



## **Integrated Business Processes with SAP ERP**

### **Script 2: Material Planning in SAP ERP**

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# 1 Material Planning in SAP ERP

This teaching unit aims at giving you an understanding of the Material Planning process in the SAP ERP system.

After this unit you will be able to:

- Name organizational levels and master data in the material planning process.
- Explain the meaning of the planning strategy for business processes.
- Describe the difference between material requirements planning and consumption based planning.
- Explain the steps of sales and operations planning (material planning process) in SAP ERP.
- Identify interfaces with other SAP ERP processes.

## Scenario for the Case Study

In the practical section of this unit, you will create a new product (Speedstarlett) and combine it with the Speedstar in a product group. Building on that, you will perform the operations and material planning for the product group. You will receive a sales order for the production of the Speedstarlett and adjust your planning correspondingly.

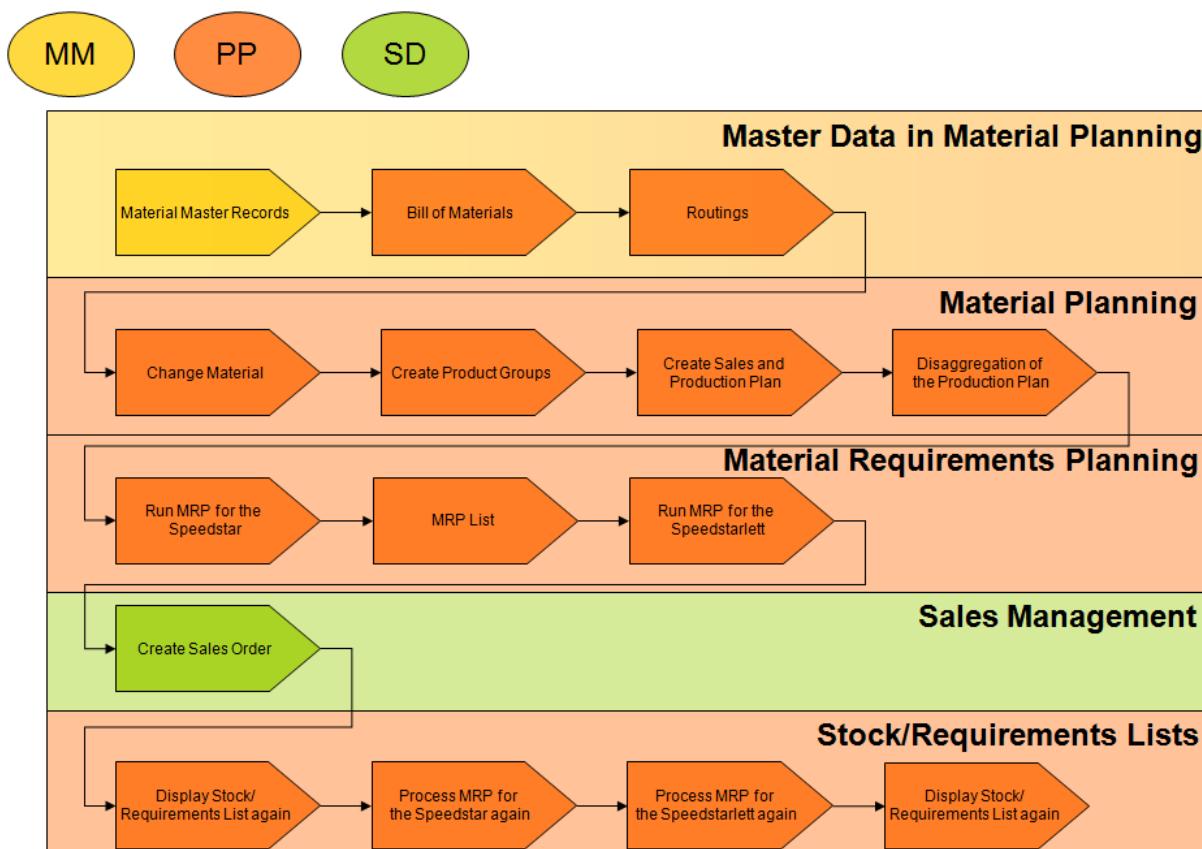


Figure 1: Process Overview: Material Management

The figure above shows the entire process that you will independently carry out in SAP ERP within the practical application section of this unit. The different colors represent the processes regarding maintaining master data both in the material management as well as in the production planning modules. Additionally, you will briefly get in touch with the sales and distribution (SD) component to create a sales order. However, you will learn about sales order management in more detail in a subsequent unit.

## 2 Organizational Levels and Master Data in Material Planning

In this section you will learn about the organizational levels in Material Planning. Material planning is part of production planning (PP). Thus, it is a component of the SAP ERP logistics module. Correspondingly, you should already be familiar with the organizational levels of material planning from the procurement process unit.

### 2.1 Theory: Organizational Levels in Material Planning



Theory

Organizational levels in SAP ERP are structures that represent the legal and/or organizational views of an enterprise. A company structure is usually designed based on the company's business processes.

The organizational levels relevant to material planning are the same as for the procurement process, except of the purchasing organization and the purchasing group. Thus, you will only find a brief overview at this point.

A **client** contains all organizational elements of a company modeled in SAP ERP.

A **company code** is an accounting unit. On company code level, balance sheets and P/L statements are created as required by law.

A **plant** is an organizational unit within a company. Within a plant, goods are produced, services created, or goods are prepared for SD. A plant can be either a factory or a warehouse/sales center.

A **storage location** is an organizational unit within a plant. A storage location refers to the location within a plant where a material is stored. Usually, a plant contains more than one storage locations.

The Material Planning processes uses the following organizational levels:

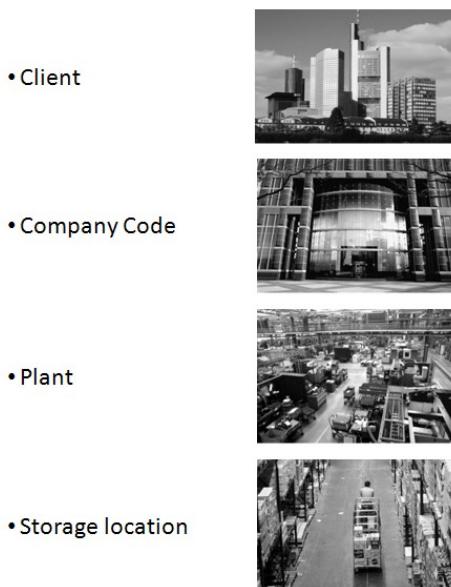


Figure 2: Organizational Levels in Material Planning

## 2.2 Theory: Master Data in Material Planning



The Material Planning application in SAP ERP uses the following master data that will be explained in detail in this chapter:

- material master
- bill of materials (BOM)
- routings

### 2.2.1 Material Master

You are already familiar with the **material master** from the previous teaching unit (Procurement in SAP ERP).

The material master file is a company's central source for depositing and accessing **material-related data**. All **logistical applications** of the SAP ERP system employ material master files for their processes. The following functional areas are some sub-areas of logistics in SAP ERP:

- SAP MM – Material Management (Procurement and Material Planning are sub-areas of SAP MM)
- SAP SD – Sales and Distribution
- SAP PP – Production Planning
- SAP PM – Plant Maintenance

You can learn this from the **SAP Easy Access Menu** as well (all functional areas assigned to **logistics**).

The material master is the data object that contains all information necessary for the business use of a material. In particular, all material relevant settings for procurement, production, storage or sales etc. are stored in the material master. Not all settings in the material master are relevant for Material Planning. Some of them are more applicable to other functional areas in SAP ERP.

You could already see from the introduction of the **views** that the material master uses different views to provide a clear display for the different functional areas (MRP 1-4, work scheduling, costing, accounting and so on).

Data stored in the material master can be used by all departments in common, e.g., purchasing, inventory management, MRP, invoice verification, etc. The views **MRP (Planning → MRP Views)** and **work scheduling (Control)** must be maintained by production. Basic data as well as data from **financial accounting, quality management, forecasting, purchasing, and classification** are used by different **manufacturing planning and execution processes**; however, they are **primarily** maintained by the particular departments (and, thus, applications).

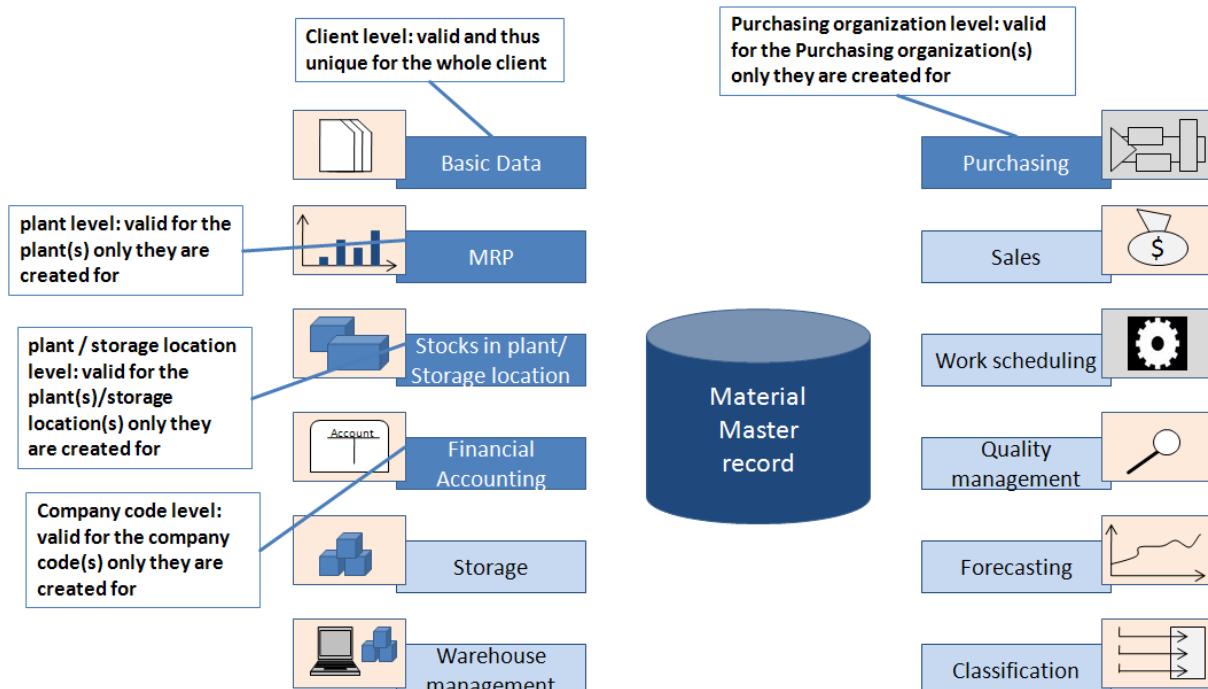


Figure 3: Material Master Data: Primary Views

#### 2.2.1.1 Data Structure

**Basic data (Basic data 1 + 2)** in the material master can be applied to the entire company and are stored on **client level**, i.e. only one material with a particular name may exist in a company. Thus, the basic data views are independent of all organizational levels such as company codes, plants, etc. For example, product descriptions, material numbers, material groups, units of measure, and conversion factors are part or the basic data.

The **MRP (production planning)**, **Work Scheduling (production execution)**, and **Accounting** views are **plant-related**. For this reason, all views that are not valid client-wide are maintained by the SAP system according to the organizational levels (e.g., plant, storage location) for which they are valid.

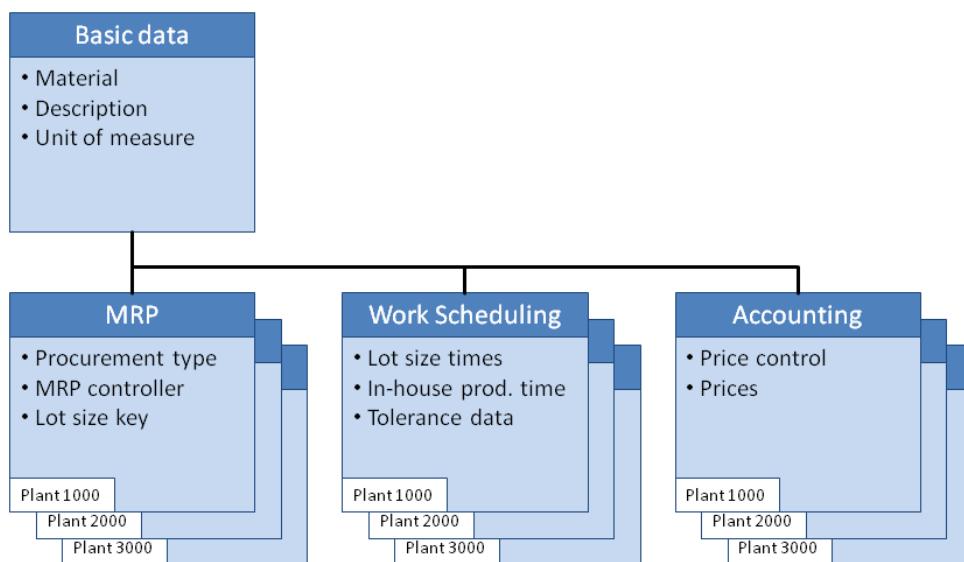


Figure 4: Data Structure of Material Master Records

### 2.2.1.2 Settings for Supply Chain Planning

When maintaining material master data, the following questions occur:

- How should I plan material requirements?
- How should I procure? Should I produce material in-house or should I procure it externally?
- Should I consider a safety stock?
- How should I plan (make-to-stock, manufactured by lot size, individual orders etc.)?
- How are ATP (Available-To-Promise) checks carried out?
- Which production procedures (make-to-stock production, Kanban, process manufacturing, etc.) are applicable?

You can find the most important settings for material requirements planning concerning these questions in the planning views **MRP 1 to 4** of the material master. The subsequent figure shows the settings for our product *Speedstar-xxyy*. You can see that the settings are not complete yet; they will be completed in the practical section of this unit.

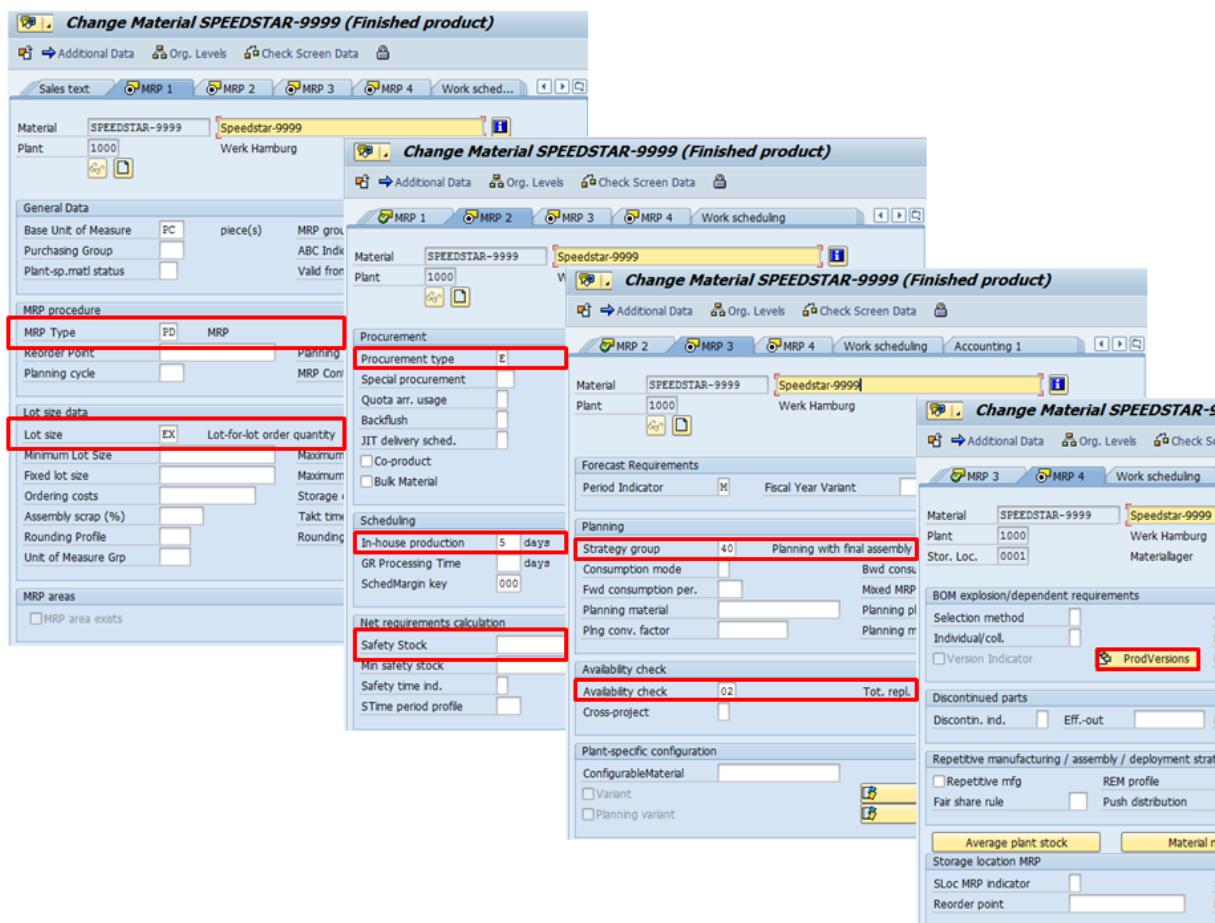


Figure 5: Planning Views MRP 1 - 4: SAP-System-Screenshot

The **MRP type** (cf. figure above, MRP) basically states how a material should be planned (provided e.g., for production). Amongst others, production types in SAP ERP are MRP, consumption-based, no planning, and MPS (master production scheduling).

The **lot-sizing procedure** determines the lot size of a certain procurement proposal. The particular lot-sizing procedure determines thereby, which quantity is produced without break or shifting. Thus, week lots or exact lot sizes can be determined.

The **procurement type** determines how materials are procured. Basically, SAP features the options in-house production and external procurement (or both).

The **in-house production time** and the **planned delivery time** refer to the duration of procurement. The in-house production time is the number of working days required for the in-house production of a particular material. Thereby, the in-house production time is independent of the order quantity. This applies correspondingly for the planned delivery time.

The SAP ERP system allows for the creation of a **safety stock** in the material master. In case of a shortfall, either a purchase requisition or a planned order is created, or a notification is issued and sent to the person in charge.

The behavior of *planned independent requirements* is controlled by the **strategy group**. Additionally, the control of the **ATP checks** is carried out using the **availability check group**. You can define a **production procedure** by a **production version**. First and foremost, you can select **routing** and **BOM** in a production version.

### 2.2.1.3 Material Type

The **material type** is the most important label assigned to a material. The allowed business processes and functions for a particular material are defined through the material type. This is for example:

- views displayed in the material master
- department-related data that can be maintained
- assignment of material numbers
- allowed procurement types (in-house production or external procurement)
- updated general ledger accounts
- material types definitions that are controlled in customizing

A material type combines materials with similar characteristics, i.e., materials can be managed according to company requirements.

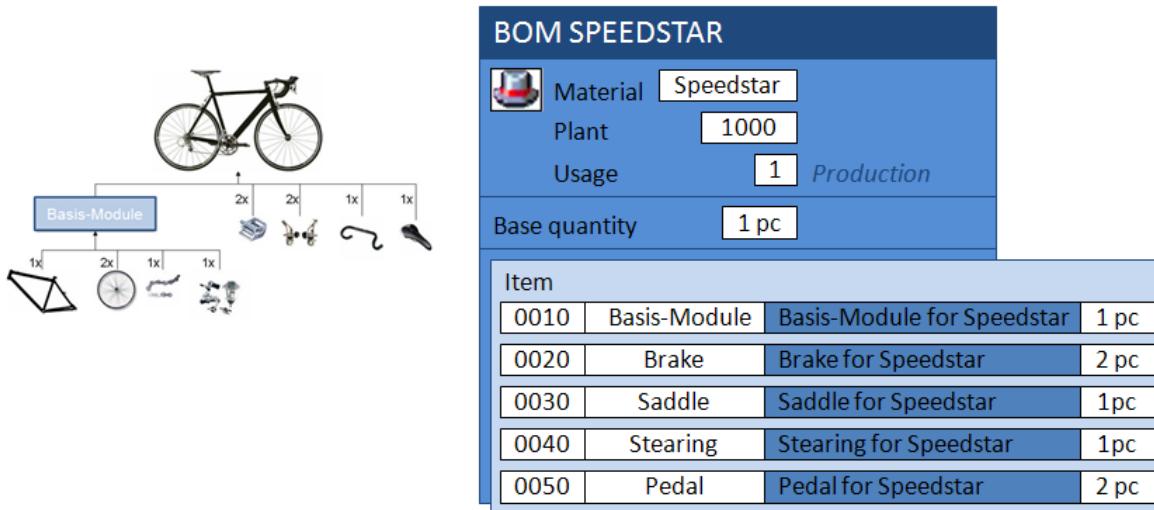
In **customizing**, you can create additional, company-specific material types.

### 2.2.2 Bill of Materials (BOM)

The **bill of materials** is a composition of all materials used for the production of a particular product. It contains assemblies (materials produced from different materials themselves) or components. BOM are used in **MRP**, **production**, **procurement**, and for **product costing**.

A BOM consists of a **BOM header** and **BOM items**. The **base quantity** in the header determines to which quantity of the finished product the production items refer.

BOM in the SAP ERP system are **single-level**. Thus, only the first step of the materials used for the production of a good are listed in the BOM. However, assemblies (containing components or assemblies..., etc.) can also be listed on a BOM, resulting in a multi-level production. Besides **stock items** that are used for the production of the finished product, a BOM can contain **documents or text items**.



- Bills of material are single-level
- Items of a bill of material can themselves contain a further bill of material

Figure 6: Example of a BOM in SAP ERP

### 2.2.2.1 Bills of Materials Structure

The **header** of a BOM contains all settings valid for the entire BOM. **BOM usage** determines, for example, for which **business applications** a BOM can be used.

Using the **status** of a BOM, you can control whether a BOM is **active** for a particular application (e.g., MRP).

In addition to **simple BOMs**, there are also so-called **multiple BOMs** consisting of multiple **BOM alternatives**. The different BOM alternatives can be valid e.g., for distinct lot-size areas of production processes.

BOM **items** are necessary for the production of the finished product.

The **item category** states which **kind of item** it is about:

- **Stock items** are managed in the warehouse and used in production.
- Contrastingly, **non-stock items** are assigned directly to a manufacturing order – not via the warehouse (e.g. consumable materials (cf. previous chapter)).
- **Variable-size items** contain variable-size data (e.g., a steel plate of a particular surface).
- Finally, **Document items** contain a supplemental document that describes manufacturing (e.g. a construction diagram).

The particular items can feature multiple settings themselves as well with respect to the certain item.

### BOM Structure

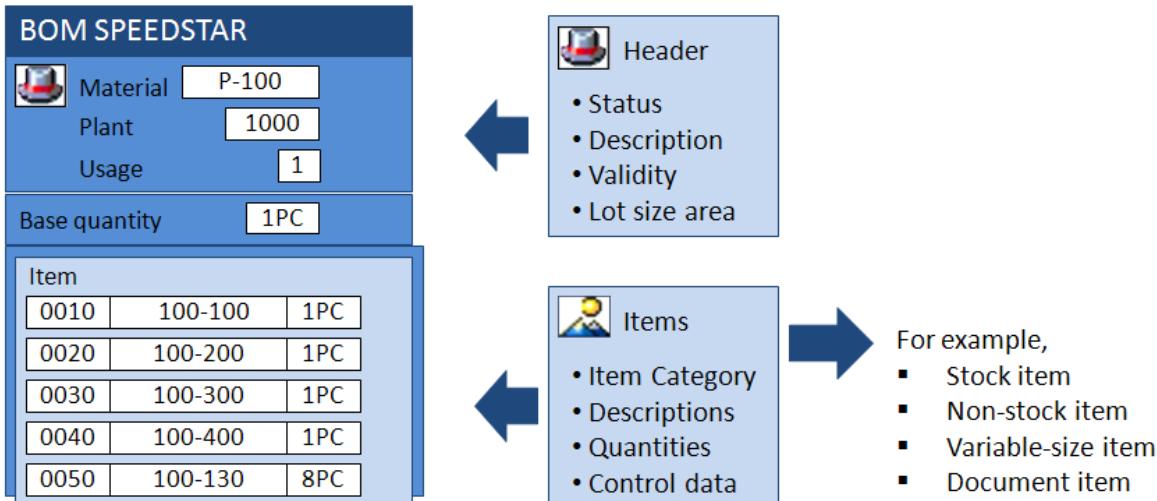


Figure 7: BOM Structure Speedstar

#### 2.2.2.2 Multi-level BOM Structure

BOMs are always created and managed as **single-level** BOMs. In the following figure, you can see two single-level BOMs. In a single-level BOM, an assembly is described with its components and quantities

The Speedstar contains one component (the Basis-module assembly), which in turn consists of components so that the Speedstar features a multi-level BOM structure.

**Multi-level BOM structures** are exploded automatically by **MRP** and **product cost planning**. It can also be exploded as a **master data evaluation**.

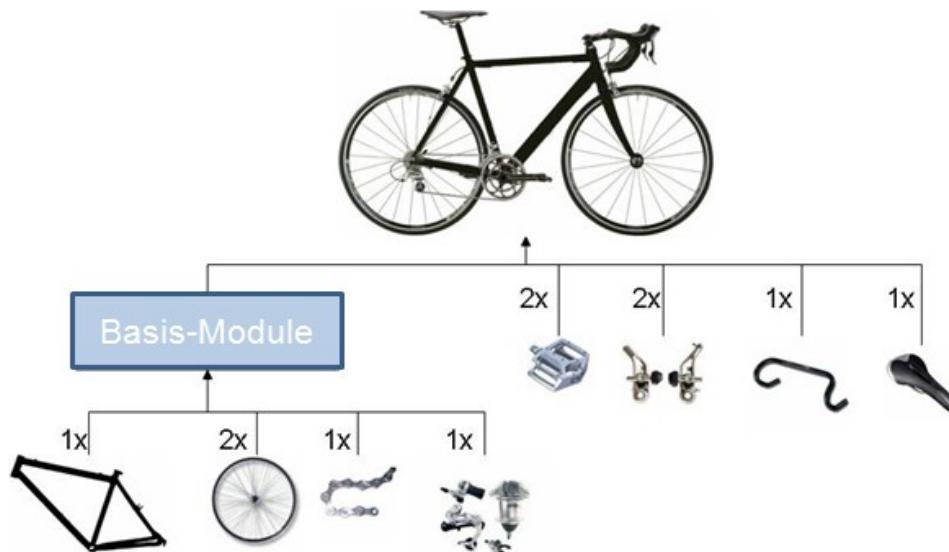


Figure 8: Multi-level BOM Speedstar

### 2.2.2.3 BOM Item Categories

Each item of a BOM needs to be assigned to an **item category** in case items of a BOM need to be changed or added. The item category affects the processing of an item. The item category manages, for example, whether a material number for a particular item is required, optional, or not allowed.

A material, which is a **stock item** in a BOM, must have a material master. Contrastingly, non-stock items do not necessarily need a material master. It can be stored in a material group as well.

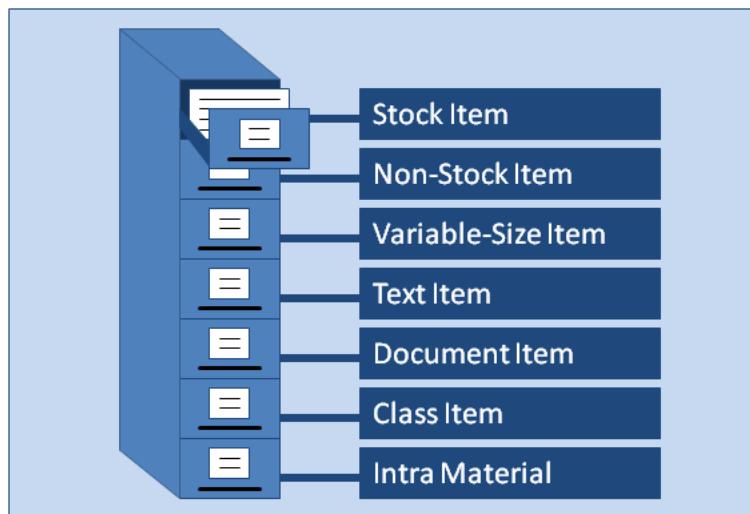


Figure 9: BOM Item Categories

### 2.2.3 Routings

**Routings** determine the required work steps relevant for production concerning operations, their sequence and work centers in charge.

In the SAP ERP system, you can transfer routings as **production process models (PPM)** to **SAP Advanced Planning and Optimization (APO)**. SAP APO/SAP SCM is an independent SAP product which provides functionalities regarding planning and managing the entire supply chain (from the vendor to the customer).

The definition of **routings** is carried out via so-called **routing groups** and **group counters**. Furthermore, a routing contains a reference to the **material** whose production it describes. In addition to the so-called **standard sequence**, a routing can contain **parallel sequences** or **alternative sequences**.

The standard sequence is the normal routing and contains a number of process steps (welding at work center X, mounting at work center Y, etc.) that are required for the production of the product.

Parallel sequences are used if work steps should be carried out simultaneously. Alternative sequences are used, for example, if there are differences between make-to-stock production and a particular sales order for a product regarding the operations required for the production process.

A routing contains so-called **standard values**. These are time elements (e.g., 15 minutes for machine X), which are relevant for scheduling operations. Please note that each step of a routing features a particular base quantity, which refers to these time elements.

### Production of Speedstar

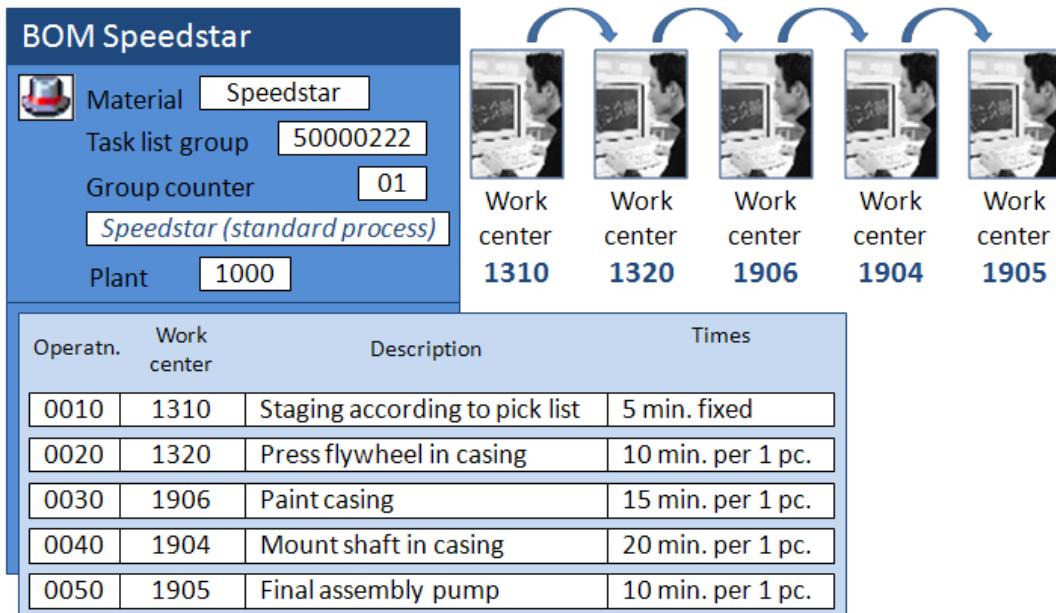


Figure 10: Example Routing Speedstar

## 2.3 Practice: Master Data in Material Planning



In this chapter, you will maintain master data required for the following steps of this case study. The subsequent figure shows the process steps you will carry out:

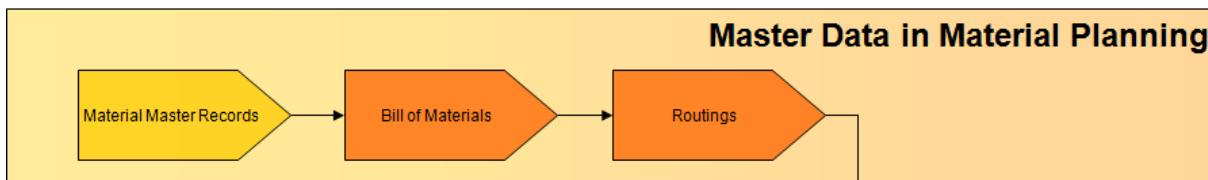


Figure 11: Process Overview: Maintaining Master Data

### 2.3.1 Material Master Records

In the unit “Procurement in SAP ERP” you already created the material master records of the Speedstar, including its components. To get a feeling for the specific views and data fields, check once again your entries in the material master of the Speedstar for correctness.

