Demand Driven MRP in SAP Integrated Business Planning

Introduction

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Introduction to Demand-Driven MRP (DDMRP)
Overview of the SAP Solution DDMRP in IBP
Demo
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Introduction to Demand-Driven MRP (DDMRP)

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Outlook
The world has changed since MRP was introduced in the 1950s…

High supply chain complexity

High product customization

Short product lifecycles

Short customer tolerance times

Many long lead time parts

High product proliferation

Many more…

Demand Uncertainty / Slow & Disruptive Response

Inventory & Service & Expense Challenges
Motivation: Inventory & Service & Expenses Challenges
Typical Customer Statements

As-Is Situation

• I have too much stock of the products I don’t need.
• I have too little stock of the products I need.
• I have high expedite or over-time expenses
• Overall I have too much stock. Nevertheless, I cannot fulfill my customer orders (in time and quantity)

What I want

• Best possible customer service levels …
• … at lowest possible (total supply chain) costs

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Why do we have “Inventory & Service & Expense Challenges”? (1/2)

Example: Fast moving consumer goods

Assumptions:

- **Customer tolerance time** (the time a customer is willing to wait for delivery) is significantly shorter than **cumulative lead time** (the time it takes to procure, produce and distribute the product)
- Typically, forward-looking **planning is over a planning horizon at least as long as cumulative lead time**
- The only demand signal for this planning horizon is **forecast**
- Traditional **MRP** considers forecast, BOM and lead times for all materials to be available when needed (by creating supply orders)
- Traditional **MRP** creates optimal plans only if forecasts and lead times are perfect (i.e. no variability anywhere, everything goes exactly according to plan).
Why do we have “Inventory & Service & Expense Challenges”? (2/2)

Realities:
• Forecasts are wrong & volatile and lead times will vary (i.e. there is variability in execution)

In addition: The full dependency assumption of MRP propagates the impact of these variations.

Result:
• Bullwhip effect and nervousness
What is Demand-Driven MRP (DDMRP)? (as defined by the Demand Driven Institute)

“Demand-driven MRP is a methodology to model, plan and manage supply chains to protect and promote the flow of relevant information and materials.

Demand-driven MRP is largely comprised of known and accepted methods (e.g. MRP, Lean, ToC, …). The key element of demand-driven MRP is harmonizing these methods together with several key innovations.”
The core principles behind Demand-Driven MRP (DDMRP) (as defined by the Demand Driven Institute)

The primary objective of DDMRP is to enable material and information FLOW, which is based on the following core principles:

- Dampen the effect of demand & supply variation on the supply chain through buffers at strategic decoupling points.
- Drive replenishment at strategic decoupling points from actual demand, not forecasts.
- Achieve visibility and demand-driven prioritization of supply based on buffer status at decoupling points.
A move towards Demand-Driven Planning can dampen variability and it’s amplification (bull-whip) in today’s volatile world

Traditional planning facilitates the amplification of variability in the supply chain

DDMRP uses strategically positioned stock buffers and pull replenishment to achieve stable material flow

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Five components of Demand Driven MRP form the basis of a demand driven operating model

1. Modeling/Re-modeling the Environment
2. Protect
3. Pull
4. Plan
5. Execute

- Position
- Protect
- Pull

- Strategic Decoupling
- Buffer Profiles and Levels
- Dynamic Adjustments
- Demand Driven Planning
- Visible and Collaborative Execution

DDMRP is an end-to-end closed loop process covering modelling (step 1-3), planning (step 4) and execution (step 5)

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As a first step, decoupling points within the product structure and supply chain have to be placed strategically.

### Product A:

- It has to be decided where inventory buffers should be positioned.
- Primary question to be answered before sizing the inventory.
- Related to BOMs as well as facilities.

### Factors influencing location of decoupling points:

- Customer tolerance time
- Market Potential lead time
- External & internal variability
- Sales order visibility horizon
- Inventory leverage and flexibility
- Critical operation protection

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Decoupled Lead Time

- DDR with (strategic) buffer
- Ad-hoc Prod.
- Decoupling through strategic buffer positioning
- Time-dependent buffer levels for shock absorption

1. Individual Lead Time
2. Decoupled (Buffer) Lead Time
Replenishment buffers are calculated based on individual part properties and buffer profiles, resulting in buffer levels for each part.

