

MRP

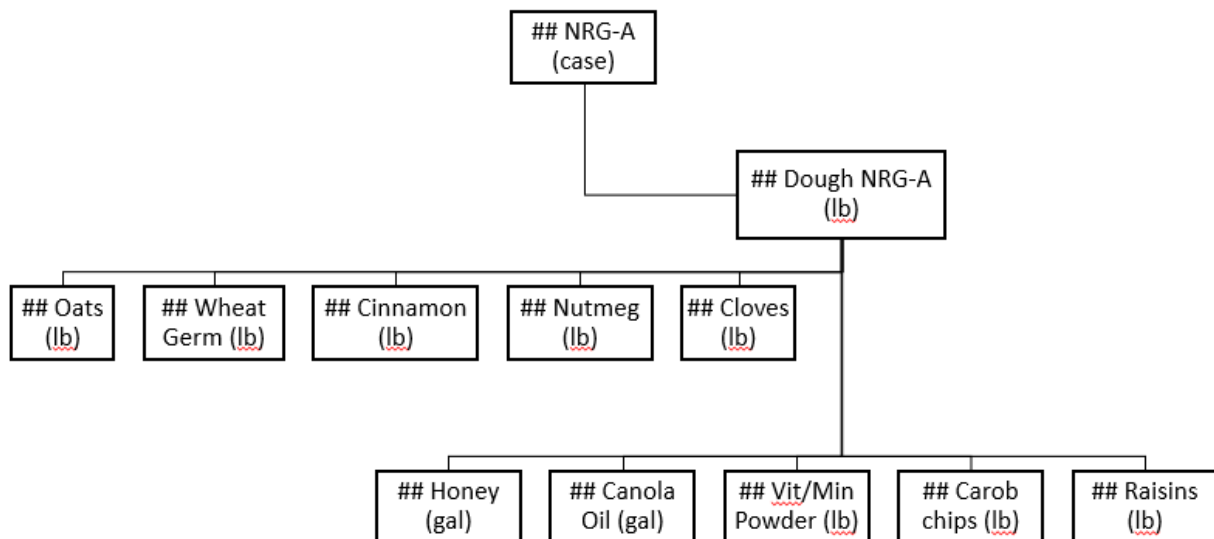
Exercise Introduction

Material resource planning is intended for 3 objectives:

- Ensure materials are available for production and products are available for delivery to customers.
- Maintain the lowest possible material and product levels in store to achieve LEAN processes.
- Plan manufacturing activities, delivery schedules and purchasing activities.

Bill of Material (BOM)

A critical input to the MRP process is the bill of material (BOM), which shows how components and semi-finished products are combined to produce the final product. A graphical representation of the BOM for the NRG-A bar is shown below:



The raw materials (Oats, Wheat Germ, etc.) are combined in a mixer to produce a 500 lb. batch of dough. The dough is then transferred to the baking line, where it is formed into bars, baked and packaged. For simplicity, we have ignored the wrappers, boxes and cases that are needed to produce a complete case of Fitter Snacker bars.

To view the BOMs for Fitter Snacker, follow the menu path:

Logistics > Production > Master Data > Bills of Material > Reporting > BOM Explosion > Material BOM > Multilevel BOM

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Material BOM Edit Goto Extras Settings Environment System Help

Explode BOM: Multi-Level BOM: Initial Screen

Material: 00F100
 Plant: 00PT
 Alternative BOM: ☐
 BOM Application: PP01

Selection
 Valid From: 07/31/2008
 Change Number:
 Required qty:

Enter ##F100 for Material, ##PT for Plant and PP01 for BOM Application, then click on the execute (⏏) icon

Material BOM Edit Goto Extras Settings Environment System Help

Display Multilevel BOM

Material: 00F100
 Plant/Usage/Alt.: 00PT / 1 / 01
 Description: 00 NRG-A
 Base Qty (CS): 7.000
 Reqd Qty (CS): 7

Level no.	Item	Qty	Component	Description	Unit	Reqd Qty	Unit	Unit
..1	0010		00S200					
..2	0010		00R380					
..2	0020		00R420	00 Wheat Germ		50	LB	L
..2	0030		00R320	00 Cinnamon		5	LB	L
..2	0040		00R370	00 Nutmeg		2	LB	L
..2	0050		00R330	00 Cloves		1	LB	L
..2	0060		00R360	00 Honey		10	GAL	L
..2	0070		00R300	00 Canola		7	GAL	L
..2	0080		00R410	00 Vit/Min Powder		5	LB	L
..2	0090		00R310	00 Carob Chips		50	LB	L
..2	0100		00R400	00 Raisins		50	LB	L

This screen shows 7 cases of snack bars requires 500 lbs. of dough, and that to produce 500 lbs. of dough, 300 lbs. of Oats, 50 lbs. of Wheat Germ, etc. are required

This screen shows the recipe required for seven cases of dough. To learn more about any of the materials required to make an NRG-A bar, select the item and click on the detail icon.

