

Demand-Driven MRP

Revolutionizing Traditional
Manufacturing Processes

PUBLIC

Contents

Abstract	2
1. Introduction.....	2
2. Traditional MRP limitations.....	3
3. Demand-Driven MRP: the methodology	3
3.1 Five steps for DDMRP implementation	4
4. Implementing Demand-Driven MRP	4
Conclusion.....	5

Abstract

The manufacturing industry is evolving rapidly, necessitating a more agile and customer-centric approach to supply chain management. This white paper explores the concept of Demand-Driven Material Requirements Planning (DDMRP) as a solution to the limitations of traditional MRP. We delve into the methodology, benefits, implementation aspects, and how Ai2 can assist in successfully adopting DDMRP.

1. Introduction

Over the past fifty years, Material Requirements Planning (MRP) has served as the cornerstone of software systems in the manufacturing industry. MRP is a computational engine that specifies the materials and components to order, in what quantities, and when they are needed. It also determines when activities should begin to ensure that the products are ready by the expected completion date.

Traditional MRP is inherently based on forecasting. However, the only certain thing about forecasts is that, being based on past activity, they are not always accurate in predicting the future. While we can partially control variability through procedural discipline, high-quality processes, reliable supplier partnerships, and other factors, there will always be surprises and shortages.

Today's supply chain, characterized by increased volatility, uncertainty, complexity, and ambiguity, requires additional planning capabilities that are sensitive to real-time fluctuations in demand. This is where demand-driven MRP (DDMRP) comes into play.

DDMRP, which stands for demand-driven material requirements planning, is an approach to material control and replenishment that enhances the functionality of traditional MRP. By being demand-driven, DDMRP is inherently more responsive to variations in demand and supply that can lead to shortages, production disruptions, and chaos in manufacturing facilities.

DDMRP, also known as demand-driven replenishment, does not replace MRP but extends its capabilities for businesses with such needs. Many manufacturers using an ERP system find MRP to be insufficient and turn to DDMRP for improved operations, especially in an unstable context.

2. Traditional MRP limitations

In its traditional sense, MRP allows for the planning of materials and resources needed to create a product, assuming that the forecast is accurate and there are no unforeseen changes in demand within the total lead time allocated for product realization. Unfortunately, in a dynamic environment, things change rapidly.

In the presence of demand fluctuations, the risk reduction strategy of the MRP method involves creating additional "just-in-case" buffer stock throughout the entire supply chain, calculated based on a set of assumptions and formulas. When unexpected events occur, part of that buffer stock can be utilized. While the additional stock effectively helps avoid shortages, it is not foolproof. Moreover, increased inventory ties up capital and space.

When MRP detects an impending shortage, as the buffer stock is depleting, it sends alerts to users to prompt the replenishment of those stocks, triggering a sequence of manual operations.

The real problem lies in the variability caused by approximate forecasts and supply chain variations, such as delays in goods receipts and order completions, excessive scrap, quality issues, and inaccuracies in documentation. While acknowledging the impossibility of completely eliminating variability, manufacturing companies still seek ways to mitigate the dual problem of excess or shortage of stock. The advanced functionalities of DDMRP, compared to traditional MRP, precisely address this need.

3. Demand-Driven MRP: the methodology

Now, let's explore how demand-driven MRP works.

If MRP operates as a "push" technique, pushing stock into the system based on projected demand, DDMRP functions in the opposite way.

By adopting a "pull" method for materials with a demand-driven approach, DDMRP eliminates variability from the equation. Instead of relying on forecast accuracy and accumulating buffer stocks to hedge against demand and supply fluctuations, DDMRP tracks actual usage and manages replenishment through a simple visual system. The buffer stock is only utilized to ensure the availability of key components deemed strategically important. By using DDMRP, both overall stock levels and the risk of shortages are reduced simultaneously.

DDMRP is structured around a methodology succinctly summarized by the formula "position, protect, and pull."

- **Position:** Bill of Materials is examined to identify strategic items, such as materials or components at critical points within the structures. In an adaptation of the Theory of Constraints, where critical resources, known as "constraints," determine production limits, these key materials require utmost attention compared to other components.
- **Protect:** The availability of these critical items is ensured by assigning a buffer function to the inventory. However, unlike traditional MRP, where this buffer stock is established within the initial planning formula, DDMRP dynamically replenishes it based on actual needs.
- **Pull:** The buffer stock is managed through an innovative pull technique that continuously monitors inventory levels and triggers visual signals to maintain the buffer within a specified range.

