

MRP

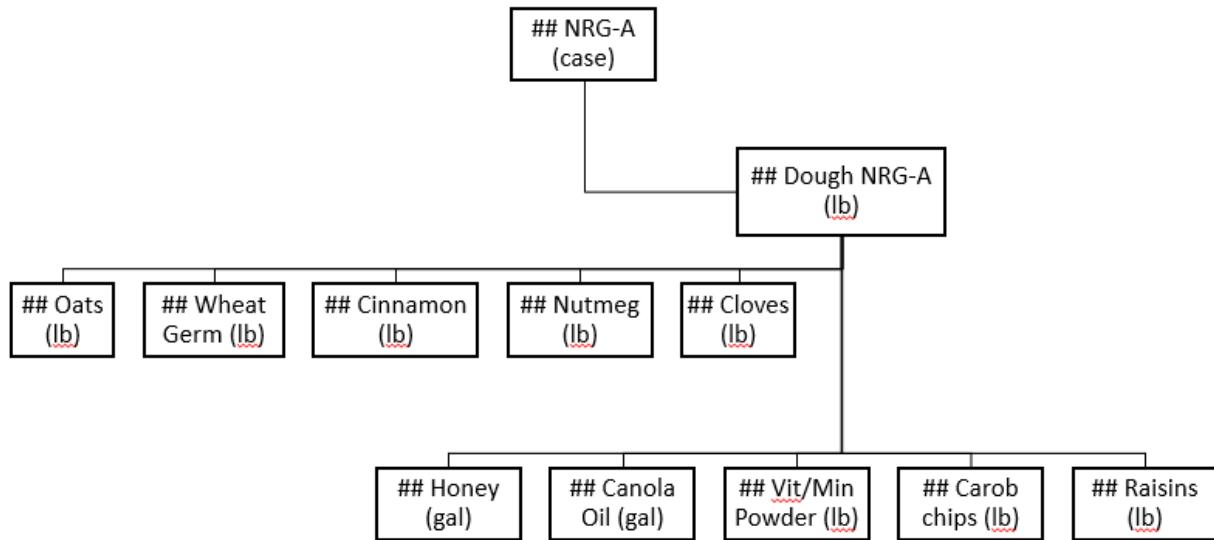
Exercise Introduction

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:

