DDMRP and Lean Manufacturing

IFS White Paper

by Bill Leedale, Senior Advisor, North America, IFS

Anyone in manufacturing, supply chain management or logistics has been exposed to the growing buzz around demand-driven materials requirements planning (DDMRP), as popularized by the Demand Driven Institute.

According to the Demand Driven Institute, DDMRP is:

…"a formal multi-echelon planning and execution method to protect and promote the flow of relevant information through the establishment and management of strategically placed decoupling point stock buffers. DDMRP combines some of the still-relevant aspects of Material Requirements Planning (MRP) and Distribution Requirements Planning (DDRP) with the pull and visibility emphases found in Lean and the Theory of Constraints and the variability reduction emphasis of Six Sigma."

That is an accurate but somewhat informationally dense description, so let's unpack it by outlining how DDMRP relates to lean manufacturing concepts manufacturers already understand. How does DDMRP relate to lean? And how can enterprise software like enterprise resource planning (ERP), which evolved to facilitate the lean environment, support organizations intent on adopting DDMRP?

A departure from BOM and Lean

Most discrete manufacturing organizations rely on a bill of material (BOM) to understand demand for component parts and materials required to manufacture products and satisfy orders or projected demand. DDMRP however is a planning method that does not really use a bill of materials explosion to determine how you plan the part. It does not, as lean does, look at unused inventory as waste unless it is pulled through from a specific order. Instead, it monitors how much of a part you have on hand and helps you determine whether you should adjust your supply based not just on pull signals from orders, but from additional demand that may or may not materialize.

Instead of traditional BOM-driven planning and scheduling where a planner will try to determine if they have enough of a part to fulfill a given demand, under DDMRP they will look at inventory levels and determine what level of demand they can respond to given inventory on hand. DDMRP also adds buffers in strategic places in front of shipment, bottlenecks, or in other parts of the value flow that make sense for the business.

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What is the best place for those buffers? Some of that is based on how common a part is in the BOM and at what point in a manufacturing process you would run out.

Buffered inventory is not treated as excess or as waste, but rather as a way to store potential to meet demand, and when that demand materializes that inventory is then pulled through the system.

Lean and DDMRP both look at inventory being pulled by demand for finished product, but those demand signals from contracts or orders are not the only factor in DDMRP. DDMRP takes into consideration that demand shocks can leave a business flat-footed in its ability to respond to the customer or prospect, and seeks to smooth out lumps in demand to a greater extent than lean. Lean is built around the assumption that a nice, smooth schedule is the goal. DDMRP lets you make adjustments quickly as things change, and may increase agility of supply chain and manufacturing processes.

DDMRP assigns statuses to each of these buffers–with simple visual signals. Buffers are red, yellow, green, and black. Black means you are out. Green means the buffer is overstocked. This may seem similar to the lean practice of the heijunka box, which provides a visual representation of the schedule. But unlike a traditional lean manufacturing, DDMRP doesn't refer to these inventory buffers as safety stock–they are a strategic inventory buffers. Lean has buffers–schedule heijunka will replenish these in continuous flow through a simple pull from upstream part consumption. But with DDMRP, instead of safety stock levels being set at a static number, it is adjusted continuously based on various business signals. These might include operational metrics from within the business, market changes or planned or known future events.

Practical applications

IFS customers have already expressed interest in the capabilities of DDMRP, even if they did not initially use the term itself. What they are asking for is a way to shrink the lead times. They have inventory that are mission-critical, and if they get a surprise demand shock that is above the forecast, they need to be able to respond. They accept that at this point, it is not a matter of getting the forecast exactly right, but rather a matter of being in the ballpark given market and demand uncertainty. They need that ability to produce on time to meet customer requirements to a degree not possible with MRP alone. They can do this by buffering their parts intelligently to mitigate risk. Only then can they handle unanticipated demand without sacrificing existing or anticipated orders.