#### 2.3.1.1 Display Material Master Records

To display material master select

**Logistics → Materials Management → Material Master → Material → Display → Display Current (MM03)**

1. Enter your material **Speedstar-xxxx**. Press **Enter**.
2. Select the views **Basic Data 1, MRP 1, MRP 2, MRP 3**, and **Accounting 1**.
3. In the next screen, enter **plant 1000** and **storage location 0001**. This screen is only displayed because, except for the Basic Data 1 view, all other views selected are plant-specific.
4. In the title bar of the screen, you can see that the Speedstar is a **finished product**, thus, its material type is **FERT**.
5. Go to the **MRP 1 view**. You can see that the selected **materials planning procedure** is **MRP (PD)**. This means that the required material is determined based on e.g. sales figures and reservations, or production requirements are created by the system.
6. Switch to the **MRP 2 view**: You can see that the field **procurement type** contains an **E**. When you click in the field and call up the **F4-help**, you will see that the entry determines the **in-house production** of the material. Further options that are SAP standard are **external procurement (F)**, **both procurement types (X)** and **no procurement**.
7. Switch to the **MRP 3 view**. In this view, you can see that the **availability check** for the Speedstar is carried out based on **individual requirements (02)**.
8. Finally, go to the **Accounting 1 view**. In this view you can see that the value of the material is recorded in accounting (management accounting). This view is predominantly a controlling view.

9. Leave the material master data of the Speedstar.

Management decided to launch another product along with the Speedstar – the Speedstarlett. This alternative model is supposed to be of high value as well. However, it is supposed to be a bit cheaper. Moreover, it is a bicycle for women.

The **Speedstarlett** features an **aluminum frame** in contrast to the carbon frame of the Speedstar. Apart from that, all assemblies are identical. Create independently three new material master records (**Speedstarlett, Basis-module2, alu-frame**).

You can use the material master records of the Speedstar, the Basis-module, and the carb-frame as reference material to copy from them.

### 2.3.1.2 Material Master Record: Speedstarlett

Create the Speedstarlett with reference to the Speedstar:

**Logistics → Material Management → Material Master → Material → Create (Special) → Finished Product (MMF1)**

1. You are now in the **create finished product** dialog. Enter the following data:

- **Material** *Speedstarlett-xxyy*
- **Industry sector** *Mechanical engineering*
- **Copy from** your material *Speedstar-xxyy*
- Press *Enter*.

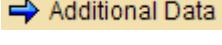
2. In the next step, select the following **views**:

- **Basic data 1**
- **Basic data 2**
- **Sales: Sales organization data 1**
- **Sales: Sales organization data 2**
- **Sales: General/plant data**
- **MRP 1**
- **MRP 2**
- **MRP 3**
- **MRP 4**
- **Work scheduling**
- **accounting 1**
- **accounting 2**
- **costing 1**
- **costing 2**

Close the dialogue (click  or press *Enter*).

3. The following dialogue comprises information about the organizational unit, for which you are supposed to create the material. Since you want to copy from a reference you must, additionally, enter the organizational units of the material you want to copy from:

- **Plant** **1000 (Hamburg)**
- **Storage Location** **0001 (Material Storage)**
- **Sales Organization** **1000 (Frankfurt)**
- **Distribution Channel** **10 (End Consumer)**
- **Copy from Plant** **1000 (Hamburg)**
- **Copy from Storage Location** **0001 (Material Storage)**
- **Copy from Sales Organization** **1000 (Frankfurt)**
- **Copy from Distribution Channel** **10 (End Consumer)**
- Complete the dialog with *Enter* or 

4. **Basic data 1 view:** **Material Description Speedstarlett-xxyy** – press *Enter*
5. **Basic data 2 view:** no changes – press *Enter*
6. **Sales: Sales Org. 1 view:** no changes – press *Enter*
7. **Sales: Sales Org. 2 view:** no changes – press *Enter*
8. **Sales: General/Plant view:** **Gross Weight 20; Net Weight 17** – press *Enter*
9. **MRP 1 view:** no changes – press *Enter*
10. **MRP 2 view:** no changes – press *Enter*
11. **MRP 3 view:** no changes – press *Enter*
12. **MRP 4 view:** no changes – press *Enter*
13. **Work Scheduling view:** no changes – press *Enter*
14. **Accounting 1 view:** **Standard price 2500** – press *Enter*
15. **Accounting 2 view:** no changes – press *Enter*
16. **Costing 1 view:** no changes – press *Enter*
17. **Costing 2 view:** no changes – press 
18. Change the Material Description for the language key **DE** also to **Speedstarlet-xxyy**  
press -button.

### 2.3.1.3 Material Master Record: Basis-module 2

Create now the Basis-module2 on your own by using the following transaction:

**Logistics → Material Management → Material Master → Material → Create (Special) → Semi-Finished Product (MMB1)**

1. Enter the following data:
  - **Material** **Basis-module2-xxyy**
  - **Industry sector** **Mechanical engineering**
  - **Copy from** your material **Basis-module-xxyy**
2. View selection:
  - **Basic data 1**
  - **Basic data 2**
  - **MRP 1**
  - **MRP 2**
  - **MRP 3**

- **MRP 4**
  - **Work scheduling**
  - **accounting 1**
  - **accounting 2**
  - **costing 1**
  - **costing 2**
3. Organizational data:
- |                                     |                                |
|-------------------------------------|--------------------------------|
| - <b>Plant</b>                      | <b>1000 (Hamburg)</b>          |
| - <b>Storage Location</b>           | <b>0001 (Material Storage)</b> |
| - <b>Copy from Plant</b>            | <b>1000 (Hamburg)</b>          |
| - <b>Copy from Storage Location</b> | <b>0001 (Material Storage)</b> |
4. **Basic data 1 view:**
- |                               |                           |
|-------------------------------|---------------------------|
| - <b>Material Description</b> | <b>Basis-module2-xxyy</b> |
| - <b>Gross Weight</b>         | <b>15 KG</b>              |
| - <b>Net Weight</b>           | <b>13 KG</b>              |
5. **Basic data 2 view:** no changes – press *Enter*
6. **MRP 1 view:** no changes – press *Enter*
7. **MRP 2 view:** no changes – press *Enter*
8. **MRP 3 view:** no changes – press *Enter*
9. **MRP 4 view:** no changes – press *Enter*
10. **Work Scheduling** view: no changes – press *Enter*
11. **Accounting 1** view: **Standard price 1500** – press *Enter*
12. **Accounting 2** view: no changes – press *Enter*
13. **Costing 1** view: no changes – press *Enter*
14. **Costing 2** view: no changes – press -button

### 2.3.1.4 Material Master Record: Aluminum frame

Finally, create the Alu-Frame with reference to the Carb-Frame:

**Logistics → Material Management → Material Master → Material → Create (Special) → Raw Material (MMR1)**

1. Enter the following data:
 

- <b>Material</b>	<b>Alu-frame-xxyy</b>
- <b>Industry sector</b>	<b>Mechanical engineering</b>
- <b>Copy from</b>	your material <b>Carb-Frame-xxyy</b>
2. View selection:
  - **Basic data 1**
  - **Basic data 2**
  - **Purchasing**
  - **MRP 1**
  - **MRP 2**
  - **MRP 3**
  - **MRP 4**

- *accounting 1*
  - *costing 1*
3. Organizational data:
- |                                     |                                |
|-------------------------------------|--------------------------------|
| - <b>Plant</b>                      | <b>1000 (Hamburg)</b>          |
| - <b>Storage Location</b>           | <b>0001 (Material Storage)</b> |
| - <b>Copy from Plant</b>            | <b>1000 (Hamburg)</b>          |
| - <b>Copy from Storage Location</b> | <b>0001 (Material Storage)</b> |
4. **Basic data 1 view:** **Material Description** **Alu-Frame-xxyy**
5. **Basic data 2 view:** no changes – press *Enter*
6. **Purchasing view:** no changes – press *Enter*
7. **MRP 1 view:** no changes – press *Enter*
8. **MRP 2 view:** no changes – press *Enter*
9. **MRP 3 view:** no changes – press *Enter*
10. **MRP 4 view:** no changes – press *Enter*
11. **Accounting 1 view:** **Standard price 250** – press *Enter*
12. **Costing 1 view:** no changes – press -button

Now that all material master records are maintained, you need to create the master data required for production.

### 2.3.1.5 Change Material

A quick delivery of sales orders is important regarding the two racing bicycles **Speedstar-xxyy** and **Speedstarlett-xxyy**. Since the production of the bikes requires a certain amount of time, production has to be planned in advance. Thus, production should be carried out before you receive a sales order. You are supposed to plan production using **pre-planning with assembly**. Accordingly, change the strategy group in the MRP 3 view to strategy group **40**, planning with final assembly.

Choose

**Logistics → Production → Master Data → Material Master → Material → Change (MM02)**

1. Enter material **Speedstar-xxyy** and press *Enter*.
2. Select the **MRP 3 view** and confirm.
3. Enter plant **1000** and storage location **0001**.
4. Enter **40** in the **strategy group** field.
5. **Safe** your modification.
6. Repeat these steps for the **Speedstarlett-xxyy**.

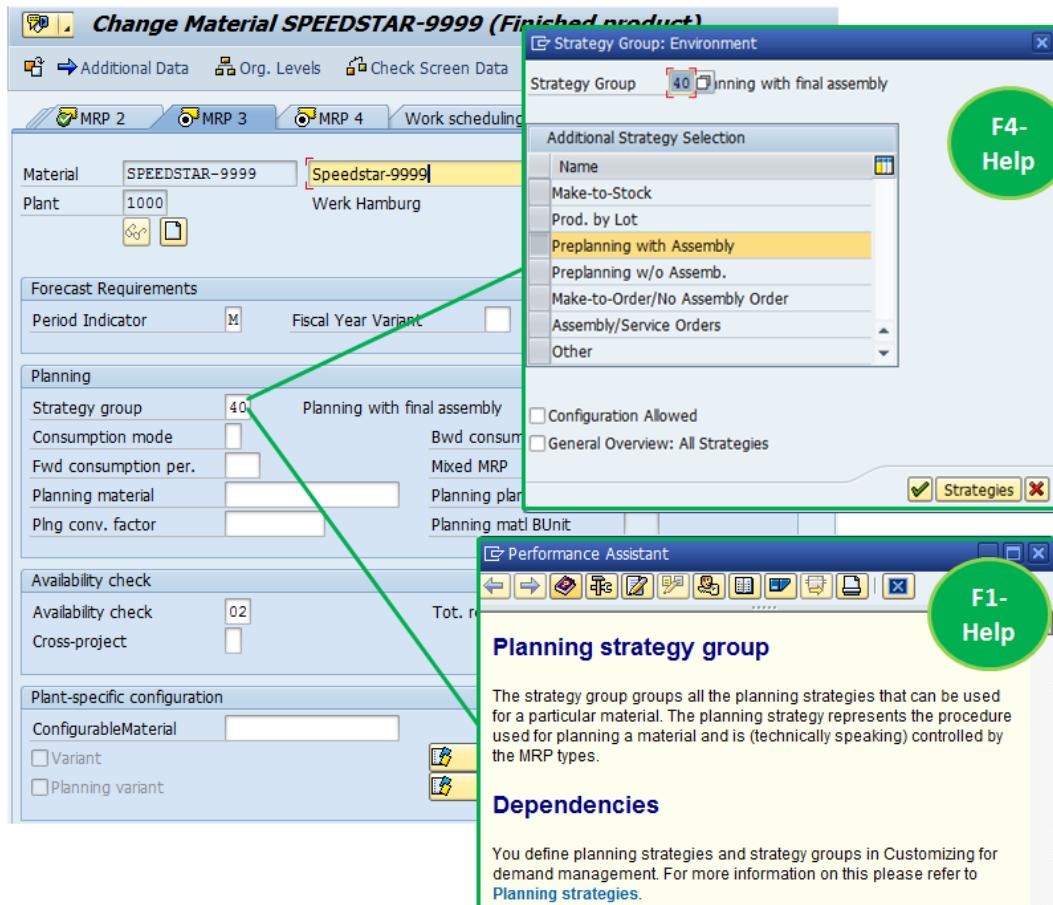


Figure 12: Strategy Group for MRP: SAP-System-Screenshot

### 2.3.2 Bill of Materials

In the theory part, you have learned that the Bill of Material is used to define the structure of a finished product. This structure contains all the components needed to produce the finished product. The BOM is not only necessary for the production application (SAP PP) but also for the Material Planning in SAP MM. BOM is used in SAP MM to create all dependent material requirements for the production process. That is, when a requirement is created for the Speedstar, SAP MM explodes the complete BOM to create requirements for the Speedstar's components (Basis-module, Handlebar etc.).

In the following, you are going to create the BOMs for:

- Basis-module
- Basis-module2
- Speedstar
- Speedstarlett

#### 2.3.2.1 BOM for Basis-module

You start with the BOM for Basis-module, since the Basis-module does not only contain components (Gearing, Carb-Frame, Wheel, and Chain), but also is itself a component of the Speedstar. Consider that in SAP ERP you can only create single-level BOMs. That is, you create a single-level BOM for the Basis-module containing one level of components and sub-

sequently create a single-level BOM for the Speedstar containing the Basis-module. In that way you create multiple-level BOMs.



*In the following creation of BOMs, please keep in mind to create ALL BOMs with date 01.01. of this year. It is crucial that you create the BOMs with the first day of the year!*

To create a BOM, call up the following transaction:

**Logistics → Production → Master Data → Bills of Materials → Bill of Material → Material BOM → Create (CS01)**

1. Enter the following data:

- **Material** *Basis-module-xxyy*
- **Plant** *1000*
- **BOM usage** *1 (production)*
- **Validity (!)** *01.01. of this business year*
- Continue by clicking or *Enter*.

You know from the scenario description that the basis-module consists of the following stock-item materials: Carb-Frame-xxyy, Wheel-xxyy, Chain-xxyy, Gearing-xxyy.

2. You can see the dialog *create material BOM: general item overview*. Enter the following data:

Item	ICt	Component	Quantity
0010	L	carb-frame-xxyy	1 PC
0020	L	wheel-xxyy	2 PC
0030	L	chain-xxyy	1 PC
0040	L	gearing-xxyy	1 PC

I...	I.	Component	Component description	Quantity	U.	A.	S..	Valid From	Valid to	Change No.
0010	L	CARB-FRAME-9999	Carb-Frame-9999	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
0020	L	WHEEL-9999	Wheel-9999	2	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
0030	L	CHAIN-9999	Chain-9999	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
0040	L	GEARING-9999	Gearing-9999	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	

Figure 13: BOM creation for Basis-module: SAP-System-Screenshot

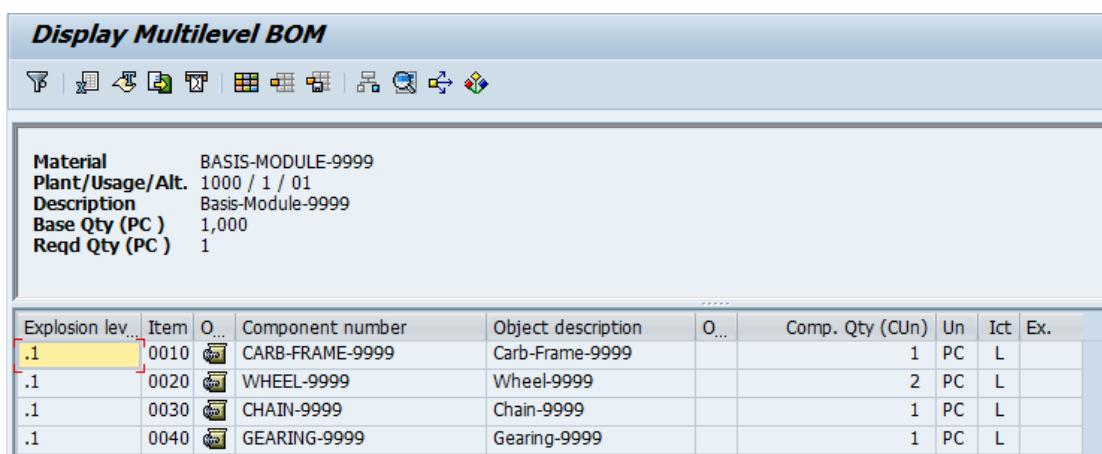
3. Save your entries ( or **CRTL-s**).
4. To double-check your newly created BOM, display the BOM explosion. Therefore, call up the following transaction:

**Logistics → Production → Master Data → Bills of Materials → Reporting → BOM Explosion → Material BOM → Multi-Level BOM (CS12)**

5. Enter the **material Basis-module-xxyy** and plant **Hamburg (1000)**. BOM application is general production **PP01**.
6. Click the  button (execute) or press **F8**. You can now see the BOM in list form.

#### For your comparison:

The following figure shows the BOM for **Basis-module-999 (created by your tutor)**.



The screenshot shows the SAP interface for displaying a multilevel BOM. At the top, there's a toolbar with various icons. Below it, a header bar displays 'Display Multilevel BOM'. The main area has two sections: a summary table and a detailed table.

**Summary Table:**

Material	BASIS-MODULE-999
Plant/Usage/Alt.	1000 / 1 / 01
Description	Basis-Module-999
Base Qty (PC)	1,000
Reqd Qty (PC)	1

**Detailed Table:**

Explosion lev...	Item	O...	Component number	Object description	O...	Comp. Qty (CUn)	Un	Ict	Ex.
.1	0010		CARB-FRAME-9999	Carb-Frame-9999		1	PC	L	
.1	0020		WHEEL-9999	Wheel-9999		2	PC	L	
.1	0030		CHAIN-9999	Chain-9999		1	PC	L	
.1	0040		GEARING-9999	Gearing-9999		1	PC	L	

Figure 14: BOM Basis-module: SAP-System-Screenshot

#### 2.3.2.2 BOM for Basis-module 2

Next, create the BOM for the Basis-module2. After that, this option will be used for the production of the Speedstarlett.

Choose

**Logistics → Production → Master Data → Bills of Materials → Bill of Material → Material BOM → Create (CS01)**

1. Enter the following data:
  - **Material** *Basis-module2-xxyy*
  - **Plant** *1000*
  - **BOM usage** *1 (production)*
  - **Validity (!)** *01.01. of this business year*
  - Continue by clicking  or **Enter**.

The only difference to the BOM of Basis-module is that you have Alu-frame instead of Carb-frame as a component.

2. Therefore, enter the following data:

<b>Item</b>	<b>ICt</b>	<b>Component</b>	<b>Quantity</b>
<i>0010</i>	<i>L</i>	<i>Alu-frame-xxyy</i>	<i>1 PC</i>
<i>0020</i>	<i>L</i>	<i>wheel-xxyy</i>	<i>2 PC</i>
<i>0030</i>	<i>L</i>	<i>chain-xxyy</i>	<i>1 PC</i>
<i>0040</i>	<i>L</i>	<i>gearing-xxyy</i>	<i>1 PC</i>

3. Save your entries ( or **CRTL-s**).

Now that you created the BOMs for the Basis-modules, you have to create the BOMs for the finished products.

### 2.3.2.3 BOM for the Speedstar

Choose

**Logistics → Production → Master Data → Bills of Materials → Bill of Material → Material BOM → Create (CS01)**

1. Enter the following data:

- **Material**      *Speedstar-xxyy*
- **Plant**           *1000*
- **BOM usage**    *1 (production)*
- **Validity (!)**   *01.01. of this business year*
- Continue by clicking  or **Enter**.

You know from the scenario description that the Speedstar consists of the following stock-item materials: Basis-module-xxyy, Pedal, Brakes, Handlebar, and Saddle.

2. Therefore, enter the following data:

<b>Item</b>	<b>ICt</b>	<b>Component</b>	<b>Quantity</b>
<i>0010</i>	<i>L</i>	<i>Basis-module-xxyy</i>	<i>1 PC</i>
<i>0020</i>	<i>L</i>	<i>Pedal</i>	<i>2 PC</i>
<i>0030</i>	<i>L</i>	<i>Brakes</i>	<i>2 PC</i>
<i>0040</i>	<i>L</i>	<i>Handlebar</i>	<i>1 PC</i>
<i>0050</i>	<i>L</i>	<i>Saddle</i>	<i>1 PC</i>

Components of the Speedstar. Note that you only created Basis-Module-xxyy on your own. The other materials were created by your course instructor and thus have no xxyy-String										
I...	I..	Component	Component description	Quantity	U..	A..	S..	Valid From	Valid to	Change No.
001	L	BASIS-MODULE-9999	Basis-Module-9999	1	PC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
002	L	PEDAL	Pedal	2	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
003	L	BRAKES	Brakes	2	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
004	L	HANDLEBAR	Handlebar	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	
005	L	SADDLE	Saddle	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	01.01.2010	31.12.9999	

Item Category – Stock item (L)      Quantity – Make sure your Speedstar has 2 Brakes and 2 Pedals!      Starting date must be 01.01. of current year

Figure 15: BOM Creation for Speedstar: SAP-System-Screenshot

3. Safe your entries.
4. Display the BOM:

**Logistics → Production → Master Data → Bills of Materials → Reporting → BOM Explosion → Material BOM → Multi-Level BOM (CS12)**

5. Enter the Speedstar as **material (Speedstar-xxyy)** and plant **Hamburg (1000)**. BOM application is general production (**PP01**).
6. Click the button (execute) or press **F8**. You can now see the BOM in list form.

Display Multilevel BOM										
<b>Material</b> SPEEDSTAR-9999 <b>Plant/Usage/Alt.</b> 1000 / 1 / 01 <b>Description</b> Speedstar-9999 <b>Base Qty (PC )</b> 1,000 <b>Reqd Qty (PC )</b> 1										
<b>Second level Items coming from the Basis-module</b>										
Exploded lev...	Item	O...	Component number	Object description	O...	Comp. Qty (CUn)	Un	Ict	Ex.	
.1	0010		BASIS-MODULE-9999	Basis-Module-9999		1	PC	L		
.2	0010		CARB-FRAME-9999	Carb-Frame-9999		1	PC	L		
.2	0020		WHEEL-9999	Wheel-9999		2	PC	L		
.2	0030		CHAIN-9999	Chain-9999		1	PC	L		
.2	0040		GEARING-9999	Gearing-9999		1	PC	L		
.1	0020		PEDAL	Pedal		2	PC	L		
.1	0030		BRAKES	Brakes		2	PC	L		
.1	0040		HANDLEBAR	Handlebar		1	PC	L		
.1	0050		SADDLE	Saddle		1	PC	L		

Figure 16: BOM Speedstar: SAP-System-Screenshot

You can see from the figure that the BOM of the Speedstar is a multi-level BOM.

#### 2.3.2.4 BOM for the Speedstarlett

Choose

**Logistics → Production → Master Data → Bills of Materials → Bill of Material → Material BOM → Create (CS01)**

1. Enter the following data:

- **Material** *Speedstarlett-xxyy*
- **Plant** *1000*
- **BOM usage** *1 (production)*
- **Validity (!)** *01.01. of this business year*
- Continue by clicking or **Enter**.

You know from the scenario description that the Speedstarlett consists of the following stock-item materials: Basis-module2-xxyy, Pedal, Brakes, Handlebar, and Saddle. The difference to the Speedstar is only the Basis-module2-xxyy.

2. Therefore, enter the following data:

Item	ICt	Component	Quantity
<i>0010</i>	<i>L</i>	<i>Basis-module2-xxyy</i>	<i>1 PC</i>
<i>0020</i>	<i>L</i>	<i>Pedal</i>	<i>2 PC</i>
<i>0030</i>	<i>L</i>	<i>Brakes</i>	<i>2 PC</i>
<i>0040</i>	<i>L</i>	<i>Handlebar</i>	<i>1 PC</i>
<i>0050</i>	<i>L</i>	<i>Saddle</i>	<i>1 PC</i>

3. Save your entries.

#### 2.3.3 Routings

As you should know already, a routing is the description of a manufacturing sequence for the production of materials or the creation of services, respectively.

Moreover, additional control parameters are provided in the SAP ERP system. Amongst others, these are:

- use of work centers
- time allocations
- use of production resources

During your manufacturing run, you have to produce 4 distinct items. These are the two assemblies **Basis-module-xxyy** and **Basis-module2-xxyy**, as well as the two finished products **Speedstar-xxyy** and **Speedstarlett-xxyy**. Correspondingly, you have to create four routings. Hereby, all items are carried out at work center 1420 (assembly IV).

To simplify matters, the four operational procedures are identical and consist of merely three steps. Usually (in the real world), operational procedures are more complex and contain multiple steps.



*In the following creation of Routings, please keep in mind to create ALL Routings with date 01.01. of this year. It is crucial that you create the Routings with the first day of the year!*

### 2.3.3.1 Create Routing for Basis-module

Call up the following transaction:

**Logistics → Production → Master Data → Routings → Routing → Standard Routings → Create (CA01)**

1. Enter the following data:
  - **Material**      *Basis-module-xxyy*
  - **Plant**            *1000*
  - **Key date (!)**    *01.01. of this business year*
  - Continue by clicking or **Enter**.
2. The routing is supposed to be used for production and has the status released (thus, can be actively used). Enter the following data:
  - **Usage**          *1 (Production)*
  - **Status**           *4 (released)*
  - Next, click the -button (**operation overview**) or press **F7** alternatively

You can see the **activity overview**. You did not have any activity maintained yet.

3. From the Information above, you know that all the activities in the production process take place at the same work center (1420). Enter the following data:

Operat.	Work Center	Control key	Standard text key
<i>0010</i>	<i>1420</i>	<i>PP01</i>	<i>P000001</i>
<i>0020</i>	<i>1420</i>	<i>PP01</i>	<i>P000002</i>
<i>0030</i>	<i>1420</i>	<b><i>PP99</i></b>	<b><i>P000005</i></b>

Press Enter. You might receive a message that a standard text is not maintained in customizing. Skip the message. Then, double-click in the **cell of operation (SOp)** for the row **0010**.

Determines which business transactions should be executed for the object that belongs to the task list.

For instance the control key PP99 is a mile stone key, which tells the routing to post goods issue in storage location after the production process is finished. That is, when this activity is finished and thus, the material is produced, the system books the material automatically to the storage location.

Key which identifies a text that is frequently used to describe certain processes (for example, turning or milling).

You can assign a standard text to an operation by entering the standard text key in the operation. By changing this text within the operation long text, you can then create an individual operation description.

Op...	O...	S...	Work center	Plnt	Control key	Standard text key	Description
	0010		1420	1000	PP01	P000001	
	0020		1420	1000	PP01	P000002	Install in accordance with design and
	0030		1420	1000	PP99	P000005	

After you entered all the data double-click on the field in the column Sop of the first Operation line.

Figure 17: Routing – Operations Overview: SAP-System-Screenshot

4. You can now see the dialog **create routing: operation details**. Here you can set the detailed information about standard values and activity types etc. That is, in case of activity 0010, you say that in this step, you have to set up the machines (activity type 1422) for the production process and this will take your workers 30 minutes. Enter the following data:

- In the line **setup**, enter the **standard value 30 min** and enter **activity type setup hours (1422)**.
- Click the **back** button or press **F3**.

The standard time the activity type specified should last.

Basically, that means that this step (setting up the machines) should take 30 minutes

Activity types describe the activity produced by a cost center and are measured in units of time or quantity. In activity type planning, control data determines whether the activity price for evaluation of the activity type is manually set or is derived iteratively through activity price calculation.

That means, that the activity type is used in calculating the price of this production step. The calculation is done in controlling application (SAP CO). The price of the activity type 1422 (Setup hours) is also determined in SAP CO. This price depends on many factors, which will be disclosed in teaching unit 9.

Standard values		Unit of measure conversion	
Base Quantity	1	Header	Unit
Act./Operation UoM	PC	1	PC
Break		<	>
Setup	30	MIN	1422
Machine		MIN	1420
Labor		MIN	1421
Standard value 1			
Standard value 2			
Standard value 3			
Business Process			

Figure 18: Routing – Operation Details: SAP-System-Screenshot

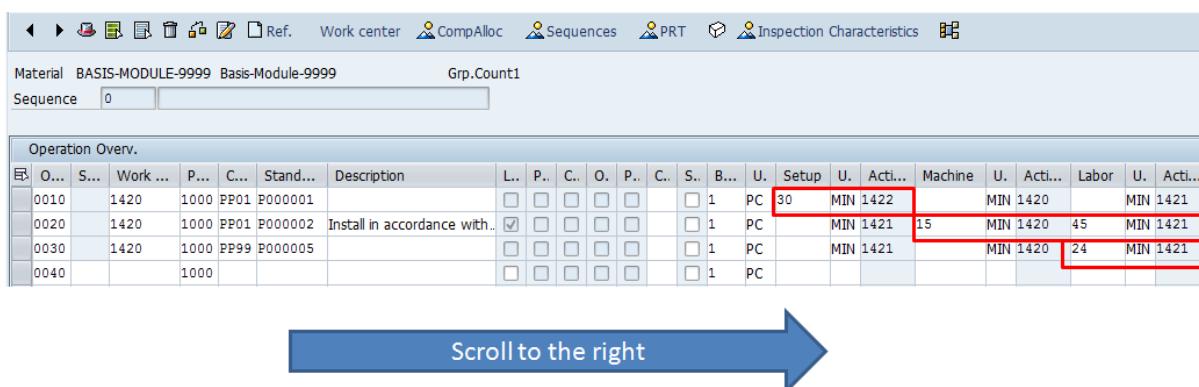
5. Once again, go to the **operation details** screen by double-clicking **cell of operation (SO<sub>p</sub>)** for the row **0020** (press Enter if any message shows up!). Now enter the detailed activities that need to be processed during this production step:
  - In the line **Machine** enter the **standard value 15 minutes** and enter as **activity type machine hours (1420)**
  - In the line **Labor time** enter the **standard value 45 minutes** and enter the **activity type wage hours (1421)**.
  - Go back ( ) to the previous screen.
6. For the last time, go to the **operation details** screen by double-clicking **cell of operation (SO<sub>p</sub>)** for the row **0030** (press Enter if any message shows up).
  - Enter the **standard value 24 minutes** in the **labor** line. The **activity type** is **wage hours (1421)**. Go back to the **operation overview**.
7. Finally, please compare your created routing with the example shown below. If the routings are identical, please save your routing ( ).

List the routing number displayed by the system in the status bar.

**Routing number 1 (Basis-module):** \_\_\_\_\_

#### For your comparison:

Please compare your routing and contact your tutor in case of discrepancies.



E	O...	S...	Work ...	P...	C...	Stand...	Description	L...	P...	C...	O...	P...	C...	S...	B...	U...	Setup	U...	Acti...	Machine	U...	Acti...	Labor	U...	Acti...						
																				PC	30	MIN 1422	MIN 1420	MIN 1421	PC	MIN 1421	15	MIN 1420	45	MIN 1421	
	0010			1420	1000	PP01	P000001																								
	0020			1420	1000	PP01	P000002	Install in accordance with..		<input checked="" type="checkbox"/>								1	PC	MIN 1421	15	MIN 1420	45	MIN 1421							
	0030			1420	1000	PP99	P000005																								
	0040				1000																										

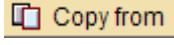
Figure 19: Routing Basis-module: SAP-System-Screenshot

#### 2.3.3.2 Create remaining Routings

Now, please independently create the other three routings (Basis-module2-xxyy, Speedstar-xxyy, Speedstarlett-xxyy) on your own by using transaction code **CA01**.



