Production Planning

Lesson 6 : Material Requirements Planning

Lesson Objectives

- Objectives -On successful completion of this training module, you should have:

  - Understood the basics of Demand Management

  - Become familiar with Consumption Base planning

  - Become familiar with Master Production Schedule

  - Become familiar with Lot Sizing Procedure

  - Become familiar with PP-MRP Planning Run

Training Agenda

- PP MRP Procedure

- PP Consumption Base planning

- PP Master Production Schedule(MPS)

- PP Firming Type

- PP Material Requirement Planning(MRP)

- PP Net Requirement Calculation

- PP Lot Sizing Procedure

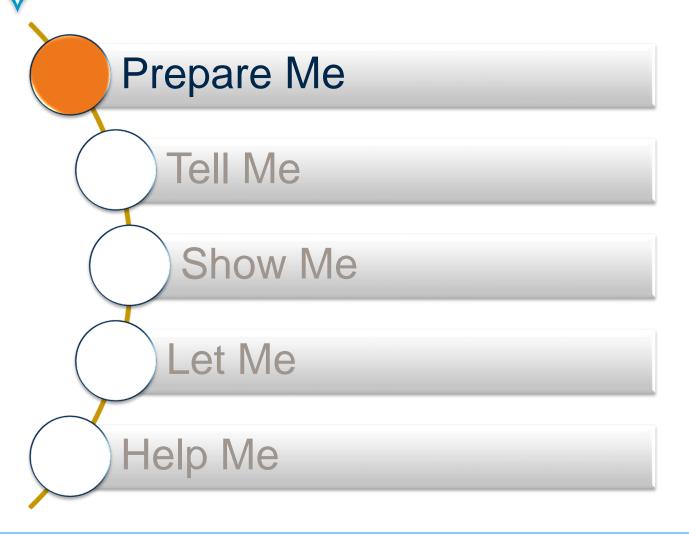- PP Scheduling

- PP BOM Explosion

- PP-MRP Planning Run

Material Requirements Planning

Prepare Me

Tell Me

Show Me

Let Me

Help Me

Material Requirements Planning

- Prepare Me
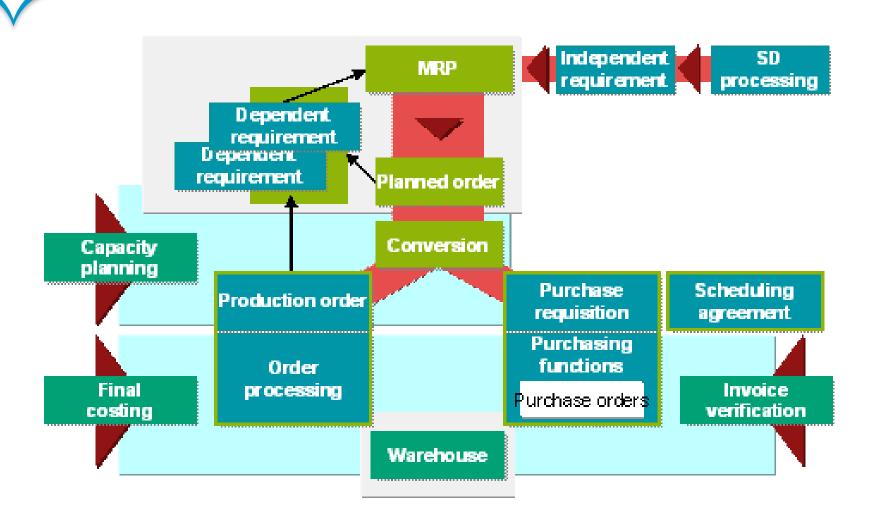- Tell Me
- Show Me
- Let Me
- Help Me

Prepare Me

The main function of material requirements planning is to guarantee material availability, that is, it is used to procure or produce the requirement quantities on time both for customer dependent and independent requirements
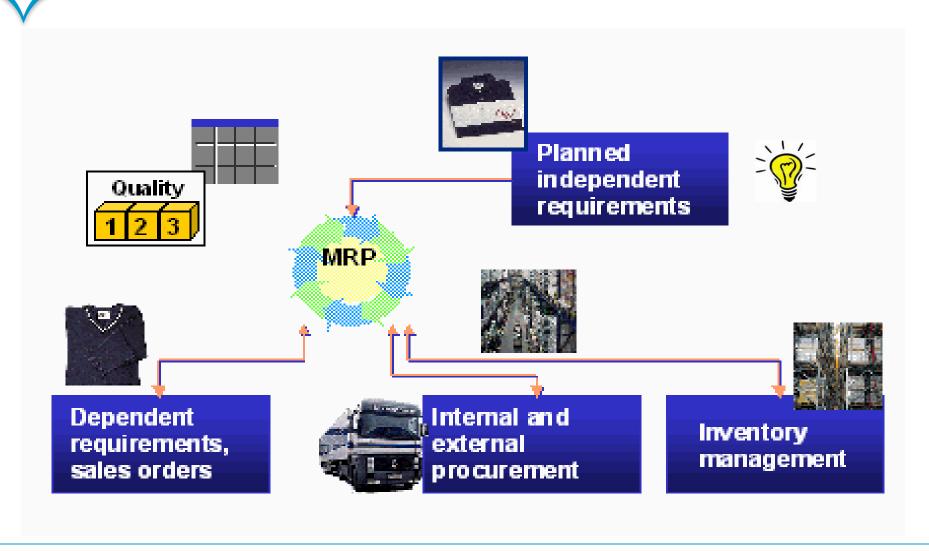
- MRP tries to strike the best balance possible between

- Optimizing the service level and

- Minimizing costs and capital lockup.

MRP in the Logistics Chain

Material Requirement Planning

Planned independent requirements

MRP

Quality 1 2 3

Dependent requirements, sales orders

Internal and external procurement

Inventory management

Purpose

- The aim of material requirements planning is to tailor available capacities and receipts on time to suit requirements quantities

- MRP tries to strike the best balance possible between

  - Optimizing the service level and

  - Minimizing costs and capital lockup

Use

- It is used to procure or produce the requirement quantities on time both for internal purposes and for sales and distribution. This process involves the monitoring of **stocks** and, in particular, the automatic creation of **procurement proposals** for **purchasing and production**.

- SAP MRP creates planned orders based on a material's net requirement quantity and its needed availability.