For practical purposes, DDMRP will be more useful in discrete manufacturing than in process manufacturing. DDMRP is still useful in a process environment, but in settings like food and beverage, there is a tradeoff between how much buffer you have and how much of that inventory will expire. Some inventory items like flour may make more sense to buffer, while other more rapidly perishable items may not. Food and beverage manufacturers will certainly face the added complexity of rotating their buffer stock and managing those strategic buffers closely. Food and beverage manufacturers tend to have longstanding commitments to suppliers for perishable items like fruit and dairy, and the supply chain management challenge may be even greater than the inventory management challenge given that the vendor cannot simply grow more peaches or make more milk.

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A manufacturer processing potato chips for instance will have long-term contracts with farms a year in advance so the farms know how many potatoes to plant. There is then a gap between what you can project and what you later produce.

In any discrete setting like industrial manufacturing, DDMRP will be broadly applicable. One thing industrial manufacturers typically do not do well is react to shifts in demand, and DDMRP is an excellent solution to this problem. DDMRP could make these manufacturers more competitive because they can turn projects faster and win more business. After all, if you can commit to satisfying an order and your competitor can't, you will win the business and they won't.

Make-to-stock discrete manufacturers selling through channels of distribution also benefit from DDMRP. If you are supplying a big box store, for instance, the retailer needs to keep a buffer in the stores to meet their daily requirements. The manufacturer or retailer may also have a small buffer in their warehouses. But the manufacturer is separated from the end customer by the retailer and often a wholesaler or distributor, so they need to watch for demand signals from the market that will indicate they need to prepare for additional order volume. These buffers can be allocated in inventory or time.

One area where DDMRP may be a challenge to implement is aerospace and defense manufacturers. Materials, components and sub assemblies are bought and manufactured to a contract. The contract will spell out anticipated demand levels and that is important because standard planned items like flat bulb steel have long lead times. There will be a tradeoff on how much it will cost to hold that inventory and the availability of additional inventory necessary to meet emergent need. It may also be harder to manufacture components or sub assemblies in advance to create a buffer further down the manufacturing process because some components cut across different projects or programs, but many do not. This is in contrast with industrial manufacturing, where you have common parts across products. And those common components can be made available to meet demand. In defense, buffers may have to be located at the raw material level.

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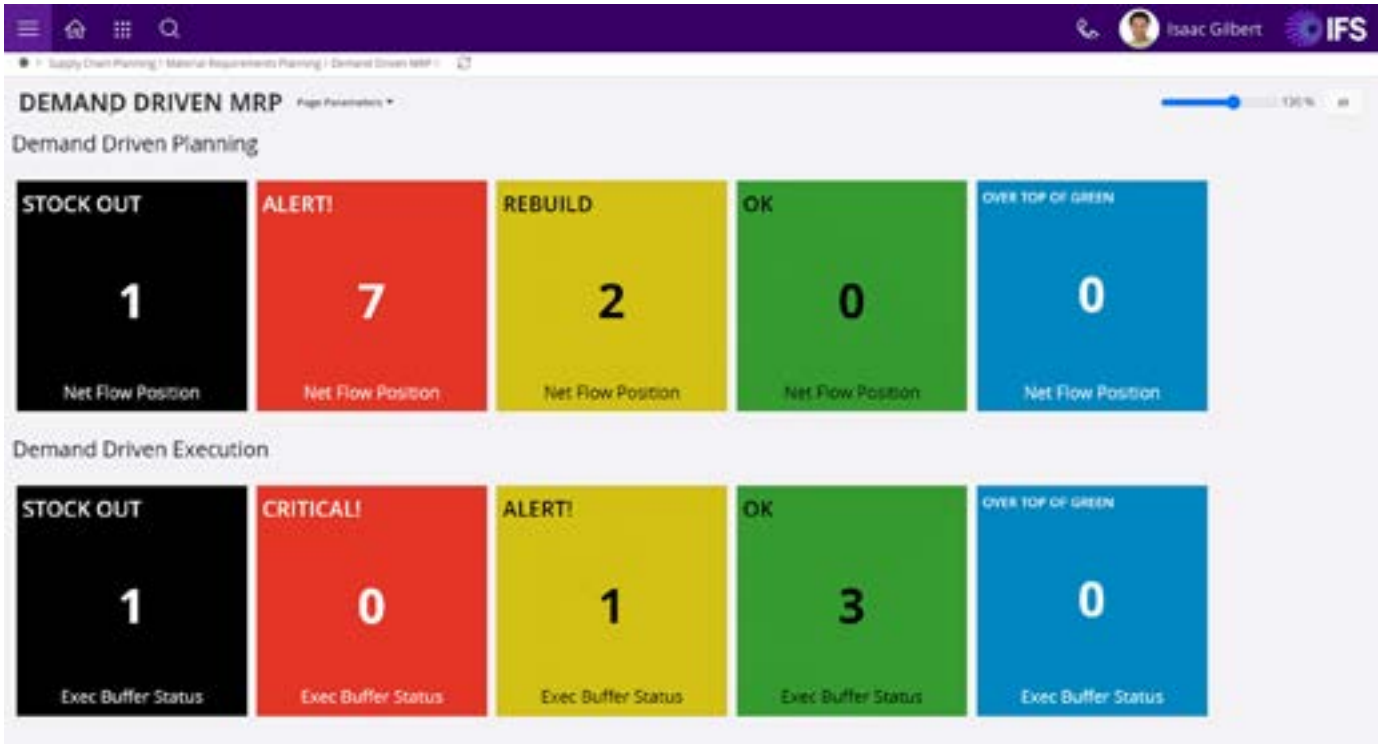
How ERP can help