We will maintain the principle stage material (**P000001**) → assembly (**P000002**) → delivery (**P000005**). The times (machine, labor, setup times) stated for the routing of the Basis-module are identical as well. To spare a little work, you can also complete the following steps:

1. In **CA01** enter
  - material Basis-module2-xxyy
  - plant 1000
  - date **01.01. of this business year (?)**
2. Click  **Copy from**, select Routing and confirm.
3. Enter the **reference material Basis-module-xxyy** and confirm your entry.
4. Enter **4** as **status plan** and press *Enter*.
5. All other data will be transferred from the reference routing.

Don't forget to save! List the other three routing numbers as well.

**Routing number 2 (Basis-module2):** \_\_\_\_\_

**Routing number 3 (Speedstar):** \_\_\_\_\_

**Routing number 4 (Speedstarlett):** \_\_\_\_\_

Thus, all required master data for the manufacturing run are maintained. Next, you will deal with the theoretical foundations of demand planning in the SAP ERP system.

## 2.4 Elucidation



### What have we learned so far?

The major outcomes of this chapter were the organizational level and the master data used in SAP ERP Material Management. You have learned how material management settings in the material master, BOMs and routings affect material planning.

### 2.4.1 Organizational Levels in Material Planning

The organizational levels relevant to material planning are

- client
- company code
- plant
- storage location

### 2.4.2 Master Data in Material Planning

Following master data are relevant for material planning:

- material master
- bill of materials (BOM)
- routings

#### 2.4.2.1 Material Master

- The material master file is a companies' central source for depositing and accessing **material-related data**.
- Data stored in material master is generally used by all departments. However, functional areas (departments) of a company are in charge of maintenance of single views.
- Views relevant for material planning and, thus, maintained by this department/application are:
  - o MRP 1-4
  - o Work scheduling
- Views relevant to material planning but maintained by other applications are:
  - o Accounting 1, 2
  - o Costing 1, 2
  - o Forecasting
  - o Purchasing
  - o Classification
  - o Basic Data 1 and 2

#### Data Structure

- **Basic data 1** and **2** are independent of organizational units and, thus, valid for the whole client.

- The **MRP (production planning)**, **Work Scheduling (production execution)**, and **Accounting** views are plant-related. You have experienced that by creating your own materials. For the MRP, Work Scheduling, Accounting, and Costing views you always had to enter plant and storage location as organizational units. Consider that although company code and controlling area are in charge of accounting resp. costing, you never had to enter these organizational units. That is due to the fact that the affiliation to the corresponding company code resp. controlling area is derived from the plant. That is, a plant is explicitly assigned to a company code and a company code is explicitly assigned to a controlling area.
- All views that are not valid client-wide are only valid for the organizational units they are defined for. However, views can be extended resp. created for as many organizational units you want them to be valid for.

### Settings for Material Planning

Material planning deals with planning of material availability (when, which material has to be where and how this can be realized (buy-or-make decision)).

All the data regarding these problems are stored in the MRP views (**MRP 1 to 4**). The following parameters are central for material planning:

- **MRP type** states how a material should be planned (provided e.g., for production). If the MRP type is classified **MRP** (Like for the Speedstar – MRP type was PD), material is provided based on plans (e.g., current and future sales plans, sales orders, material reservations). **Consumption-based planning** refers to the provision of material based on historical consumption. This MRP type is commonly used for B and C goods, which are not of high value. More significant (expensive) materials can be classified **MPS**. For example, an airplane fuselage, which costs multiple million Euros, is planned as major item and procured just in time, as opposed to rivets for stabilization. Procuring the fuselage at the latest possible time before it is used in production saves high amounts of money in the production of an airplane, e.g., concerning capital lockup, interest charges and storage costs.
- The **lot-sizing procedure** determines the lot size of a certain procurement proposal. The particular lot-sizing procedure thereby determines which quantity is produced without break or shifting of the production process. Concerning the Speedstar you set the lot-sizing procedure EX (exact lot size). That means that the system calculates the exact amount to be produced in one production process to cover the required quantity from e.g., a sales order.
- The **procurement type** determines how materials are procured. You can either set E for in-house production or F for external procurement. X means that you can procure or produce the material. The Speedstar has the procurement type in-house production (E), whereas the components like Gearing have the procurement type external procurement (F). Thus, you cannot purchase the Speedstar using the procurement application.
- The **in-house production time** and the **planned delivery time** refer to the duration of procurement. The in-house production time is the number of working days required for the in-house production of a particular material. Thereby, the in-house production

time is independent of the order quantity. This applies correspondingly for the planned delivery time.

- The SAP ERP system allows for the creation of a **safety stock** in the material master. For instance, if you have a safety stock of 50 units of Gearings sets and the stock amount reaches 50 pieces, the system automatically creates a purchase requisition.
- The **strategy group** groups all the planning strategies that can be used for a particular material. The planning strategy represents the procedure used for planning a material and is (technically speaking) controlled by the MRP types.
- The **ATP check** is carried out using the **availability check group**. You set the availability check group 02 (individual requirement) for the Speedstar. That means that the system checks availability every single time a requirement is created in applications such as production planning or sales. For instance, if you create a sales order for Speedstars, the system checks immediately (after you entered the Speedstar in the sales order and pressed Enter) if the amount entered is available on stock. There are many more standard values for this field, e.g. 01 (daily requirements) – sums up all requirements of one day – or KP (no check) – system does not check for availability.
- You can define a **production procedure** by a **production version**. That is, you can assign different **routings** and **BOMs** to a production process using production versions. In doing that, you can produce different variants of a product (e.g., a car with 2 engine variants: 200 HP and 100 HP), where differences in routing activities or BOM components are accounted for.

### Material type

**Material type** is the most important label assigned to a material and influences what further business processes and functions can be done for a particular material:

- Views displayed in the material master: raw materials (cannot have the view work scheduling).
- Department-related data that can be maintained: same as first point – raw materials are irrelevant for production execution (work scheduling).
- Assignment of material numbers: some material types have internal material number assignment, so that you cannot enter the material number upon creation (only the description field is editable).
- Allowed procurement types (in-house production or external procurement): you experienced yourself that you could not select in-house production for raw materials like chain.
- Updated general ledger accounts: e.g. value based stock changes for raw materials are posted on account 300000, whereas finished goods are posted on 895000. This is controlled by the valuation class you entered in view accounting.

A material type combines materials with similar characteristics, i.e. materials can be managed according to company requirements.

In **customizing**, you can create additional, company-specific material types. Standard material types in SAP ERP are for example:

- FERT           finished products (e.g., Speedstar)
- ROH           raw materials (e.g., Chain)

- HALB semi-finished products (e.g., Basis-module)
- HAWA trading goods (e.g., Gearing)

When creating a material master, the used transaction code determines the material type of the new material:

- FERT MMF1
- ROH MMR1
- HALB MMB1
- HAWA MMH1

Alternatively, you can use the general transaction MM01; however then you have to explicitly determine the material type in the next step!

#### 2.4.2.2 Bill of materials (BOM)

A **bill of materials** contains all the components necessary for producing a finished or semi-finished good.

BOMs are used in:

- **MRP:** When planning material requirements for a finished good, you must know what components it contains, since you must plan those too.
- **Production:** Producing a finished good is only possible if you know what components it is composed of.
- **Procurement:** Purchasing requirements for finished goods components are derived using BOM.
- **Product costing:** When you calculate the production costs for a finished good in controlling application, you need to know what components it contains.

#### Bills of Materials Structure

- BOM consists of Header data:
  - o contains all settings valid for the entire BOM
  - o **Base quantity** determines to which quantity of the finished product the production items refer; e.g. 100 units of Speedstar → 100 Chains in the BOM
  - o **BOM usage** determines, for example, for which **business applications** a BOM can be used, e.g. production or costing
- and item data:
  - o Contains the components of the finished product.
  - o **Item category** states which **kind of item** it is about: **Stock items, non-stock items, variable-size items, document items**, text items, class items, intra material.
  - o Each item of a BOM needs to be assigned to an item category in case items of a BOM need to be changed or added. The item category affects the processing of an item. The item category manages, for example, whether a material number for a particular item is required, optional, or not allowed.
  - o A material which is a **stock item** in a BOM must have a material master. Contrastingly, non-stock items do not necessarily need a material master. They can be stored in a material group as well.

- **Status** of a BOM: Key which describes the current processing status of the BOM. This indicator controls subsequent processing of the BOM in various other organizational areas (e.g., engineering, costing, MRP). Examples:
  - o BOM active (1): BOM can, for example, be exploded in MRP and released for planned orders.
  - o BOM not active (2): This BOM cannot be processed as described above.
- BOM in the SAP ERP system are always **single-level**. Multi-level production is accomplished through multiple single-level BOMs (cf. Speedstar – Basis-module)
- Simple BOMs have only one alternative BOM, whereas **multiple BOMs** consisting of multiple **BOM alternatives**. For instance, you can create a BOM for Speedstar containing brakes (alternative BOM 1) and one without brakes (alternative BOM 2), in case you want to produce a Speedstar without brakes. However, generally different BOM alternatives are used e.g. for distinct lot-size areas of production processes.

### Multi-level BOM Structure

OK, we already know how a multi-level BOM is build; here are some features of SAP ERP for working with multi-level BOMs:

- **Multi-level BOM structures** are exploded automatically by **MRP** and **product cost planning** when a Speedstar is scheduled by MRP, the BOM is analyzed down to the lowest level of the BOM and all required materials (including the Basis-module assembly) are reserved or included in the order and production process, respectively.
- It can also be exploded as a **master data evaluation**. For example for reporting reasons.

#### 2.4.2.3 Routings

**Routings** determine the required work steps relevant for production, concerning operations, their sequence, and the work centers in charge. The definition of **routings** is carried out via so-called **routing groups**. That is, all routings belonging to one particular material are grouped together. Each routing in a group receives its individual **group counter**.

Routings features:

- Reference to material: routing is created **material-specific**.
- **Standard sequences** define the standard procedure (activities) to be carried out when producing a material.
- **Parallel sequences** are used when certain activities can be run simultaneously.
- **Alternative sequences** are defined for materials that can be produced in different ways. For instance, if your production process alters depending on the variant of the product to be produced.
- A routing contains **standard values**. These are time elements (e.g., 15 minutes for machine X), which are relevant for scheduling operations. Please note that each step of a routing features a particular base quantity, which refers to these time elements.
- Routings can be transferred as **production process models (PPM)** to SAP **Advanced Planning and Optimization (APO)**.

## 3 Material Planning

You will now get acquainted with the material planning process in SAP ERP.

### 3.1 Theory: Material Planning Process



Generally, the **material planning process** consists of multiple steps. The following figure displays all steps in the material planning business process. Demand planning, which is used for the deduction of a future production program from previous sales figures, begins with **Sales and Operations Planning** (Standard SOP in our context). Data for this deduction are derived from the SAP BW system or the SAP LIS (Logistics Information System). The results of the Standard SOP are transferred to **Demand Management** and form the **Demand Program**. The Demand Program is used by the **Material Requirements Planning (MRP)** to create planned orders for production and procurement. The **Capacity Requirements Planning (CRP)** compares the production resources needed with the available capacities (mainly work center capacities) and concludes the detailed production planning process. Dates calculated for the purchase orders (delivery time of vendors) and production orders (in-house production time) determine the earliest possible delivery time to the customer (who ordered a product). These dates are considered in the availability check of sales orders in Sales and Distribution (SAP SD).

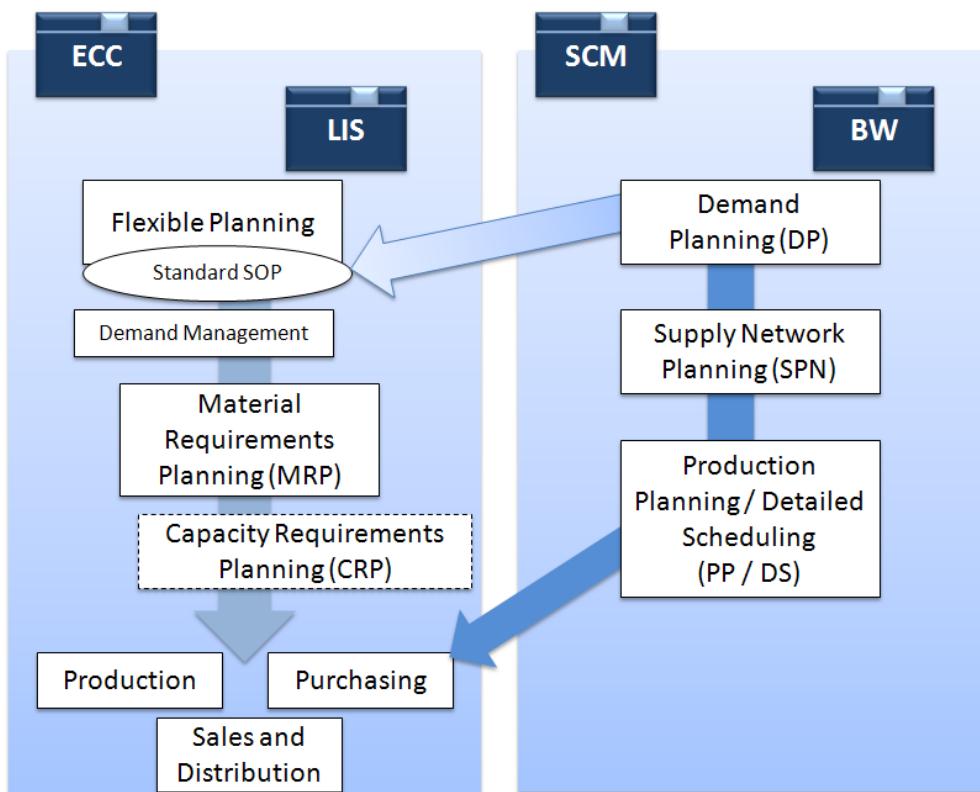


Figure 20: Supply Chain Planning

In this teaching unit we will focus on the left side of the figure above.

### 3.1.1 Overview Material Planning Process

**Sales and operations planning (SOP)**, as part of the Demand Planning, deals with the data collection of sellable product types and product quantities for a medium to long-term planning horizon. Thereby, future demand figures for aggregated finished products (e.g., product groups), finished products, and independently sellable spare parts (assemblies, individual components) are estimated (Material forecast). SOP aims at gaining the corresponding planning data for production and at roughly predicting planned sales data (without determining dependent requirements/bill explosion or scheduling via the routing) based on market analyses and historical sales data. SOP determines the product range and the sales quantity for a future planning period depending on the aggregated capacities of manufacturing as well as depending on product demand on the market. Thus, SOP is the link between the market-oriented profit planning and the manufacturing-oriented demand management.

**Sales orders** are not a step of the demand planning resp. material planning process, but they are crucial for determining the materials required. Sales orders are collected in sales order management (Sales and Distribution application SAP SD). Sales orders are the concrete order of a customer, demanding a particular product at a given date.

The purpose of **Demand Management** is the creation of the Demand Program and thus the management of independent requirements, which are transferred to the Material Requirements Planning.

- **Independent requirements** are the finished product requirements created by sales planning or concrete sales orders.
- **Dependent requirements** are item requirements a product consists of. Dependent requirements are determined by bill of material explosion with reference to the independent requirements.
- The **requirements type** or the **planning strategy** determines the behavior of the corresponding independent requirements in the SAP ERP system. Demand management aims at determining which quantities of a finished product are supposed to be manufactured at which time. This occurs by creating independent requirements. Thereby, planned independent requirements contain a precise date and can be consumed by sales order requirements, as opposed to SOP.

In **Material Requirements Planning** **net requirements** are calculated in the planning run to determine whether a material shortage is the case. Stock and fixed receipts are compared with the safety stock. The result of this comparison is the **quantity available for planning proposes**. These quantities are created as planned orders for production (→ production orders) or procurement (purchase orders/ purchase requisition)

**(SCM) Production Execution (teaching unit 4)** and **(SCM) External Procurement (teaching unit 1)**, again are not part of the material planning process. Here, the processing of production orders and the procurement of materials needed for the production orders are accomplished.

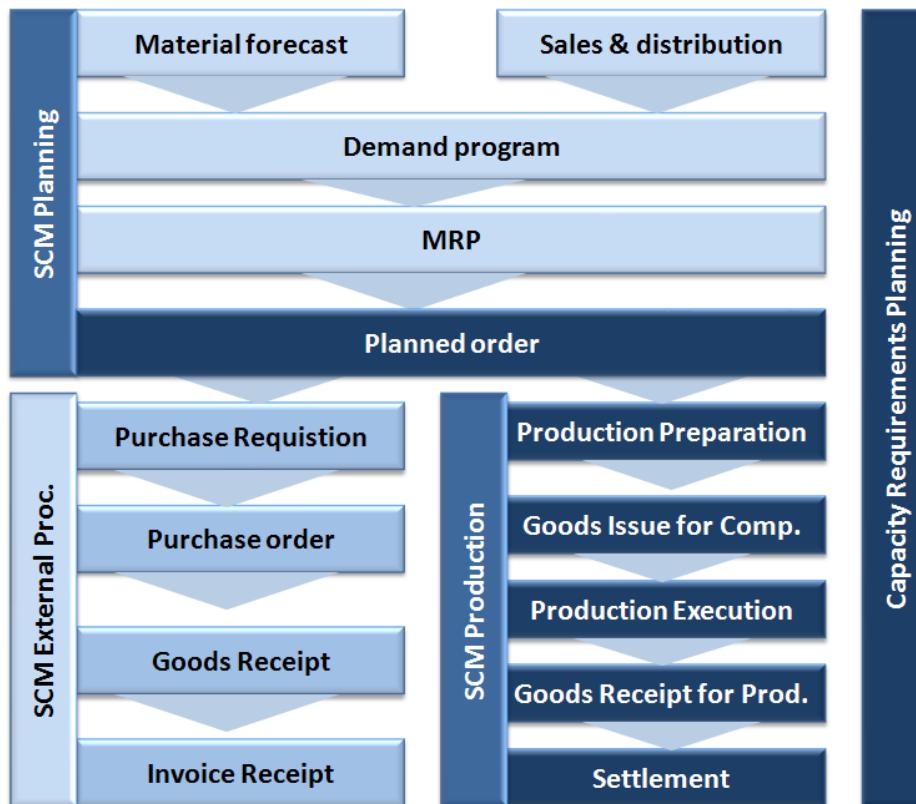


Figure 21: Material Planning Overview

### 3.1.2 Demand Planning

Demand Planning aims at forecasting future demand. It can be the starting point for the entire production planning process. The demand planning can result in the creation production plans which are then transferred to operative planning in the form of planned independent requirements.

Thereby, Demand Planning contains two core elements: Flexible planning and Standard SOP. **Flexible planning** provides more flexibility when creating the future sales plans. However, you can and, to a large extent, have to use the relevant information structures and planning types to create settings for flexible planning yourself. This requires a detailed understanding of the structures of the Logistics Information System (LIS).

Contrastingly, **Standard SOP** is designed as a standard process that is installed by default. The Standard SOP implemented with the delivery of SAP ERP is based on the S076 information structure. This information structure uses level-by-level planning where the planning hierarchy levels are independent of one another. This means that plans at different levels do not have to be consistent. Standard SOP is a simplified variant of flexible planning in which a specific planning process is already defined. Therefore, the use of this function does not require a detailed knowledge of the settings of the Logistics Information System on which it is based.

The following figure summarizes the differences between the Flexible Planning and the Standard SOP. In this section we will focus on the Standard SOP.

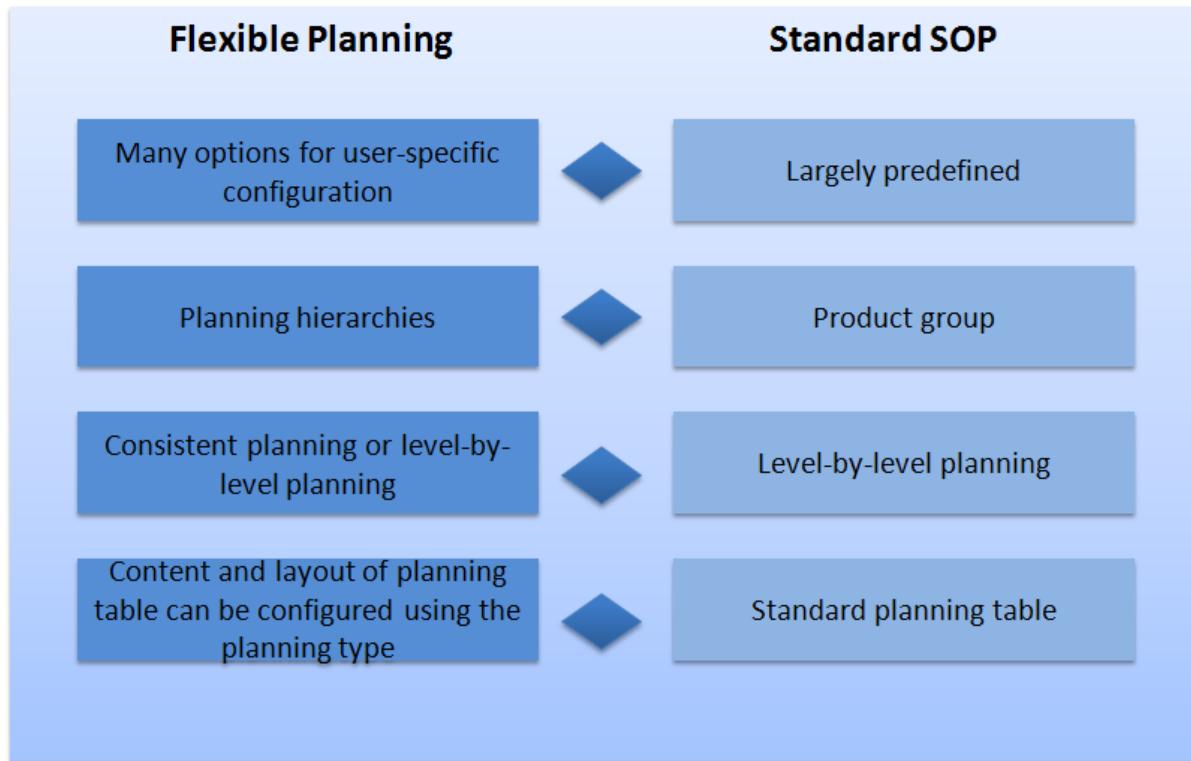


Figure 22: Flexible Planning and Standard SOP

### 3.1.3 Standard Sales and Operations Planning (SOP)

The Standard Sales and Operations Planning is a preconfigured module for **planning** and **forecasting** in logistics. Standard SOP can be used to estimate future sales for a product or product group and to develop production plans as well as carry out feasibility checks.

You can, for example, develop **sales plans** using data from the sales and distribution module. Integrated forecasting tools can be used for predicting future sales by, for instance, adjusting and updating historical data.

A **production plan** can be developed based on a sales plan. The feasibility of a production plan can be assessed roughly by checking **key resources** (e.g., a scarce commodity or a vital manufacturing machine, which can trigger production shortfalls) and if required, you can change the production plan. A **planning table** serves as supportive tool for this function. It is quite similar to a spreadsheet (in Microsoft Excel).

SOP provides a method for:

- Sales planning
- Production planning
- Feasibility estimates

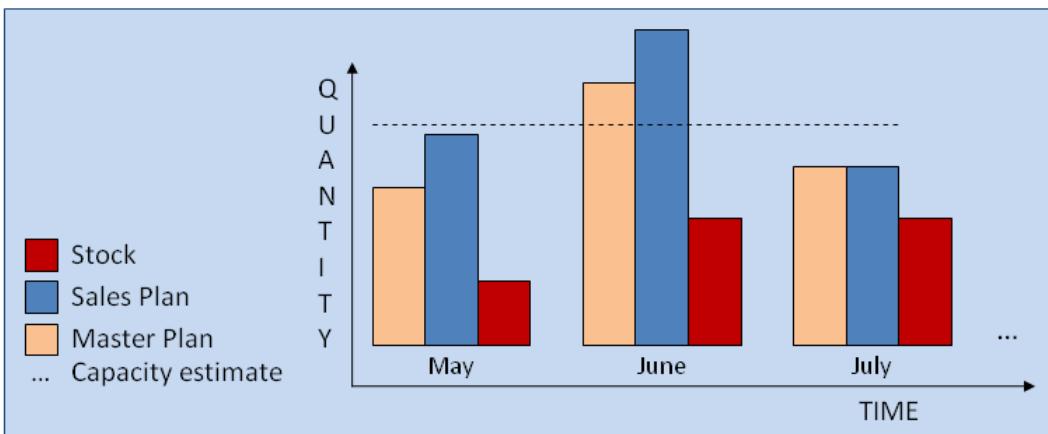


Figure 23: Sales and Operations Planning

### 3.1.3.1 Planning Levels in Standard SOP

The Standard SOP can be executed for materials or product groups. **Product groups** can be used in SAP to facilitate the planning process. You can think of a **product group** as of a product family. A product group consists of products with **similar planning characteristics**. A product group can also contain product groups, which contain materials themselves. In the following figure, you can see a hierarchy of product groups. Thereby, product group 1 consists of product group A and B. The lowest product group of a hierarchy must consist of materials.

Product groups are created in SOP. For each product group, the system automatically creates a material master with the PROD material type.

Planning at higher product group levels can be disaggregated to the members of the product group. For disaggregating the planning data from a product group to the product group members, you require a **proportion factor**. You can define the proportion factor by specifying the product group members and the associated proportional factors that determine how the planning data is divided among the members. The proportional factors can be defined manually or automatically calculated based on historical consumption values of the product group members. The sum of all proportion factors of a particular planning level is usually 100%. A proportion factor can equal zero as well.

You can also execute cross-plant planning in SOP.

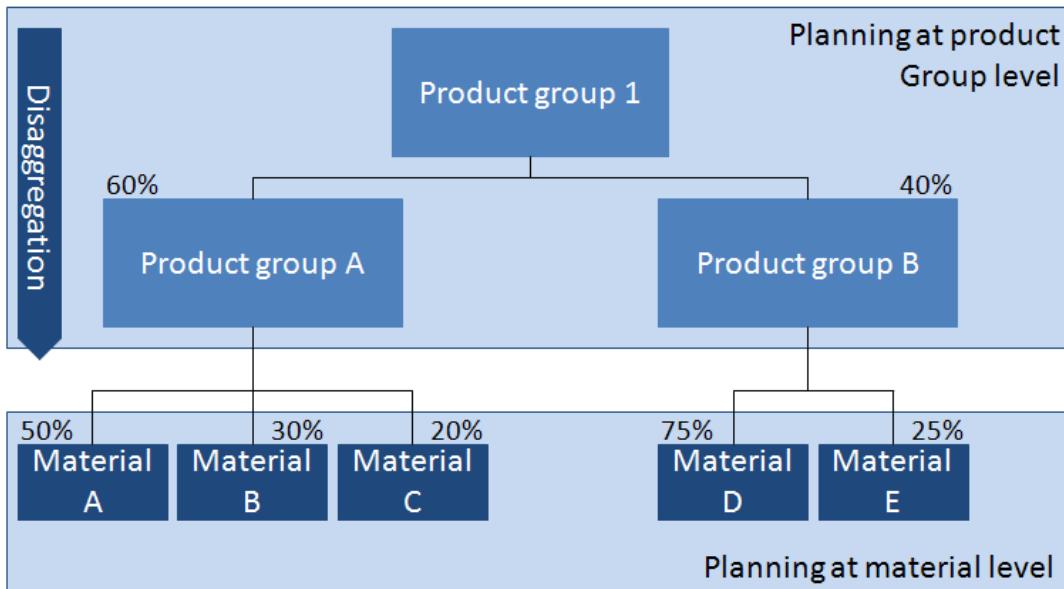


Figure 24: Planning Levels of SOP

### 3.1.3.2 Planning using the Standard Planning Table

The SOP **planning table** allows for the development of sales and production plans. A planning table is available for all members of a **product group hierarchy**.

You can execute planning in parallel in multiple independent versions. In this case, planning in the active version A00 always occurs in change mode, whereas the planning in inactive versions must first be created before it can be changed during a subsequent revision.

The standard SOP planning table contains one row each for the **sales plan**, the **production plan**, the **stock level** (calculated by the system), the **target stock level**, the **days' supply** (calculated by the system) and the **target days' supply**.

The time periods in the planning table can be days, weeks, months, or a combination of different periods. You can also define other time spans, e.g. with reference to accounting periods or sales periods.

You can develop a sales plan in several ways:

- by transferring data from the **sales information system (SIS)**
- by transferring data from the **controlling/profitability analysis module (CO/PA)**
- by using data from **history to forecast future sales**
- by transferring data from another **product group**
- by **manual entry**

After completion of a sales plan, you can create a **production plan** based on the sales plan. You can also create production plans synchronous to sales plans, according to the target stock level and according to the target day's supply. Therefore, you have the following options:

- transferring data from the **sales plan**
- geared to the **target stock level**
- geared to the **target day's supply**
- **inventory to zero** (reduction of the inventory on-hand balance to zero and then analogously to the sales plan)

- by manual entry

The distribution function provides a simple method of entering data for the various key figures and periods.

Of course, you can manually create or correct the plans at any stage.

Changing Sales & Operation Planning					
Product group	Racing-Bike				
Plant	1000				
Plant	A00 Active Version				
	M 01	M 02	M 03	M 04	M 05
Sales	100	110	130	140	140
Production	100	110	150	132	128
Stock level			20	12	
Target stock			20	12	
Day's supply			2	1	
Target day's supply					

Planning in multiple versions possible

Forecasts can be transferred

Production plan can be created synchronously to sales, according to target day's supply or target stock level

Figure 25: Planning Using the Standard Planning Table

### 3.1.3.3 Disaggregation and Transfer to Demand Management

If a sales plan or a production plan is created at one level of the product structure hierarchy, **lower level plans are not created automatically**. Therefore, you need to disaggregate the plan to the product group members.

There are different options for **disaggregation**.

- You can disaggregate the *sales plan* of product group 1, resulting in the *sales plan* of product groups A and B. Next, you can create production plans on this level and disaggregate them to the material level (Material A, B, and C).
- Another option is to disaggregate the **sales plans of all product groups** to the material level (materials A, B, and C) and to develop **production plans** on this level.

In the SAP ERP system, you can transfer the planning data (demand program or production plan) of all elements of a product group level (e.g., product group A) to demand management. You can also transfer planning data for a material (such as the frame) to demand management. In addition to this, the target version and the characteristics of the planned independent requirements can be defined.

You can develop different **planning scenarios** for each product group structure, since each plan is saved with a **version number** and a description. Thereby, only one version is considered active, in this case this is the standard version A00. You can also transfer the active or inactive version to demand management.

The plan that is sent to demand management is used in planning the material requirements. After processing disaggregation, planned **independent requirements** are available in **Demand Management**. This plan is sent to demand management and utilized by MRP.

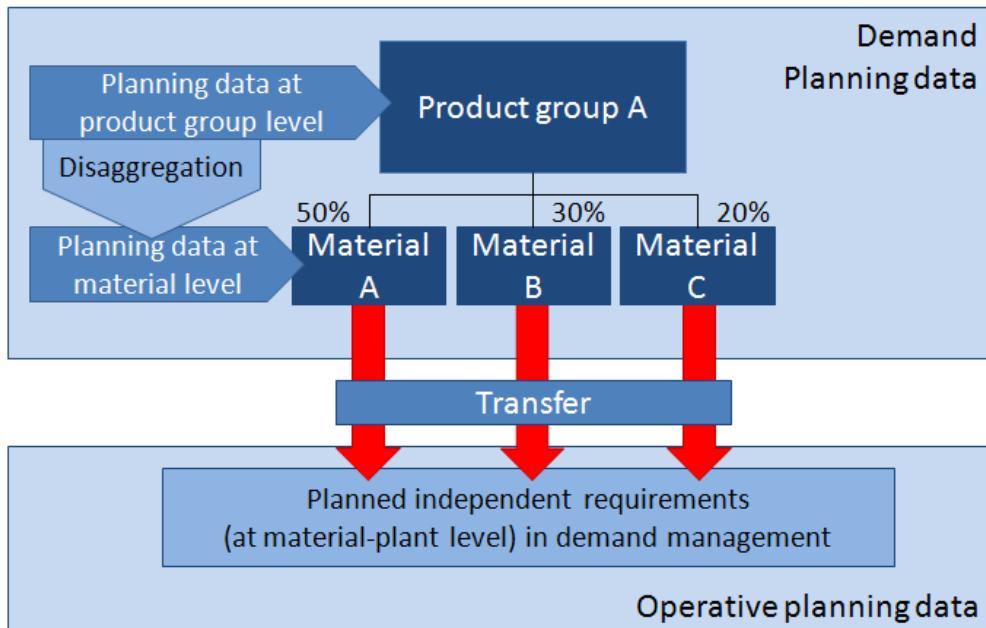


Figure 26: Disaggregation and Transfer to Demand Management

### 3.1.4 Demand Management

So far in the Material Planning Business Process you have estimated future sales in the Demand Planning (Standard SOP), created the sales plan and derived the operation (production) plan through disaggregation, and finally transferred the planned independent requirements to Demand Management. The following figure displays the demand planning process cycle.