With the nutmeg selected, click on the where-used icon (⏏), which will call up the following screen:

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Lv	U	Plant	Ob	Component number	Alt	Item	R	Required quantity	Un	R	Resulting qty	B...
1	1	00PT		00S200		0040		2.000	LB		500.000	LB
1	1	00PT		00S210		0040		2.000	LB		500.000	LB

This screen shows that Nutmeg is used in two products—the dough for NRG-A and NRG-B bars. (You can double click on each line to view the products.) According to help.sap.com, the where-used list can be used to:

- Determine requirements for a specific material
- Select products that are affected by a change to an individual part
- Find assemblies that will be delayed if, for example, there is a delay in the delivery of a raw material
- Calculate the effect on the cost of a product if the price of a raw material rises

Click on the exit icon (🏠) until you return to the SAP Easy Access screen.

Display Workcenters

Production is carried out at workcenters. In the SAP ERP system, workcenters can represent machines or groups of machines, production lines, assembly lines, employees or groups of employees.

To display the workcenters used for Fitter Snacker's snack bar production, follow the menu path:

Logistics > Production > Master Data > Work Centers > Work Center > Display

Work center Edit Goto Extras System Help

Display Work Center: Initial Screen

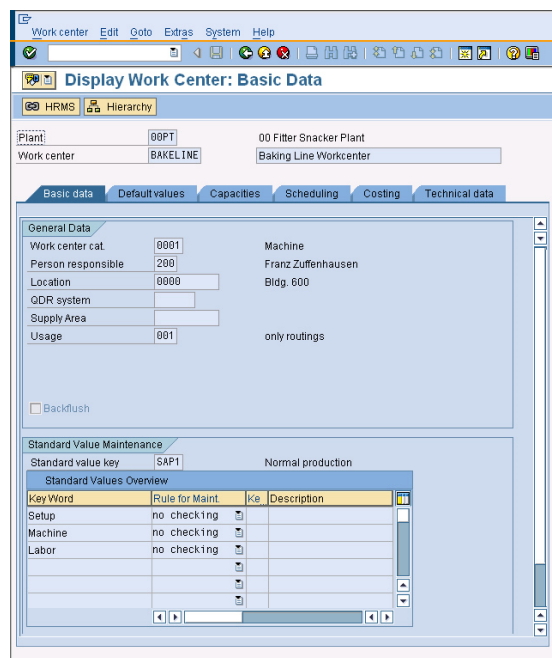
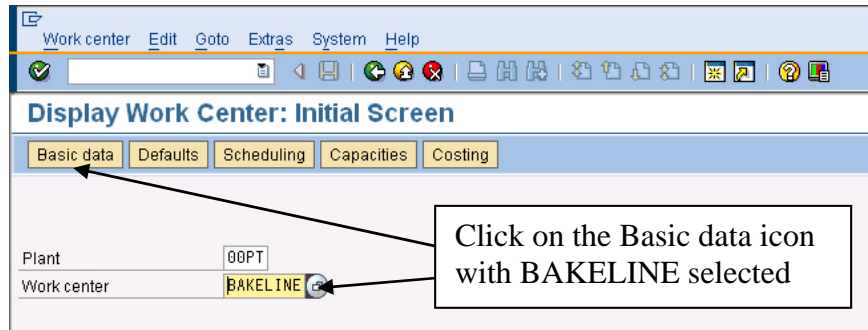
Basic data Defaults Scheduling Capacities Costing

Plant 00PT

Work center

Enter **##PT** for plant, then click on the **Work center** field, and click on the search icon and search for BAKELINE using **##PT** as filter criterion OR type BAKELINE directly

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This multi-tabbed screen contains all relevant data for the workcenter.
Click on the exit icon (🏠) until you return to the SAP Easy Access screen.

Routings

Routings define the work centers that a product must visit in the production process. Routings also define the operations that must be performed at each workcenter and the components that are needed for each operation.