Challenges

- Accuracy of Master Data

- Material master

- Bills of material

- Work center – For in-house production

- Routing - For in-house production

- And also the following components

  - Demand Management

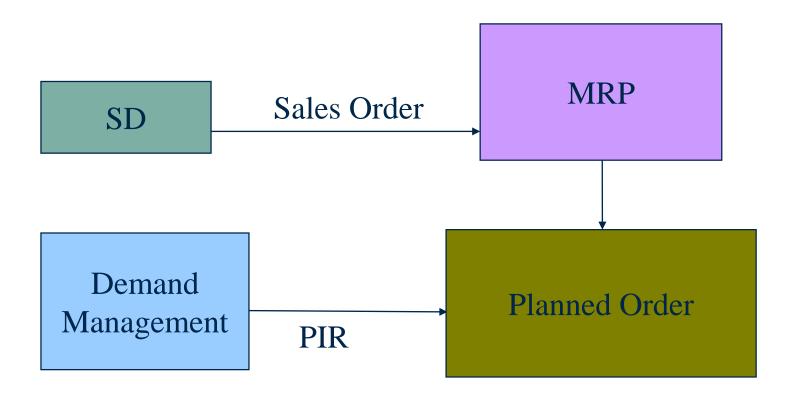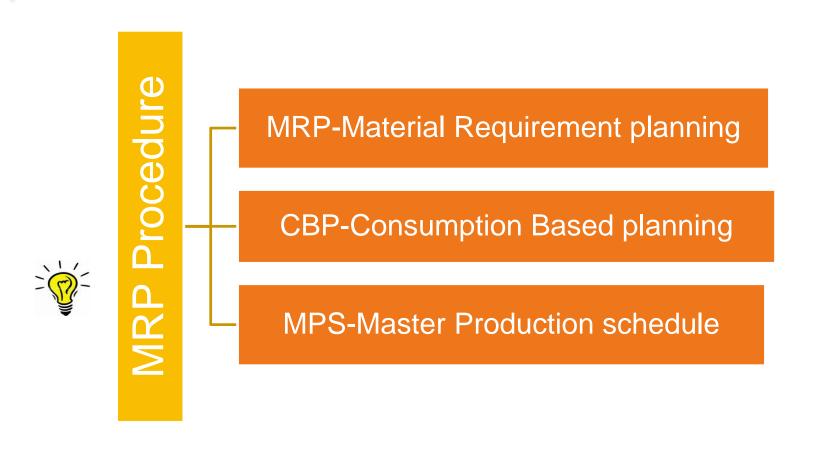 - Sales and Distribution

PP1003 - Material Requirements Planning

Prepare Me

Tell Me

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Help Me

Tell Me

- Process Flow

- Process Description

Process Flow

```
┌──────────────┐                          ┌──────────────────┐
│              │                          │                  │
│     SD       │──── Sales Order ────────▶│       MRP        │
│              │                          │                  │
└──────────────┘                          └──────────────────┘
                                                    │
                                                    ▼
┌──────────────┐                          ┌──────────────────┐
│   Demand     │                          │                  │
│ Management   │──────── PIR ────────────▶│  Planned Order   │
│              │                          │                  │
└──────────────┘                          └──────────────────┘
```

Process Description

MRP Procedure

- MRP-Material Requirement planning
- CBP-Consumption Based planning
- MPS-Master Production schedule

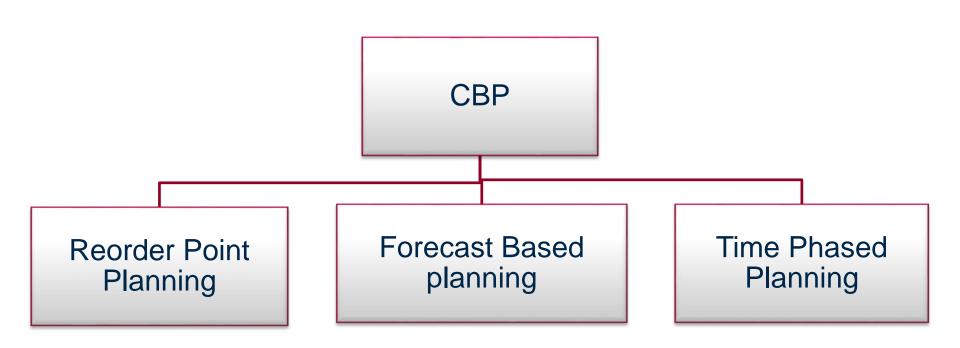# Demand and Stock elements for MRP

Various Requirement Elements

- Demand plan (Forecast) from Demand Planning system
- Sales Order requirements
- Dependent Requirements
- Requirements from other Plants (stock transfer requirements)
- Safety Stock requirements

Various Stock Elements

- Available stock in warehouse (various stock types)
- Planned Orders
- Production Orders
- Purchase Requisitions
- Purchase Orders
- Stock Transfer Requisitions
- Stock Order Orders

Consumption Base Planning

Tell Me

Net Requirements Calculation: Reorder Point Planning

Available warehouse stock is calculated as follows:

```
    Plant stock
+   Open order quantity (purchase orders, firmed planned orders,
    firmed purchase requisitions)
─────────────────────────────────────────────────────────────
=   Available stock
```

If available warehouse stock falls below Reorder Point then in MRP Run Systems generate procurement proposal

Tell Me

Net Requirements Calculation: Reorder Point Planning

Available stock is calculated as follows:

```
     Plant stock
—    Safety stock
+    Receipts (purchase orders, firmed purchase orders)
—    Requirements quantity (forecast requirements)
=    Available stock
```
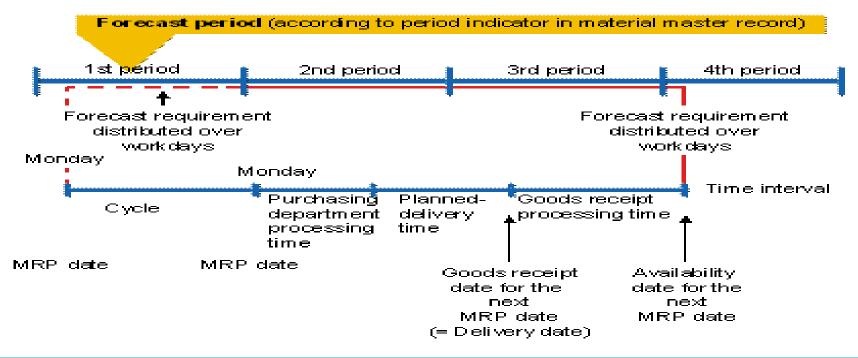
If the available stock becomes negative then in MRP run system generates new procurement proposal.

Tell Me

Net Requirements Calculation: Time Phased Planning

If a vendor always delivers a material on a particular day of the week, it makes sense to plan. This material according to the same cycle, in which it Is delivered.

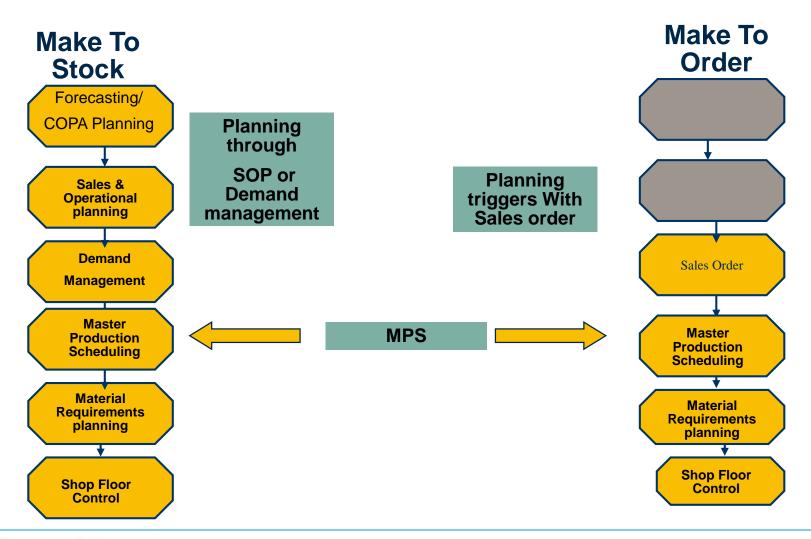Forecast requirements or other requirements in the interval + safety stock