#### 3.1.4.1 The Demand Planning Cycle

The first two steps are carried out in SOP:

1. Historical sales order quantities are the foundation for the forecast of future demands. This historical data is managed in an information structure in the LIS. Special extraction structures are used to transfer the data from the operational ECC system to the information structure. Additionally, market information or one-off events (e.g., trade fairs) can be integrated in the forecast.
2. The **demand plan** (or any other key figure) as a result of the forecast is released as **planned independent requirements**. The planned independent requirements are then transferred to the Demand Management.
3. Demand Management uses the planned independent requirements, sales orders from the Sales and Distribution, and stock transfer postings to create the Demand Program (see next figure).
4. The cycle ends with updating the historical data in the database. The new data about present sales figures are used in the next Demand Planning cycle (e.g., next period or next year) for the new estimation.

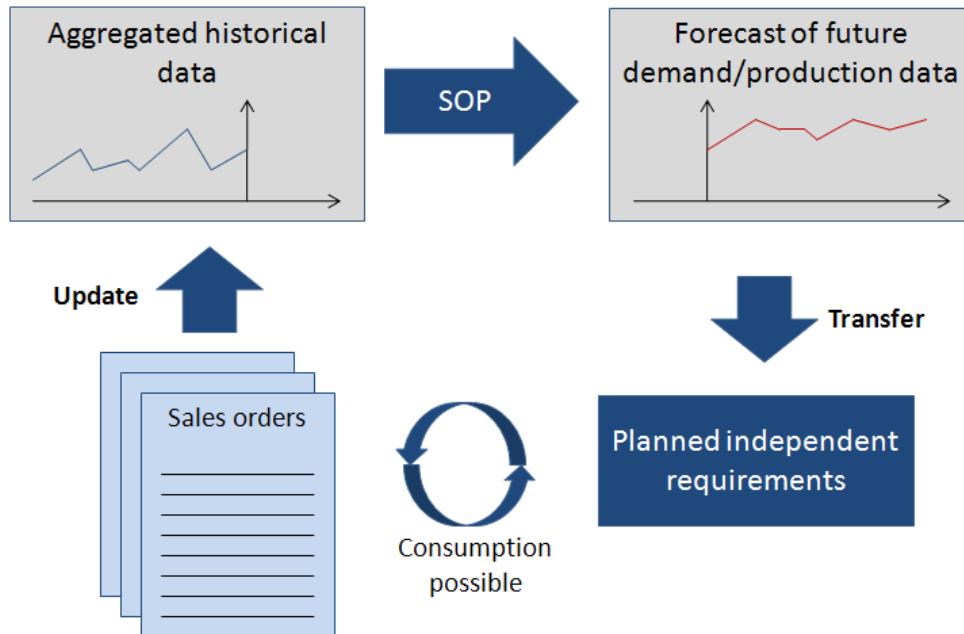


Figure 27: The Demand Planning Cycle

### 3.1.4.2 Demand Management and Demand Program in Material Planning

As stated previously, **Demand Management** deals with the administration of the so-called **independent requirements** (independent requirements are quantities of *finished products* needed according to sales forecasts, customer orders, or stock transfer orders). The way in which independent requirements behave in MRP (e.g., if they affect requirements or consume other requirements) is determined by their **requirement type** or **planning strategy**.

The planned independent requirements are the foundation of **procurement and production planning** and can, for example, consume current **sales orders**. Thereby, planned independent requirements are not concrete requirements of a material. They are merely based on forecasts and estimates. Usually (depending on the planning strategy), planned independent requirements consume concrete sales orders at the time of occurrence. That is, planned independent requirements are reduced by the quantity in a concrete sales order. Thus, consider that it is within demand management, that consumption of planned independent requirements by sales order takes place. The system does not recognize the sales and operation (production) plan, until it is transferred from the Demand Planning to Demand Management.

The forecast for planned independent requirements transferred to Demand Management defines what requirements types are planned and which planning demands are settled with which customer demands. A number of options are available for this. The various effects of planned independent requirements are controlled by what is known as the **planning strategy**. There are three types of independent requirements in SAP ERP:

**Planned independent requirements** are warehouse requirements, i.e. independent requirements derived from a *forecast of future requirements*. In make-to-stock production, you want to start procurement of the affected materials without waiting for specific sales orders.

If you use make-to-stock production strategies, production usually takes place without there being sales orders for the respective material. If sales orders are then received, these can be fulfilled from stock at the warehouse, which means that delivery times can be kept short. With make-to-stock production, it is also possible to implement a steady production process, independent of the current demand.

**Sales orders** (customer independent requirements) are entered from the Sales and Distribution application (SAP SD) and can be transferred directly to MRP, independently of their assigned requirements type. This is necessary for customer-specific planning. That is, if you want to plan for specific customers.

Sales orders can serve as exclusive requirements sources, for which then specific procurement is initiated (make-to-order production), or they can create the total demand together with the planned independent requirements. Moreover, consumption with planned independent requirements is also possible.

**Stock transfer requirements** are requirements from other locations in the supply chain (such as distribution centers) and can be included in the demand program along with the independent requirements entered in the production plant.

The output of demand management is the **Demand Program**, which is transferred to and used by MRP to create *planned orders*.

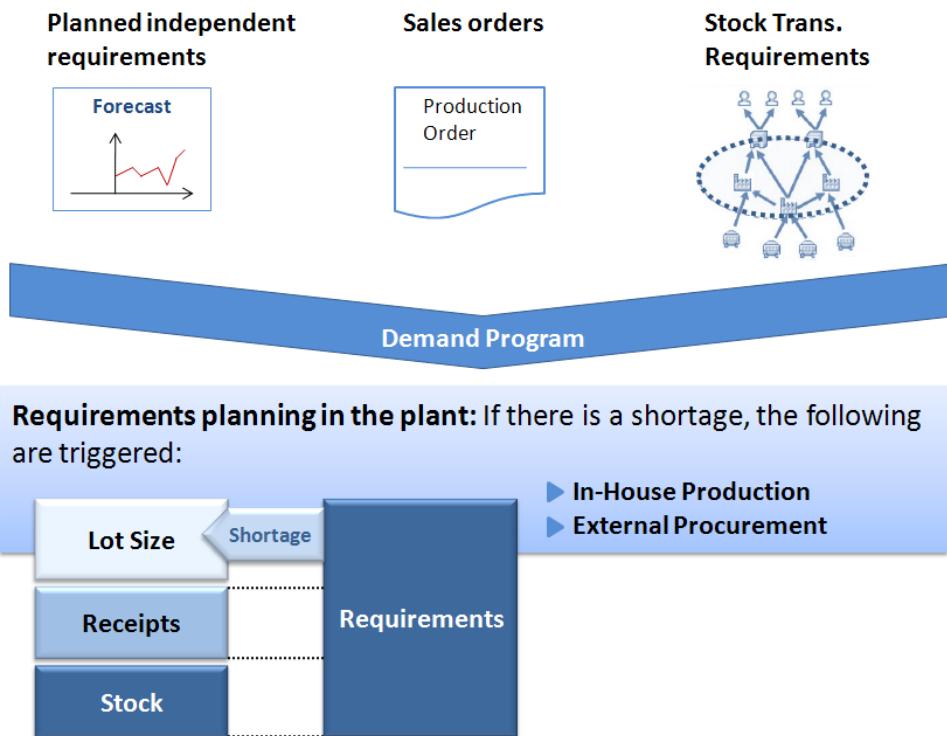


Figure 28: Demand Program in Material Planning

### 3.1.4.3 Sales Orders, Stock Transfer Orders and Planned Independent Requirements

The next two figures display the effect that Sales Orders and Stock Transfer Orders could have on Planned Independent Requirements.

#### Sales Orders and Planned Independent Requirements

Sales order management is an element of the logistical component Sales and Distribution (SD). Correspondingly, **sales orders** are created in **SAP SD**. They are the order of a customer demanding a particular quantity of a certain product at a particular date. Sales orders are a **requirement in the delivering plant**.

Conversely, **Make-to-stock planning** is managed in a distribution center or in a production plant via **planned independent requirements**. Thus, the planned consumption is forecasted. Due to this planning and forecasting, procurement takes place. Later, if concrete requirements are on hand (e.g., sales orders), they can ideally be covered from the warehouse.

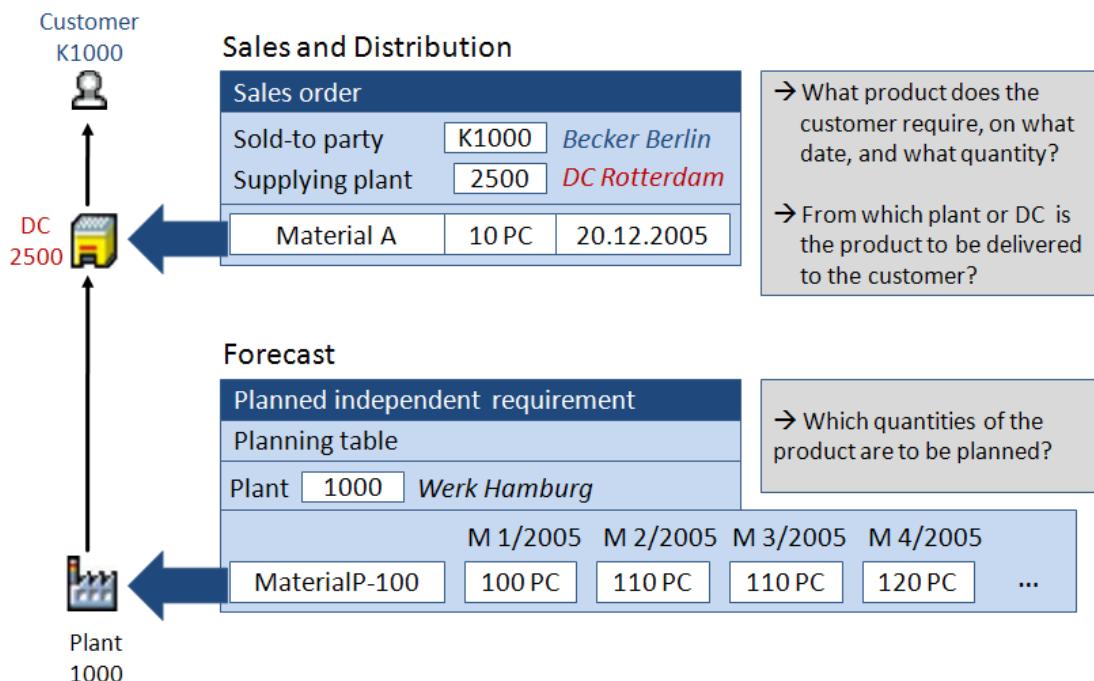


Figure 29: Sales Orders and Planned Independent Requirements

#### Stock Transfers and Planned Independent Requirements

Planned Independent Requirements can be covered by stock transfers from other locations in the location network. For this purpose, a purchase requisition is created in the location that requires the stock for procurement from the “delivering plant”. In return, the delivering plant receives a requirement in form of a purchase requisition release.

### Stock Transfers

Requirements are covered by stock transfers from another location

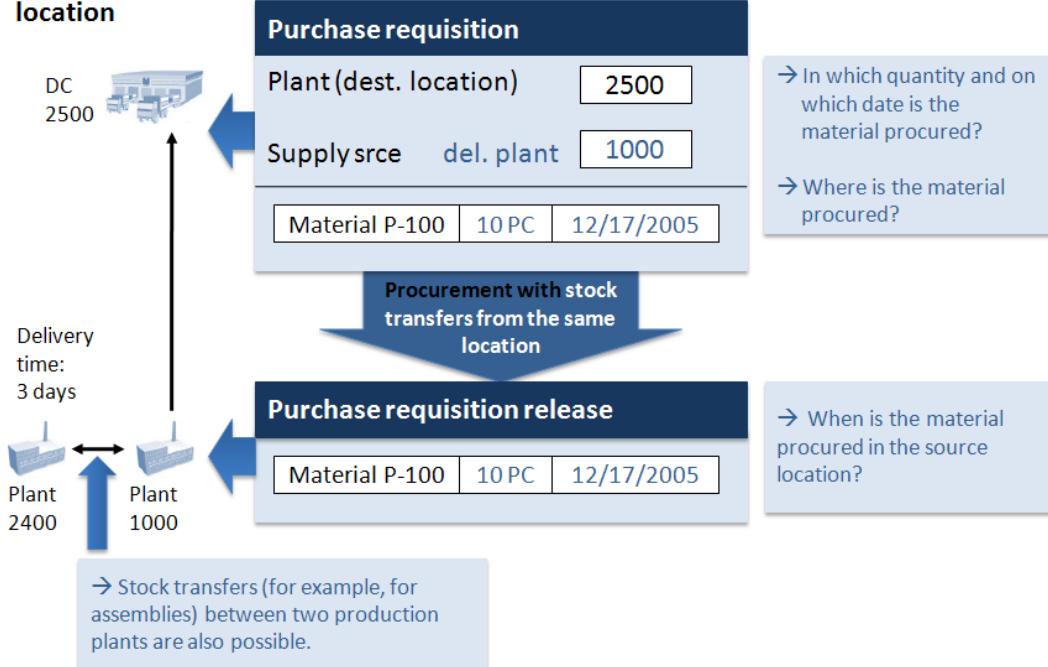


Figure 30: Stock transfers

#### 3.1.4.4 Planning Strategies

The SAP ERP system features various options for planning production with planned independent requirements. The behavior of planned independent requirements is controlled by the **planning strategy**.

In case of **make-to-stock production**, production is based on planning without reference to present sales orders. If **strategies for make-to-stock production** are applied, production can be carried out without concrete sales orders for the particular material. If then sales orders are received, they can be covered by warehouse stock to shorten delivery times. Moreover, make-to-stock production allows a consistent production process independent of current demand.

**(Sub-)Assembly planning** is also accomplished with make-to-stock production strategy. The only difference is that you have assemblies (composite components) instead of materials. Correspondingly, **make-to-stock production** for **assemblies** can be executed the same way. Consequently, not the finished products themselves are produced to stock, but merely the required assemblies. A **sales order** for a **finished product** can thus be met quickly as only the final assembly needs to be carried out – the assemblies themselves are already available after production.

**Sales-order based production (make-to-order production)** is **not planned ahead**; procurement is only carried out when a **concrete sales order** has been received. Often, sales-

order based production is combined with (sub-)assembly planning to maintain short delivery times.

### 3.1.4.5 Consumption

**Planning with final or sub-assembly** aim at flexible and immediate reactions to customer requests, as well as a smooth production flow. **Sales orders** thereby affect **requirements** and consume **planned independent requirements**.

Before sales orders arrive, procurement and production of all components and assemblies, including final assembly, are initiated by planned independent requirements.

The planned independent requirements for the finished product are planned in **demand management**. **Incoming sales orders consume these planned independent requirements**.

In case the sales order quantity exceeds the planned independent requirements quantity, a planned order is automatically created in the next MRP run for the unplanned quantity (thus, sales orders affect requirements). Availability checks can be carried out from a sales order using ATP logic.

If and how customer requirements **consume** planned independent requirements is dependent on the **settings defined for consumption mode** and the **consumption periods**. Both characteristics are set in the respective material master.

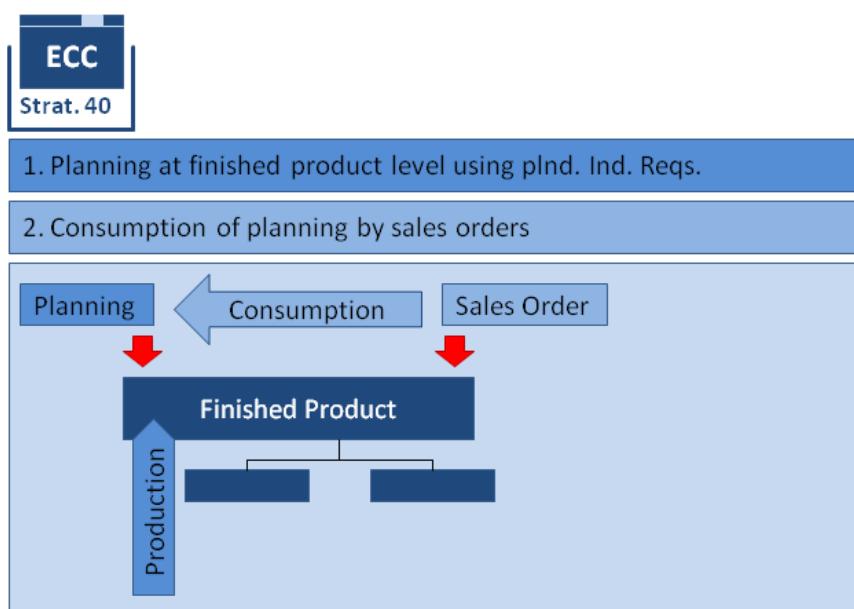


Figure 31: Planning with Final Assembly

The **consumption mode** determines in which direction of the time axis consumption of the incoming sales orders with the planned independent requirements is carried out.

**Backward consumption** (consumption mode 1) consumes customer requirements (sales orders) with planned independent requirements lying **before** the customer requirements.

**Forward consumption** (consumption mode 3) consumes customer requirements with planned independent requirements lying **after** the customer requirements.

You can also combine backward and forward consumption if you pay attention to the respective periods (consumption mode 2 or 4).

The **consumption mode** and the **consumption periods** can be set either in the **material master** or for the **MRP group**. If you do not enter a value for the two characteristics, the default setting, i.e. backward consumption for 999 days, is applicable. Note that if you enter a consumption mode but no consumption period, only requirements of the same day are consumed.

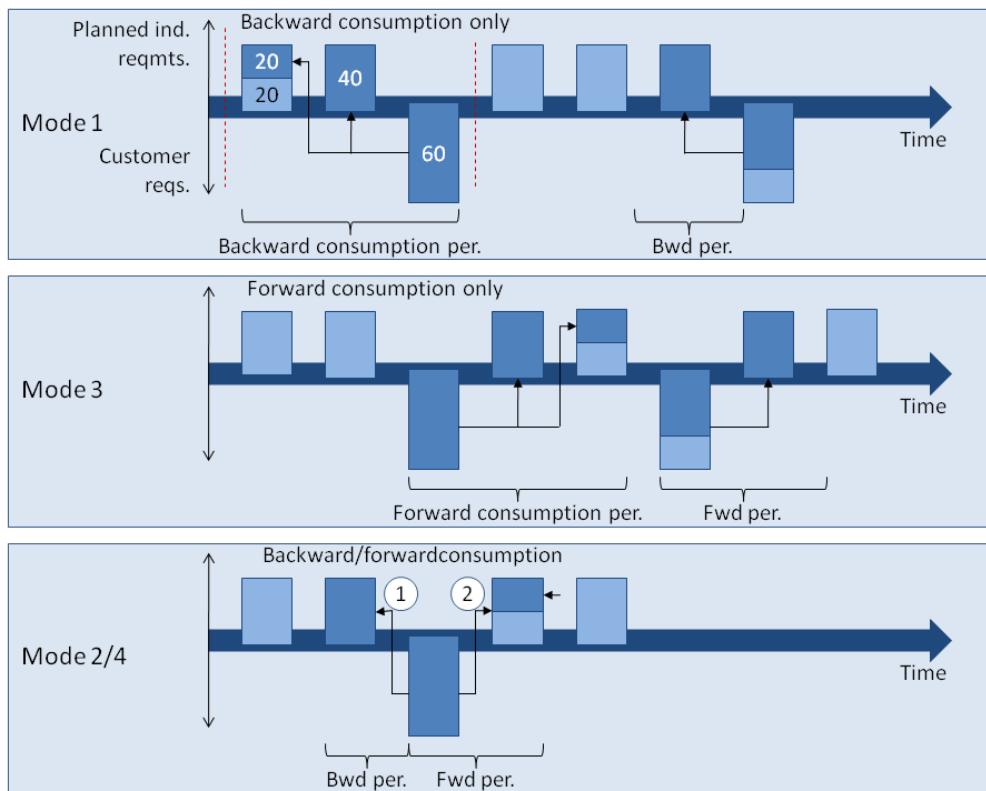


Figure 32: Consumption

### 3.1.5 Material Requirements Planning (MRP) Procedures

This chapter provides an overview of two different planning types, which are relevant in the context of this course: **MRP** and **consumption based planning**.

#### 3.1.5.1 MRP Procedures

The **planning type** is entered in the MRP Type field of the MRP1 view of each material master and defines which planning type will be used in the Material Requirements Planning run. The planning type can, for example, be planned-based **MRP (PD)** or **consumption-based (e.g. RF)**. Using the particular MRP type, a material can also be excluded from MRP (**ND**).

The planning type **MRP** is carried out using current and future sales figures. The planned and the exact requirement (sales orders) quantities trigger the net requirements calculation.

Consumption-based planning procedures use past consumption data (historical data) to calculate future requirements with the help of the material forecast or statistical planning procedures. Consumption-based planning procedures have no reference to the master plan. This means that the net requirements calculation is not triggered by an independent or a dependent requirement. Instead, the net requirements calculation is triggered when stock levels fall below a reorder point or by forecast requirements calculated from past consumption data. Con-

sumption-based planning is simple and predominantly applied for B and C parts, i.e. for those parts that have a low value.

### MRP Procedures

How do you plan materials in ECC?

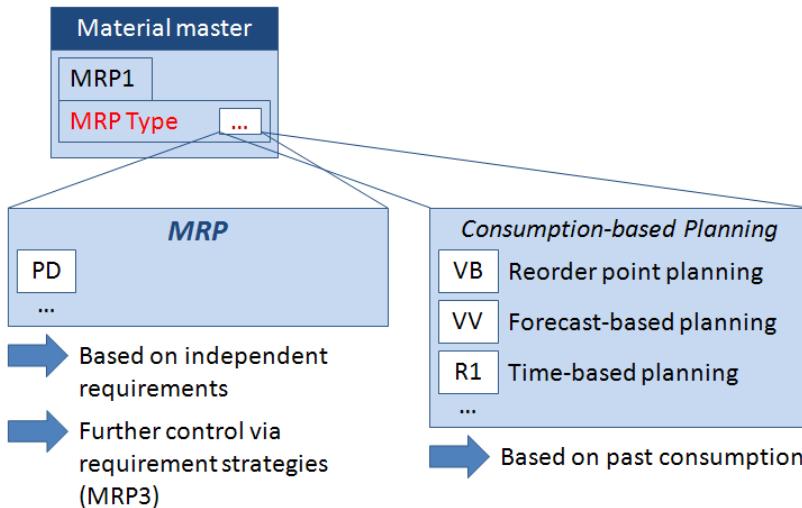


Figure 33: MRP Procedures

### Consumption-based Planning: Manual reorder point planning

**Manual reorder point planning** is one type of consumption-based planning. Its benefit is its simplicity.

The **consumption-based planning** procedure uses historical consumption data of a material and determines future requirements using statistical methods. Consumption-based planning has no reference to the production plan. Accordingly, the net requirements calculation is not initiated by an independent or dependent requirement. Only when stock levels fall below a re-order point (e.g., safety stock) or below the forecasted requirements, an order is triggered.

A manually entered re-order point (e.g., 50 pieces) controls planning. The system then checks in the planning run whether this re-order point is undercut or not (e.g., whether there are less than 50 pieces in stock). In this case, a procurement amounting to the lot size (e.g., fixed lot size of 500 pieces) is initiated.

If schedule lines are created directly for, e.g., external procured materials, the administrative efforts for this kind of planning are minimal.

Re-order point planning is only reasonable for materials with relatively constant demands. Additionally, timely inventory management is required.

### Example: Reorder point planning

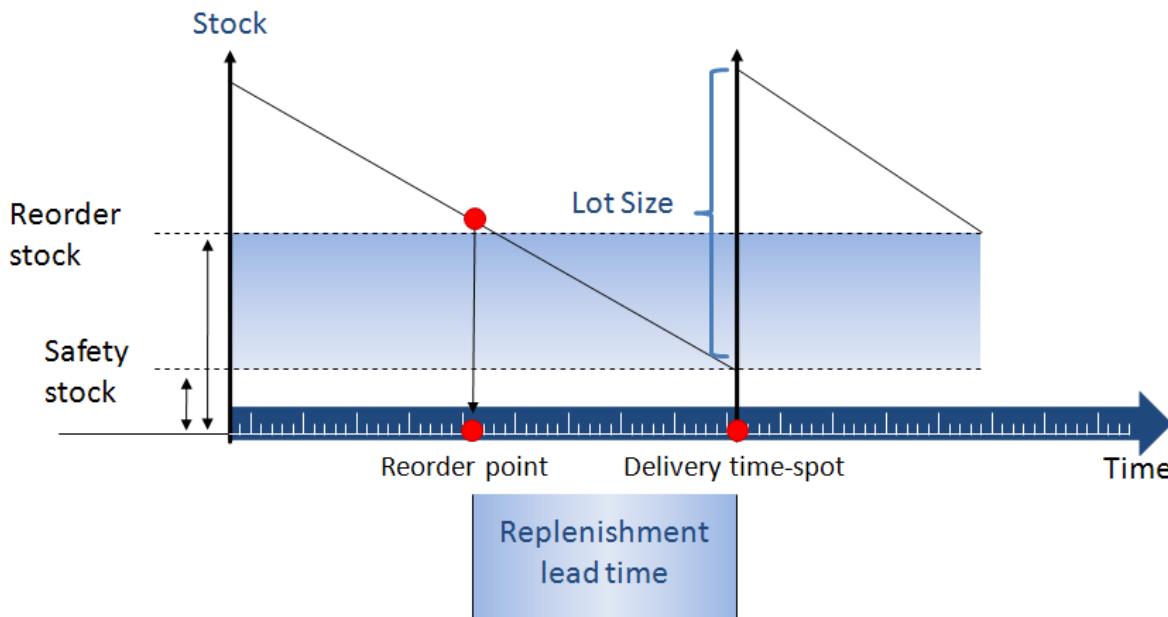


Figure 34: Consumption-based Planning

#### 3.1.5.2 Net Requirements Calculation

In MRP, a **net requirements calculation** is carried out in the planning run. The net requirement calculation determines whether there is a shortage for a particular material that is needed as part for the production of the respective finished product (independent requirement). To determine whether there is a material shortage, stock and fixed receipts (e.g. orders, production orders, fixed sales orders, and planned orders) are compared to the safety stock and requirements. The result of this comparison is the **quantity available for planning**.

In case the quantity available for planning is below zero, a material shortage is the case. MRP reacts to this with the creation of new **procurement proposals**. That is, the system reacts independently of the material's **procurement type** (stated in the material master: F, E, X) of the respective material, and creates purchase requisitions or planned orders. The proposed procurement quantity results from the lot-sizing procedure (e. g. EX), which is set in the material master.

### in Material Requirements Planning

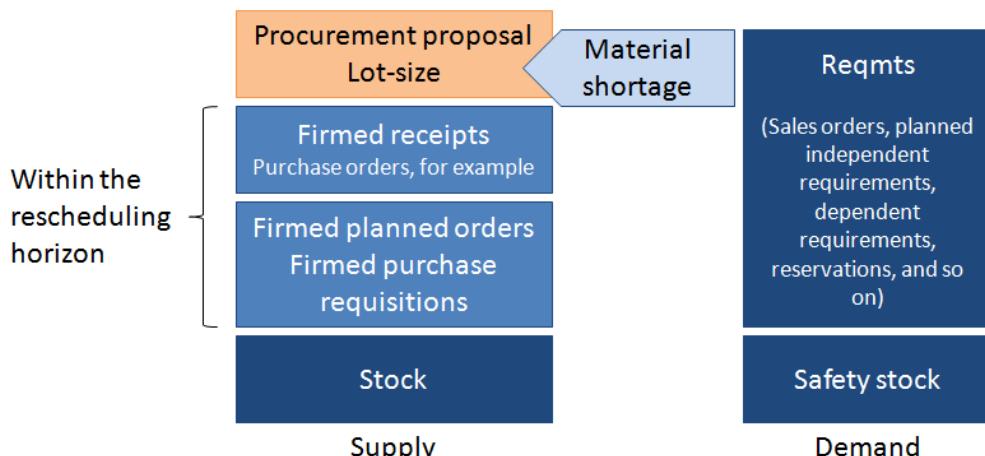


Figure 35: Net requirements calculation

#### 3.1.5.3 Running MRP

In SAP ERP, Material Requirements Planning can be executed on two levels:

- **total planning**
- **individual planning (single-item planning)**

#### Total Planning

A Total planning run is executed for a **scope of planning**. This scope can include **one or multiple plants** and/or **MRP areas**. Thereby, **all** materials of the planning scope (MRP areas, plant, plants) are planned.



*An MRP area represents an organizational unit for which you can perform material requirements planning separately. An MRP area can include one or several storage locations of a plant or a subcontractor. You can define MRP areas in a plant. By defining MRP areas, you can perform MRP for each area. This means the right quantity of materials can be provided on time for each area, such as a production line, a storage location for spare parts, or subcontractor stock.*

For Total Planning you have the option to execute the run **online** in transaction MD01 or as a **background job** in transaction MDBT. In order to execute the total planning run as a background job, you select a report variant limiting it to the corresponding scope of planning and plan the job.

You can also use a **user exit** to limit the total planning run, specifically to those materials which fulfill freely definable criteria. You can use this, for example, to select all the materials belonging to a particular MRP controller. User exits allow defining more flexible planning scopes. But consider that they are not preconfigured in the SAP standard delivery and must be defined by the SAP users themselves.

Total planning is carried out as multi-level planning. Thereby, total planning encompasses all materials relevant to MRP for the planning scope and includes the BOM explosion for mate-

rials with BOMs. That is (see next figure), not only the materials are planned, but all materials (components) contained in the materials' BOMs.

## Running MRP

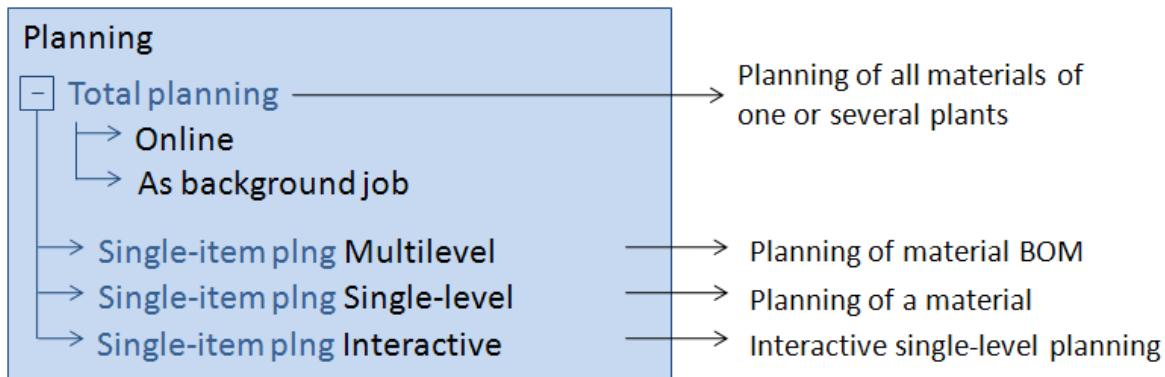


Figure 36: Running MRP

### Individual Planning

Individual planning (single-item planning) plans a material or finished product separately (e.g., interactively). That is, you enter a specific material that is to be planned.