<table>
<thead>
<tr>
<th>Individual Part Properties</th>
<th>Group Settings (Buffer Profiles)</th>
<th>Zone and Buffer Levels for each Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decoupled Lead Time</td>
<td>Item Type</td>
<td>Green Zone</td>
</tr>
<tr>
<td>Minimum Order Quantity (MOQ)</td>
<td>Lead Time Category</td>
<td>Yellow Zone</td>
</tr>
<tr>
<td>Location (distr. parts only)</td>
<td>Variability Category</td>
<td>Red Zone</td>
</tr>
<tr>
<td>Average Daily Usage (ADU)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The heart of the order generation aspect of the buffer, determining the frequency of order generation and the minimum size of each order.

The heart of the demand coverage in the buffer.

The safety embedded in the buffer position.

Source: copyright Demand Driven Institute – used with permission
Dynamic adjustments

ADU-based recalculation of buffer

Manual adjustment of buffer

“Forecast used for the buffer calculation“
Replenishment Planning
Big picture

DDR with (strategic) buffer
Ad-hoc Prod.
Decoupling through strategic buffer positioning
Time-dependent buffer levels for shock absorption

2 Individual Lead Time
8 Decoupled (Buffer) Lead Time
Replenishment Planning
Protecting the strategically determined decoupling points via net flow equation

Net flow position = On-hand + Open Supply - “Qualified demand”

- **On-Hand Stock**: Quantity being physically in stock
- **Open Supply**: Total of all outstanding replenishment orders
- **Qualified Demand**: Firm Demands past-due or due today + Qualified spikes

![Net flow diagram](source: copyright Demand Driven Institute – used with permission)

**Max Stock**
- 10,000

**Reorder Point**
- 7,500

**Qualified Demand**
- (3.500)

**Open Supply**
- (500)

**On-Hand Stock**
- (4.000)

**Safety Zone**
- 0

**Spike Horizon**
- Spike

**Spike Threshold** = (e.g.) 50% x Safety Stock

**Firm Demand Quantity**
- Past Due SO’s
- Today

**Spike**
Replenishment Planning
Supply against a part is generated by its net flow position relative to its buffer- and zone levels

- Depending on the net flow position, different actions are possible:
  - **Green**: No action
  - **Yellow**: Place new order
  - **Red**: Expedite open supply (execution)

- Recommended order quantity (lot size) is the quantity to bring the available stock position to the top of green
- Buffer penetration (%) serves as basis for relative priorities
- In the example we have an on hand buffer status of 40%
Achieve visibility and demand-driven prioritization of supply based on buffer status at decoupling points

Orders prioritized by buffer status

<table>
<thead>
<tr>
<th>Order #</th>
<th>OH Buffer Status</th>
<th>Due Date</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 275-44</td>
<td>3%</td>
<td>05/16</td>
<td>Super Tech</td>
</tr>
<tr>
<td>PO 281-21</td>
<td>17%</td>
<td>05/14</td>
<td>Super Tech</td>
</tr>
<tr>
<td>PO 276-54</td>
<td>27%</td>
<td>05/12</td>
<td>Super Tech</td>
</tr>
<tr>
<td>PO 280-89</td>
<td>47%</td>
<td>05/12</td>
<td>Super Tech</td>
</tr>
<tr>
<td>PO 279-84</td>
<td>54%</td>
<td>05/12</td>
<td>Super Tech</td>
</tr>
</tbody>
</table>

Benefits

- Generate clear visibility (On Hand buffer status) for relative priorities to determine execution priority
- Avoid manual workaround or disconnected subsystems and massive daily efforts of analysis and adjustments for actual priority determination
- Provide sequence for orders in manufacturing

This order likely would have been deferred highest priority!
The Demand Driven Institute states key benefits and substantial improvement potentials by the use of DDMRP

- **Improved customer service:** Users consistently achieve a high on time fill rate performance
- **Lead time compression:** Lead time reductions have been achieved in several industry segments
- **Right-sized inventory:** Inventory reductions are achieved while improving customer service
- **Lower total supply chain cost:** Costs related to expedite activity and false signals are largely eliminated
- **Easy and intuitive:** Planners see priorities instead of constantly fighting the conflicting messages of MRP

Source: Camelot ItLab
Question: “What is the difference between Inventory Optimization and DDMRP?”