MPS: Master Production Scheduling

- MPS enables you to plan materials that greatly influence a company's profits and critical.
- The master production scheduling run only plans the master schedule items. Master production scheduling is executed with the same logic as MRP.
- MPS run will plan and pass on the dependent requirement but it will not create any procurement proposal for the material which are planned with MRP run. i.e. in the material master MRP type PD.
- The firming type defines how the order proposals are firmed and how the dates are set within the firming period.
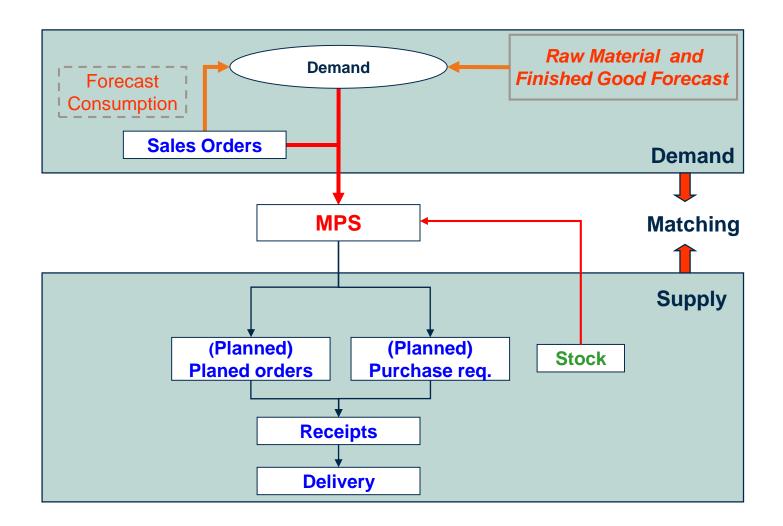- Goods having high inventory cost and less in demand can be planned through MPS planning.

Position of MPS in the PP process flow

Make To Stock

Forecasting/ COPA Planning	Planning through SOP or Demand management	
Sales & Operational planning		
Demand Management		
Master Production Scheduling	← MPS →	Master Production Scheduling
Material Requirements planning		Material Requirements planning
Shop Floor Control		Shop Floor Control

Make To Order

Planning triggers With Sales order

Sales Order

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Process Flow: MPS

MPS Planning

- **Planning Time Fence** : You can protect the master plan from any automatic changes to master schedule items in the near future by using a planning time fence.

- You can define the planning time fence either material-specific or per MRP group

- **Firming Type** : The firming type determines how procurement proposals are to be firmed and scheduled within the planning time fence during the planning run
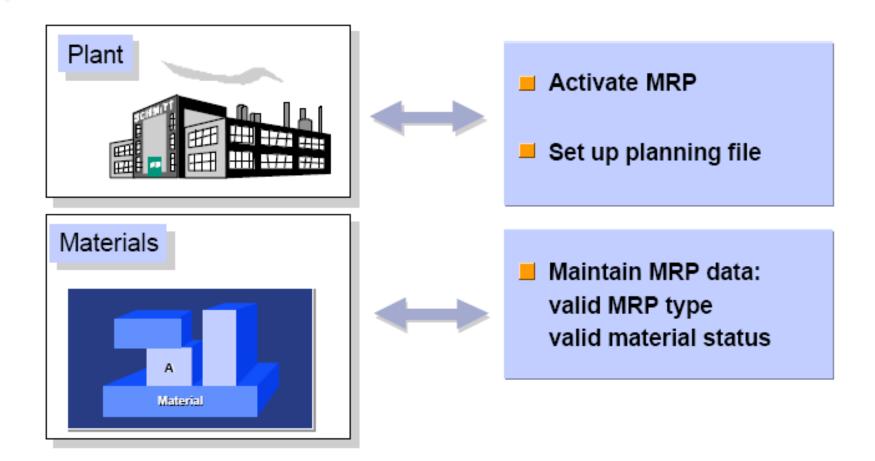
Firming Type

- The following firming types are available

| Firming Types	Existing order proposals are	New order proposals are
M0	Not automatically firmed	Created with appropriate dates
M1	Automatically firmed	Created, moved to end of firming period
M2	Automatically firmed	Not created, shortages remain uncovered
M3	Not automatically firmed	Created, moved to end of firming period
M4	Not automatically firmed	Not created, shortages remain uncovered
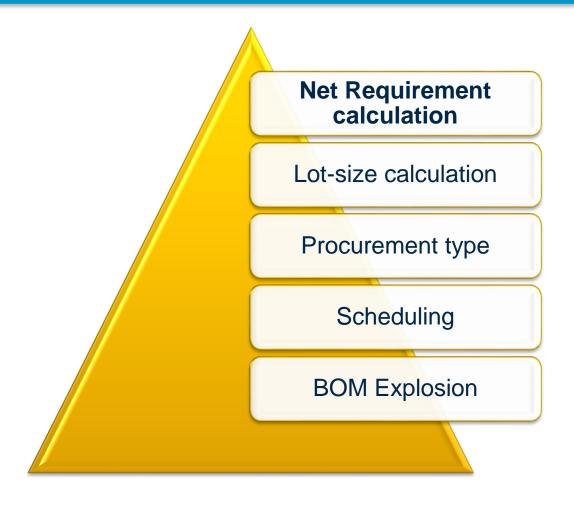
MRP :Material Requirement Planning

Deterministic MRP is carried out using current and future sales figures. The planned and the exact requirement quantities trigger the net requirements calculation. The requirement elements of this calculation include sales orders, planned independent requirements, material reservations, dependent requirements received from BOM explosion, and so on. The net requirements calculation can give the exact requirements for each day.
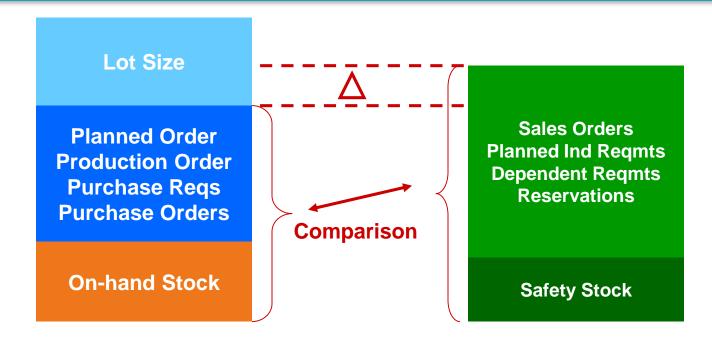
Prerequisites for running MRP

Plant		Activate MRP
	⟷	Set up planning file

Materials

⟷ ■ Maintain MRP data:
valid MRP type
valid material status

MRP Flow

Net Requirement calculation

Lot-size calculation

Procurement type

Scheduling

BOM Explosion
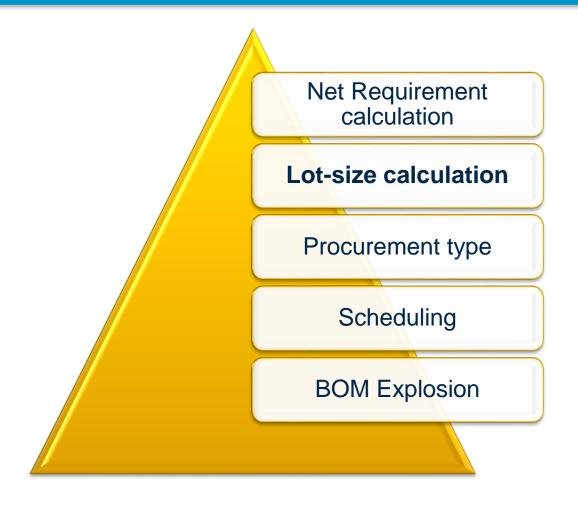
Net Requirements Calculation

- MRP determines how much supply is needed to satisfy demand in the net requirements calculation.
- The difference between the demand and the supply of an item is the shortage. This shortage quantity must now be covered by one or more planned orders.
- The system calculates the quantity of the planned order according to the lot sizing procedure specified in the material master.