For individual planning you have the following options (that are relevant in this course):

- **single-item, single-level planning** (transaction MD03)
- **single item, multi-level planning** (transaction MD02)
- **single item, single-level interactive planning** (transaction MD43)

In **single level** planning only the **header material** is actually planned. For instance, you plan only the Speedstar. The components of the Speedstar are not planned.

In multi-level planning, planning is carried out across all BOM levels of a particular material. Accordingly, **multi-level** planning also covers **dependent requirements**. Requirements depending on the header material arise from the explosion of the BOM of the finished product (header material). They are referred to as dependent requirements (or secondary requirements). Dependent requirements depend on the respective planned orders. To realize these planned orders, the materials (assemblies) are necessary.

When a planned order is converted into a production order, dependent requirements are converted into **order reservations**.

**Interactive planning** is a **single-level simulative planning** and enables checking the planning result particularly carefully and altering them to meet the planning requirements before saving. This planning type is suitable for materials for which a thorough check is necessary, e.g. high value materials like an aircraft engine, which costs millions of Euros.

When executing the interactive planning, the system first of all displays the stock/ requirements list. At this moment, the planning is a simulation and the planning results are not saved to the data base. From this stock/requirements list you can trigger the planning and simulation functions manually. Thereby, you have the following options:

- Entering procurement proposals for materials procured in-house or externally

- Changing or rescheduling procurement proposals entered in the planning run
- After each change, you can carry out a rescheduling check and the planning (net and lot-size calculation).

After all planning is finished and adjusted, you can save the planning results.

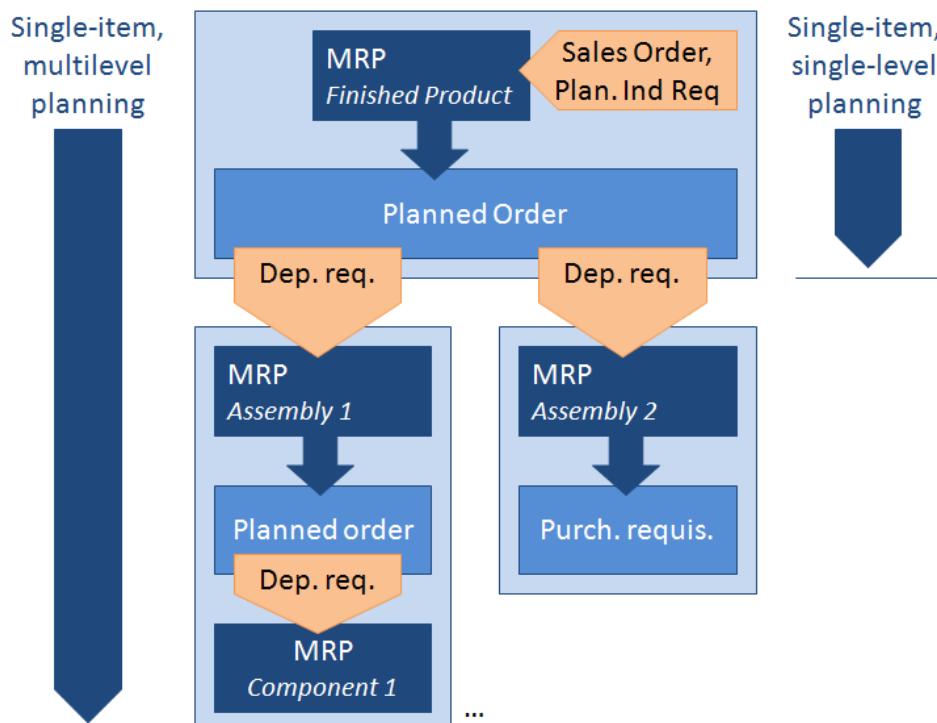


Figure 37: Multi-Level Material Requirements Planning

### 3.1.5.4 MRP Control Parameters

When calling up the planning run (e.g., MD02), you need to enter the following parameters to execute the Material Requirements Planning:

- The **processing key** defines the planning type as regenerative planning or change planning either for the whole period or limited to the planning horizon.
- The indicators “**create purchase requisition**“ and “**schedule lines**“ are only relevant to externally procured materials. You can determine if and when these two indicators are required as a result of the planning run.
- Furthermore, you can determine whether the planning run should create **MRP lists**. You can thereby create MRP lists depending on the occurrence of particular exception messages (the exceptions messages which lead to the generation of a MRP list, need to be defined in the customizing step “define and group exception messages”).
- Using the **planning mode**, you can determine whether already existent planning data are merely adjusted, whether BOMs and routings should be re-explored or planning should be performed from the very beginning once again.
- The creation indicator for purchase requisitions, schedule lines, and MRP lists can also be listed in the **MRP group**. Materials assigned to this MRP group are planned accordingly in the overall planning run.

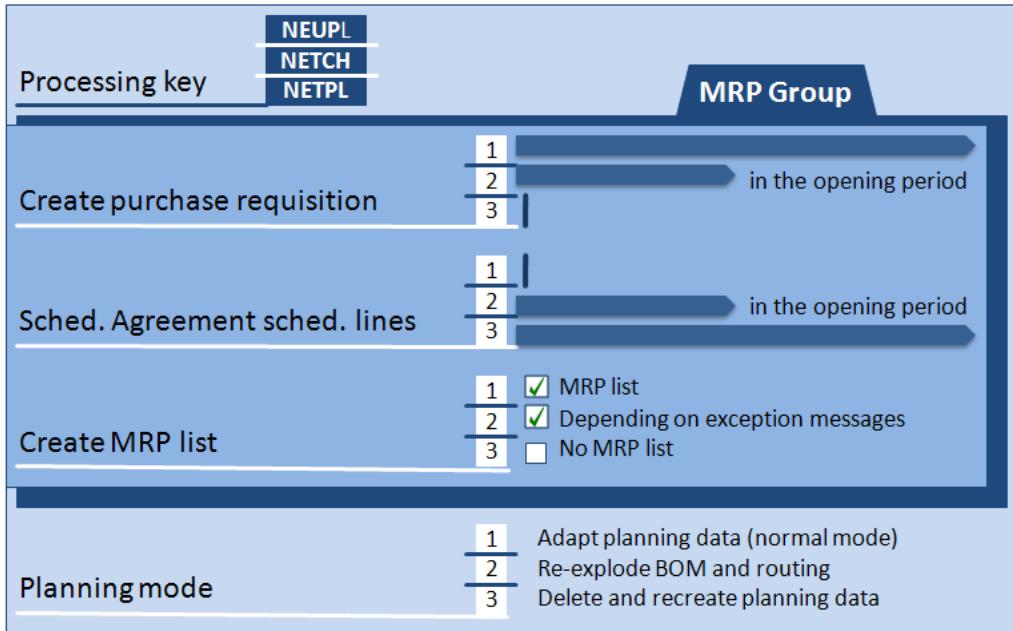


Figure 38: MRP Control Parameter

### 3.1.5.5 Coverage of the Planning Run: Processing Key

When running the Materials Requirement Planning, you have several options for Processing key selection. In the initial screen for planning (MD01, MDBT, MD02, MD03, MD43), you can determine the type of the planning run.

For single-item planning, you can differentiate in the processing key field, whether Net Change Planning (**NETCH**) or Net Change Planning in the Planning Horizon (**NETPL**) is to be executed. In total planning, you can additionally select the **NEUPL** key that allows for the planning of all materials of the planning file (planning scope). Consider that **NEUPL** processing key is not possible in the single-item planning transactions (MD02, MD03, MD43).

When a **Regenerative Planning** (only in total planning) is conducted in MRP, all materials of the planning scope are planned. Regenerative planning is expedient when the planning run is carried out for the first time. Moreover, it is useful in occasions where (e.g., due to technical errors) data consistency is affected. Regenerative planning is executed with the Processing Key **NEUPL**.

Especially in case of many materials, it usually makes sense to carry out MRP only for those materials that have undergone a MRP-relevant change (e.g., due to goods issues, new sales orders, changes to the BOM structure) in current operations. To plan only materials with changes relevant to MRP, you can use **Net Change Planning (NETCH)** procedure. This procedure allows for carrying out the planning run in relatively brief periods, due to its short runtime.

Instead you can also use **Net Change Planning in the Planning Horizon (NETPL)**. Here, the system only accounts for changes in the planning horizon. Accordingly, only materials are planned that have undergone a MRP-relevant change during the planning horizon (e.g., one month). The planning horizon is entered in customizing for MRP as plant or MRP group pa-

parameter. The length of the planning horizon should be at least a time span in which sales orders are usually received (e.g., 30 days). Moreover, delivery times and total lead times for the materials should be considered.

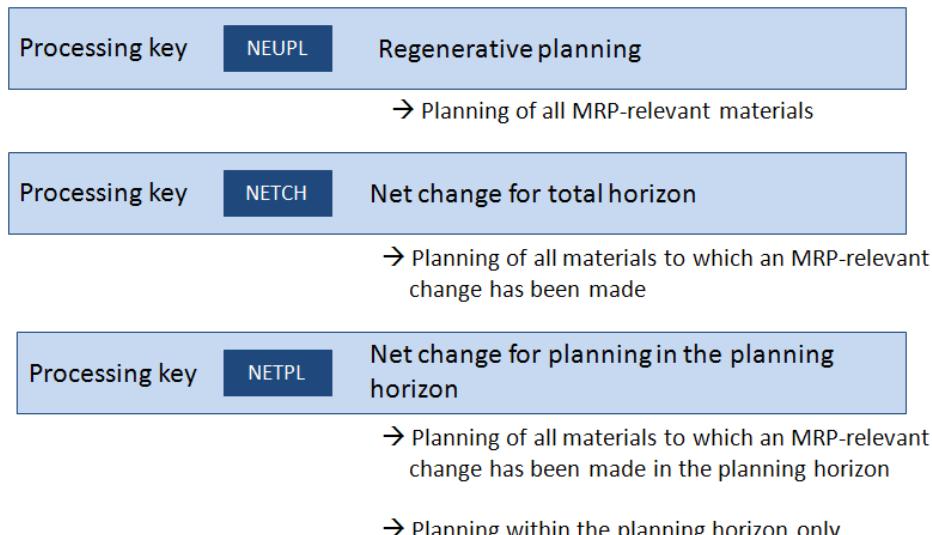


Figure 39: Scope of the Planning Run

### 3.1.5.6 Results of Material Requirements Planning

If a shortfall for a material is discovered by MRP, the SAP system creates a **procurement proposal**. Both purchase requisitions and planned orders can be procurement proposals. **Purchase requisitions** (e.g., for trading goods) and **planned orders** (e.g., for semi-finished products) are internal planning elements that are created due to a MRP run. They can be changed, rescheduled, or deleted at any time.

What type of procurement proposal is created as the result of the Material Requirements Planning run, is determined by the **procurement type** set in the material master record. The procurement type is used to define if a material is to be produced in-house (indicator is set to E in the material master) or procured externally (indicator is set to F). If both procurement types (indicator is set to X) are permitted by the procurement type, requirements planning starts with in-house production.

If a product is manufactured in **in-house production**, the system creates **planned orders** for planning production quantities. When planning is completed, planned orders are converted into production orders or used directly for repetitive manufacturing

Conversely, in case of **external procurement**, the system creates either a **planned order** or a **purchase requisition** directly to plan the external procurement quantity. When planning is completed, a planned order is converted into a purchase requisition and later, the purchase requisition is converted into a purchase order (purchasing).

You can determine in the initial screen of the planning run – by using the creation indicator for purchase requisition – whether the system directly creates purchase requisitions for exter-

nal procured materials or creates planned orders. In case a **scheduling agreement** exists for a material and the scheduling agreement is relevant to MRP in the **source list**, you can also create **schedule lines** for externally procured materials in MRP directly. You can control this by using the creation indicator for schedule lines in the initial screen of the planning run.

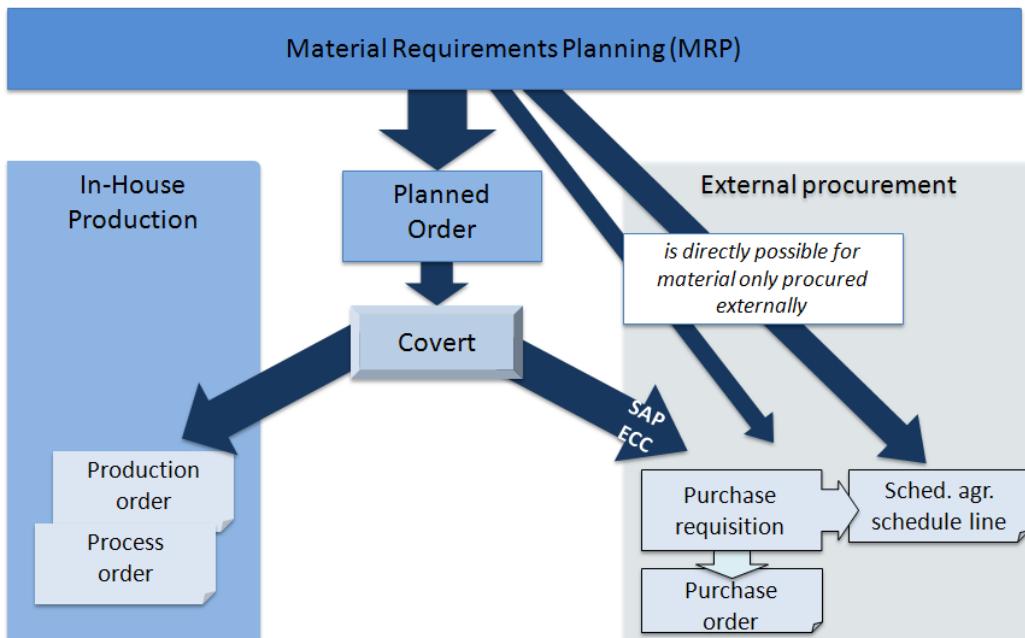


Figure 40: Results of Material Requirements Planning

### 3.1.5.7 Planned Orders and Production Orders

**Planned orders** are used to plan materials that are produced in **in-house production**. Planned orders already contain the basic data (e.g. dates, in general the BOM, the routing are also included in the planned order) for manufacturing. Moreover, they contain information about the components required for production in form of dependent requirements. Capacity requirements planning can be carried out based on planned orders.

Planned orders that are meant for execution of production are converted into production **orders (SAP PP)** (*or process orders SAP PP-PI*).

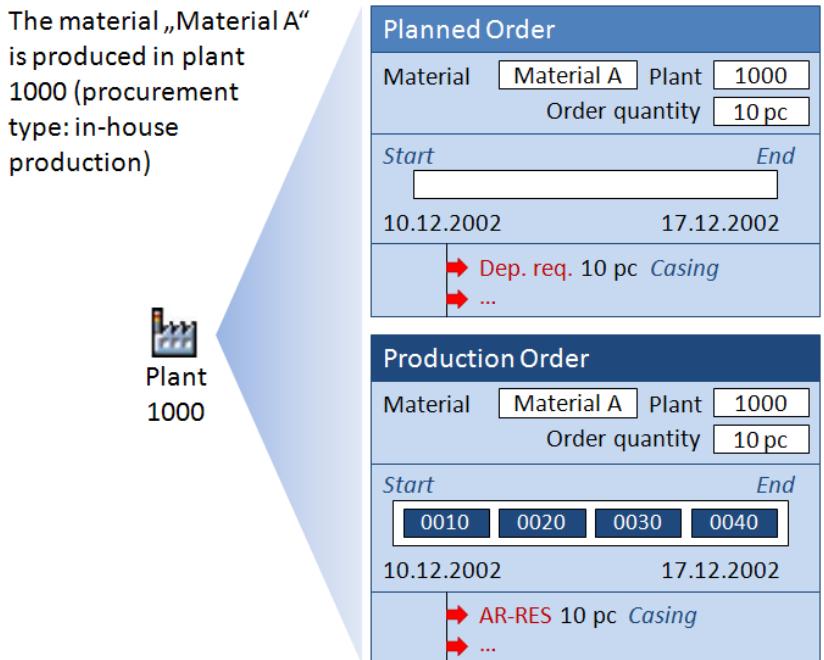


Figure 41: Planned Orders and Production Orders

### 3.1.5.8 Purchase Requisitions and Purchase Orders

Planning for the external procurement of a material can be carried out using **purchase requisitions** or **purchase orders**. In case planned orders are created first, they need to be converted into purchase requisitions (and later to purchase orders). You can also perform planning directly using scheduling agreement releases. Thereby, the system creates schedule lines for the planned orders or sales orders.

In purchasing (SAP MM), purchase requisitions are converted to purchase orders. Not later than in this step, a source of supply (vendor) should be assigned to the purchase requisition.

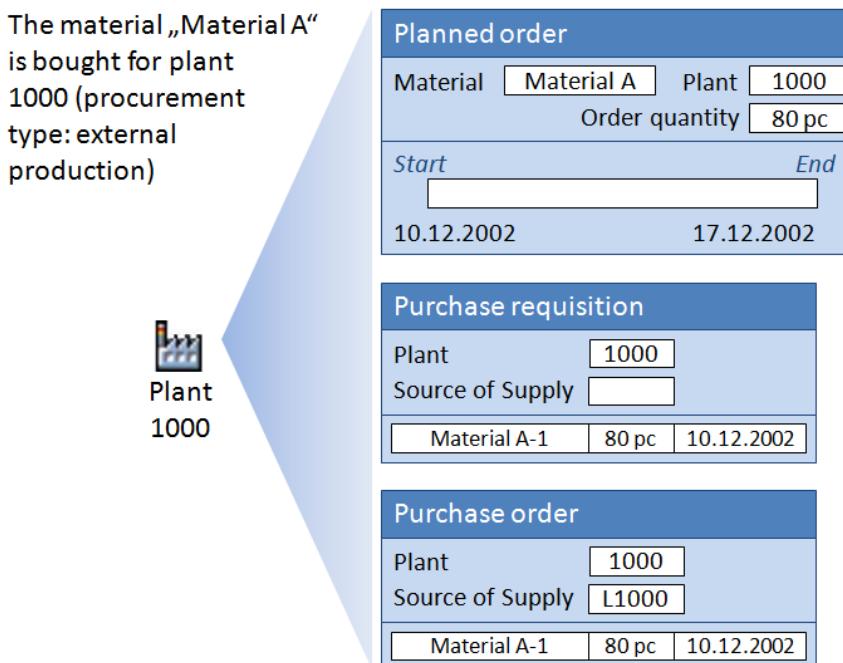


Figure 42: Purchase Requisitions and Purchase Orders

### 3.1.5.9 Evaluation of Material Requirements Planning

The **stock/requirements list** is a dynamic list containing the current status of stock, requirements, and receipts. All changes to stock and requirements are displayed immediately in the stock/requirements list as soon as the current list is called up, or information is updated from the database by using the “refresh” function.

Contrastingly, the **MRP list** is static and displays the result of the last planning run (MRP). Changes carried out after the planning run, such as changes to the BOM that affect for example dependent requirements, are not visible. Only when a new planning run is executed, changes are displayed in the MRP list and, for example, dependent requirements are updated. In the planning run, you can control whether a MRP list is created or not.

The basic structure of both lists is the same:

- On the left hand side, there is the work list for the MRP controller in form of a tree.
- Above the list there is the header with the material number. Moreover, you can display further information using the header details.
- The list itself contains the individual MRP items and the correspondingly available quantities.

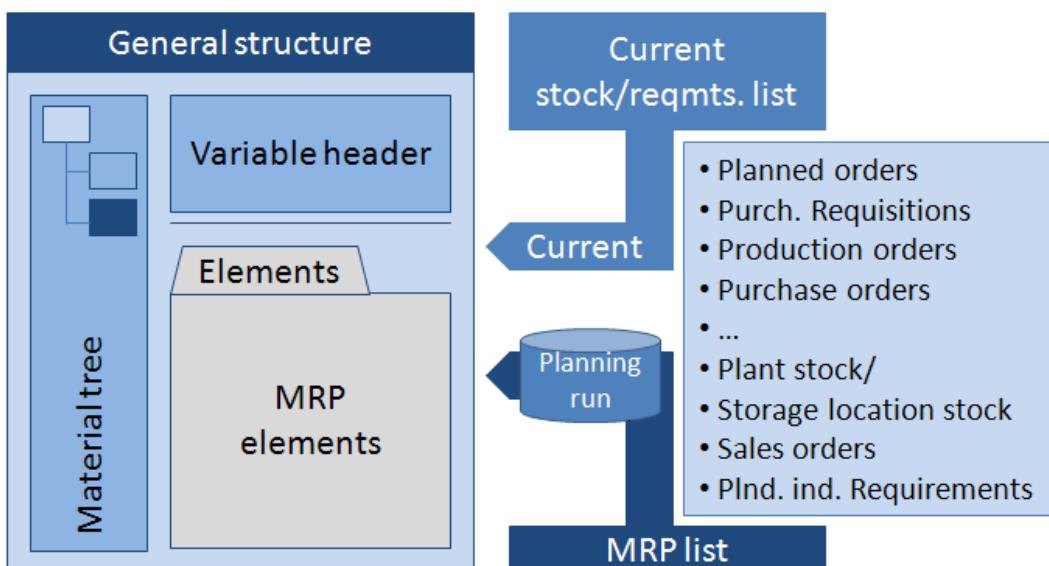


Figure 43: Stock/Requirements List and MRP List

Like the MRP list, the current stock/requirements list offers several display options: you can display various dates (the availability date or the goods receipt date, with/without safety time). You can use display filters and selection rules, work in the period totals display and so on. You can define the display accordingly in your personal settings.

“Period Totals” is a display function in the MRP list and stock/requirements list evaluations that groups the planning results into periodic buckets (e.g., weekly or monthly buckets). In the Define Period Display for Period Totals activity in Customizing, you define which periods are to be shown in the “Period Totals” display. The periods you select here are shown on various tab pages in the Period Totals display.

You can analyze the capacity situation from the current stock/requirements list. The system displays the available capacity, the total capacity requirements and the capacity requirements of the current material for each work center and capacity category. Overload situations are highlighted in color. Note that planned orders that have not been scheduled using detailed scheduling do not generate capacity requirements.

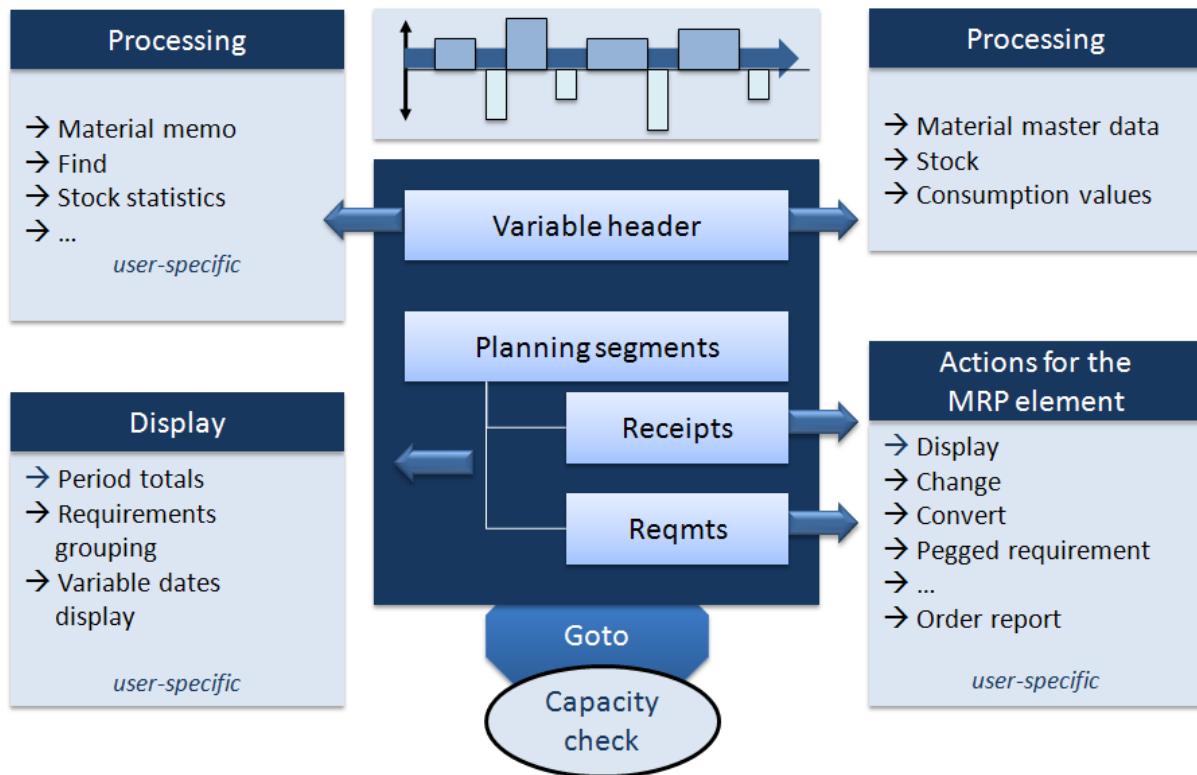


Figure 44: Functions of the current stock/requirements list

## 3.2 Practice: Carry out Material Planning



You are supposed to plan the two racing bicycles using sales and operations planning. Since the two products are new developments, no historical sales data is available for sales and operations planning.

Generally, future sales figures are forecasted using historical sales data using methods such as trend extrapolation, life-cycle models, etc. Another option is sales figure forecasting using the Bass model (Marketing model developed by Frank Bass to forecast product diffusion). When, for example, no historical sales figures are available, you can derive parameters based on sales figures of similar products and then forecast the future sales figures of the new product under certain assumptions.

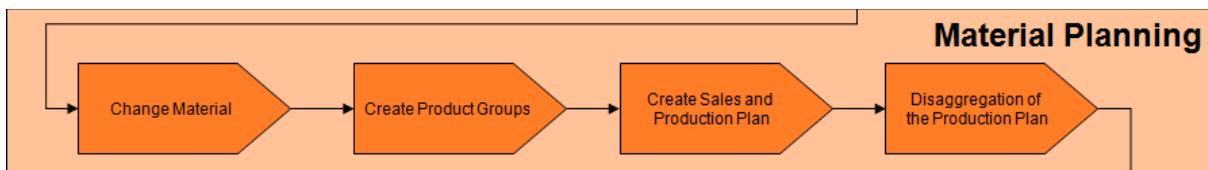


Figure 45: Process Overview: Production Planning

### 3.2.1 Change Material

Before you start with the production planning process, you need to perform some changes to your material master records. Incoming **sales orders** (concrete requirements) are supposed to consume **planned independent requirements** (estimated future requirements) from production planning. That is, when you receive a sales order, the planned independent requirements of this period should be lowered by that amount. Therefore, you need to set the consumption mode in the material master data of the Speedstar and the Speedstarlett. The **consumption mode** controls the direction of requirements consumption of the time axis.

Choose

**Logistics → Production → Master Data → Material Master → Material → Change (MM02)**

1. Enter material **Speedstar-xxyy** and confirm with *Enter*.
2. Select the **MRP 3** view and confirm with *Enter*.
3. Enter plant **1000** and storage location **0001**.
4. Enter the following data:
  - a. **Consumption mode**      **2**
  - b. **Bwd. consumption per.**    **30**
  - c. **Fwd. consumption per.**    **30**
5. Save your modifications.
6. Repeat steps 1-5 for the material **Speedstarlett-xxyy**.

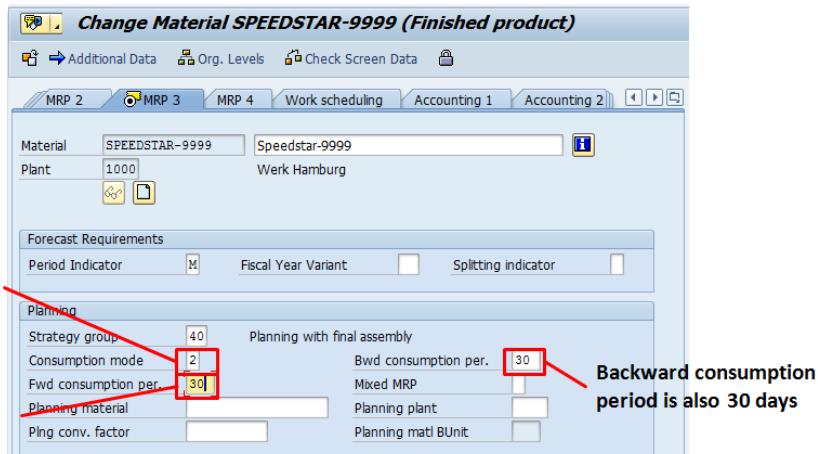


Figure 46: Consumption mode and Consumption Period: SAP-System-Screenshot

By these settings, sales orders that are supposed to be covered at a particular date are consumed with planned independent requirements 30 days before or after that particular date. By default, backward consumption is carried out so that the sales order consumes planned independent requirements of the last 30 days.

### 3.2.2 Sales Plan and Master Production Plan

#### 3.2.2.1 Create Product Groups

The two racing bicycles *Speedstar* and *Speedstarlett* are supposed to be combined in one product group. Product groups generally allow for the combination of similar products to a structure and facilitate maintenance in the system. Correspondingly, your first task is to define the product group *racing-bicycle*, which contains both materials Speedstar and Speedstarlett.

To create a production group, call up the following transaction

**Logistics → Production → SOP → Product Group → Create (MC84)**

In the *create product group: initial screen*, enter the following data:

- |                                |  |
|--------------------------------|--|
| 1. <b>Product group</b>        | <i>racing-bike-xxyy</i>                  |
| 2. <b>Description</b>          | <i>racing-bicycle-xxyy</i>               |
| 3. <b>plant</b>                | <i>1000</i>                              |
| 4. <b>Base unit</b>            | <i>PC (piece)</i>                        |
| 5. <b>members</b>              | <i>select the materials radio button</i> |
| 6. Confirm with <i>Enter</i> . |  |

The market research department expects sales of the product group to consist of 60% Speedstar sales and 40% Speedstarlett sales. Enter the following data:

1. first row
  - member number **Speedstar-xxyy**
  - Plant **1000**
  - Aggr. fact. **0**
  - Proportion **60 %**
2. second row
  - member number **Speedstarlett-xxyy**
  - Plant **1000**
  - Aggr. fact. **0**
  - Proportion **40 %**

**Create Product Group: Maintain Members (Materials)**

Hierarchy graphic	Versions...	Master data...	Product grp. graphic			
Product group	RACING-BIKE-9999	racing-bicycle-9999				
Plant	1000	Werk Hamburg				
Base Unit	PC					
Member number	Plnt	Unit conv.	Aggr.fact.	Proportion	UoM	V M Fx
		Short Text			MTyp	
SPEEDSTAR-9999	1000	1	0	60	PC	<input type="checkbox"/>
		Speedstar-9999			FERT	
SPEEDSTARLETT-9999	1000	1	0	40	PC	<input type="checkbox"/>
		Speedstarlett-9999			FERT	

Figure 47: Create Product Group: SAP-System-Screenshot

3. Press *Enter* and *safe* the product group.

### 3.2.2.2 Create Sales and Production Plan

Now, you will create a sales and production plan for your product group racing-bicycle-xxyy. Right after that, both plans will be aggregated to the material level using the proportion factors.

Call up the following transaction

**Logistics → Production → SOP → Planning → For Product Group → Change (MC82)**

1. On the *change plan: initial screen*, enter your **product group racing-bike-xxyy** and **plant 1000**. Press **Active version** to plan in the active planning version A00.

Now you enter the *create rough-cut plan* screen.

In our fictive story, we suppose that the market research department has already estimated the sales figures for the next months. How they got these numbers is irrelevant to us; we just hope that they did their work thoroughly. The following table shows the estimated numbers for the next 6 months for the product group racing-bicycle.

Month	Estimated sales figures
Current month + 2	2000
Current month + 3	1500
Current month + 4	1000
Current month + 5	1500
Current month + 6	2000
Current month + 7	1750

Thus, the **planned independent requirements** for bicycle production are already known.