ERP can and should evolve to deliver functionality that streamlines and formalizes DDMRP in the system of record.

Core functionality that separates ERP software designed for DDMRP from software that is not suitable include:

- The ability to add protected versus unprotected lead time
- Average daily usage rates for parts, and tools to help you calculate those
- A way to identify what demand is real by designating qualified demand versus unqualified demand–with qualified orders linked to a customer order and unqualified demand tied to anticipated demand shocks
- The ability to add DDMRP features to some parts but not others and identify which parts require buffers
- Visibility required to buffer inventory and get the best possible outcomes
- The flexibility to quickly adjust strategic buffers so they stay in an optimal range
- The ability to evaluate your BOM to find common parts and parts that are strategic to your business and add the buffers as required



IFS is compliant with requirements of the Demand Driven Institute, having passed a software compliance test.

Conclusion

DDMRP holds tremendous promise for manufacturers in industries where demand can fluctuate... and these days, that is almost any industry. This simple primer will give you some initial ideas of what DDMRP is and what DDMRP is as compared with the lean manufacturing principals you are already familiar with. But as you determine what DDMRP can do for you, you will want to research further, perhaps starting with materials from the Demand Driven Institute. Carol Ptak and Chad Smith have written a very useful guide, available for download or hard copy through amazon.com.

And it will also make sense to discuss DDMRP with your enterprise software vendor so you can learn what they can do to help you adopt DDMRP.

Bill Leedale has more than 30 years of experience leading large-scale implementation and business process reengineering engagements for global companies, making him a sought-after consultant across multiple industrial sectors. Leedale holds a B.A. in Business and Economics from Wittenberg University in Springfield, Ohio and an M.B.A. from Ohio State University in Columbus, Ohio. He is an author of the current APICS body of knowledge and an author of APICS' current Lean Enterprise Workshop. His certifications include Certified Fellow in Production and Inventory Management (CFPIM), and Certification in Integrated Resource Management (CIRM).

About IFS

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The industry expertise of our people and of our growing ecosystem, together with a commitment to deliver value at every single step, has made IFS a recognized leader and the most recommended supplier in our sector. Our team of 4,000 employees every day live our values of agility, trustworthiness and collaboration in how we support our 10,000+ customers.

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