MRP Flow Contd.

Net Requirement calculation

Lot-size calculation

Procurement type

Scheduling

BOM Explosion
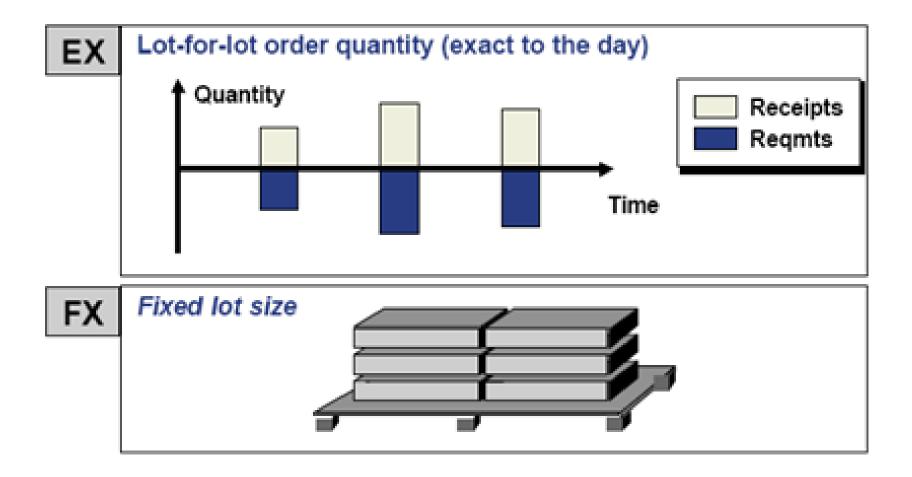
Lot Sizing Procedure

- During MRP, the system creates procurement proposals based on   your lot-sizes if there is a stock shortage.

- By determining lot-sizes you can plan optimal quantities per procurement proposal and thus specifically cover your requirements.

- The planning of lot-sizes influences the planning of the available capacity, and the planning of the production or procurement costs.
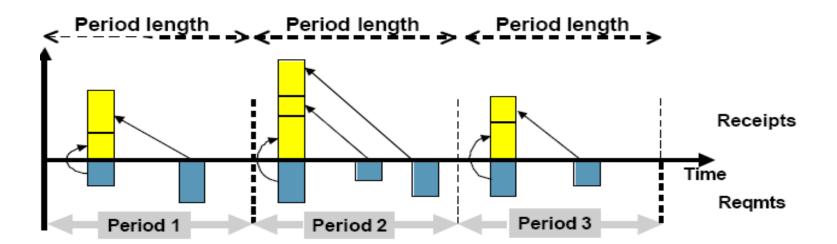
Static Lot Size Procedures

EX — Lot-for-lot order quantity (exact to the day)

Quantity

Receipts
Reqmts

Time

FX — *Fixed lot size*
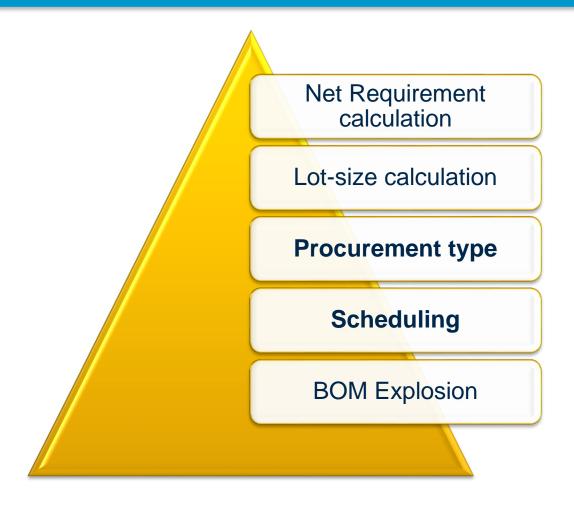
Period Lot Sizing Procedures

MRP Flow Contd.

Net Requirement calculation

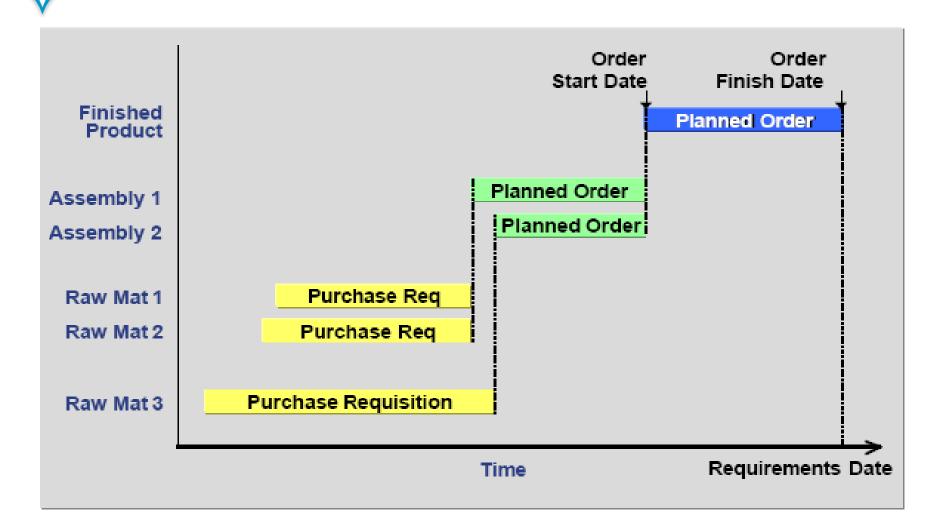Lot-size calculation

Procurement type

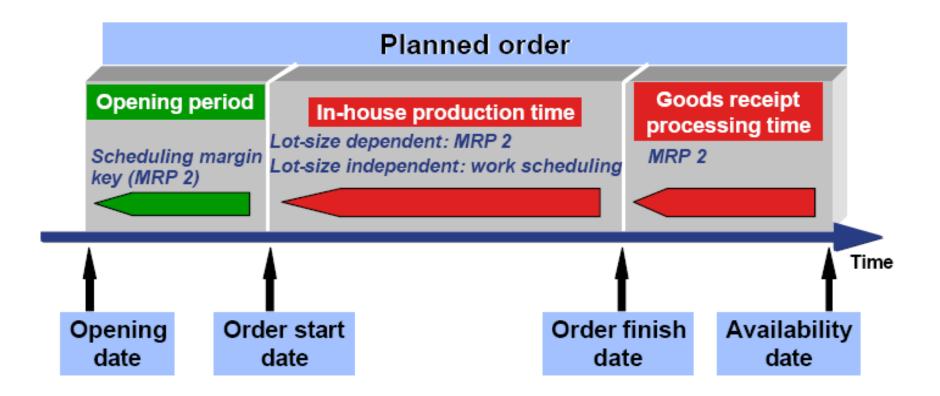**Scheduling**

BOM Explosion

MRP : Order Scheduling

MRP : Order Scheduling Contd.

- After MRP calculates the planned order lot size, it must calculate the planned order finish date and the planned order start date. These dates are known as the basic dates of the planned order.