2. Create a sales plan, starting with the **second month into future** (i.e., in case the current month is August, the second month to come is October). Enter the information from the table above in the **sales** row.
3. Due to market uncertainties, stock quantity has to be available for up to **3 days**. To set this in your plan, enter **3** in the **target days' supply field** for each month, starting from the second month to come.
4. Press **Enter**. The system automatically calculates and fills in the stock row.

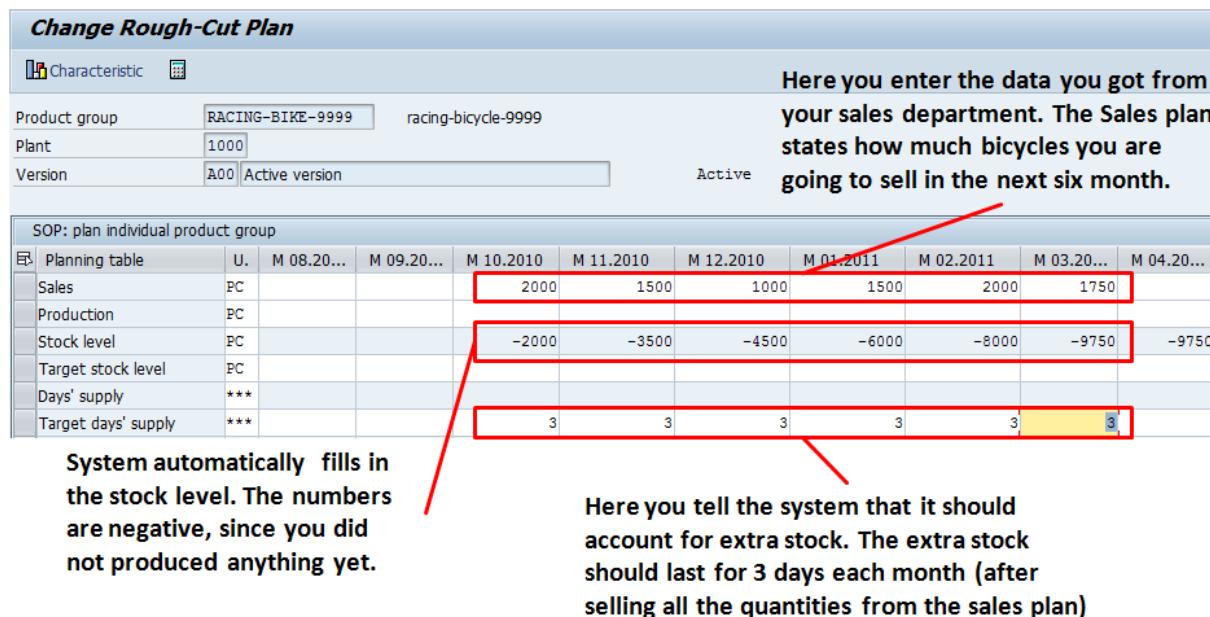


Figure 48: Create Sales and Production Plan: SAP-System-Screenshot

5. Create a production plan for your product group racing-bike-xxxx based on the sales plan and the desired target stock level. Therefore, choose **Edit → Create prod.plan → Target Days' Supply** from the menu. You should see that the system calculated the production numbers for the individual periods.

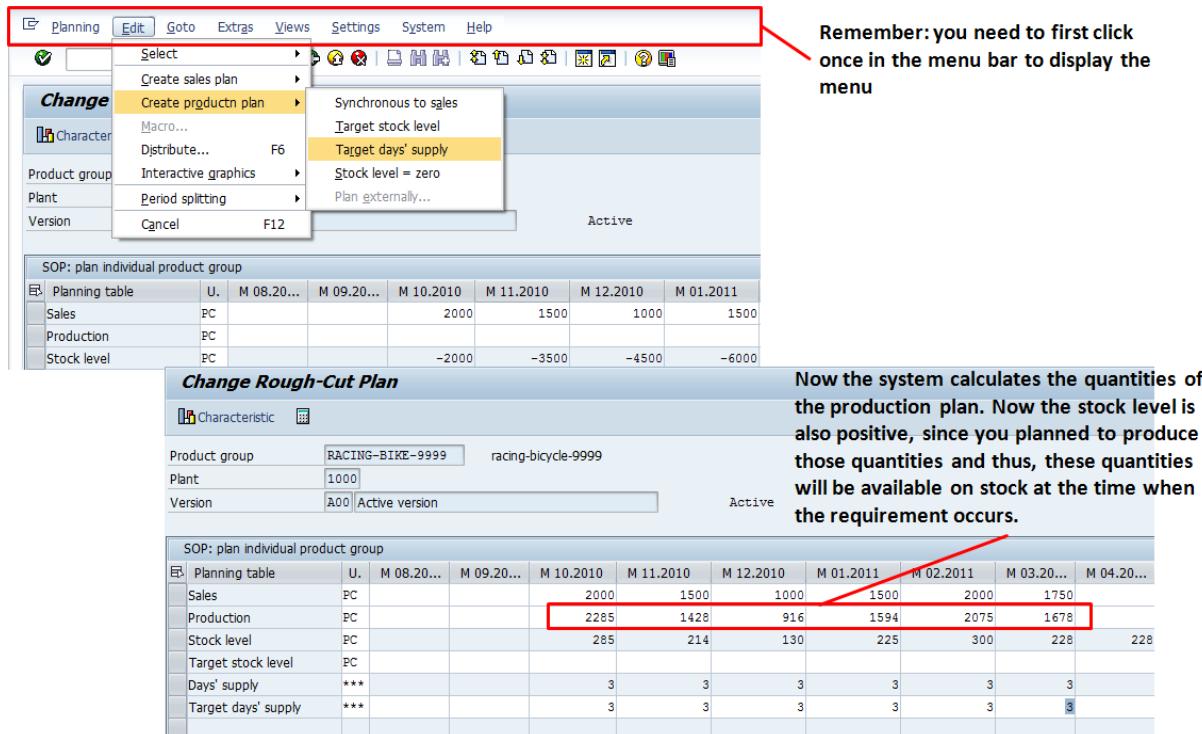


Figure 49: Create Production Plan: SAP-System-Screenshot



**Caution** Small deviations from the numbers in the figure above are not only possible but are the standard. That is due to the time you execute this planning. If you execute it at a time where you have the same amount of days left of the month and the same month length, you probably will get the very same figures. Consider that the system uses the given periods to calculate the production plan.

Thus, if you have deviation at this point, you also will have the same small deviations in the following parts of the case studies regarding screenshots of MRP lists etc. (approx. 50 pc).

However, you can also manually adjust the numbers in the production row, so that they comply with the screenshot above (this might affect the target days' supply, but that is ok). In this case you receive the same results as described in this script.

You can also change numbers subsequently using transaction MC82. Then, you need to enter the product group and the active version. The next steps of planning (e.g., disaggregation) need to be carried out again if you should change the plan.

## 6. Safe your entries.

### 3.2.2.3 Disaggregation of the Production Plan

Now that you have created the production plan for the racing-bicycle product group, you need to disaggregate it to determine the production quantities of the individual product group members. Disaggregate the **production plan** for your production group (racing-bicycle-xxxy) and transfer the production plans for the Speedstar-xxxy and the Speedstarlett-xxxy for detailed production planning to **demand management**. Choose

**Logistics → Production → SOP → Disaggregation → Transfer Product Group to Planning (MC75)**

In the *transfer planning data to demand management* screen, enter the following data:

- |  |                  |
|--|------------------|
| 1. Product group                                     | racing bike-xxyy |
| 2. plant   | 1000             |
| 3. Version   | A00              |
| 4. Prod. plan for mat. or PG members as a proportion | selected         |
| 5. From date   | current date     |
| 6. Invisible transfer                                | not selected     |
| 7. Active indicator                                  | selected         |

Click the **Transfer now** button to execute transfer of the production plan to demand management.

If you deselect the **invisible transfer** box, results of the disaggregation are displayed on another screen allowing the planner to manually change results according to management demands before saving.

When you look at the transfer results, you can see that 60% of the production plan of the product group (racing-bicycle) was assigned to your product Speedstar-xxyy and 40% to the Speedstarlett-xxyy.

List the value for the fifth month for the Speedstar on your data sheet:

**Speedstar 5<sup>th</sup> month:** \_\_\_\_\_

Review the results for the Speedstar and *safe*. The results for Speedstarlett are displayed below. *Save* the results for the Speedstarlett as well.

Plnd Ind. Reqmts: Planning Table											
Planning start 11.08.2010 Planning End											
Table Items Sched. lines											
	Material	MR...	V	A	B..	M 10.2...	M 11.2...	M 12.2...	M 01.2...	M 02.2...	M 03.2...
	SPEEDSTARLETT-9999	00	AG	<input checked="" type="checkbox"/>	PC	914	571	366	638	830	671
		AG	<input checked="" type="checkbox"/>								
		AG	<input checked="" type="checkbox"/>								

Figure 50: Planned Independent Requirements – Planning Table: SAP-System-Screenshot

The effects of demand management are the creation of the *planned independent requirements*. They can be displayed using the stock/requirements list. Therefore, choose

**Logistics → Production → MRP → Evaluations → Stock/Requirements list (MD04)**

Enter product **Speedstar-xxyy** and plant **1000** and choose **Enter**.

You can see that the *planned independent requirements* were transferred into the stock/requirements list. Thus, the production numbers for the next six displayed months (in the example, October - March) were listed. In the MRP column, you can see the abbreviation **IndReq**, which states that it is an individual requirement.

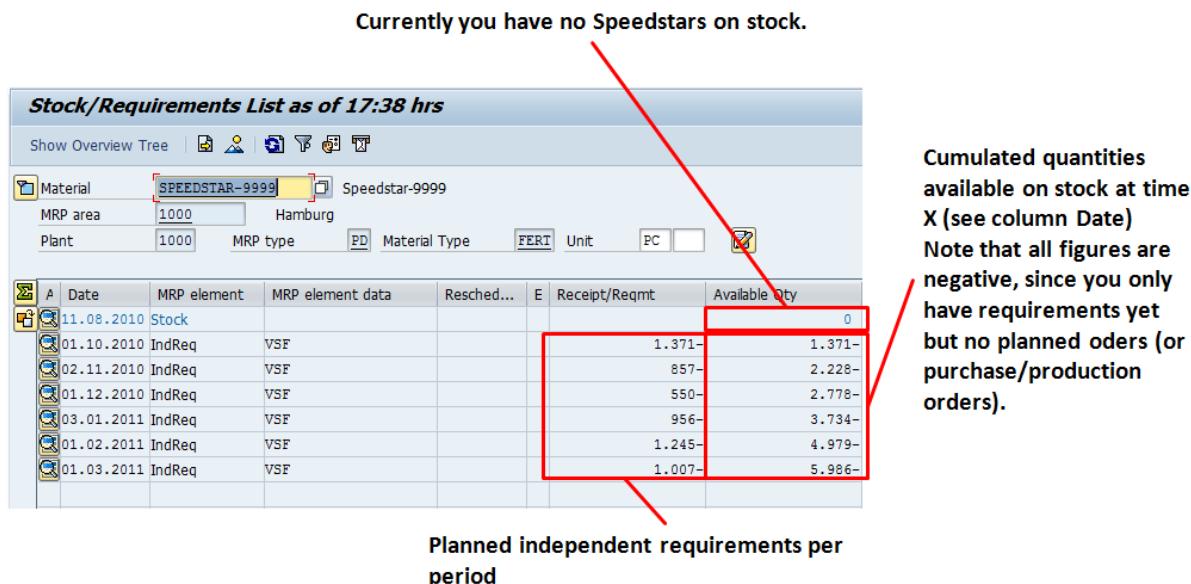


Figure 51: Stock/Requirements List: SAP-System-Screenshot

In the **Receipt/Requirement quantity (Receipt/Reqmt)** column, the required or, e.g. in case of a production or purchase order, received quantities for a particular product are displayed. The **available quantity** column displays the units of a product that are in **unrestricted-use stock**.

Please check the stock/requirements list for the **Speedstarlett** on your own. What is the amount of the **unrestricted-use stock** in the last month of planning? List the answer on your data sheet.

**Speedstarlett unrestricted-use stock:**

---

Look at the stock/requirements list for the **Basis-module-xxyy** assembly as well. You should see that no dependent requirements emerged. This is because **MRP** was not carried out yet. Only when MRP is executed together with BOM **explosion** and determination of **dependent requirements**, the system creates dependent requirements for the components.

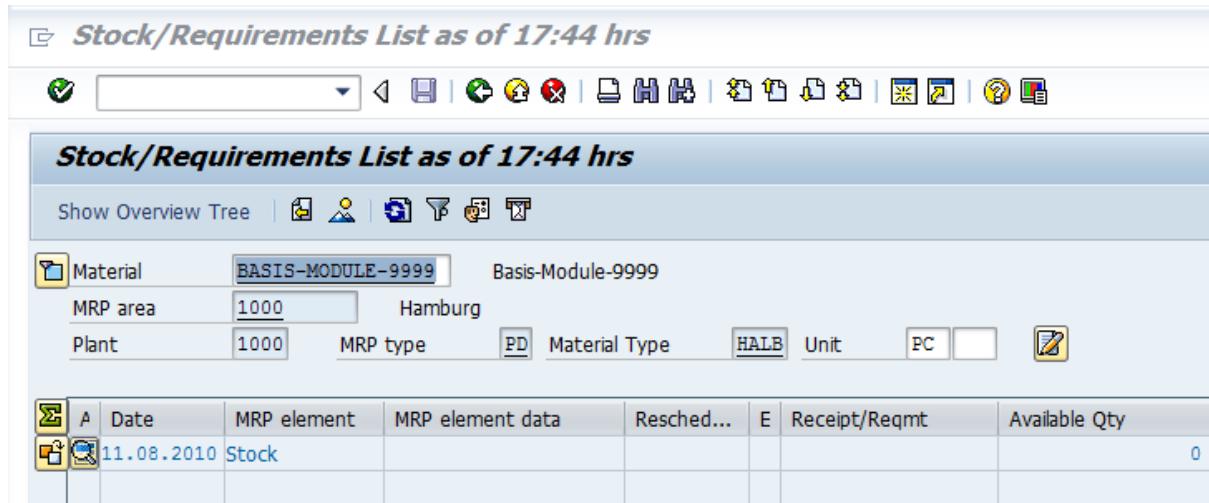


Figure 52: Stock/Requirements List Components: SAP-System-Screenshot

The **planned orders column does not cover the planned independent requirements** as you can see in the **MRP element** column. Therefore, you need to execute **MRP**. This is your next task. Carry out **material requirements planning** for the two products Speedstar and Speedstarlett.

### 3.2.3 Material Requirements Planning (MRP)

In this section, you will perform MRP for your product group. The following figure shows the required steps.

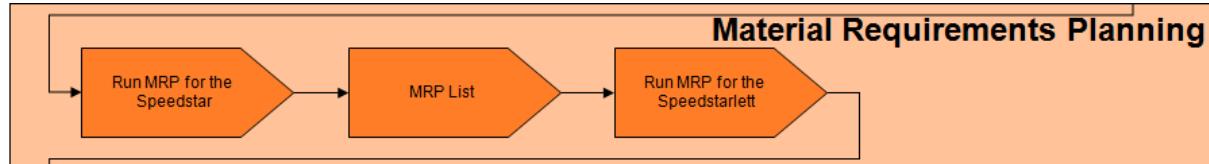


Figure 53: Process Overview: Material Requirements Planning

#### 3.2.3.1 Run MRP for the Speedstar

Run MRP for the entire BOM for the *Speedstar-xxyy* in plant **1000**. Therefore, choose

**Logistics → Production → MRP → Planning → Single-item, Multi-level. (MD02)**

1. Use the following data:
 

- Processing key	<b>NETCH</b>
- Create purchase req.	<b>3 (!)</b>
- Delivery schedules	<b>3</b>
- Create MRP list	<b>1</b>
- Planning mode	<b>1</b>
- Scheduling	<b>1</b>
- Also plan unchanged components	<b>deselect</b>

- Display results before they are saved      *deselect*
- Display material list      *deselect*
- Simulation mode      *deselect*

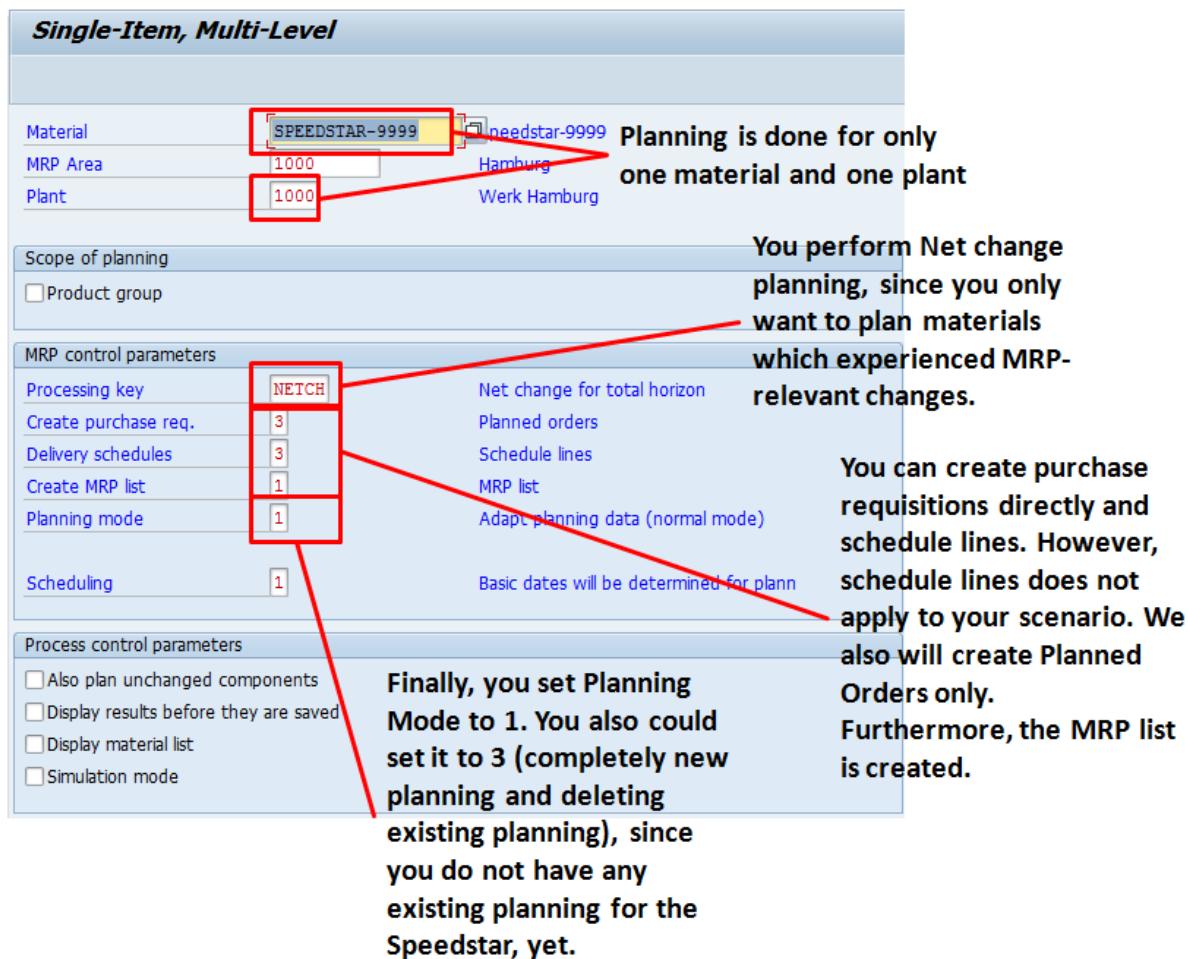


Figure 54: MRP run - NetChange: SAP-System-Screenshot

2. Choose *Enter* and ignore the system message by pressing *Enter* again. You should see the following screen.

<b>Single-Item, Multi-Level</b>	
<b>Statistics</b>	
Materials planned	10
Materials with New Exceptions	6
Materials with Termination MRP List	
<b>Parameters</b>	
MRP Area	1000
Plnt	1000
Processing Key	NETCH
Create Purchase Requisition	3
SA Schedule Line	3
Create MRP List	1
Planning Mode	3
Scheduling	1
<b>Database Statistics</b>	
Planned orders created	36
Dependent requirements created	54
<b>Runtime Statistics</b>	
Start of Planning Run	16:29:54
End of Planning Run	16:29:57
Runtime	00:00:03
CPU Time Read-In	00:00:01
CPU Time: Update	00:00:01

Figure 55: MRP: SAP-System-Screenshot

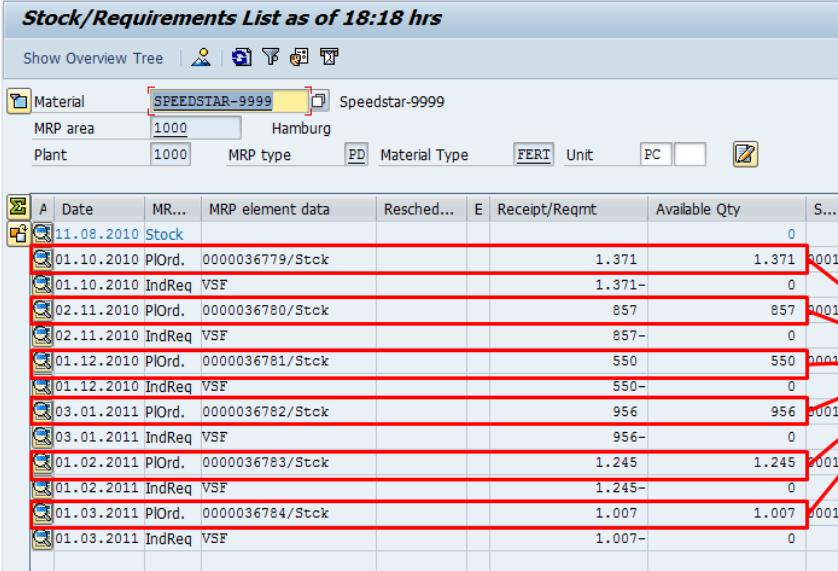
In the **Statistics**, you can see that **10 materials** were planned. This corresponds with the ten (Basis-module-xxxx, frame-xxxx, wheel-xxxx, chain-xxxx, gearing-xxxx, pedal, brakes, handlebar, saddle, and Speedstar-xxxx), which the system includes in determination of requirements. **For 6 materials**, exceptions occurred. This is due to the materials Basis-module (and its 4 components), frame, chain, wheel, gearing and Speedstar since these materials are not in stock. Large quantities of the other 4 materials are in unrestricted-use stock. The **exceptions** displayed by the system refer to the created planned orders (all in all  $54 = 9 \text{ materials} * 6 \text{ months}$ ) for these materials, as you can see from the database statistics.

 **Caution** Eventually (more likely), you will have **10 materials planned with 6 exceptions** displayed. That is, the 3 materials you did not create yourself (pedals, brakes, handlebars) have been planned initially by your course instructor (or the first person running the MRP for his Speedstar). In that case, these materials are planned only and no exceptions will occur. Depending on the MRP mode, 10 exceptions may occur; so this does not have to be an error.

3. You can gain a detailed insight in the MRP situation when calling up the stock/requirements list once again.

**Logistics → Production → MRP → Evaluations → Stock/Requirements List (MD04)**

4. Enter material **Speedstar-xxyy** and plant **1000**. You can now see the effects of the MRP run.



The screenshot shows the SAP Stock/Requirements List (MD04) interface. At the top, it displays 'Material SPEEDSTAR-9999' and 'Plant 1000'. The main area is a grid titled 'Stock/Requirements List as of 18:18 hrs'. The columns include Date, MRP element data, Resched..., E, Receipt/Reqmt, Available Qty, and S... (partially visible). The grid lists various planning events (PIOrd, IndReq, VSF) for different dates (e.g., 01.10.2010, 02.11.2010, etc.) and shows their impact on the available quantity. A red callout points to the first row of the grid, which corresponds to the entry '01.10.2010 PIOrd. 0000036779/Stck'. The text next to the callout reads: 'Planned orders for each planned independent requirement'.

Figure 56: Stock/Requirements List after MRP: SAP-System-Screenshot

You can see that **planned orders** were created for each planned independent requirement. The planned orders are characterized by the **PIOrd.** entry in the MRP element column. Thus, the planned independent requirements are also covered by planned orders. The available quantities column, in which no negative numbers are listed anymore, shows this. A positive amount is added by the planned order and consumes the independent planning requirements (0).

In the MRP element column, double-click on the first entry **PIOrd.** A small window opens. In this window, you can determine **follow-up activities** for the **planned order**. Since the Speedstar is a finished product, the system provides the following buttons

- **production order** -> Prod.ord
- **partial production order** -> PartConvProdOrder
- **process order** -> Proc.ord.
- **sub process order** -> SubProcOrd
- **purchase requisition** -> Pur.req.

The first four options allow you to convert the planned order into a **production order** to work on it in **production**. **Purchase requisition** is for **external procurement**. This option converts

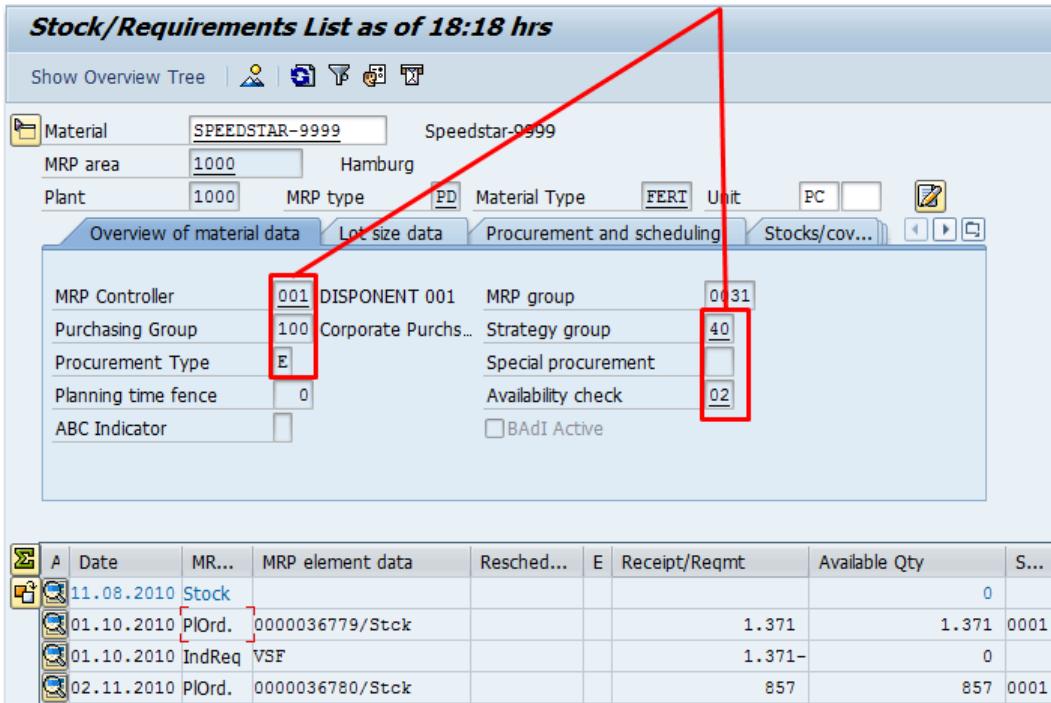
the planned order into a purchase requisition that can be carried out by **purchasing** in form of a purchase order.

Stock/Requirements List as of 18:18 hrs									
<a href="#">Show Overview Tree</a>									
Material	<b>SPEEDSTAR-9999</b>		Speedstar-9999						
MRP area	1000		Hamburg						
Plant	1000		MRP type	PD	Material Type	FERT	Unit	PC	
	A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...
	11.08.2010	Stock						0	
	01.10.2010	PlOrd.	0000036779/STCK				1.371	1.371	0001
	01.10.2010	IndReq	VSF				1.371-	0	
	02.11.2	Additional Data for MRP Element							
	02.11.2	Plnd order	0000036779	Make-to-stock	Order finish	01.10.2010	GR ProcTme	0	
	01.12.2	Order qty	1.371	PC	Order start	24.09.2010	Proc. type	E	
	03.01.2	Scrap	0		Planned opening	24.09.2010	Order type	IA	
	03.01.2		<a href="#">-&gt; Prod.ord</a> <a href="#">-&gt; PartConvProdOrder</a> <a href="#">-&gt; Proc.ord.</a> <a href="#">-&gt; SubProcOrd</a> <a href="#">-&gt; Pur.req.</a>						
	01.02.2011	IndReq	VSF				1.245-	0	
	01.03.2011	PlOrd.	0000036784/STCK				1.007	1.007	0001
	01.03.2011	IndReq	VSF				1.007-	0	

Figure 57: MRP – Follow-up Activities: SAP-System-Screenshot

5. Close the window with *Enter*.
6. Choose the icon. You receive additional planning data for the material, predominantly from the material master record.

**Data derived from Material master,  
including Strategy group and Availability  
check and Procurement type**



The screenshot shows the SAP Stock/Requirements List interface. At the top, it displays material information: SPEEDSTAR-9999, Speedstar-9999, MRP area 1000 Hamburg, Plant 1000, MRP type PD, Material Type FERT, Unit PC. Below this is a navigation bar with tabs: Overview of material data (selected), Lot size data, Procurement and scheduling, Stocks/cov... (highlighted by a red arrow). The main area contains several configuration fields:

MRP Controller	001	DISPONENT 001	MRP group	0031
Purchasing Group	100	Corporate Purch...	Strategy group	40
Procurement Type	E		Special procurement	
Planning time fence	0		Availability check	02
ABC Indicator			<input type="checkbox"/> BAdI Active	

Below this is a table showing stock information:

A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...
	11.08.2010	Stock					0	
	01.10.2010	PlOrd.	0000036779/Stck			1.371	1.371	0001
	01.10.2010	IndReq	VSE			1.371-	0	
	02.11.2010	PlOrd.	0000036780/Stck			857	857	0001

Figure 58: Additional Planning Information: SAP-System-Screenshot

Also check the requirements list and the follow-up activities for the other components. You will see that, for example, for the gearing component, only the purchase requisition option is selectable since it is a trading good that is always procured externally. Moreover, in the MRP element column, DepReq is displayed (dependent requirement), as opposed to IndReq (individual requirement). Since we will focus on follow-up activities in the next case study, look at the MRP list.

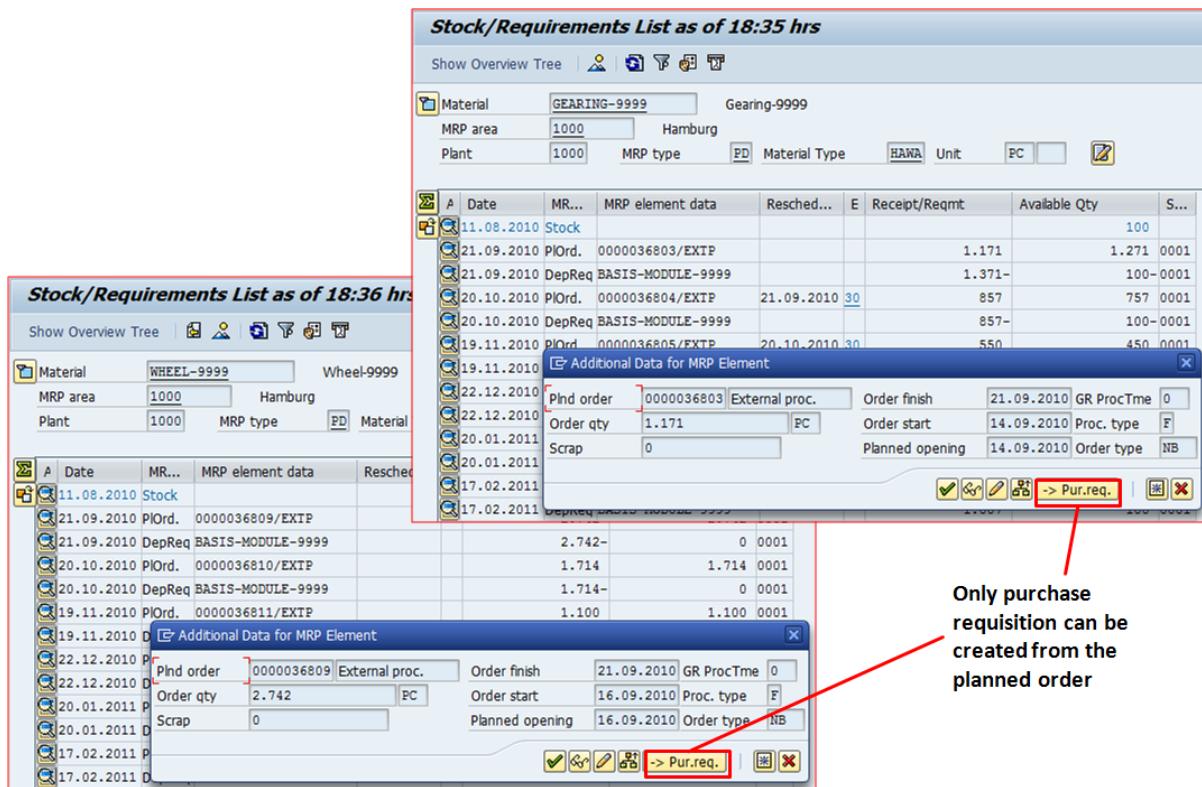


Figure 59: Planned Order - Purchase Requisition for Component: SAP-System-Screenshot

### 3.2.3.2 MRP List

To display the MRP list, call up the following transaction

**Logistics → Production → MRP → Evaluation → MRP List (MD05)**

1. Enter material **Speedstar-xxyy** and plant **1000**. Confirm with *Enter*.

At this point, you can see once again that the planned independent requirements from demand management are covered by planned orders.