Comparing IO with DDMRP is like comparing 🍎 s with 🍊 s!

DDMRP is an end-to-end planning & execution process, while IO is one planning / process step in a forecast driven approach.
Question: „Do we still need a forecast?“

YES!

“Forecasted demand can be used in conjunction with a DDMRP system as an input into the buffer zone calculation” (*)

You (can) configure (the buffer levels) based on forecast – you execute based on actual demand

(*) Quote: Chad Smith – Demand Driven Institute
Agenda

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Overview of the SAP Solution DDMRP in IBP

Demo

Customers

Outlook
Press release May 14th 2019

WALLDORF — SAP SE (NYSE: SAP) today announced the availability of the SAP Integrated Business Planning application for demand-driven replenishment.

Co-developed with Cameo IT Lab, certified by the Demand Driven Institute, the application helps organizations better manage supply chain variability, compress
### Supply Chain Control Tower

Exception Handling and Business Network Collaboration

### Sales and Operations Planning

Strategic and Tactical Decision Processes

<table>
<thead>
<tr>
<th><strong>Demand</strong></th>
<th><strong>Inventory</strong></th>
<th><strong>Demand-Driven Replenishment</strong></th>
<th><strong>Response &amp; Supply</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Forecasting, Consensus Planning, Demand Sensing</td>
<td>Multi-Stage Inventory Optimization</td>
<td>Demand-Driven Material-Requirements Planning (DDMRP)</td>
<td>Unconstrained and Constrained Supply Planning, Allocations and Deployment Planning, Order Rescheduling</td>
</tr>
</tbody>
</table>

### IBP Platform

Analytics and Web-based Planning UI, Microsoft Excel Planning Frontend, Job Scheduling, Data Integration, Version Planning and Simulation, User Management and Authorizations, Data Realignment, …

### SAP HANA
SAP Integrated Business Planning for Demand-Driven Replenishment
End-to-End Process Flow

<table>
<thead>
<tr>
<th>Position</th>
<th>Protect</th>
<th>Pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Position</td>
<td>2 Protect</td>
<td>3 Pull</td>
</tr>
</tbody>
</table>

- 1: Strategic Decoupling
- 2: Buffer Profiles and Levels
- 3: Dynamic Adjustments
- 4: Demand Driven Planning
- 5: Visible and Collaborative Execution

Source: copyright Demand Driven Institute – used with permission
Step 1: Buffer positioning (strategic)
Set the Decoupling Points

- **Automated proposals** for decoupling points via „*Recommend decoupling points*“ operator

- **Manual simulation and override possibility** via the Buffer Analysis Fiori app
Step 2: Buffer sizing (operational)

• (Daily) automated calculation of buffer levels – based on individual part properties (e.g. ADU) and group settings (buffer profile)
Step 3: Dynamic buffer level adjustments

- Option to **manually adjust** the buffer levels
Step 4: Replenishment planning

Calculate net flow position and create supply elements

- Calculate net flow position and create supply element at the end of decoupled lead time if net flow is in yellow or red zone
Step 5: Replenishment execution and visibility

- Replenishment execution in SAP ECC with enhanced TA MD04

- Multiple monitoring and analytics (Fiori analytics or Excel) to evaluate buffer sizing, on-hand inventory, net flow integrity and many more.
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Outlook
How Did a Home Appliances Manufacturer Infuse Intelligence into its Digital Supply Chain?

Improving customer service and efficiency with Integrated Business Planning and Demand Driven MRP

The BSH Home Appliances Group, Europe’s largest manufacturer of home appliances, operates 42 plants around the globe and has a sales, production, and service presence in 80 locations in about 50 countries. In order to drive digital transformation and optimize business results based on collaborative decision-making and a demand driven operating model, the company reimagined planning and supply chain functions. BSH was looking for an integrated end-to-end planning system that would allow to make automated statistical forecasts and real-time simulations in only one system. So the company decided to implement SAP Integrated Business Planning for sales and operations.
BSH creates a transparent, demand driven end-to-end supply chain to **fulfill future demand profitably** and raise customer satisfaction levels.