1. Create ##F100 (NRG-A bar) and ##F110 (NRG-B bar) Routings

To create a routing for the NRG-A bars, follow the menu path:

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Logistics ▷ Production ▷ Master Data ▷ Routings ▷ Routings ▷ Standard Routings
▷ Create

Routing Edit Goto Details Extras Environment System Help

Create Routing: Initial Screen

Copy from Routings Sequences Operations

Material 00F100

Plant 00PT

Sales Document Sales Document Item

WBS Element

Group 00GROUP

Validity

Change Number

Key date 08/01/2008

Revision Level

Additional data

Profile

Enter ##F100 for material, ##PT for plant and ##Group for Group, then click on the enter icon

Routing Edit Goto Details Extras Environment System Help

Create Routing: Header Details

Routings MatAssignment Sequences Operations CompAlloc

Material 00F100 00 NRG-A

Task list

Group 00GROUP

Group Counter 1

Plant 00PT

Production line

Line hierarchy

General data

Deletion flag

Usage 1

Status 4

Planner group

Planning work center

CAPP order

From Lot Size

Old task list no.

Enter 1 for Usage and 4 for Status, then click on the Operations icon

Routing Edit Goto Details Extras Environment System Help

Create Routing: Operation Overview

Work center CompAlloc Sequences PRT Inspection Characteristics

Material 00F100 00 NRG-A

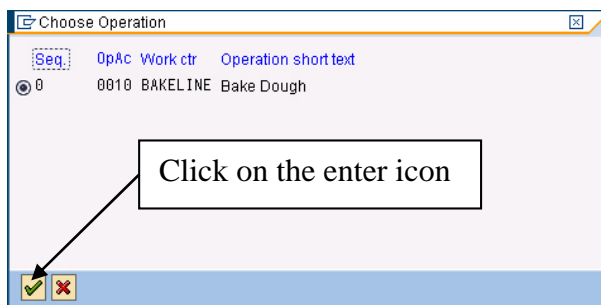
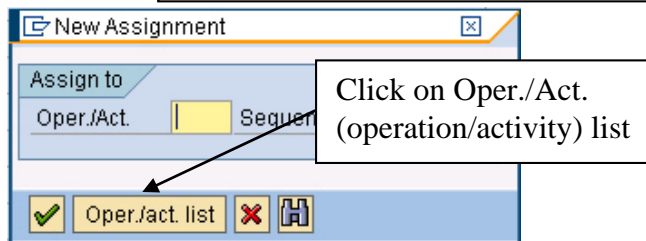
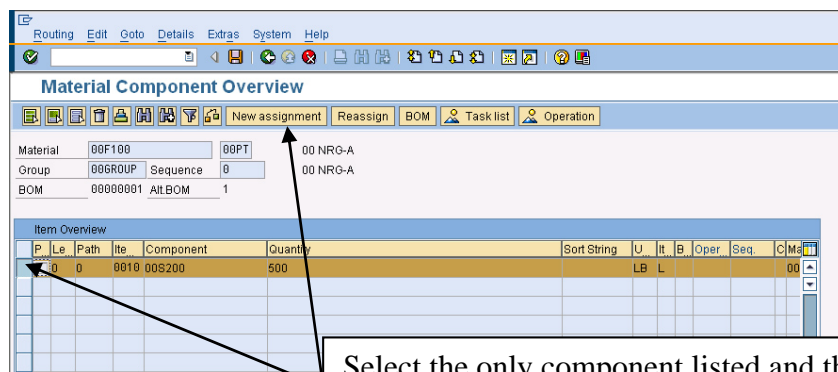
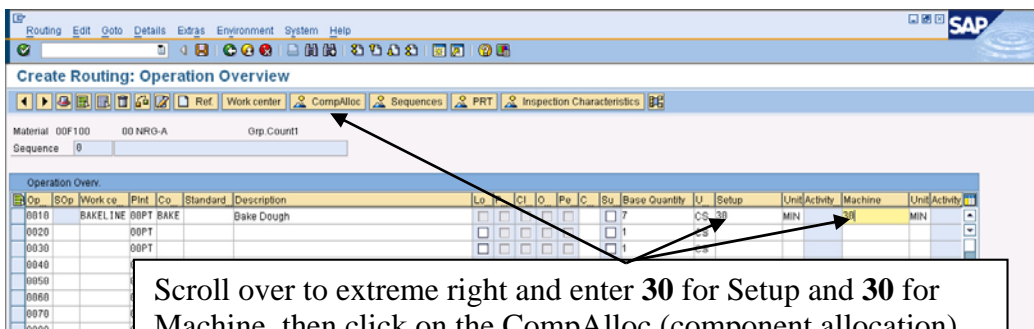
Sequence 0

Operation Overv.