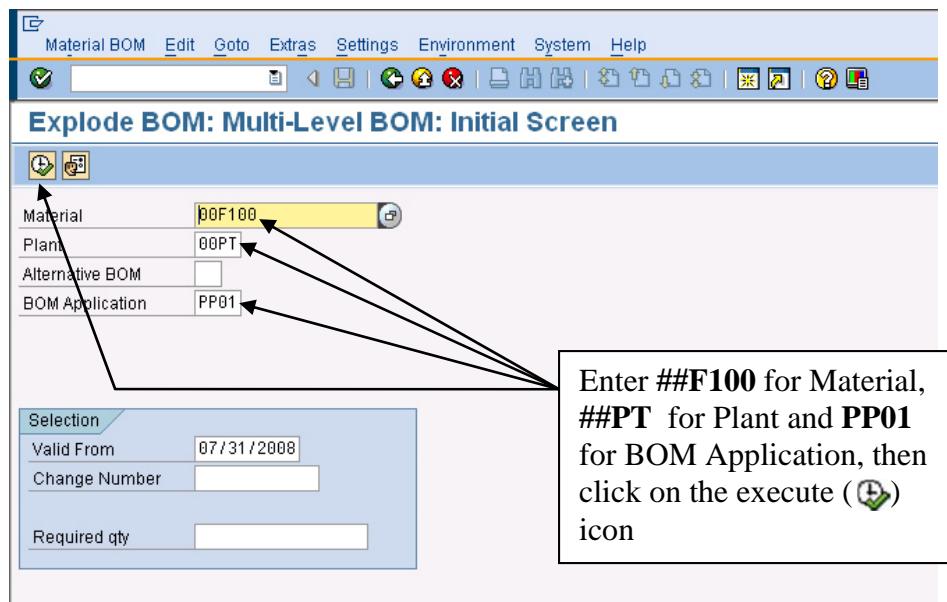


The raw materials (Oats, Wheat Germ, etc.) are combined in a mixer to produce a 500 lb. batch of dough. The dough is then transferred to the baking line, where it is formed into bars, baked and packaged. For simplicity, we have ignored the wrappers, boxes and cases that are needed to produce a complete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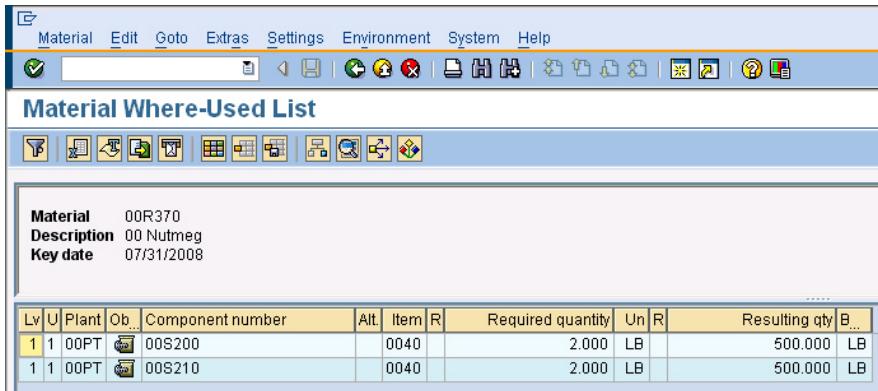


Display Multilevel BOM						
Material 00F100 Plant/Usage/Alt. 00PT/1/01 Description 00 NRG-A Base Qty (CS) 7.000 Reqd Qty (CS) 7						
This screen shows 7 cases of snack bars requires 500 lbs. of dough, and that to produce 500 lbs. of dough, 300 lbs. of Oats, 50 lbs. of Wheat Germ, etc. are required						
Level no.	Item	Obj.	Component			
.1	0010	00S200				
..2	0010	00R380				
..2	0020	00R420	00 Wheat Germ		50	LB
..2	0030	00R320	00 Cinnamon		5	LB
..2	0040	00R370	00 Nutmeg		2	LB
..2	0050	00R330	00 Cloves		1	LB
..2	0060	00R360	00 Honey		10	GAL
..2	0070	00R300	00 Canola		7	GAL
..2	0080	00R410	00 VitMin Powder		5	LB
..2	0090	00R310	00 Carob Chips		50	LB
..2	0100	00R400	00 Raisins		50	LB

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 (Where-Used icon), which will call up the following screen:

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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

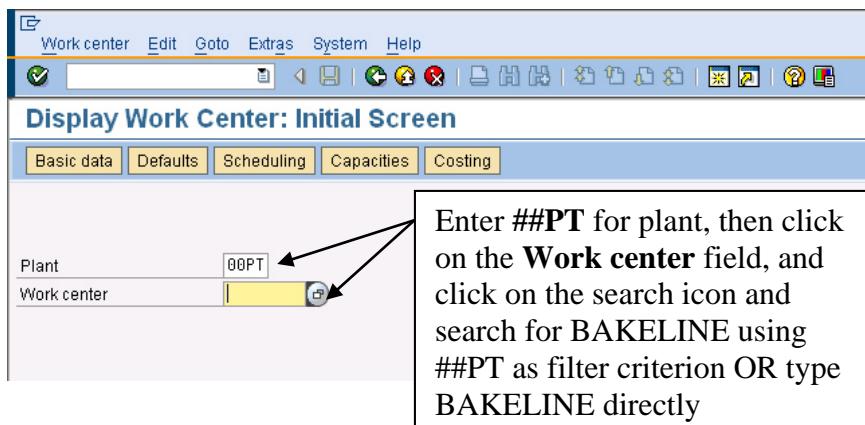
Click on the exit icon (🏠) until you return to the SAP Easy Access screen.