3.1 Five steps for DDMRP implementation

The DDMRP encompasses five consecutive components:

- **Strategic Decoupling:** This initial step involves identifying strategic decoupling points within the product's internal structure and the overall supply chain. By doing so, the DDMRP prevents the propagation of variability upstream and downstream, reduces lead time, and enables an independent and shorter planning horizon. Unlike MRP, which relies on long-term planning and is susceptible to system nervousness, DDMRP allows for more flexibility in planning.
- **Buffer Profile and Levels:** This stage establishes buffer levels at the decoupling points to absorb shocks and minimize variability. The determination of buffer levels combines various information sources such as forecasts, historical data, and DDMRP methodology-derived data. Each buffer consists of three distinct zones, each serving different objectives. This approach provides immediate visibility and transparency into stock positions, a feature not attainable with MRP. It's crucial to note the significant differences between a DDMRP buffered item and a safety-stocked item used in MRP.
- **Dynamic Buffer Adjustment:** Once the initial levels of strategic buffers are set, DDMRP allows for dynamic adjustments to protect buffer levels in response to internal and external changes. This flexibility helps prevent the risk of strategic stock outages when they are most needed.
- **Demand-Driven Planning:** In DDMRP, planning involves generating supply orders using a simple yet effective algorithm. The methodology leverages the structure established in the previous steps, enabling the generation of supply orders based on sales orders within a short-term horizon. Unlike MRP, which heavily relies on long-term forecasts, DDMRP focuses on decision-making based on actual sales orders.
- **Visible and Collaborative Execution:** Execution in the DDMRP methodology refers to the management of open or upcoming supply orders. Clear and precise signals are used to identify priorities, with higher priority given to lower strategic buffer levels. This shift from prioritizing delivery dates to buffer-driven dates represents a significant departure from MRP logic. The underlying principle is to prioritize flow maintenance. DDMRP ensures optimal stock levels at designated decoupling points, eliminating concerns about excess or insufficient materials when they are needed.

4. Implementing Demand-Driven MRP

The DDMRP methodology offers significant benefits for organizations, but realizing these advantages necessitates the presence of skilled professionals, the right methodology and effective software tools.

- Before implementing DDMRP, it is crucial to assess the organization's readiness and feasibility. This involves evaluating current processes, systems, and capabilities to determine the scope and potential benefits of implementing a demand-driven approach. Shifting from traditional forecast-based planning to a more responsive and dynamic system demands a change in mindset and culture.
- Identifying gaps between the existing MRP system and the desired demand-driven state is a vital step. This analysis helps identify areas for improvement and provides insights into necessary changes in processes, systems, and organizational structure.

- Designing a demand-driven operating model requires customizing DDMRP to align with specific business requirements. It involves redesigning processes, optimizing inventory positioning, and defining roles and responsibilities within the organization.
- Successful implementation of DDMRP necessitates training employees on the new methodology and cultivating a culture of change. Change management practices help facilitate smooth transitions and foster employee buy-in and commitment.
- Implementing DDMRP is an ongoing process. Continuous improvement initiatives and ongoing support are essential for refining the demand-driven operating model, addressing challenges, and ensuring sustained success.

Conclusion

In conclusion, DDMRP is a method through which we can model, plan and manage the supply chain by protecting and promoting the flow of relevant materials and information through the positioning and management of stock buffers positioned at strategic decoupling points.

The DDMRP combines typical aspects of Material Requirements Planning (MRP) and Distribution Requirements Planning (DRP), also incorporating key aspects of Lean and *TOC* (Theory of Constraints) approaches such as visibility and pull logic.

Position, protect and pull these are the three words that best summarize the whole methodology, without forgetting the flow, the mainstay and ultimate goal of all operations.

By aligning supply chains with real-time customer demand, organizations can enhance customer satisfaction, reduce costs, optimize inventory, and drive operational excellence. Ai2 stands ready to assist organizations in successfully adopting DDMRP, leveraging our expertise, structured approach, and commitment to achieving sustainable results. Together, we can embark on a journey towards a demand-driven operating model that positions your organization for long-term success in today's dynamic manufacturing landscape.