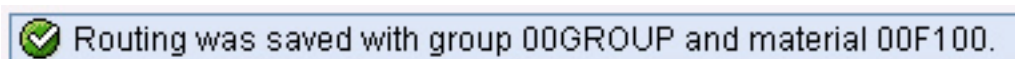
Op	SOp	Work ce	Plant	Co	Standard	Description	Lo	P	Cl	O	Pe	C	Su	Base Quantity	U	StdValuTxd1	UnitActivity	UnitActivity
0010		BAKELINE	00PT	BAKE		Bake Dough								7	CS			
0020			00PT											1	CS			
0030			00PT											1	CS			

Enter BAKELINE for Work center
Enter BAKE for Control key
Enter Bake Dough for Description
Enter 7 for Base Quantity
Then click on the enter icon

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Click on the save icon (💾) to save the routing. You will get a message like the following:



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Return to the beginning of section 1 and repeat the process to create a routing for material **##F110** (NRG-B bars). All entries are the same as for the **##F100** (NRG-A bars).

2. Create Routings for material **##S200** (dough for NRG-A bars) and **##S210** (dough for NRG-B bars)

To create a routing for **##S200** (dough for NRG-A bars), again follow the menu path:

Logistics ▷ **Production** ▷ **Master Data** ▷ **Routings** ▷ **Routings** ▷ **Standard Routings** ▷ **Create**

Routing Edit Goto Details Extras Environment System Help

Create Routing: Initial Screen

Copy from Routings Sequences Operations

Material 00S200
Plant 00PT
Sales Document
Sales Document Item
WBS Element
Group 00GROUP
Validity
Change Number
Key date 08/01/2008
Revision Level
Additional data
Profile

Enter ##S200 for material, ##PT for plant and ##Group for Group, then click on the enter icon

Routing Edit Goto Details Extras Environment System Help

Create Routing: Header Details

Routings MatlAssignment Sequences Operations CompAlloc

Material 00S200 00 Dough NRG-A
Task list
Group 00GROUP
Group Counter 3 00 Dough NRG-A
Plant 00PT
Production line
Line hierarchy
General data
Deletion flag
Usage 1
Status 4
Planner group

Enter 1 for Usage and 4 for Status, then click on the Operations icon

MRP

Routing Edit Goto Details Extras Environment System Help

Create Routing: Operation Overview

Material 00S200 Sequence 0

Enter the information shown, then click on the enter icon (✓)

Op	SOp	Work	Plnt	Mo	Standard	Description	Lo	P	Cl	O	Pe	C	Su	Base Quantity	U	StdVs
0010		MIXERS	00PT	MIX		Mix Dough								500	LB	
0020			00PT											1	LB	
0030			00PT											1	LB	

Routing Edit Goto Details Extras Environment System Help

Create Routing: Operation Overview

Material 00S200 00 Dough NRG-A Grp.Count3 Sequence 0

Scroll over to the right and enter 30 for Setup and 30 for Machine, then click on CompAlloc

Op	SOp	Lo	P	Cl	O	Pe	C	Su	Base quantity	U	Setup	Unit Activity	Machine	Unit Activity	Labor	Unit Activity
0010									500	LB	30	MIN	30	MIN		
0020									1	LB						
0030									1	LB						

Routing Edit Goto Details Extras System Help

Material Component Overview

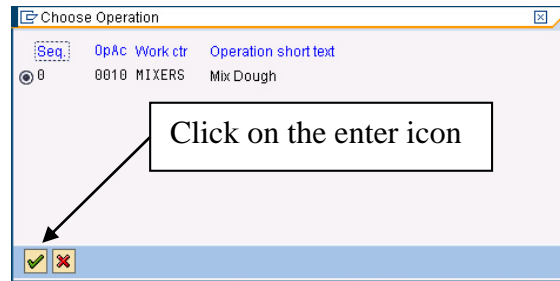
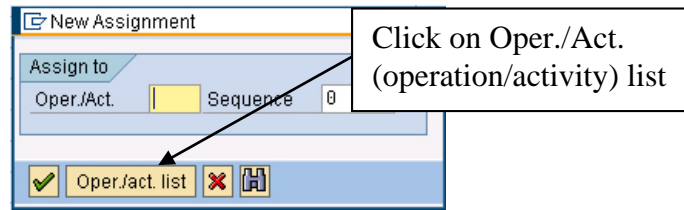
Material 00S200 00PT 00 Dough NRG-A
Group 006R0UP Sequence 0 00 Dough NRG-A
BOM 00000001 AILBOM 1

New assignment Reassign BOM Task list Operation

Select all components, then click on the New assignment icon

P	Le	Path	Itc	Component	C	M	U	Q
0	0	0010	00R380					00
0	0	0020	00R420					00
0	0	0030	00R320					00
0	0	0040	00R370					00
0	0	0050	00R330					00
0	0	0060	00R360					00
0	0	0070	00R300					00
0	0	0080	00R410					00
0	0	0090	00R310					00
0	0	0100	00R400					00

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Click on the save icon (floppy disk) to save the routing. You will get a message like the following:

✓ Routing was saved with group 00GROUP and material 00S200.