- The order finish date of the finished product's planned order is based on the requirement date of the customer order or the planned independent requirement. To calculate the order start date, MRP backward schedules using lead-time information from either the material master or the routing.

- The order finish date of planned orders of the assemblies is based on the order start date of the finished product's planned order. MRP backward schedules to determine the order start date of each.

- This process continues for the purchase requisitions. This is done using the planned delivery time from the material master to determine the order start date.
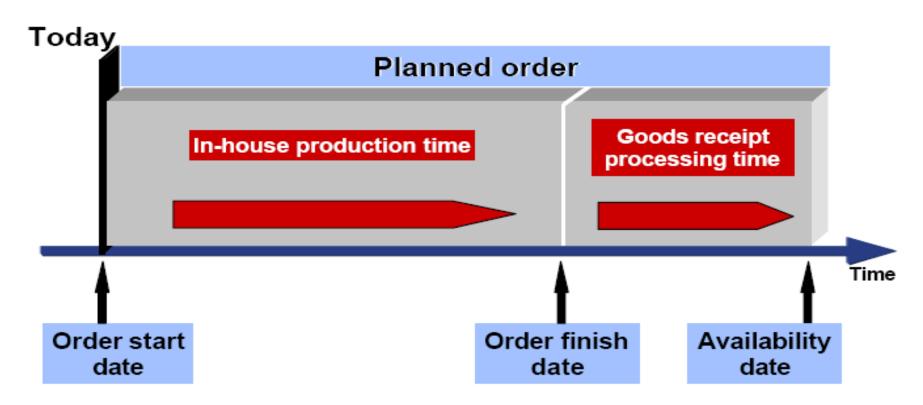
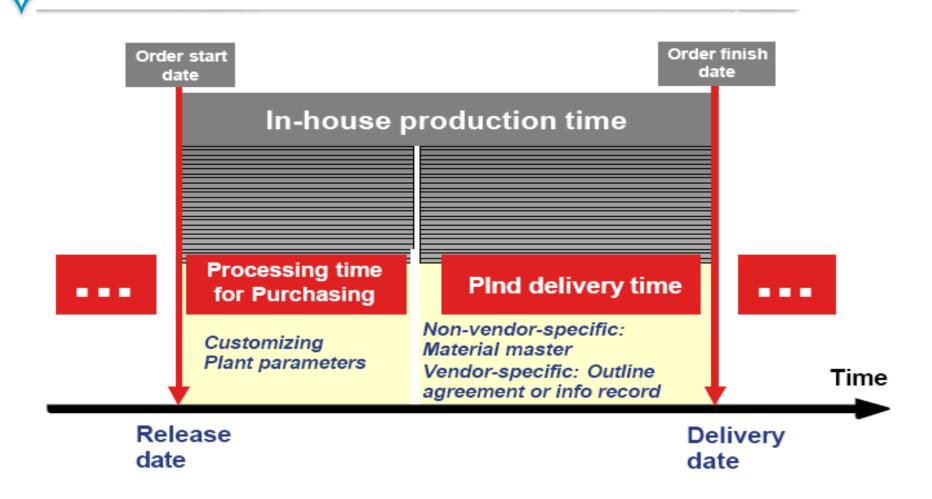# Backward Scheduling for In house Production
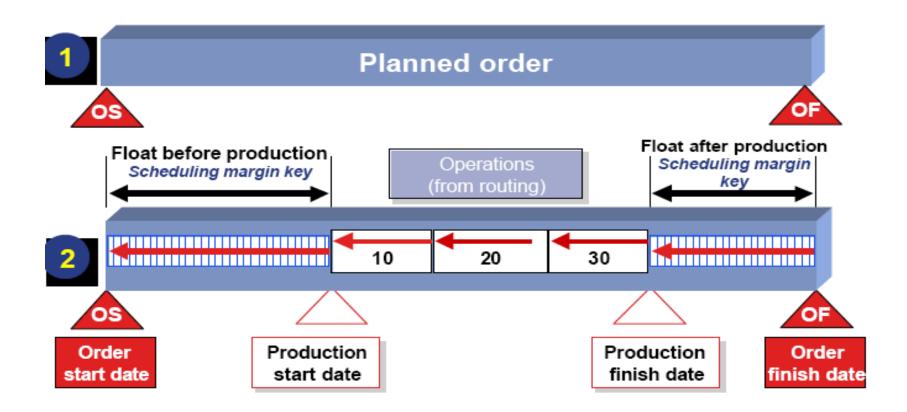
Forward Scheduling for In house Production

Scheduling for External Procurement
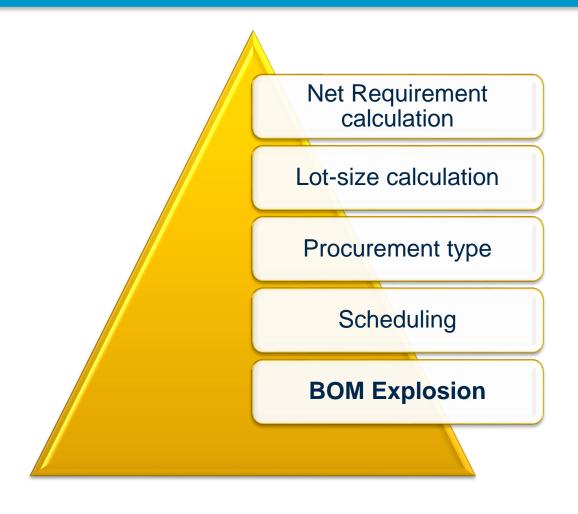
Lead Time Scheduling

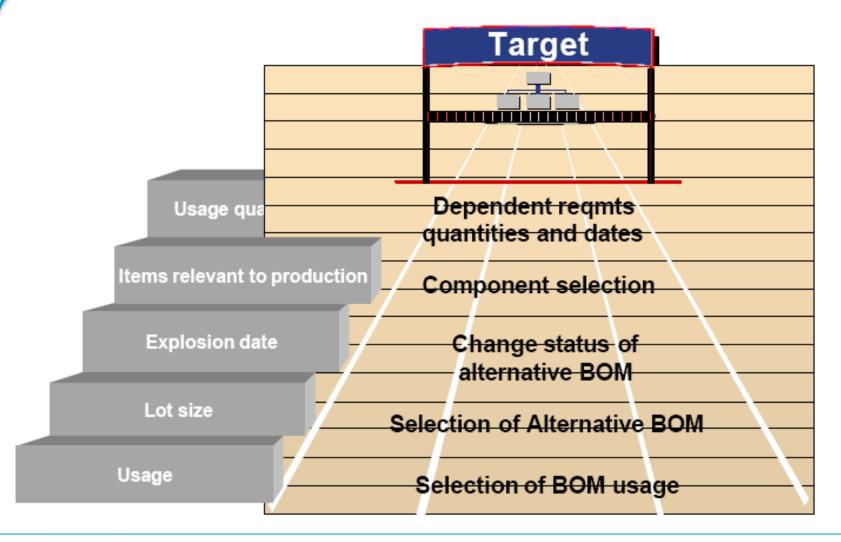
Scheduling ind. = 2, capacity requirements are calculated