2. Moreover, display additional information in the header. It is displayed that 6 exceptions of group 4 occurred (general messages – descriptions of groups can be accessed using the F1 help).

MRP List as of 11.08.2010, 18:10 hrs																																																																																																																																																																				
<a href="#">Show Overview Tree</a>        On																																																																																																																																																																				
Material		SPEEDSTAR-9999	Speedstar-9999																																																																																																																																																																	
MRP area	1000	Hamburg	Plant	1000	MRP type	PD	Material Type	FERT	Unit	PC																																																																																																																																																										
Special MRP list data			Overview of material data			Lot size data		Procurement and s...																																																																																																																																																												
MRP Controller	001	DISPONENT 001	MRP date	11.08.2010		Processing Indicator	Processing date																																																																																																																																																													
<input type="checkbox"/> New exceptions exist																																																																																																																																																																				
No. of exceptn messages according to groups:																																																																																																																																																																				
1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	6	5	<input type="checkbox"/>	6	<input type="checkbox"/>																																																																																																																																																									
7	<input type="checkbox"/>	8	<input type="checkbox"/>																																																																																																																																																																	
<table border="1"> <thead> <tr> <th>E</th><th>A</th><th>Date</th><th>MR...</th><th>MRP element data</th><th>Resched...</th><th>E</th><th>Receipt/Reqmt</th><th>Available Qty</th><th>S...</th><th></th></tr> </thead> <tbody> <tr> <td></td><td></td><td>11.08.2010 Stock</td><td></td><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>01.10.2010 PIOrd.</td><td>0000036779/Stck</td><td></td><td>01</td><td></td><td>1.371</td><td>1.371</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>01.10.2010 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>1.371-</td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>02.11.2010 PIOrd.</td><td>0000036780/Stck</td><td></td><td>01</td><td></td><td>857</td><td>857</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>02.11.2010 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>857-</td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>01.12.2010 PIOrd.</td><td>0000036781/Stck</td><td></td><td>01</td><td></td><td>550</td><td>550</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>01.12.2010 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>550-</td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>03.01.2011 PIOrd.</td><td>0000036782/Stck</td><td></td><td>01</td><td></td><td>956</td><td>956</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>03.01.2011 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>956-</td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>01.02.2011 PIOrd.</td><td>0000036783/Stck</td><td></td><td>01</td><td></td><td>1.245</td><td>1.245</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>01.02.2011 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>1.245-</td><td>0</td><td></td><td></td></tr> <tr> <td></td><td></td><td>01.03.2011 PIOrd.</td><td>0000036784/Stck</td><td></td><td>01</td><td></td><td>1.007</td><td>1.007</td><td>0001</td><td></td></tr> <tr> <td></td><td></td><td>01.03.2011 IndReq</td><td>VSF</td><td></td><td></td><td></td><td>1.007-</td><td>0</td><td></td><td></td></tr> </tbody> </table>											E	A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...				11.08.2010 Stock						0					01.10.2010 PIOrd.	0000036779/Stck		01		1.371	1.371	0001				01.10.2010 IndReq	VSF				1.371-	0					02.11.2010 PIOrd.	0000036780/Stck		01		857	857	0001				02.11.2010 IndReq	VSF				857-	0					01.12.2010 PIOrd.	0000036781/Stck		01		550	550	0001				01.12.2010 IndReq	VSF				550-	0					03.01.2011 PIOrd.	0000036782/Stck		01		956	956	0001				03.01.2011 IndReq	VSF				956-	0					01.02.2011 PIOrd.	0000036783/Stck		01		1.245	1.245	0001				01.02.2011 IndReq	VSF				1.245-	0					01.03.2011 PIOrd.	0000036784/Stck		01		1.007	1.007	0001				01.03.2011 IndReq	VSF				1.007-	0		
E	A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...																																																																																																																																																											
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		01.03.2011 IndReq	VSF				1.007-	0																																																																																																																																																												

Figure 60: MRP List: SAP-System-Screenshot

- To display a comparison of MRP list (MD05) and Stock/requirements list (MD04), choose **Goto → Stock/Requirements List Comparison** from the menu.
- You can see that there are no differences between the MRP list (list 1) and the stock/requirements list (list 2) at this point. This is because no planning or production activities were carried out since the MRP run.

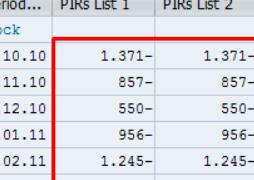
MRP List - Stock/Requirements List Comparison: Period Totals																																																																																							
Material	SPEEDSTAR-9999	Plant	1000	Base Unit	PC																																																																																		
MRP Area	1000	Hamburg			<th></th> <th></th> <th></th> <th></th> <th></th>																																																																																		
Comparison																																																																																							
List 1	MRP List		11.08.2010																																																																																				
List 2	Stock/Requirements List																																																																																						
<table border="1"> <thead> <tr> <th>Days</th><th>Weeks</th><th>Months</th><th>Plng Calendar</th><th>Indiv. Split</th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th></tr> </thead> <tbody> <tr> <td>Period...</td><td>PIRs List 1</td><td>PIRs List 2</td><td>Req...</td><td>Req...</td><td>Receipts L...</td><td>Receipts L...</td><td>Avail...</td><td>Avail...</td><td>ATP Qty L...</td><td>ATP Qty L...</td></tr> </tbody> </table>											Days	Weeks	Months	Plng Calendar	Indiv. Split							Period...	PIRs List 1	PIRs List 2	Req...	Req...	Receipts L...	Receipts L...	Avail...	Avail...	ATP Qty L...	ATP Qty L...																																																							
Days	Weeks	Months	Plng Calendar	Indiv. Split																																																																																			
Period...	PIRs List 1	PIRs List 2	Req...	Req...	Receipts L...	Receipts L...	Avail...	Avail...	ATP Qty L...	ATP Qty L...																																																																													
<table border="1"> <thead> <tr> <th>Stock</th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th><th> </th></tr> </thead> <tbody> <tr> <td>01.10.10</td><td>1.371-</td><td>1.371-</td><td>0</td><td>0</td><td>1.371</td><td>1.371</td><td>0</td><td>0</td><td>1.371</td><td>1.371</td></tr> <tr> <td>02.11.10</td><td>857-</td><td>857-</td><td>0</td><td>0</td><td>857</td><td>857</td><td>0</td><td>0</td><td>857</td><td>857</td></tr> <tr> <td>01.12.10</td><td>550-</td><td>550-</td><td>0</td><td>0</td><td>550</td><td>550</td><td>0</td><td>0</td><td>550</td><td>550</td></tr> <tr> <td>03.01.11</td><td>956-</td><td>956-</td><td>0</td><td>0</td><td>956</td><td>956</td><td>0</td><td>0</td><td>956</td><td>956</td></tr> <tr> <td>01.02.11</td><td>1.245-</td><td>1.245-</td><td>0</td><td>0</td><td>1.245</td><td>1.245</td><td>0</td><td>0</td><td>1.245</td><td>1.245</td></tr> <tr> <td>01.03.11</td><td>1.007-</td><td>1.007-</td><td>0</td><td>0</td><td>1.007</td><td>1.007</td><td>0</td><td>0</td><td>1.007</td><td>1.007</td></tr> </tbody> </table>											Stock											01.10.10	1.371-	1.371-	0	0	1.371	1.371	0	0	1.371	1.371	02.11.10	857-	857-	0	0	857	857	0	0	857	857	01.12.10	550-	550-	0	0	550	550	0	0	550	550	03.01.11	956-	956-	0	0	956	956	0	0	956	956	01.02.11	1.245-	1.245-	0	0	1.245	1.245	0	0	1.245	1.245	01.03.11	1.007-	1.007-	0	0	1.007	1.007	0	0	1.007	1.007
Stock																																																																																							
01.10.10	1.371-	1.371-	0	0	1.371	1.371	0	0	1.371	1.371																																																																													
02.11.10	857-	857-	0	0	857	857	0	0	857	857																																																																													
01.12.10	550-	550-	0	0	550	550	0	0	550	550																																																																													
03.01.11	956-	956-	0	0	956	956	0	0	956	956																																																																													
01.02.11	1.245-	1.245-	0	0	1.245	1.245	0	0	1.245	1.245																																																																													
01.03.11	1.007-	1.007-	0	0	1.007	1.007	0	0	1.007	1.007																																																																													
<div style="text-align: center;">             No difference between Stock/Requirements List and MRP List         </div>																																																																																							

Figure 61: Comparison MRP list – Stock/Requirements List: SAP-System-Screenshot

5. Close the MRP list and go back to the SAP Easy Access Menu.

### 3.2.3.3 Run MRP for the Speedstarlett

Execute requirements planning for the entire BOM of the **Speedstarlett-xxyy** in plant **1000**. Choose

**Logistics → Production → MRP → Planning → Single-item, Multi-level (MD02)**

1. Use the following data:

- Processing key	<b>NETCH</b>
- Create purchase req.	<b>3 (!)</b>
- Delivery schedules	<b>3</b>
- Create MRP list	<b>1</b>
- Planning mode	<b>1</b>
- Scheduling	<b>1</b>
- Also plan unchanged components	<b>deselect</b>
- Display results before they are saved	<b>deselect</b>
- Display material list	<b>deselect</b>
- Simulation mode	<b>deselect</b>

2. Choose **enter** and ignore the system message by pressing enter again.

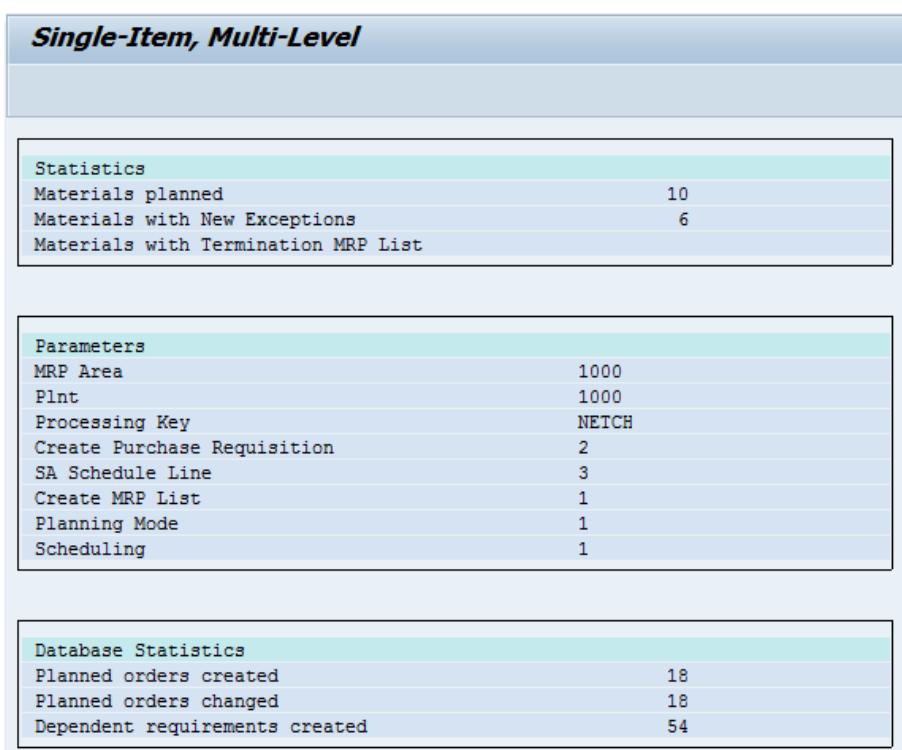


Figure 62: MRP for the Speedstarlett: SAP-System-Screenshot

You can see that 18 planned orders were **created**. These are regarding the **Speedstarlett-xxyy**, **Basis-module2-xxyy**, and **alu-frame-xxyy**. The other planned orders concern components

that Basis-module 1 and Basis-module 2 use in common (e.g., gearing). For these components, the planned orders were *changed*.

- Review the result in the stock/requirements lists (MD04) independently.

Stock/Requirements List as of 18:57 hrs									
Show Overview Tree									
Material	SPEEDSTARLETT-9999	Speedstarlett-9999							
MRP area	1000	Hamburg							
Plant	1000	MRP type PD Material Type FERT Unit PC							
A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...	
11.08.2010	Stock						0		
01.10.2010	PlOrd.	0000036819/Stock				914	914	0001	
01.10.2010	IndReq	VSF				914-	0		
02.11.2010	PlOrd.	0000036820/Stock				571	571	0001	
02.11.2010	IndReq	VSF				571-	0		
01.12.2010	PlOrd.	0000036821/Stock				366	366	0001	
01.12.2010	IndReq	VSF				366-	0		
03.01.2011	PlOrd.	0000036822/Stock				638	638	0001	
03.01.2011	IndReq	VSF				638-	0		
01.02.2011	PlOrd.	0000036823/Stock				830	830	0001	
01.02.2011	IndReq	VSF				830-	0		
01.03.2011	PlOrd.	0000036824/Stock				671	671	0001	
01.03.2011	IndReq	VSF				671-	0		

Figure 63: Stock/Requirements List for Speedstarlett: SAP-System-Screenshot

- In the next figure, you can see that for the **gearing**, a dependent requirement was created both for Basis-module 1 as well as for Basis-module 2. The planned order for the period was updated accordingly. Please also note the unrestricted-use stock from the first case study (100 units of measure).

Stock/Requirements List as of 18:54 hrs								
Show Overview Tree								
Material	GEARING-9999	Gearing-9999						
MRP area	1000	Hamburg						
Plant	1000	MRP type PD Material Type HAWA Unit PC						
A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...
11.08.2010	Stock						100	
21.09.2010	PlOrd.	0000036803/ExtP				2.185	2.285	0001
21.09.2010	DepReq	BASIS-MODULE-9999				1.371-	914	0001
21.09.2010	DepReq	BASIS-MODULE2-9999				914-	0	0001
20.10.2010	PlOrd.	0000036804/ExtP				1.428	1.428	0001
20.10.2010	DepReq	BASIS-MODULE-9999				857-	571	0001
20.10.2010	DepReq	BASIS-MODULE2-9999				571-	0	0001
19.11.2010	PlOrd.	0000036805/ExtP				916	916	0001
19.11.2010	DepReq	BASIS-MODULE-9999				550-	366	0001
19.11.2010	DepReq	BASIS-MODULE2-9999				366-	0	0001
22.12.2010	PlOrd.	0000036806/ExtP				1.594	1.594	0001
22.12.2010	DepReq	BASIS-MODULE-9999				956-	638	0001
22.12.2010	DepReq	BASIS-MODULE2-9999				638-	0	0001
20.01.2011	PlOrd.	0000036807/ExtP				2.075	2.075	0001
20.01.2011	DepReq	BASIS-MODULE-9999				1.245-	830	0001
20.01.2011	DepReq	BASIS-MODULE2-9999				830-	0	0001
17.02.2011	PlOrd.	0000036808/ExtP				1.678	1.678	0001
17.02.2011	DepReq	BASIS-MODULE-9999				1.007-	671	0001
17.02.2011	DepReq	BASIS-MODULE2-9999				671-	0	0001

Figure 64: Stock/Requirements List for Gearing: SAP-System-Screenshot

5. In the MRP list - Stock/requirements list comparison you can see that there are no differences between those two lists for the Speedstarlett.

Stock/Requirements List - MRP List Comparison: Period Totals											
Period		Stock/Requirements List		MRP List		Comparison					
Material	SPEEDSTARLETT-9999	Plant	1000	Base Unit	PC	Comparison					
MRP Area	1000	Hamburg									
List 1	Stock/Requirements List		List 2	MRP List			11.08.2010				
<a href="#">Days</a> <a href="#">Weeks</a> <a href="#">Months</a> <a href="#">Plng Calendar</a> <a href="#">Indiv. Split</a>											
Period totals: Comparison											
Period...	PIRs Lis...	PIRs Lis...	Req...	Req...	Receipt...	Receipt...	Avail...	Avail...	ATP Qt...	ATP Qt...	
<b>Stock</b>							0	0	0	0	
01.10.10	914-	914-	0	0	914	914	0	0	914	914	
02.11.10	571-	571-	0	0	571	571	0	0	571	571	
01.12.10	366-	366-	0	0	366	366	0	0	366	366	
03.01.11	638-	638-	0	0	638	638	0	0	638	638	
01.02.11	830-	830-	0	0	830	830	0	0	830	830	
01.03.11	671-	671-	0	0	671	671	0	0	671	671	

**No difference between Stock/Requirements List and MRP List**

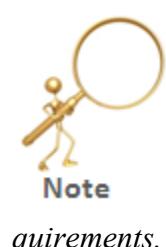
Figure 65: Comparison MRP List – Stock/Requirements List: SAP-System-Screenshot

### 3.2.4 Create Sales Order

You receive your first sales order from a customer (1000 – Becker, Berlin) the customer orders 100 Speedstars and 100 Speedstarletts. Capture the sales order in the SAP ERP system.



Figure 66: Process Overview: Sales Management



*Entering Sales orders is a function of SD and not of PP/MM. Nevertheless, you should enter the sales order at this point to be able to understand effects on MRP. In case you cannot remember the theoretical section, please note that requirements to be planned are not only planned independent requirements but also sales orders, which are actual requirements, as opposed to planned requirements.*

Next, create the sales order. Choose

**Logistics → Sales and Distribution → Sales → Order → Create (VA01)**

In the **create sales order: initial screen**, enter the following data:

1. Order type                   **OR**
2. Sales organization         **1000**
3. Distribution channel      **10**
4. Division                   **00**
5. Confirm with *Enter*.

On the **create standard order: overview** screen, enter the following data:

1. Sold-to-party               **1000 (customer already exists in IDES group)**
2. Ship-to-party               **1000**
3. PO number                  **order-xxyy**
4. Req. deliv. date.          **15<sup>th</sup> day of current month + 3 (!) months**



+3 months means that if the current month is for example August 2010, the date to enter would be 15<sup>th</sup> November 2010.

5. Material position 10       **Speedstar-xxyy**
6. Material position 20       **Speedstarlett-xxyy**
7. Order quantity position 10   **100**
8. Order quantity position 20   **100**
9. Confirm with *Enter* and skip any system messages with *Enter*.

**Create Standard Order: Overview**

Standard Order	Net value	0,00	EUR
Sold-To Party	1000 Becker Berlin / Calvinstrasse 36 / D-13467 Berlin-Hermsdorf	<input type="button" value=""/>	
Ship-To Party	1000 Becker Berlin / Calvinstrasse 36 / D-13467 Berlin-Hermsdorf	<input type="button" value=""/>	
PO Number	order-9999	PO date	<input type="button" value=""/>

Sales    Item overview    Item detail    Ordering party    Procurement    Shipping    Reason for rejection

Req. deliv.date	D 15.11.2010	Deliver.Plant	<input type="button" value=""/>
<input type="checkbox"/> Complete dlv.		Total Weight	3.800 KG
Delivery block	<input type="button" value=""/>	Volume	0,000
Billing block	<input type="button" value=""/>	Pricing date	11.08.2010
Payment card	<input type="button" value=""/>	Exp.date	<input type="button" value=""/>
Card Verif.Code	<input type="button" value=""/>		
Payment terms	ZB01 14 Days 3%, 30/2...	Incoterms	CIF Berlin
Order reason	<input type="button" value=""/>		

All items

Item	Material	Order Quantity	Un	Description	S	Customer Material Numb	I...
10	SPEEDSTAR-9999	100	PC	Speedstar-9999	<input type="checkbox"/>		TAN
20	SPEEDSTARLETT-9999	100	PC	Speedstarlett-9999	<input type="checkbox"/>		TAN

Figure 67: Create Sales Order: SAP-System-Screenshot

Since no sales price conditions are present for bicycles yet (part of the SD functional area; this will be focused on later), you will manually enter sales prices at this point.

1. Select the first row in the position overview (Speedstar) and choose **Goto → Item → Conditions** from the menu.

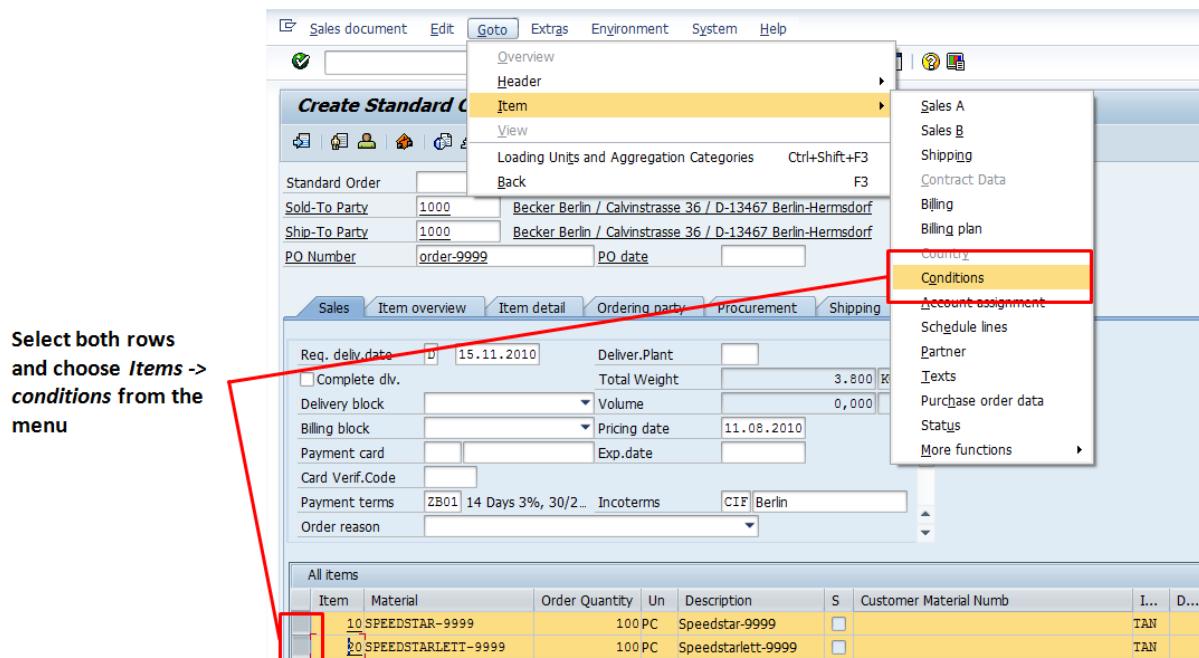


Figure 68: Maintain Sales Conditions (1): SAP-System-Screenshot

2. In the first empty field of the **CnTy** column, enter the condition **pr00** and in the **amount** column, enter **3000**. The transfer price already named in the condition originates from the material master record of the Speedstar. Confirm with *Enter* and press **►** (next item).

This screenshot shows the 'Create Standard Order: Item Data' screen. It displays two rows of items: '10 SPEEDSTAR-9999' and '20 SPEEDSTARLETT-9999'. The 'Conditions' tab is selected. A red box highlights the 'Conditions' tab in the navigation bar. A red bracket on the left points to the 'Conditions' tab with the text 'Standard condition type and amount'. A red box highlights the 'CnTy' column for the first item, containing 'pr00'. Another red box highlights the 'Amount' column for the same item, containing '3000'. A red bracket on the right points to these fields with the text 'After entering the conditions for Speedstar press the next button to change to Speedstarlett'. The bottom part of the screen shows a detailed view of the 'Pricing Elements' table for both items, with the second item's table also having a red border around its 'CnTy' and 'Amount' columns. A red bracket on the right points to this table with the text 'After pressing enter the pricing information is updated'.

Figure 69: Maintain Sales Conditions (2): SAP-System-Screenshot

3. Repeat the procedure for the **Speedstarlett** with condition type **pr00** and amount **2500**.
4. Go one step back (  ) to return to the initial screen of the order.

*Note: Please make sure you do not confuse **sales price conditions** for a **customer** with conditions you created in the first case study (procurement). Those were **purchasing conditions** for **vendors***

5. **Safe** the sales order and note the sales order number (from the status bar) on your data sheet.

**Sales order number:** \_\_\_\_\_

### 3.2.5 Stock/Requirements Lists

Finally, you will take a closer look at the stock/requirements list to get an insight into the MRP situation after material planning.

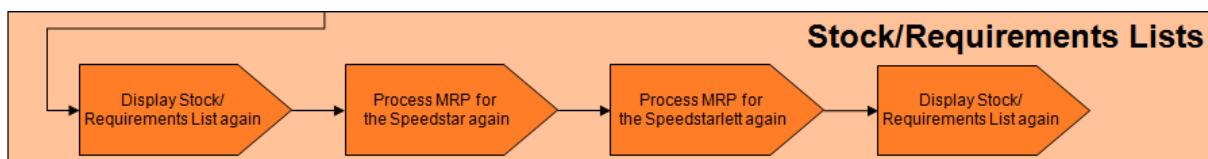


Figure 70: Process Overview: Stock/Requirements Lists

#### 3.2.5.1 Display Stock/Requirements List again

Select

**Logistics → Production → MRP → Evaluations → Stock/Requirements List (MD04)**

1. Display the stock/requirements list for the **Speedstar-xxyy** and plant **1000** once again.

You should see that the sales order was planned in requirements planning. Moreover, the sales order consumes the requirements from planning. In the example below, the value for period 11 (November) was reduced by 100 units of measure.

Now you have a new Order  
(not a planned Order) in  
your MRP list.

Stock/Requirements List as of 19:36 hrs														
Show Overview Tree														
Material	SPEEDSTAR-9999	MRP area	1000	Hamburg	Speedstar-9999	Plant	1000	MRP type	ED	Material Type	FERI	Unit	PC	
A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt	Available Qty	S...						
11.08.2010	Stock						0	0						
01.10.2010	PlOrd.	0000036779/Stck				1.371		1.371	0001					
01.10.2010	IndReq	VSF				1.371-		0						
02.11.2010	PlOrd.	0000036780/Stck				857		857	0001					
02.11.2010	IndReq	VSF				757-		100						
10.11.2010	Order	0000013324/000010/0...				100-		0						
01.12.2010	PlOrd.	0000036781/Stck				550		550	0001					
01.12.2010	IndReq	VSF				550-		0						
03.01.2011	PlOrd.	0000036782/Stck				956		956	0001					
03.01.2011	IndReq	VSF				956-		0						
01.02.2011	PlOrd.	0000036783/Stck				1.245		1.245	0001					
01.02.2011	IndReq	VSF				1.245-		0						
01.03.2011	PlOrd.	0000036784/Stck				1.007		1.007	0001					
01.03.2011	IndReq	VSF				1.007-		0						

Note that the planned order was not effected. This will happen after the MRP run

Furthermore, you witness that the order consumes the independent planned requirement

Figure 71: Stock/Requirements List Speedstar: SAP-System-Screenshot

- Now, compare the stock/requirements list with the MRP list via **GoTo → MRP List Comparison**.

Due to the consumption of the sales order, you should see that the independent requirements in the MRP list (list 2) are by 100 units of measure above the independent requirements of the stock/requirements list. The differences are highlighted red below.

Stock/Requirements List - MRP List Comparison: Period Totals												
Period	Stock/Requirements List		MRP List		Comparison							
Material	SPEEDSTAR-9999	Plant	1000	Base Unit	PC	Comparison						
MRP Area	1000	Hamburg				List 1	Stock/Requirements List					
Comparison						List 2	MRP List					
							11.08.2010					
Days	Weeks	Months	Plng Calendar	Indiv. Split								
Period totals: Comparison												
Period...	PIRs List 1	PIRs List 2	Reqmts...	Req...	Receipts L...	Receipts L...	Availab...	Avail...	ATP Qty L...	ATP Qty L...		
Stock							0	0	0	0		
01.10.10	1.371-	1.371-	0	0	1.371	1.371	0	0	1.371	1.371		
02.11.10	757-	857-	0	0	857	857	100	0	757	857		
10.11.10	0	0	100-	0	0	0	0	0	0	0		
01.12.10	550-	550-	0	0	550	550	0	0	550	550		
03.01.11	956-	956-	0	0	956	956	0	0	956	956		
01.02.11	1.245-	1.245-	0	0	1.245	1.245	0	0	1.245	1.245		
01.03.11	1.007-	1.007-	0	0	1.007	1.007	0	0	1.007	1.007		

Note the difference between the two lists. The MRP list is STATIC, thus, it is updated after the MRP run

Figure 72: Comparison Stock/Requirements List: SAP-System-Screenshot

Please note that the MRP list shows amounts after the last planning process (MRP run: **MD02**) while the stock/requirements list displays the current planning situation. Accordingly, you need to process materials planning once again.

### 3.2.5.2 Process Materials Requirements Planning for the Speedstar again

Carry out materials requirements planning for the entire BOM of product *Speedstar-xxyy* in plant **1000**. Choose

**Logistics → Production → MRP → Planning → Single-Item, Multi-Level (MD02)**

1. Use the following data:

- Processing key	<b>NETCH</b>
- Create purchase req.	<b>3 (!)</b>
- Delivery schedules	<b>3</b>
- Create MRP list	<b>1</b>
- Planning mode	<b>1</b>
- Scheduling	<b>1</b>
- Also plan unchanged components	<i>deselect</i>
- Display results before they are saved	<i>deselect</i>
- Display material list	<i>deselect</i>
- Simulation mode	<i>deselect</i>

2. Press *Enter* and skip the notification with *Enter*.

### 3.2.5.3 Process Materials Requirements Planning for the Speedstarlett again

Execute requirements planning for the entire BOM of the Speedstarlett-*xxyy* in plant **1000**. Choose

**Logistics → Production → MRP → Planning → Single-Item, Multi-Level (MD02)**

1. Use the following data:

- Processing key	<b>NETCH</b>
- Create purchase req.	<b>3 (!)</b>
- Delivery schedules	<b>3</b>
- Create MRP list	<b>1</b>
- Planning mode	<b>1</b>
- Scheduling	<b>1</b>
- Also plan unchanged components	<i>deselect</i>
- Display results before they are saved	<i>deselect</i>
- Display material list	<i>deselect</i>
- Simulation mode	<i>deselect</i>

2. Press *Enter* and skip the notification with *Enter*.

### 3.2.5.4 Display Stock/Requirements List again

Display the stock/requirements list for the *Speedstar* and plant *1000* once again.

**Logistics → Production → MRP → Evaluations → Stock/Requirements List (MD04)**

You can see that due to the sales order, a new planned order was created. Simultaneously, the planned order for the planned independent requirements was reduced by the quantity of the sales order requirements.