Display Workcenters

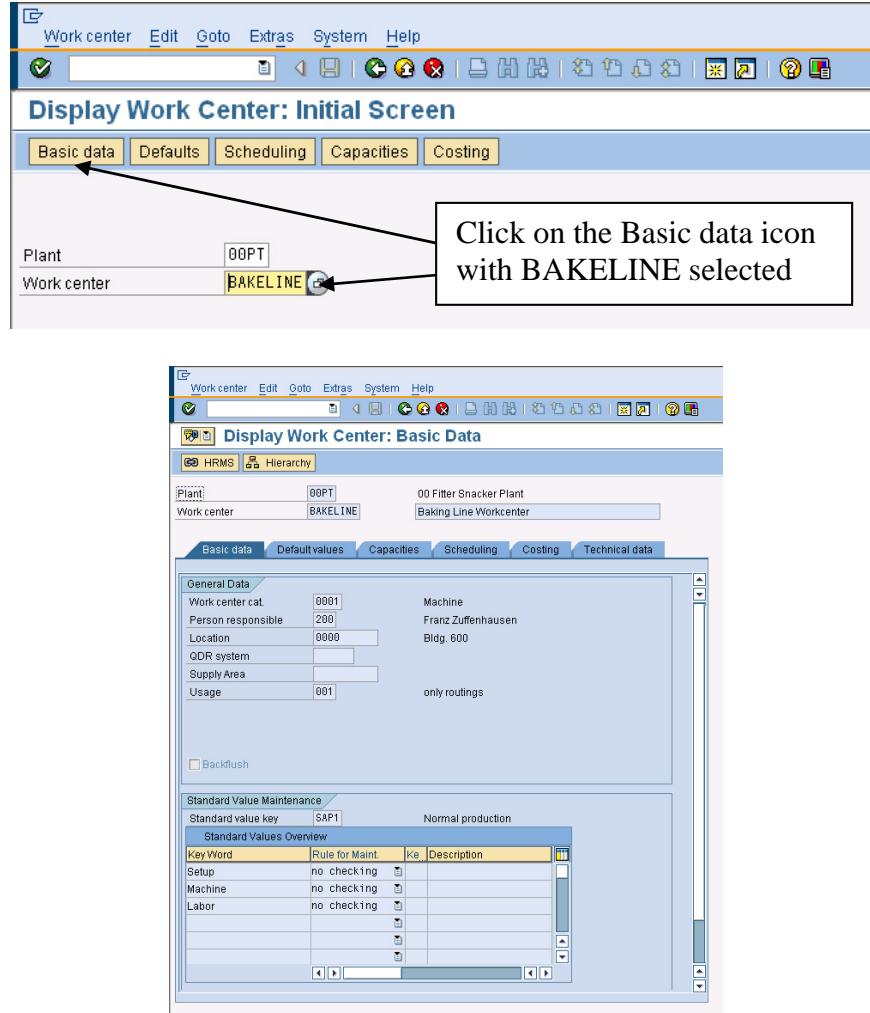
Production is carried out at workcenters. In the SAP ERP system, workcenters can represent machines or groups of machines, production lines, assembly lines, employees or groups of employees.

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



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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

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

Material 00F100 00 NRG-A

Task list

Group 006GROUP

Group Counter 1 00 NRG-A

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

Material 00F100 00 NRG-A

Sequence 0

Work center BAKELINE

Control key BAKE

Description Bake Dough

Base Quantity 7

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

Op.	SOp	Work ce	Plant	Co.	Standard	Description	Lo...	P...	Cl...	O...	Pe...	C...	Su...	Base Quant...	U...	StdValueTxt1	UnitActivity	UnitActivity
0010		BAKELINE	00PT	BAKE		Bake Dough								7	CS			
0020			00PT											1	CS			
0030			00PT											1	CS			

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Operation Overview:

Op.	SOp	Work ce	Pint.	Co.	Standard	Description	Loc.	Ct.	O.	Pe.	C.	Su.	Base Quantity	U.	Setup	Unit	Activity	Machine	Unit	Activity
0010	BAKELINE	DOPT	BAKE			Bake Dough							7	CS	30	MIN	20			
0020		DOPT											1							
0030		DOPT											1							
0040																				
0050																				
0060																				
0070																				