1 Planned order
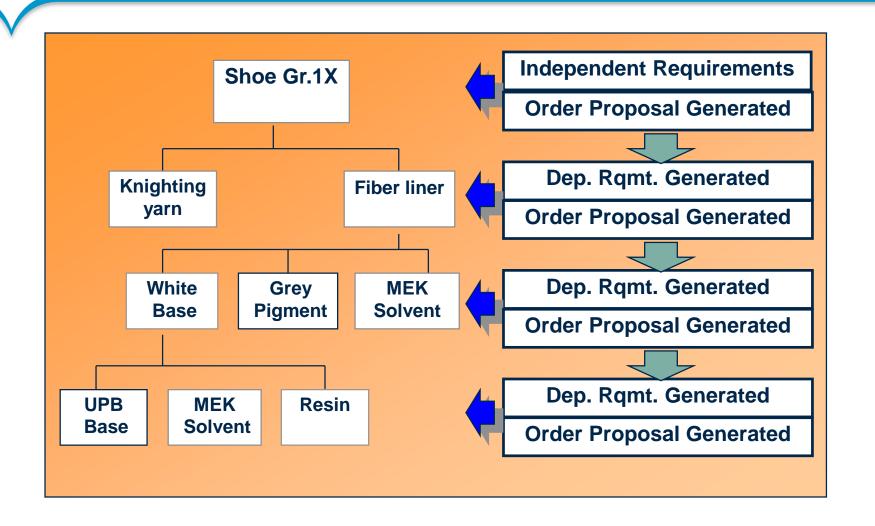
OS → OF

Float before production
Scheduling margin key

Operations
(from routing)

Float after production
Scheduling margin key

2

10 | 20 | 30

OS — Order start date

Production start date

Production finish date

OF — Order finish date

MRP Flow Contd.

Net Requirement calculation

Lot-size calculation

Procurement type

Scheduling

BOM Explosion

BOM Selection

BOM Explosion and Dependent Requirement Calculation

Shoe Gr.1X
- Knighting yarn
- Fiber liner
  - White Base
  - Grey Pigment
  - MEK Solvent
    - UPB Base
    - MEK Solvent
    - Resin

Independent Requirements
Order Proposal Generated

Dep. Rqmt. Generated
Order Proposal Generated

Dep. Rqmt. Generated
Order Proposal Generated

Dep. Rqmt. Generated
Order Proposal Generated

MRP Planning Run

Planning Types

Plant
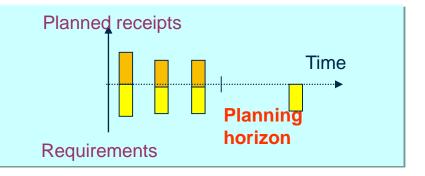
- **Regenerative planning**
- **Net change planning**
- **Net change planning within the planning horizon**

Planning horizon

Planned receipts

Time

Planning horizon

Requirements

MRP Planning Run: Control Parameters

- Planning run can be carried out at different levels:
  - Single-item Single-level planning for an individual material
  - Single-item Multi-level planning for an individual material
  - Total planning for all materials in a plant
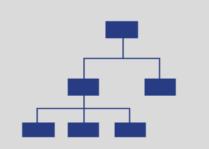
- Planning Run Types
  The planning run type determines which materials are to be planned:
  - **Regenerative planning (NEUPL)** - The system plans all the materials that are contained in the planning file
  - **Net change planning (NETCH)** - The system only plans materials that have undergone a change relevant to MRP since the last planning run
  - **Net change planning in the planning horizon (NETPL)** - The system plans for any material that has undergone some changes since last MRP run, and those changes are in the planning horizon
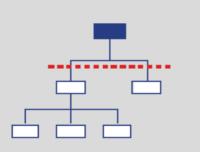
Executing Planning Run for Single Items

Single-Item, Multi-Level Planning

▶ Planning a BOM structure

▶ Possibility of changing the master plan for each material in the BOM manually.

Single-Item, Single-Level Planning

▶ Planning one BOM level only

▶ Dependent requirements are transmitted for the next BOM level

▶ Manual changes can be made at any time

PP1003 - Material Requirements Planning

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- **Show Me**
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Environment

The Environment in which MRP runs is SAP R3 under Production

Planning Module

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Prerequisites

- Material Requirements Planning Procedure
  - You have set an *MRP type* for MRP in the material master (*MRP 1* view).
  - You define MRP types in Customizing for MRP in the IMG activity *Check MRP types*

Master Data

- The settings for master data such as routings, bills of material, work center, production resources/tools, trigger points are important when MRP is carried out.

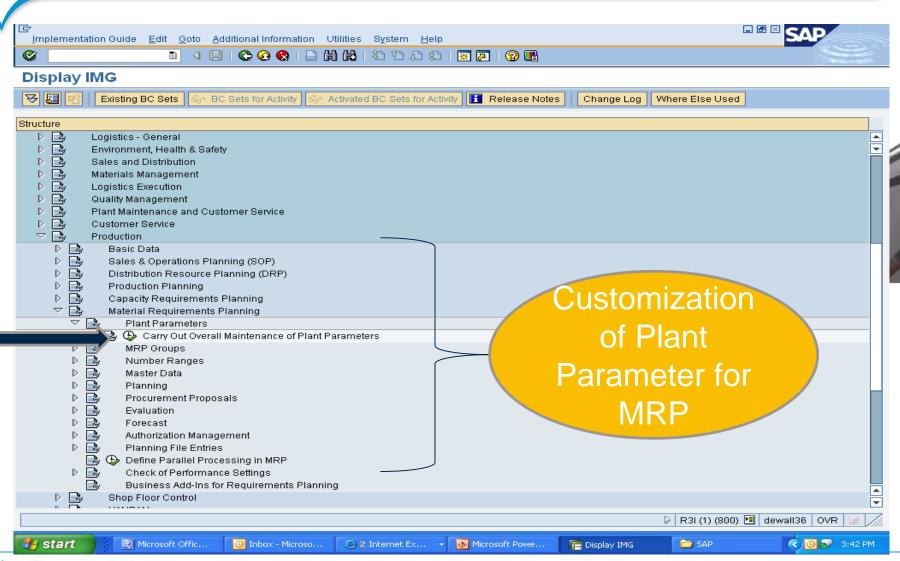- Except these, settings need to be done in different planning strategies.

Configuration

Configuration require various master data configuration & to maintain plant parameters for MRP for a particular plant.
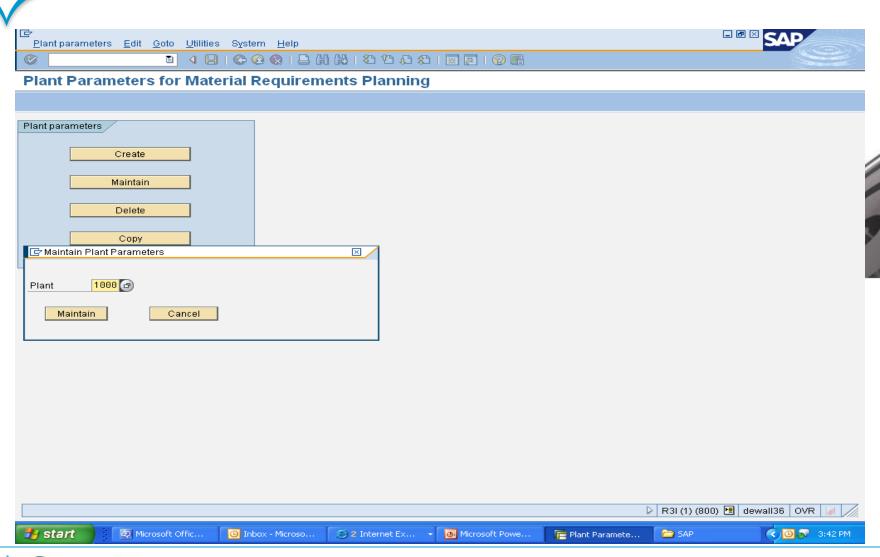
Plant Parameter for MRP

- This configuration setting enables to configure the plant parameter for Materials Requirement Planning (MRP).
- MRP will ensure
  - Availability of right material at right time.
  - Calculate the capacity requirements.
- Following MRP related parameters must be configured to perform MRP.
  - Frequency of planning,
  - How to explode the BOM,
  - Order type to be used when converting planned order
  - Planning horizon
  - Scheduling
- Apart from above there are more parameters to be configured, which we shall discuss.