*In our planning scenario this ensures that planned independent requirements consume sales orders when they actually occur. Consider that the planned independent requirements are nothing else but the forecast of those very sales orders.*

The independent planned requirement was  
reduced before the MRP run, now the  
corresponding planned order is reduced too, due  
to consumption

Stock/Requirements List as of 19:58 hrs														
Show Overview Tree														
Material	SPEEDSTAR-9999	MRP area	1000	Hamburg	Plant	1000	MRP type	PD	Material Type	FERI	Unit	PC	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A	Date	MR...	MRP element data	Resched...	E	Receipt/Reqmt		Available Qty		S...				
	11.08.2010	Stock						0						
	01.10.2010	PIOrd.	0000036779/Stck			1.371		1.371	0001					
	01.10.2010	IndReq	VSF			1.371-		0						
	02.11.2010	PIOrd.	0000036780/Stck			757		757	0001					
	02.11.2010	IndReq	VSF			757-		0						
	10.11.2010	PIOrd.	0000036837/Stck			100		100	0001					
	10.11.2010	Order	0000013324/000010/0...			100-		0						
	01.12.2010	PIOrd.	0000036781/Stck			550		550	0001					
	01.12.2010	IndReq	VSF			550-		0						
	03.01.2011	PIOrd.	0000036782/Stck			956		956	0001					
	03.01.2011	IndReq	VSF			956-		0						
	01.02.2011	PIOrd.	0000036783/Stck			1.245		1.245	0001					
	01.02.2011	IndReq	VSF			1.245-		0						
	01.03.2011	PIOrd.	0000036784/Stck			1.007		1.007	0001					
	01.03.2011	IndReq	VSF			1.007-		0						

New planned order created to  
cover the Sales Order

Figure 73: Stock/Requirements list for Speedstar: SAP-System-Screenshot

Now, compare the stock/requirements list to the MRP list again via **GoTo → MRP List Comparison**. You should see that both lists were updated and equal to each other.

Stock/Requirements List - MRP List Comparison: Period Totals															
Period		Stock/Requirements List		MRP List		Comparison									
Material	SPEEDSTAR-9999	Plant	1000	Base Unit	PC										
MRP Area	1000	Hamburg													
Comparison															
List 1	Stock/Requirements List														
List 2	MRP List					11.08.2010									
Days	Weeks	Months	Plng Calendar	Indiv. Split											
Period totals: Comparison															
Period...	PIRs List 1	PIRs List 2	Reqmts...	Reqmts...	Receipts L...	Receipts L...	Avail...	Avail...	ATP Qty L...	ATP Qty L...					
<b>Stock</b>							0	0	0	0					
01.10.10	1.371-	1.371-	0	0	1.371	1.371	0	0	1.371	1.371					
02.11.10	757-	757-	0	0	757	757	0	0	757	757					
10.11.10	0	0	100-	100-	100	100	0	0	0	0					
01.12.10	550-	550-	0	0	550	550	0	0	550	550					
03.01.11	956-	956-	0	0	956	956	0	0	956	956					
01.02.11	1.245-	1.245-	0	0	1.245	1.245	0	0	1.245	1.245					
01.03.11	1.007-	1.007-	0	0	1.007	1.007	0	0	1.007	1.007					

No more differences between MRP List and  
Stock/Requirements List after MRP run

Figure 74: Comparison updated Stock/Requirements List: SAP-System-Screenshot

### 3.3 Elucidation



#### What have we learned so far?

We have learned how material planning is carried out in SAP ERP and which components and parameters are important in this process. Furthermore, the outcome of the material planning process was introduced.

#### 3.3.1 Overview Material Planning Process

The material planning process consists of:

##### Sales and operations planning (Standard SOP):

- Basically, SOP uses historical data from past sales and production processes or market analyses of the marketing department to forecast/estimate future sales and, thus, determines production requirements.
- Used for finished products or independently sellable materials. Thus, it does not account for dependent requirements (lower-level materials and components of a BOM)
- medium (month) to long-term (years) horizon

##### Sales orders

- Are not part of the material planning process but are accounted for in the determination of the requirements, since sales orders are concrete requirements in the planning process.

##### Demand Management

- management of independent requirements
- Determines which quantities of a finished product (independent requirement) are supposed to be manufactured at what time.
- Independent requirements that are created via demand management can be consumed by concrete sales orders. That is, if you have an independent requirement of 50 Speedstars calculated, based on your forecasts for 15th august, and you receive a sales order from a customer about 25 Speedstars for the 20th august, the independent requirement might be reduced by 25 units. Whether consumption takes place or not depends on the **requirements type** or the **planning strategy** in the material master of Speedstar.
- **Independent requirements** are the finished product requirements created by sales planning or concrete sales orders. For example, if you receive a sales order of 50 Speedstars, an independent requirement of 50 Speedstars is created.
- **Dependent requirements** are item requirements a product consists of. Dependent requirements are determined by bill explosion with reference to the independent requirements. For instance, the basis-module would be created as dependent requirement of a Speedstar sales order.

##### MRP

- The **material requirements planning** runs a **net requirements calculation** to determine material shortage.
- considers stock and fixed receipts as well as safety stock in the calculation
- Result of this comparison is the **quantity available for planning proposes**.

## Manufacturing

- is one step after planning: production orders are processed

## External Procurement

- is another step after planning: purchase requisitions and purchase orders are processed

### 3.3.2 Demand Planning

Demand Planning aims at forecasting future demand.

#### Flexible planning

- provides more flexibility
- more complex set up: you must compose relevant information structures and planning types yourself
- requires a detailed understanding of the structures of the Logistics Information System (LIS)

#### Standard SOP

- Standard process that is installed by default.
- is based on the S076 information structure:
  - o Level-by-level planning where the planning hierarchy levels are independent of one another.
  - o Thus, plans at different levels do not have to be consistent.
- is a simplified variant of flexible planning in which a specific planning process is already defined.
- does not require a detailed knowledge of the settings of the Logistics Information System.

### 3.3.3 Sales and Operations Planning (SOP)

- is a **planning and forecasting** module in SAP LO used to
  - estimate future sales for a product or product group,
  - develop production plans,
  - carry out feasibility checks.
- Example:

You create a **sales plan** using sales data of the Speedstar from the last year and use the integrated forecasting tools to predict future sales by adjusting and updating those historical data.

Then you create a **production plan** based on this sales plan and check the **feasibility** of that production plan by accounting for **key resources** in your production process. For instance, you look at the key process step and the capacities on this work station and if required (not enough capacity on this work station), change the production plan. The **planning table** supports the planning process graphically.

#### Planning Levels in Standard SOP

- You can combine products with similar characteristics to **product groups** (product family). For instance, Speedstar and Speedstarlett were combined in the product group racing bicycle.
- Product groups can contain further product groups. The lowest level of a product group must contain materials.
- Product groups are created in SOP. For each product group, the system automatically creates a material master with the PROD material type.
- Planning at higher product group levels can be disaggregated to the members of the product group.
- The **proportion factor** of a product group states the proportion for disaggregation. That is, if you proportion factor for racing bicycles is 40% Speedstarlett to 60% Speedstar, planning data (e.g., 1000 units) planned for the product group are disaggregated with the same factor to the material level (e.g., 400 Speedstarletts and 600 Speedstars).
- Cross-plant planning is possible in SOP

### Planning using the Standard Planning Table

- **Planning table** is used to create sales and production plans.
- Each member of a **product group hierarchy** has its own planning table. That is, you can access planning on each level of a product group hierarchy (racing bicycle or Speedstar/Speedstarlett).
- Planning table contains one row for
  - **sales plan**
  - **production plan**
  - **stock level**
  - **target stock level**
  - **days' supply**
  - **target days' supply**
- Time periods available in the planning table: days, weeks, months, or a combination of different periods.
- You can use several data sources to create a sales plan:
  - data from **sales information system**
  - data from the **controlling/profitability analysis module (CO/PA)**
  - data from **history to forecast future sales**
  - data from another (similar) **product group**
  - **manual entry**
- The sales plan is used to create the **production plan** by one of the following ways:
  - Taking the data from the **sales plan**.
  - Calculating the production plan due to **target stock level**; that is the quantity that should be available on stock after sales quantities have been satisfied.
  - **target days supply**; opposite to target stock level; the quantity I need each day in my production/processes.
  - **inventory to zero**; reduction of the inventory on-hand balance to zero and then analogously to the sales plan.

- manual entry

### Disaggregation and Transfer to Demand Management

- Sales and production plans are created at one level of the product structure hierarchy, e.g. racing bicycle.
- **Lower level plans**, e.g. for Speedstar and Speedstarlett, **are not created automatically**. You need to disaggregate those plans.
- You can disaggregate the sales plan to any level of the product group hierarchy and then create the production plan.
- Planning data of any product group hierarchy level (e.g., product group A or Material A) can be transferred to demand management.
- Different **planning scenarios** can be developed for each product group structure using a **version number** and a description. By standard the version A00 is the only active version of the planning. However, you also can use an inactive version for planning. You can transfer the active or inactive version to demand management.
- The outcome of the disaggregation is **planned independent requirements**, which are available now in demand management and are used by MRP for further planning.

### 3.3.4 Demand Management

#### The Demand Planning Cycle

The first two steps are carried out in SOP:

1. Historical sales order quantities, market information etc. are used as a basis for the forecast of future demands.
2. **Demand plan** is released as a result of forecasting as the **planned independent requirement**.
3. Those planned independent requirements are the basis for **procurement and production planning**.
4. Consider that planned independent requirements are not concrete requirements for a material (in opposite to real sales orders that induce real requirements). They are merely based on forecasts and estimates. That is, the company thinks that it will sell this quantity in the next time period.
5. Usually (**if not make-to-stock production is the case**), planned independent requirements consume concrete sales orders. Thus, the quantities and occurrence of concrete sales orders are already predicted in the forecast figures in demand management.

#### Demand Management and Demand Program in Material Planning

- Demand Management deals with the administration of **independent requirements**.
- Independent requirements are initiated through the forecast-based planning in SOP or concrete sales orders. Independent requirements do not depend on any other material, e.g. a sales order for Speedstar is an independent requirement, whereas this very sales order creates dependent requirements for basis-module, chain, brakes etc.
- Behavior of independent requirements in MRP depends on the **requirement type** or **planning strategy** of the material (set in material master). Behavior means in this context that e.g. a planned order is created due to a sales requirement (that would be the

case for requirement type PD) or that e.g. a planned order consumes other requirements like concrete sales orders (which would be the case for planning strategy 40).

There are three types of requirements relevant for the Demand Management:

- **Planned independent requirements** are requirements that are produced for warehouses. That is, the production strategy is make-to-stock. Make-to-stock production is always used for mass products e.g. shoes. You produce the products and sell them without waiting for concrete sales orders. Often you have contracts and agreements with wholesalers and fixed delivery periods. Benefits of make-to-stock production are known delivery times and smooth capacity utilization of your production resources by foresighted planning. Make-to-stock planning strategy can be set in material master view MRP 3 (**planning strategy group = 10**). This field then controls the behavior of this material regarding MRP. For instance, make-to-stock planned requirements do not consume sales orders.
- **Sales orders (Customer independent requirements)** can be transferred directly to MRP, independently of their assigned requirements type. That is, if a sales order about 50 Speedstars is created in the SAP SD application, a requirement for Speedstars with quantity 50 is created in demand management. There are three options how the MRP program deals with a sales order based on the planning strategy of the material:
  - 1) Sales order is an exclusive requirement source for which specific procurement or production is initiated (make-to-order production)
  - 2) Sales order creates the total demand together with the planned independent requirements from the forecast planning. That is, if you had 50 Speedstars from your forecast and now you receive a sales order over 25 Speedstars, this will result in 75 Speedstars to be produced.
  - 3) Sales order is consumed by planned independent requirements. That is, if you had 50 Speedstars from your forecast and now you receive a sales order over 25 Speedstars, this will result in 50 Speedstars to be produced. The planned independent requirement is then reduced to 25.
- **Stock transfer requirements** are requirements from other locations in the supply chain (such as distribution centers) and can be included in the demand program along with the independent requirements entered in the production plant.
- **Sales Orders and Stock Transfer Orders vs. Planned Independent Requirements**
  - 1) Sales order management is an element of the logistical component sales and distribution (SAP SD). That means **sales orders** are created in **SD** and are a **requirement in the supplying plant**.
  - 2) **Make-to-stock planning** is managed in a **Distribution Center** or in a **production plant** via **planned independent requirements**. Thus, the planned consumption is forecasted. Due to this planning and forecasting, procurement takes place. Later, if concrete requirements are on hand (e.g., real sales orders), they can ideally be covered from the warehouse.
  - 3) Planned Independent Requirements can be covered by **stock transfers** from other locations in the location network. For this purpose, a purchase requisition is created in the location that requires the stock for procurement from the “de-

livering plant". In return, the delivering plant receives a requirement in the form of a purchase requisition release.

- The output of demand management is the **Demand Program**, which is transferred to and used by MRP to create *planned orders*.

## Planning Strategies

- SAP ERP provides various options for planning the production process based on planned independent requirements. One crucial field in the material master for controlling the behavior of planned independent requirements is the **planning strategy**.
- Following planning strategies are relevant in this course:
  - 1) **make-to-stock production:**
    - Production is based on planning without reference to present sales orders.
    - Production can be carried out **without** concrete **sales orders**.
    - Concrete sales orders can be covered by warehouse stock to shorten delivery times.
    - allows for a smooth capacity utilization independent of current demand.
  - 2) **Assembly planning:**
    - is basically the same as make-to-stock production, but for assemblies (basis-module).
    - Not the finished products themselves are produced to stock, but merely the required assemblies.
    - A concrete **sales order** for a **finished product** can thus be met quickly as only the final assembly needs to be carried out – the assemblies themselves are already available on stock.
  - 3) **Sales-order based production:**
    - is **not planned ahead**.
    - Procurement is only carried out when a **concrete sales order** arrives.
    - Often, sales-order based production is combined with assembly planning to maintain short delivery times.

## Consumption

- aims at flexible and immediate reactions to customer requests and a smooth production flow.
- **Sales orders** consume **planned independent requirements** for finished products from the demand management.
- Procurement and production of all components and assemblies (+final assembly) are initiated by planned independent requirements before the real sales order arrives.
- If the required sales order quantity is higher than the planned independent requirements quantity, a planned order is automatically created in the next MRP run for the unplanned quantity (Thus, sales orders affect requirements).
- Availability checks can be carried out from a sales order using Available-to-Promise functions. That is in the sales order screen you can check prior to creating that sales order, whether the material demanded is available at the particular delivery time.

- **Consumption mode** and **consumption period** in the material master determine if and how sales order requirements **consume** planned independent requirements.

With the consumption mode you determine whether planned independent requirements are consumed through sales orders arriving after or before the planned independent requirement's time. You have the following options:

- **Backward consumption** (consumption mode 1) consumes customer requirements with planned independent requirements lying **before** the customer requirements.
- **Forward consumption** (consumption mode 3) consumes customer requirements with planned independent requirements lying **after** the customer requirements.
- **Combined consumption** (consumption mode 2 or 4)
- **Consumption period** determines the time interval to be considered for the consumption of planned independent requirements.

Example 1:

- You have planned independent requirement for the 15th of August and 15th of July.
- You have forward consumption set (consumption mode 3).
- You have a consumption period of 1 month.
- Now you receive a sales order with the date of 16th of July. This sales order then consumes the planned independent requirement from August.

Example 2:

- You have planned independent requirement for the 15th of August and 15th of July.
- You have combined consumption set (consumption mode 2 and 4).
- You have a consumption period of 1 month.
- Now you receive a sales order with the date of 29th of July. This sales order then consumes the planned independent requirement from **July**, since the July requirement is closer to the sales order date.

### 3.3.5 Material Requirements Planning (MRP)

Material Requirements Planning (MRP) is the last step of the material planning process.

#### MRP Procedures

- The **MRP type** field in material master view MRP 1 determines the MRP procedure (Planning type) for a material
- MRP procedures are for example:
  - o **PD:** classic MRP, where planned independent requirements from SOP/Demand management and sales orders from Sales department induce creation of requirements in the MRP run and, thus, lead to creation of planned orders, requisitions etc. This MRP type also explores the whole BOM structure and creates dependent requirements.
  - o **Consumption-based:** includes the historical consumption values of a material and then forecasts future requirements using statistical methods. Consumption-

based planning is simple and predominantly applied for B and C parts, i.e. for those parts that have a low value.

- **No MRP:** material can also be excluded from MRP

### Consumption-based Planning

- uses historical consumption data of a material and determines future requirements using statistical methods.
- has no reference to the production plan. Thus, the net requirements calculation is not initiated by an independent or dependent requirement.
- Only when stock levels fall below a re-order point (e.g., safety stock) or below the forecasted requirements, an order is triggered.
- Manually entered re-order point controls planning. For instance, if you have entered 50 pc of Chains as reordering point and your stock quantity of chains falls under this quantity (e.g., 45), the system automatically generates a purchase requisition with the amount stated in the lot size (e.g., fixed lot size of 500 pieces).
- Re-order point planning is only reasonable for materials with relatively constant demands that require timely inventory management and that are of low value.

### Net Requirements Calculation

- Net requirements calculation is carried out in the MRP run and determines whether there is a shortage for a particular material that is needed as part for the production of the respective finished product (independent requirement).
- Stock and fixed receipts (orders, production orders, fixed sales orders, and planned orders etc.) are compared to the safety stock and requirements. The result of this comparison is the **quantity available for planning**.
- In case of a calculated material shortage MRP reacts with the creation of new **procurement proposals** (purchase requisition/planned order) or planned orders (for production). The proposed procurement quantity results from the lot-sizing procedure, which is also set in the material master.

### Running MRP

- There are two options when executing the **MRP** run:
  - 1) **total planning (MD01, MDBT):**
    - All materials of one or multiple plants and or MRP areas are planned.
    - multi-level planning
    - User exit can be used to limit the total planning run to those materials fulfilling particular freely definable criteria.
    - Planning can be executed online or as background job.
  - 2) **individual planning:**
    - Only one material is planned.
    - **single level planning (MD03):** Only the header material is planned.
    - **multi-level planning (MD02):** Planning is carried out across all BOM levels of a particular material.
    - **interactive planning (MD43):** Single-level simulative planning, with checking and altering the planning results before saving.

Multi-level planning although accounts for all **dependent requirements**. Dependent requirements (Chain, Basis-Module etc.) are requirements for materials or components used to produce the product (header material = Speedstar). Requirements depending on the header material arise from the explosion of the BOM of the finished product (header material). Dependent requirements depend on the respective planned orders. When a planned order is converted into a production order, dependent requirements of this planned order are converted into **order reservations**.

### MRP Control Parameters

When calling up the planning run (MD02), you need to enter the following parameters for MRP:

- **processing key:** defines the planning type (NEUPL, NETCH, NETPL)
- **Create purchase requisition** and **schedule lines** are only relevant to externally procured materials. Those fields determine, if and when these two characteristics are required as a result of the planning run.
- **MRP lists:** Here you specify if a MRP list should be created.
- **Planning mode:** determine whether
  - already existent planning data should be adjusted
  - BOMs and routings should be explored again
  - delete existing planning data and perform planning from the very beginning
- **MRP group:** Can hold purchase requisitions, schedule lines, and MRP lists indicator for materials assigned to this MRP group. Then you do not need to enter those values, since the settings for materials belonging to that MRP group are planned accordingly in the overall planning run.

### Coverage of the Planning Run

SAP ERP provides several processing types for the MRP run. Therefore, you can enter a processing key in the initial screen of MD01, MDBT, MD02, MD03, and MD43:

- Regenerative planning (NEUPL):
  - only possible in total planning
  - All materials of the planning scope are planned.
  - Commonly used when planning run is carried out for the very first time.
  - Sometimes, in case of technical errors, it is carried out to guarantee data consistency.
  - Problem: needs a lot of computational resources and long run-time
- Net change planning (NETCH):
  - MRP run covers only those materials that have undergone an MRP-relevant change (e.g., due to goods issues, new sales orders, changes to the BOM structure).
  - Allows for carrying out the planning run in relatively brief periods, due to its short run-time.
- Net change planning for planning horizon (NETPL):
  - It is equal to net change planning but limited to a specific time span, e.g. one month.

- System plans only MRP relevant changes in this planning horizon.
- Planning horizon is set in customizing for MRP as plant or MRP group parameter. The length of the planning horizon should be at least a time span, in which sales orders are usually received (e.g., 30 days). Moreover, delivery times and total lead times for the materials should be considered.

### Results of Material Requirements Planning

- When executing the MRP run, the system looks for shortfalls of materials and, if needed, creates **procurement proposals** and planned orders.
- Procurement proposals are created as **planned orders** or **purchase requisitions** (e.g., for trading goods, procurement type F or X) or **planned orders** (e.g., for finished goods, procurement type E or X)
- Planned orders and purchase requisitions can be changed, rescheduled, or deleted at any time manually.

Thus, you differentiate between

- **In-house production** (indicator E in material master): The system creates **planned orders** for planning production quantities. After you finished the planning you can convert those planned orders into production orders or used directly for repetitive manufacturing.
- **External procurement** (indicator F in material master): The system creates either a **planned order** or a direct **purchase requisition** to plan the external procurement quantity. After you finished the planning you can convert planned orders into a purchase requisition and later, convert the purchase requisition into a purchase order. Whether planned orders or purchase requisitions are created can be set in the initial screen of the planning run in transaction MD02.
- In case a **scheduling agreement** is existent for a material that is MRP relevant in the **source list**, you can also directly create schedule lines in MRP. You can control this by using the creation icon for schedule lines in the initial screen of the planning run.

### Planned Orders and Production Orders

- **Planned orders** are used to plan materials that are produced in **in-house production**.
- Planned orders contain the basic data for manufacturing and information about the components required for production (dependent requirements).
- Capacity requirements planning can be carried out based on planned orders.
- Planned orders are converted into a **production order (or process order)** for manufacturing.

### Purchase Requisitions and Purchase Orders

- **Purchase requisitions** or **purchase orders** are used for planning external procurement of a material.
- If purchase requisitions are created first, they need to be converted into purchase orders. In this conversion step source of supply (vendor) is assigned to the purchase requisition.
- You can also perform planning directly using scheduling agreement releases.

## Evaluation of Material Requirements Planning

There are two types of lists generated after the MRP run is finished:

- **Stock/requirements list (MD04):**
  - Dynamic list containing the current status of stock, requirements, and receipts.
  - All changes to stock and requirements are displayed immediately in the stock/requirements list as soon as the current list is called up or information is updated from the database by using the “refresh” function.
- **MRP list (MD05):**
  - Static list displaying the result of the last planning run (MRP).
  - Changes carried out after the planning run, such as changes to the BOM that affect e.g. dependent requirements, are not visible. Only when a new planning run (MD02) is executed, changes are displayed in the MRP list.

The basic structure of both lists is the same:

- On the left hand side there is the work list for the MRP controller in form of a tree.
- Above the list, there is the header with the material number. Moreover, you can display further information using the header details.
- The list itself contains the individual MRP items and the correspondingly available quantities.
- User-specific settings allow for the adjustment of the lists to personal requirements; these apply to both lists. Via a customer exit, you can display additional data that can be called up using a function key.

MRP list and the current stock/requirements list offers several display options:

- You can display various dates (the availability date or the goods receipt date, with/without safety time).
- You can use display filters and selection rules, work in the period totals display and so on.
- You can define the display accordingly in your personal settings.
- You can display "Period Totals" that groups the planning results into periodic buckets.
- You can analyze the capacity situation on work centers from the current stock/requirements list: Available capacity, the total capacity requirements and the capacity requirements of the current material for each work center and capacity category. Overload situations are highlighted in color.
- Note that planned orders that have not been scheduled using detailed scheduling do not generate capacity requirements.

## 4 Data Sheet

Congratulations! You completed the **material planning** case study.

The subsequent case studies are based on the results of this case study. In case your data differs from the description in the script, please contact your tutor prior to processing another case study.

Finally, please **submit the carefully completed data sheet** to your tutor (use support email address) for the case study **material planning**.

Please comply with the naming rules. Non-compliant data sheets will not be accepted; i.e. rename the document that you downloaded from this course's download area as follows:

**02-materialplanning-xxyy-zzz-surname.doc**

Thereby, you need to replace **xxyy** with your user number **without** the “**WIP**“ and without the hyphen (WIP-xx-yy) and replace **zzz** with the number of the client you are working on.

Example:

Your name is **Max Mustermann**, you are working on **client 901**, and your **user number is WIP-99-99**. Then, name the document as follows:

**02-materialplanning-9999-901-Mustermann.doc**

## 5 Reflexion



Test your knowledge. In this section you are confronted with some question regarding the theoretical chapters of this teaching unit. Try to answer the questions on your own before taking a look at the standard solutions.

### 5.1 Questions

#### Comprehension Questions

1. A product group supports the planning process by grouping products according to \_\_\_\_\_
2. What happens if material planning identifies material shortages?  
\_\_\_\_\_
3. Which options are available when executing MRP run?  
\_\_\_\_\_
4. What is the difference between processing a regenerative MRP run and a net change MRP run?  
\_\_\_\_\_
5. What are the three processing keys for MRP?
6. What is the outcome of MRP?
7. The \_\_\_\_\_ groups together products of similar characteristics?

#### True/False Questions

8. Generally, consumption-based planning is exclusively based on historic consumption of a material.
9. All BOMs are created and maintained as single-level bills.
10. Basic data in the material master are applicable to the entire company and are stored on plant-level.
11. While processing material planning, the quantity of a planned order is determined by the material costs.

### **Multiple Choice Questions**

12. All manufacturing organizational elements exist in which of the following?

(1 correct answer)

- a. Plant
- b. Client
- c. Company Code
- d. Storage Location

13. Which of the following statements about Bill of Materials are true?

(2 correct answer)

- a. BOMs are used for MRP, Production and Procurement.
- b. The base quantity in the BOM header specifies the component quantities used to produce the finished good.
- c. A Bill of Material may contain other Bills of Material
- d. A BOM consists of a BOM Header, BOM Items and Schedule Items

14. Which of the following are examples of BOM Item Categories?

(3 correct answer)

- a. Stock Item
- b. Finished Goods Item
- c. Non-Stock Item
- d. Document Item
- e. Trading Goods Item

15. What can be used to create a Sales Operation Plan (SOP)?

(3 correct answer)

- a. Data transferred from SIS
- b. Data transferred from CO/PA
- c. Data entered Manually
- d. Data transferred from Purchasing

16. Which of the following about Demand Planning are correct?

(2 correct answer)

- a. Planned Independent Requirements are created from Sales Orders
- b. Customer Independent Requirements are created from Sales and Distribution
- c. The Planning Strategy on the Material Master represents a procedure for planning a material
- d. Planned Materials can only be produced In-House.

17. Net requirements calculation uses data from which modules?

(2 correct answer)

- a. Human Resources
- b. Warehouse Management
- c. Quality Management
- d. Material Management
- e. Sales and Distribution

18. Different planning level in Materials Planning include?

(4 correct answers)

- a. CO-PA (Global)
- b. SOP (Product Group)
- c. MPS (Material)
- d. MRP (Assembly)
- e. Sales Order
- f. Manufacturing

19. Which of the following are different ways in which you can plan?

(2 correct answers)

- a. Consumption based (Re-order point)
- b. MRP
- c. MM
- d. PP

20. What kind of master data records are used in Material Planning?

(3 correct answers)

- a. Material Master (views: MRP1, 2, 3, 4 and work scheduling)
- b. PRT
- c. Routing
- d. Bill of Material
- e. Work Center

21. Which of the following is true for Production Planning Organization units?

(1 correct answer)

- a. 1 plant to many company codes
- b. 2 plants to 1 company code
- c. 1 plant to 1 controlling area
- d. 1 plant to more than 1 operating concern

22. Net requirements calculation uses data from

(1 correct answer)

- a. WM
- b. HR
- c. SD
- d. QM

## 5.2 Standard Solution

### Comprehension Questions

1. A product group supports the planning process by grouping products according to **planning characteristics**.

2. What happens if material planning identifies material shortages?

*Procurement proposals are created; purchase requisitions and planned orders are internal planning elements that can be changed, re-scheduled, or deleted at any time.*

*For in-house production, the system creates planned orders for planning production quantities. When planning is completed, planned orders are converted into production or process orders.*

*For external procurement, the system creates either a planned order or directly a purchase requisition for planning external procurement quantities. When planning is completed, a planned order is converted into a purchase requisition and later, the purchase requisition is converted into a purchase order (purchasing).*

3. Which options are available when executing MRP run?

- **Single-item planning (single-level, multi-level, or interactive)**
- **Total planning online**
- **Total planning in the background**

4. What is the difference between processing a regenerative MRP run and a net change MRP run?

*In regenerative planning, all materials are planned. In change planning, only materials are planned for which a change regarding material planning occurred.*

5. What are the three processing keys for MRP?

**Answers:** **Regenerative**

**Net Change – Total Horizon**

**Net Change – Planning Horizon**

6. What is the outcome of MRP?

**Answers:** **Procurement proposals**

**Planned order / purchase requisition**

7. The **Product Group** groups together products of similar characteristics?

### True/False Questions

8. Generally, consumption-based planning is exclusively based on historic consumption of a material.

**True. In contrast to MRP, consumption-based planning is based on material consumption. External requirements such as sales orders, planned independent requirements, reservations, etc., are usually not relevant to planning.**

9. All BOM are created and maintained as single-level bills.

**True!**

10. Basic data in the material master are applicable to the entire company and are stored on plant-level.

**False! Basic data in the material master are valid for the entire company, but they are stored on client-level. Basic data contain material number, material group, the unit of measure, and conversion rates for other units of measure.**

11. While processing material planning, the quantity of a planned order is determined by the material costs.

**False! The quantity of a planned order is based on the lot-size key defined in the material master record.**

### Multiple Choice Questions

12. All manufacturing organizational elements exist in which of the following?

(1 correct answer)

- a. Plant
- b. Client
- c. Company Code
- d. Storage Location

**Answer: b**

13. Which of the following statements about Bills of Materials are true?

(2 correct answer)

- a. BOMs are used for MRP, Production and Procurement.
- b. The base quantity in the BOM header specifies the component quantities used to produce the finished good.
- c. A Bill of Material may contain other Bills of Material
- d. A BOM consists of a BOM Header, BOM Items and Schedule Items

**Answers: a, c**

14. Which of the following are examples of BOM Item Categories?

(3 correct answer)

- a. Stock Item
- b. Finished Goods Item
- c. Non-Stock Item
- d. Document Item
- e. Trading Goods Item

**Answers: a, c, d**

15. What can be used to create a Sales Operation Plan (SOP)?

(3 correct answer)

- a. Data transferred from SIS
- b. Data transferred from CO/PA
- c. Data entered Manually
- d. Data transferred from Purchasing

**Answers: a, b, c**

16. Which of the following about Demand Planning is correct?

(2 correct answer)

- a. Planned Independent Requirements are created from Sales Orders
- b. Customer Independent Requirements are created from Sales and Distribution
- c. The Planning Strategy on the Material Master represents a procedure for planning a material
- d. Planned Materials can only be produced In-House.

**Answers: b, c**

17. Net requirements calculation uses data from which modules?

(2 correct answer)

- a. Human Resources
- b. Warehouse Management
- c. Quality Management
- d. Material Management
- e. Sales and Distribution

**Answers: d, e**

18. Different planning level in Materials Planning include...?

(4 correct answers)

- a. CO-PA (Global)
- b. SOP (Product Group)
- c. MPS (Material)
- d. MRP (Assembly)
- e. Sales Order
- f. Manufacturing

**Answers: a, b, c, d**

19. Which of the following are different ways in which you can plan?

(2 correct answers)

- a. Consumption based (Re-order point)
- b. MRP
- c. MM
- d. PP

**Answers: a, b**

20. What kind of master data records are used in Material Planning?

(3 correct answers)

- a. Material Master (views: MRP1, 2, 3, 4 and work scheduling)
- b. PRT
- c. Routing
- d. Bill of Material
- e. Work Center

**Answers: a, c, d**

21. Which of the following is true for Production Planning Organization units?

(1 correct answer)

- a. 1 plant to many company codes
- b. 2 plants to 1 company code
- c. 1 plant to 1 controlling area
- d. 1 plant to more than 1 operating concern

**Answer: b**

22. Net requirements calculation uses data from

(1 correct answer)

- a. WM
- b. HR
- c. SD
- d. QM

**Answer: c**