Return to the beginning of section 2 and repeat the process to create a routing for **##S210** (dough for NRG-B bars).
All entries are the same as for **##S200** (dough for NRG-A bars).

3. Create Product Group

Many firms produce hundreds of products, and planning for each product individually is not feasible or desirable. What these firms do is create product groups, and then plan production for a small number of product groups and then transfer these plans to individual products based on historic percentages. While Fitter Snacker does not have a large number of products, we will use the product group process anyway.

To create a product group for Fitter Snacker, follow the menu path:

Logistics ▷ Production ▷ SOP ▷ Product Group ▷ Create

which will produce the following screen:

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Create Product Group: Initial Screen

Product group: 00 NRG Group 00 NRG-Aand NRG-B Bars

Plant: 00PT

Base Unit: CS

Members:

- ☒ Materials
- ☐ Product groups

Enter **## NRG Group** and **## NRG-A and NRG-B Bars**
 Enter **##PT** for Plant
 Enter **CS** for Base unit
 Then click on the enter icon

Create Product Group: Maintain Members (Materials)

Product group: 00 NRG GROUP 00 NRG-Aand NRG-B Bars

Plant: 00PT 00 Fitter Snacker Plant

Base Unit: CS

Member number	Plnt	Unit conv. Short Text	Aggr. fact.	Proportion	UoM	V	M	Fx	MTyp
00F100	00PT		1	70					
00F110	00PT		1	30					

Enter **##F100** and **##F110** for member numbers
 Enter **##PT** for Plnt, **1** for Aggr. fact. for both bars
 Enter **70** for the Proportion for **NRG-A** and **30** for the proportion for **NRG-B** bars

These proportions mean that whatever production is planned for the NRG group, it will be assumed that 70% of the production should be NRG-A bars and 30% should be NRG-B bars. Click on the enter icon (✓) to confirm that you have the correct products in the group:

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Product groups Edit Goto Extras System Help

Create Product Group: Maintain Members (Materials)

Hierarchy graphic Versions... Master data... Product grp. graphic

Product group 00 NRG GROUP 00 NRG-Aand NRG-B Bars

Plant 00PT 00 Fitter Snacker Plant

Base Unit CS

Member number PInt Unit conv. Short Text

Member number	PInt	Unit conv.	Short Text	CS	FERT
00F100	00PT	1	00 NRG-A	<input checked="" type="checkbox"/>	<input type="checkbox"/>
00F110	00PT	1	00 NRG-B	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Confirm the two products are the NRG-A and NRG-B bars

Click on the save icon (💾) to save the product group.

4. Run MRP

We can run the MRP process on our new product group. To do this, follow the menu path:

Logistics ▷ Production ▷ MRP ▷ Planning ▷ Multilevel Single-Item Planning (MD02)

Planning Edit Goto Settings Extras System Help

Single-Item, Multi-Level

Material 00 NRG Group

Plant 00PT

Scope of planning

☒ Product group

MRP control parameters

Processing key NETCH

Create purchase req. 2

Delivery schedules 3

Create MRP list 1

Planning mode 1

Scheduling 1

Process control parameters

☐ Also plan unchanged components

☐ Display results before they are saved

☐ Display material list

☐ Simulation mode

Enter (or search for) ## NRG GROUP for Material

Enter ##PT for Plant

Check **Product group** for Scope of planning

Confirm the following MRP control parameters:

Processing key: **NETCH**

Create purchase req.: **2**

Delivery schedules: **3**

Create MRP list: **1**

Planning mode: **1**

Scheduling: **1**

MRP

Stock/Requirements List: Initial Screen

Individual access **Collective access**

Plant: 00PT 00 Fitter Snacker Plant

Selection by:

- ☒ MRP controller
- ☐ Product group
- ☐ Vendor
- ☐ Production line
- ☐ Class

Class Type:

000

Click on the **Collective access** tab.
Enter **##PT** for Plant and **0##** for MRP controller, then click on the enter icon