Plant Parameter for MRP

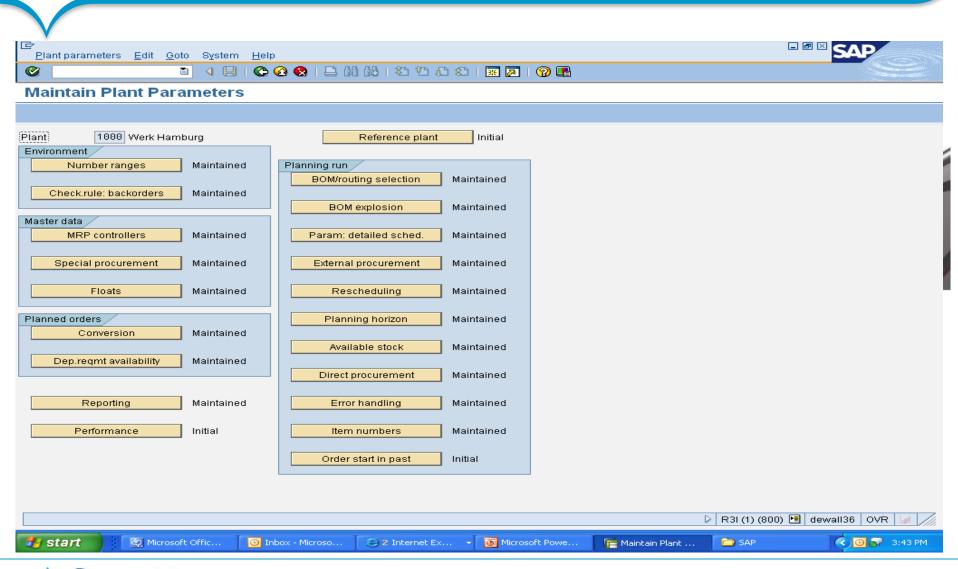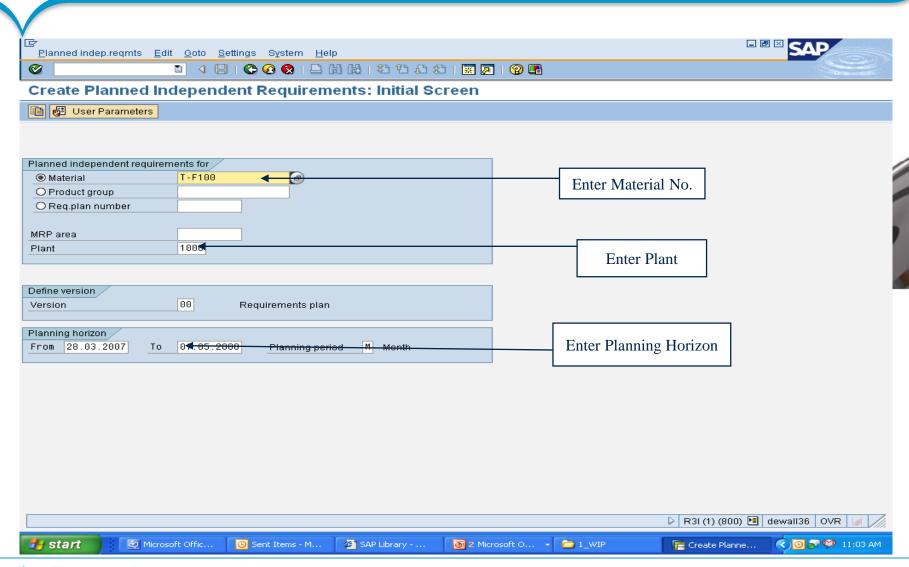Customization of Plant Parameter for MRP
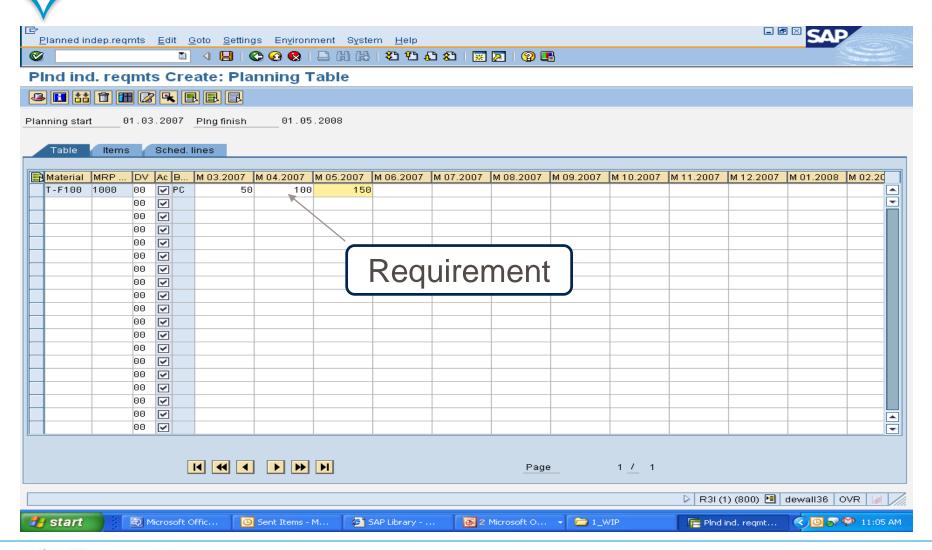
Plant Parameter for MRP

Plant Parameter for MRP

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Let Me

Let Me

Let Me

Let Me

Let Me

T-Code:MD04

Let Me

Let Me

Let Me

Single-Item, Multi-Level

```
Statistics
Materials planned                            6
Materials with new exceptions                2
Materials with terminated MRP list
```

```
Parameters
MRP Area                             1000
Plnt                                 1000
Processing Key                       NETCH
Create Purchase Requisition          2
Sched. Agreement Schedule Line       3
Create MRP List                      1
Planning Mode                        1
Scheduling                           1
```

```
Database statistics
Planned orders created                       5
Dependent requirements created              21
```

```
Run-time statistics
Start of planning run                08:03:14
End of planning run                  08:03:20
Planning run time                    00:00:06
CPU time : Import                    00:00:01
CPU time: net calc. and lot-size calc 00:00:01
.. BAdI: Change char. value assgmnt  00:00:01
CPU time: BOM explosion              00:00:01
.. BAdI: Alternative Explosion       00:00:01
CPU time: update                     00:00:02
```

