen.

Beginning in 2005 the market began to take off for all LTI business segments. What is really important to understand is that LTI has been through these boom cycles before. All previous times, however, LTI's inventory and expenses have dramatically risen at a similar rate as revenue along with deteriorating service levels. What is unique about this particular case, is that the Longview facility was able to dramatically control inventory and expenses while maintaining excellent service levels.

Additionally, what should be noted is that all boom markets eventually end. You can see in the graphs below that in 2008 the markets began to cool off. When those boom times are over DDMRP minimizes your exposure to inventory liabilities. The bottom line is that no matter what kind of economic times your company finds itself in, good inventory practices that minimize inventory exposure while maintaining service levels is always the right strategy.

This first graph shows Total Revenue versus Inventory from 2001-2009 from the Longview campus only. Note that beginning in 2005 there was rampant growth. Revenue grew by a factor of greater than 3X (over $400 Million). Over that same period inventory rose only by about $80 Million.





Service levels in Longview are high, WIP is very low and expenses are relatively under control.

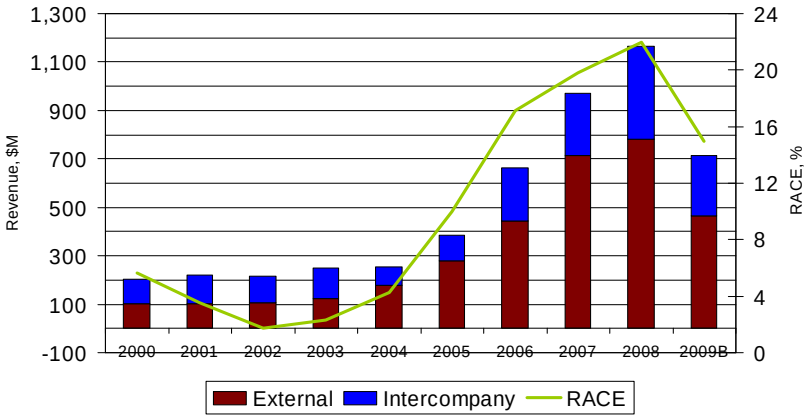
This second graph shows Total Revenue versus Inventory from 2001-2009 from the Houston campus only. Note that at the beginning of 2005 there was the same rampant growth curve as

observed in Longview. In this case, however, inventory ended up growing at nearly the same rate as revenue. There is about a 6-9 month lag but it is pacing at the same rate. Why is there a lag? As typical with most MRP implementations, they are building to forecast.

Now, when the market begins to turn as can be seen in both graphs at the beginning of 2008, LTI is exposed with a huge amount of inventory liability. In fact, due to the nature of forecasting there is a risk that the inventory will actually grow beyond revenue in the short run without massive course correction in the form of PO and MO cancellation and/or delay. This is a classic effect of traditional MRP driven environments.

It is very important to note that the people in the Houston facility are smart, professional manufacturing personnel. They simply did not have the tools and new approaches at their disposal to replicate what happened at Longview. The above graph is not an indictment of those people; it is the proof that traditional MRP represents a huge liability in the volatile and variable manufacturing environments that tend to be today's rule rather than exception.

Overall the company's RACE shows dramatic improvement from 2005 through 2008. This is demonstrated in the graph below. RACE grew from just over 4% to over 22% in 4 years. RACE, however, took a solid hit during 2009 as revenue fell in proportion to inventory levels, the majority of which was located at the Houston site.



DDMRP Solution Summary

DDMRP is an unprecedented no compromise fusion of relevant MRP and DRP tactics combined with the pull-based approaches and signals of Lean and the Theory of Constraints. DDMRP includes planning and execution innovations for better lead time compression and execution visibility. It takes Lean's waste reduction focus and visibility for execution and combines it with a new set of demand driven planning tactics that provides unprecedented planning visibility across an enterprise and supply chain.

Demand Driven MRP (DDMRP Critical Components)	
5 Zone Buffers	Provides easy status and relative priority visibility for planning and execution at all levels
Dynamically Adjusted Buffers	"Flexes" buffer positions based on changes to consumption
Planned Adjustments to Buffers	Accounts for seasonality, product introduction/deletion/transition
Globally Managed Buffer Profiles	Parts/SKU are grouped by like attributes for ease of management
Decoupled BOM Explosion	Creates a unique blend of dependence and independence for planning
ASR Lead Time Calculation	Lead time determination based on the BOM's longest unprotected sequence
Order Spike Protection	Highlights and accounts for problematic sales orders based on a threshold and horizon
Material Synchronization Alert	Identifies specific misalignments between child supply and parent demand
Multi-Location Buffer Status Visibility	Relative status visibility across a distribution net for like parts/SKU
Lead Time Managed Parts	Managing critical non-stocked items through timed alert zone
Matrix BOM + ASR Lead Time Analytics	A revolutionary lead time and working capital compression approach across all BOMs

DDMRP Summary Video Available

You can watch a 62 minute video detailing the problem with conventional MRP in today's environment and the exciting Demand Driven MRP solution:
http://www.demanddrivenmrp.com/videodl.php

White Paper on DDMRP and Lean:

Get the White Paper: *Lean Finds a Friend in Demand Driven MRP (DDMRP)* at:
http://www.demanddrivenmrp.com/leandl.php

Authors' Note:

We understand that most readers of this article might be Planning personnel bound by various policy and metrics restrictions; believe us, we understand. Show your executives the results experienced by the companies already embracing this approach. Convince them to explore the alternative (and superior) metrics and rules of the demand driven methodology. The case CAN be made effectively. Focus on services levels, cash and return on working capital employed (ROCE). Then demand better and more appropriate tools from your technology providers. Please go to www.demanddrivenmrp.com to see how changing the rules AND tools to fit the volatile and demand driven world of the 21st Century is not only possible but also practical. Please contact us with questions, feedback and requests for help.

About the Authors:

Carol Ptak is currently a partner with the Demand Driven Institute, and was most recently at Pacific Lutheran University as a Visiting Professor and Distinguished Executive in Residence. Previously, she was vice president and global industry executive for manufacturing and distribution industries at PeopleSoft where she developed the concept of demand driven manufacturing (DDM). Ms. Ptak spent four years at IBM culminating in the position of SMB segment executive. cptak@demanddriveninstitute.com

Chad Smith is the co-author of Orlicky's Material Requirements Planning, Third Revised Edition (McGraw-Hill, 2011). In 1997 Chad co-founded Constraints Management Group, LLC (CMG). Since the late 1990's Chad and his partners at CMG have been at the forefront of developing and articulating the concepts behind Demand Driven MRP as well as building DDMRP compliant technology (Replenishment+®). Additionally, Chad is an internationally recognized expert in the application and development of the Theory of Constraints (TOC), getting his formal training at the Avraham Y. Goldratt Institute Academy and working under the tutelage of Dr. Eli Goldratt, author of The Goal, for several years. csmith@demanddriveninstitute.com

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