Stock/Requirements List: Material List

Selected stock/requirements lists Define traffic light Exception groups

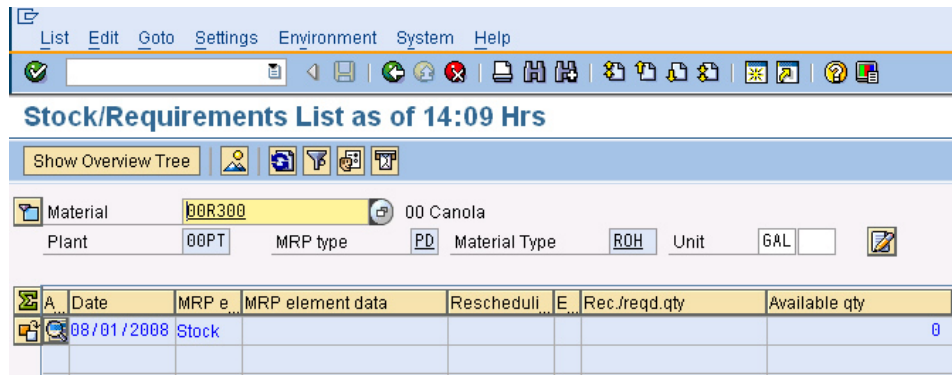
Plant: 00PT 00 Fitter Snacker Plant

MRP Controller: 000 FS Controller

Light	Material	Material Description	A...	Supply	1stRDS	2nd	1	2	3	4	5	6	7	8	Plant sto	B...	MTyp	PT	S...	A...	MT	Cde	C
00	00F100	00 NRG-A		999.9	999.9	999.9									0	CS	FERT	E			PD	000	✓
00	00F110	00 NRG-B		999.9	999.9	999.9									1,000	CS	FERT	E			PD	000	✓
00	00R300	00 Canola		999.9	999.9	999.9									0	GAL	ROH	F			PD	002	✓
00	00R310	00 Carob Chips		999.9	999.9	999.9									0	LB	ROH	F			PD	002	✓
00	00R320	00 Cinnamon																				002	✓
00	00R330	00 Cloves																				002	✓
00	00R340	00 Dates																				002	✓
00	00R350	00 Hazelnuts																				002	✓
00	00R360	00 Honey		999.9	999.9	999.9									0	GAL	ROH	F			PD	002	✓
00	00R370	00 Nutmeg		999.9	999.9	999.9									0	LB	ROH	F			PD	002	✓
00	00R380	00 Oats		999.9	999.9	999.9							3		44,000	LB	ROH	F			PD	002	✓
00	00R390	00 Protein Powder		999.9	999.9	999.9									0	LB	ROH	F			PD	002	✓
00	00R400	00 Raisins		999.9	999.9	999.9									0	LB	ROH	F			PD	002	✓
00	00R410	00 Vit/Min Powder		999.9	999.9	999.9									0	LB	ROH	F			PD	002	✓
00	00R420	00 Wheat Germ		999.9	999.9	999.9							3		2,000	LB	ROH	F			PD	002	✓
00	00S200	00 Dough NRG-A		999.9	999.9	999.9									0	LB	HALB	E			PD	001	✓
00	00S210	00 Dough NRG-B		999.9	999.9	999.9									0	LB	HALB	E			PD	001	✓

Select **## Canola** and then click on the Display Selected stock/requirements lists icon

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Click on the back icon, which will bring you back to the list of your materials. Note that there is now a check mark next to ## **Canola** in the column **Already accessed**:

Light	Material	Material Description	A...	Supp	Already accessed			
	00F100	00 NRG-A	<input type="checkbox"/>	999.9	999.9	999.9		
	00F110	00 NRG-B	<input type="checkbox"/>	999.9	999.9	999.9		
	00R300	00 Canola	<input checked="" type="checkbox"/>	999.9	999.9	999.9		
	00R310	00 Carob Chips	<input type="checkbox"/>	999.9	999.9	999.9		
	00R320	00 Cinnamon	<input type="checkbox"/>	999.9	999.9	999.9		
	00R330	00 Cloves	<input type="checkbox"/>	999.9	999.9	999.9		

This feature helps the MRP controller keep track of which materials they have already reviewed. The traffic lights also help the MRP controller focus on critical materials. The traffic light concept is used in many areas of the SAP system to help the user prioritize tasks. In our case, the materials with a red traffic light have a non-zero safety stock specified. As there have been no goods receipts for these materials, they are below their safety stock levels and, hence, the red lights.

It is possible to customize the traffic lights.