Scroll over to extreme right and enter **30** for Setup and **30** for Machine, then click on the CompAlloc (component allocation) icon

Material Component Overview:

Material	Group	Sequence	Component	Quantity	Sort String	U.	It.	B.	Oper.	Seq.	C.	M.
00F100	00GROUP	0	0010 00S200	500							00	

Select the only component listed and then click on the New assignment icon

New Assignment:

Assign to
Oper./Act. [] Sequence []

Click on Oper./Act. (operation/activity) list

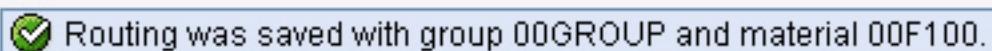
Choose Operation:

Seq. OpAc Work ctr Operation short text

0 0010 BAKELINE Bake Dough

Click on the enter icon

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



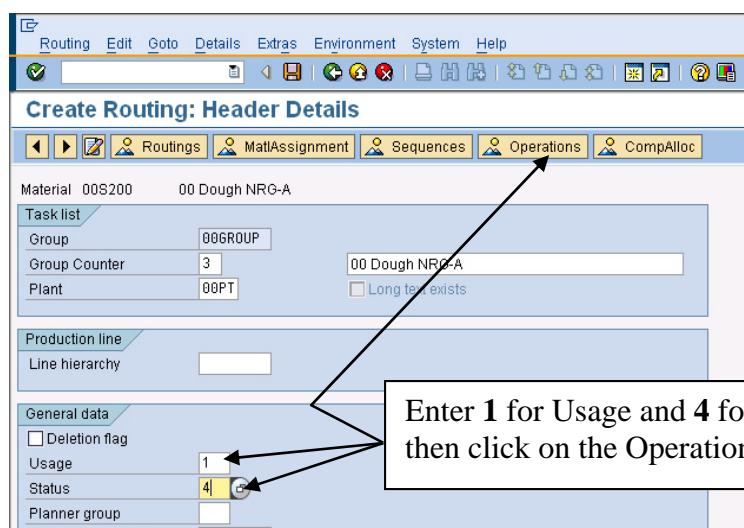
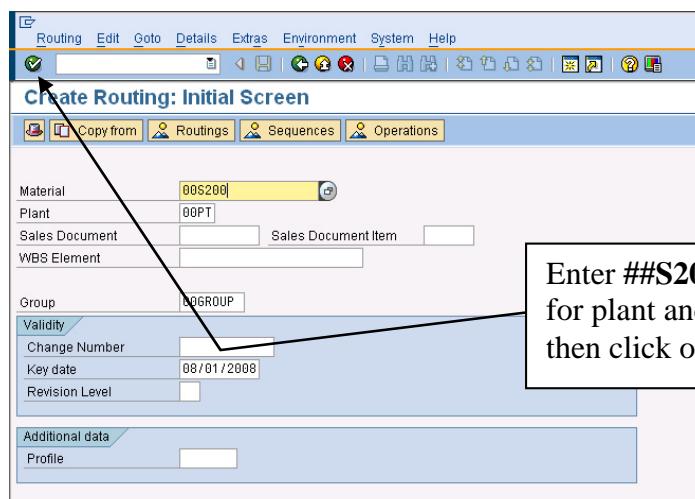
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Return to the beginning of section 1 and repeat the process to create a routing for material **##F110** (NRG-B bars). All entries are the same as for the **##F100** (NRG-A bars).