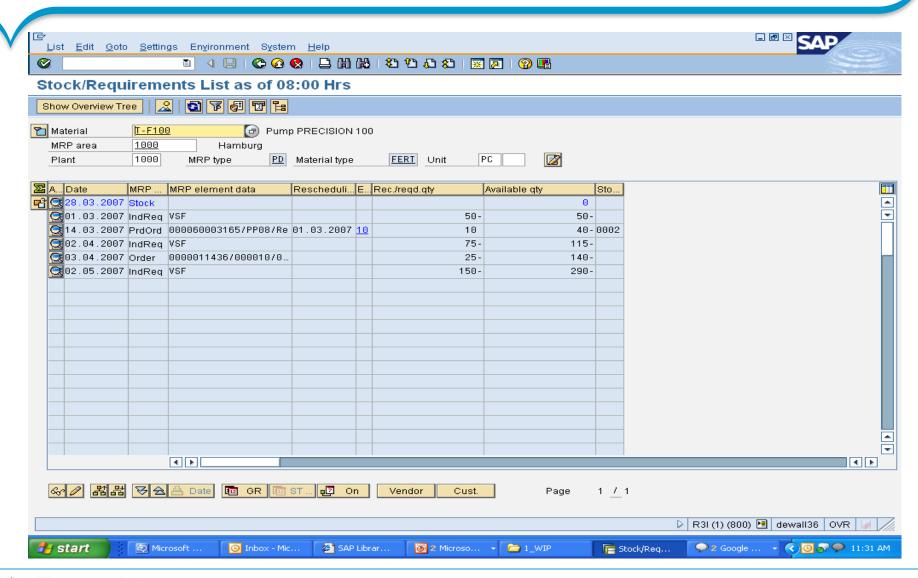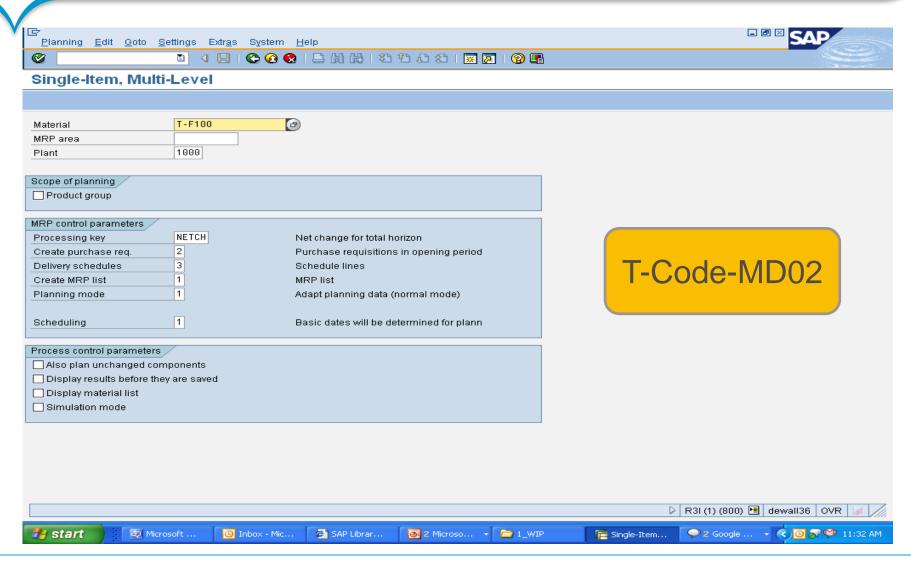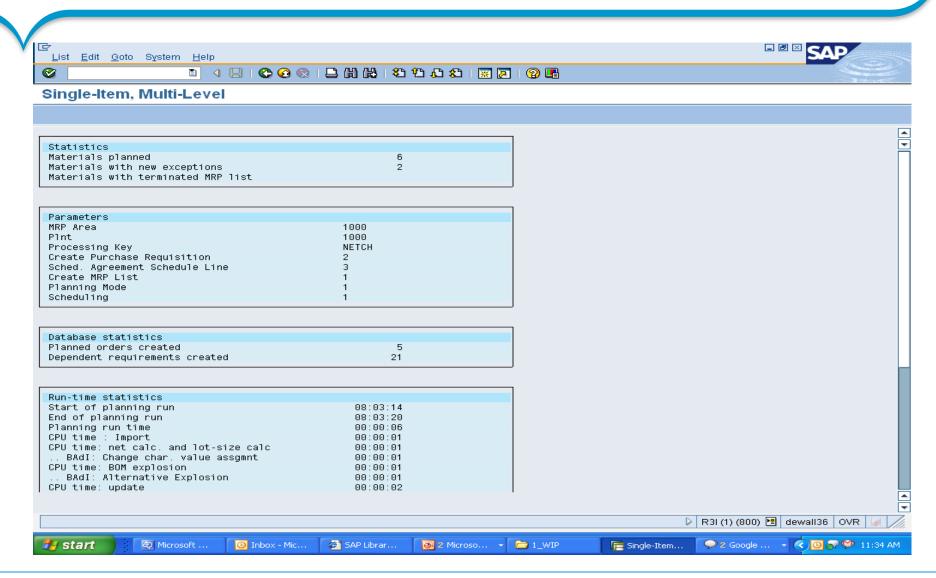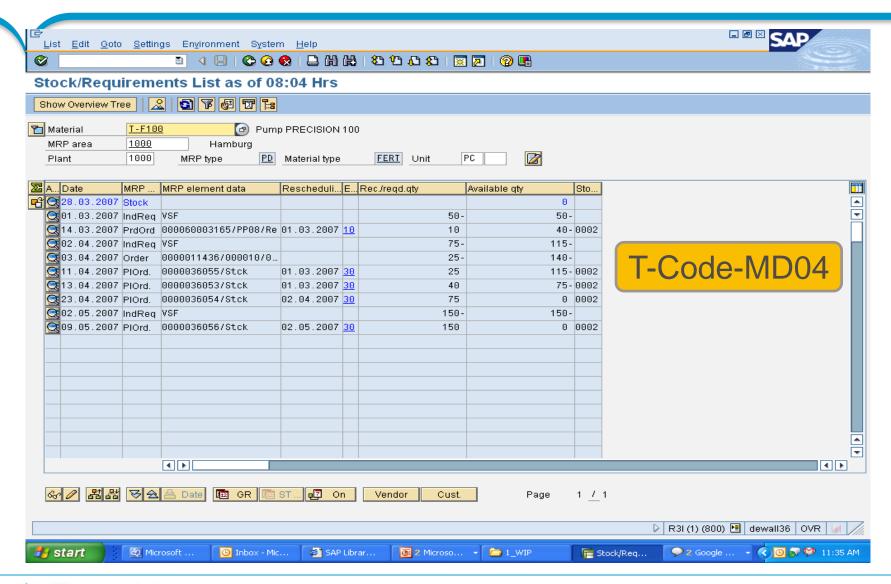R3I (1) (800) dewall36 OVR

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Material Requirements Planning

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For further information please refer
http://help.sap.com/saphelp_46c/helpdata/en/f4/7d3f9344af11d182b40000e829fbfe/frameset.htm

Summary

- The main function of material requirements planning is to guarantee material availability, that is, it is used to procure or produce the requirement quantities on time both for customer dependent and independent requirements

- It is used to procure or produce the requirement quantities on time both for internal purposes and for sales and distribution.

- MPS enables you to plan materials that greatly influence a company's profits and critical.

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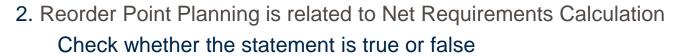
Summary

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Review Questions

1. The main function of material requirements planning is to guarantee material availability

   Check whether the statement is true or false

   a. True
   b. False

2. Reorder Point Planning is related to Net Requirements Calculation

   Check whether the statement is true or false

   a. True
   b. False

Thank You