Click on the Define traffic lights icon (), which will produce the following:

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Define Traffic Light

Define traffic light depending on ranges of coverage

Field	Value	Light 1	Light 2	Light 3	Light 4
Days' supply	<= 1.1 -	Red	Yellow	Green	Green
1st rcpt days'supply	<= 0.1 -	Red	Yellow	Green	Green
2nd rcpt days'supply	<= 0.1 -	Red	Yellow	Green	Green

Define traffic light depending on exception groups

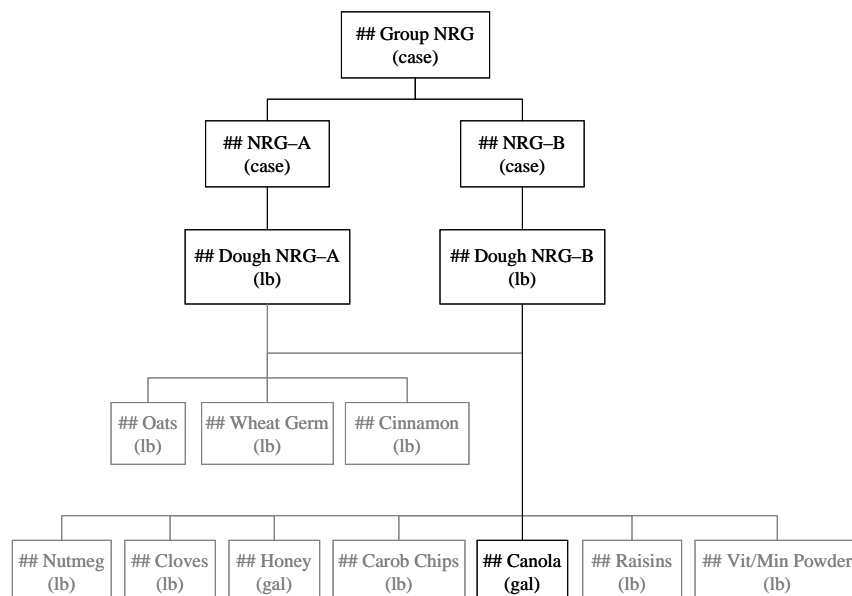
Exception Group	Light 1	Light 2	Light 3	Light 4
1 New; opening date in the past	Red	Yellow	Green	Green
2 New; start date in the past	Red	Yellow	Green	Green
3 New; finish date in the past	Red	Yellow	Green	Green
4 General messages	Red	Yellow	Green	Green
5 Exception during BOM explosion	Red	Yellow	Green	Green
6 Exception during availability	Red	Yellow	Green	Green
7 Exception during rescheduling	Red	Yellow	Green	Green
8 Terminations	Red	Yellow	Green	Green

Basic Setting Exception groups

This screen shows that the SAP system provides the user with a great deal of flexibility in how to configure the traffic light system for issuing warnings as required. Click on the cancel icon (✖) to close this window.

We will keep the Stock/Requirements list open so that we can easily review the results of the MRP process. We will use the following materials to evaluate the MRP process (see figure below):

- ## NRG-A
- ## NRG-B
- ## Dough NRG-A
- ## Dough NRG-B
- ## Canola



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At this point, the Stock/Requirements list for these materials is pretty boring as there is no production scheduled.

5. Create Sales and Operations Plan

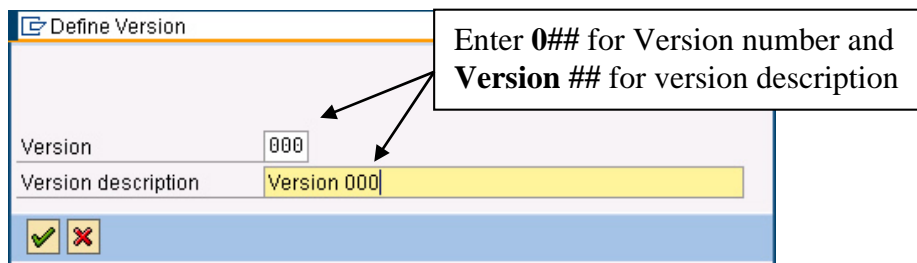
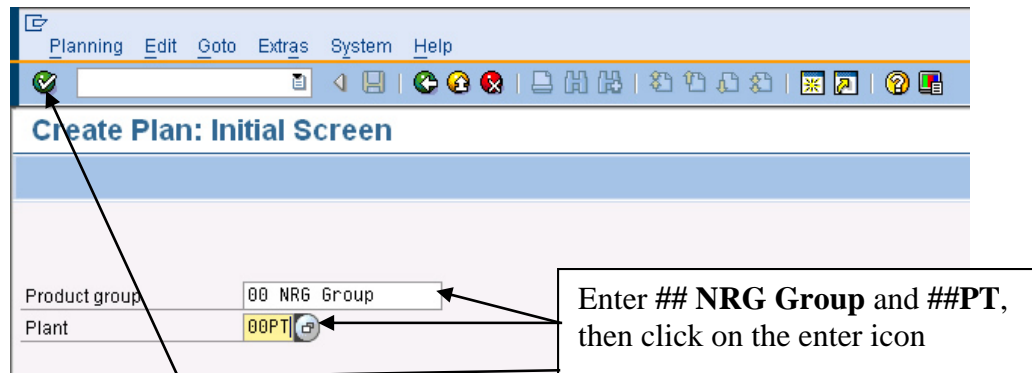
In SAP, the Sales and Operations Planning process is one way to create demand for the MRP process. In practice, Sales and Operations Planning is the process where operations and marketing agree on a demand forecast and a production plan to meet that demand. Ideally, this Sales and Operations Plan should optimize profit for the organization.