The **SAP® Integrated Business Planning** solution and the support of **CAMELOT Consulting Group** helped BSH Home Appliances Group to:

- Optimize planning results using forecast algorithms and predictive analytics
- Create standard, global templates for demand planning and sales and operations planning
- Implement integrated processes based on tactical planning and operational pull replenishment & leveling
- Become more agile with respect to changing customer demand and market conditions
- Handle exceptions through alerts and increase visibility over bottlenecks and stock evolution
- Empower planners for what-if simulation, allowing improved decision making
- Initiate a real paradigm shift within the supply chain towards pull replenishment based on DDMRP principles
- Improve scheduling based on integration of production leveling and SAP IBP based DDMRP
- Automize parametrization of the DDMRP based replenishment planning process
- Improve forecast accuracy, customer satisfaction and inventory levels

“SAP Integrated Business Planning and the CAMELOT team help us shape our future digital supply chain based on a **state-of-the-art planning** application. We're closing in on our goal to become and stay the first choice for consumers worldwide.”

Dietmar Baumann, Head of the Supply Chain Factory (IT), BSH Home Appliances Group

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B/S/H/

Company Name
BSH Home Appliances GmbH

Industry
Consumer products

Employees
61,800

Revenue
€13.8 billion

Featured Solutions and Services
SAP Integrated Business Planning, SAP Digital Business Services

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Outlook
SAP Integrated Business Planning for demand-driven replenishment
Product road map overview – Key innovations

V1908 – Recent innovations
Buffer positioning and sizing
- Enhanced approach to calculate average daily usage (ADU) based on local dependent demand and forecasts
- Master data attributes to specify ADU calculation horizon (through configuration)

V1911 – Planned Q4/2019
Buffer positioning and sizing
- New ADU operator for calculating ADU
- SAP Fiori support loading of planning filter in DDMRP Buffer Analysis app
- Improvement of solver’s selection of decoupling points based on inventory and flexibility leverage
- Outbound integration of decoupling point indicators and buffer levels to SAP S/4HANA, 1909 release (on premise)

V2002 – Planned Q1/2020
Buffer positioning and sizing
- Demand-driven replenishment operators to support setting for calculation horizon
- Buffer levels updated only outside of decoupled lead time
- Include outliers in ADU operator calculation

V2005 – Planned Q2/2020
Buffer positioning and sizing
- Mass update of decoupling points in DDMRP Buffer Analysis app

Visible and collaborative execution
- Order frequency variance and flow index KPI

Demand-driven planning
- Creation of supply and demand elements outside decoupled lead time

Visible and collaborative execution
- Integration of source-target decoupling point mapping and the planning priority into SAP ERP

1This is the current state of planning and may be changed by SAP at any time without notice.
SAP Integrated Business Planning for Demand-Driven Replenishment

Direction update

**Buffer positioning and sizing**
- Algorithm improvements to DDMRP strategic inventory positioning and buffer calculation
- SAP Fiori app “Manage Buffer Profiles” for configuration of buffer profile master data
- Effectivity/validity dates for sources of supply

**Demand-driven planning**
- Order-based DDMRP replenishment
- Leveraging of calendars
- DDMRP-specific deployment capabilities within general deployment framework

**Demand-driven sales and operations planning**
- Buffer calculations and buffer visualizations at an aggregate level
- Long-term order-based replenishment proposals
- Scenario planning capabilities

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Further information

On the **Topic**
- Website: [http://www.demanddriveninstitute.com/](http://www.demanddriveninstitute.com/)
- Book: Demand Driven Material Requirements Planning (DDMRP), Version 3 (2019)
- Videos to motivate and introduce DDMRP: [https://vimeo.com/208396607](https://vimeo.com/208396607), [https://vimeo.com/219437991](https://vimeo.com/219437991)

On the **SAP Solution**
- [SAP Help for IBP](#) (IBP 1908)
- [IBP Roadmap](#) (IBP 1908 update)
Thank you.

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