To perform Sales and Operations Planning, open a second session by following the pull-down menu path:

System→Create session

In this second session, follow the menu path:

Logistics ▷Production ▷SOP ▷Planning ▷For Product Group ▷Create (MC81)



Click on the enter icon (✓), then the following screen will appear:

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Create Rough-Cut Plan

Product group: 00 NRG GROUP NRG-A and NRG-B Group
 Plant: 00PT
 Version: 000 Version 000 New, inactive

SOP: plan individual product group

Planning table	Un	M 08/2008	M 09/2008	M 10/2008	M 11/2008	M 12/2008	M 01/2009	M 02/2009	M 03/2009	M 04/2009
Sales	CS		10	30	50					
Production	CS									
Stock level	CS									
Target stock level	CS									
Days' supply	***									
Target days' supply	***									

Enter 10, 30 and 50 for the sales level for **next** month and the two following months, respectively

There are a number of ways to develop a sales forecast in the SAP ERP system, however, we'll just enter the values **10, 30 and 50** as the sales level for **next** month and the two following months, respectively.

There are also a number of ways to develop a production plan—for example, we can have production match sales. To do this automatically, follow the pull-down menu path:

Edit→Create production plan→Synchronous to sales

and the system will create a production plan that exactly matches sales:

Create Rough-Cut Plan

Product group: 00 NRG GROUP NRG-A and NRG-B Group
 Plant: 00PT
 Version: 000 Version 000 New, inactive

SOP: plan individual product group

Planning table	Un	M 08/2008	M 09/2008	M 10/2008	M 11/2008	M 12/2008	M 01/2009	M 02/2009	M 03/2009	M 04/2009
Sales	CS		10	30	50					
Production	CS		10	30	50					
Stock level	CS									
Target stock level	CS									
Days' supply	***									
Target days' supply	***									

Note that production matches sales level

We can also develop a plan that allows for a safety stock—a stock level above the expected sales level.

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Product group: 00 NRG GROUP NRG-A and NRG-B Group
 Plant: 00PT
 Version: 000 Version 000 New, inactive

Planning table	Un	M 08/2008	M 09/2008	M 10/2008	M 11/2008	M 12/2008	M 01/2009	M 02/2009	M 03/2009	M 04/2009
Sales	CS		10	30	50					
Production	CS		10	30	50					
Stock level	CS									
Target stock level	CS		5	15	25					
Days' supply	***									
Target days' supply	***									

Enter 5, 15 and 25 for Target stock level

Follow the menu path:

Edit→Create production plan→Target stock level

and the system will create a production plan that allows for a Target stock level:

Planning table	Un	M 08/2008	M 09/2008	M 10/2008	M 11/2008	M 12/2008	M 01/2009	M 02/2009	M 03/2009	M 04/2009
Sales	CS		10	30	50					
Production	CS		15	40	60					
Stock level	CS		5	15	25	25	25	25	25	25
Target stock level	CS		5	15	25					
Days' supply	***		15	15	15					
Target days' supply	***									

Note that the system calculates a production plan that will produce enough to meet the sales level and have the appropriate Target stock level. The system will also calculate the **Day's supply**, which is calculated as:

$$\text{Day's supply} = \frac{\text{Days in month}}{\text{Sales}} (\text{Target stock level})$$

Note that **Days in month** is taken from the factory calendar, which considers weekends, holidays and number of days in the month.