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



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Create Routing: Operation Overview

Material 00S2 Sequence 0

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

Op.	SOp	Workcenter	Plnt	Do.	Standard	Description	Lo.	P.	Cl.	O.	Pe.	C.	Su.	Base Quantity	U.	StdVa
0010		MIXERS	00PT	MIX		Mix Dough								500	LB	
0020			00PT											1	LB	
0030			00PT											1	LB	

Create Routing: Operation Overview

Material 00S200 Sequence 0

00 Dough NRG-A Grp.Count3

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	Setup	Unit	Activity	Machine	Unit	Activity	Labor	Unit	Activity
0010									500	LB	30	MIN	30	MIN				
0020									1	LB								
0030									1	LB								

Material Component Overview

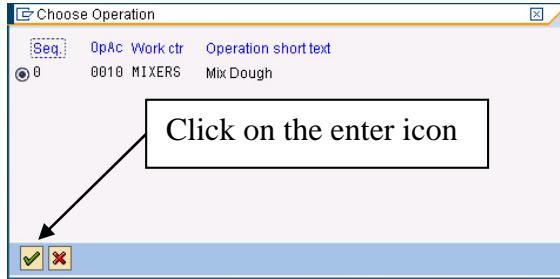
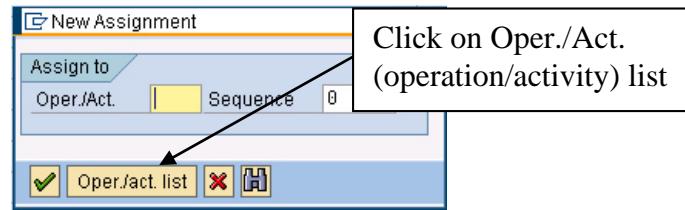
Material: 00S200 Group: 00GROUP Sequence: 0 BOM: 00000001 Alt.BOM: 1

00 Dough NRG-A
00 Dough NRG-A

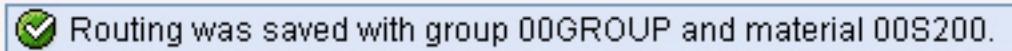
Select all components, then click on the New assignment icon

P.	Le.	Path	Itc.	Component	QTY	Unit	Activity	Machine	Unit	Activity	Unit	Activity
0	0	0010	00R380		1	LB	L		00		00	
0	0	0020	00R420		10	GALL			00		00	
0	0	0030	00R320		7	GALL			00		00	
0	0	0040	00R370		5	LB	L		00		00	
0	0	0050	00R330		50	LB	L		00		00	
0	0	0060	00R360		50	LB	L		00		00	
0	0	0070	00R300		50	LB	L		00		00	
0	0	0080	00R410		50	LB	L		00		00	
0	0	0090	00R310		50	LB	L		00		00	
0	0	0100	00R400		50	LB	L		00		00	

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



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 of number 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	<input checked="" type="button"/>

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)

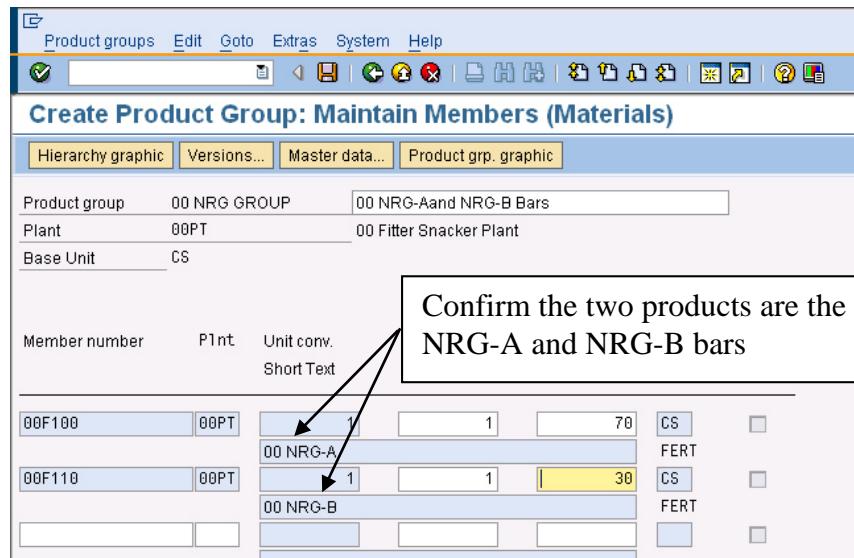
Product group	00 NRG GROUP	00 NRG-Aand NRG-B Bars
Plant	00PT	00 Fitter Snacker Plant
Base Unit	CS	

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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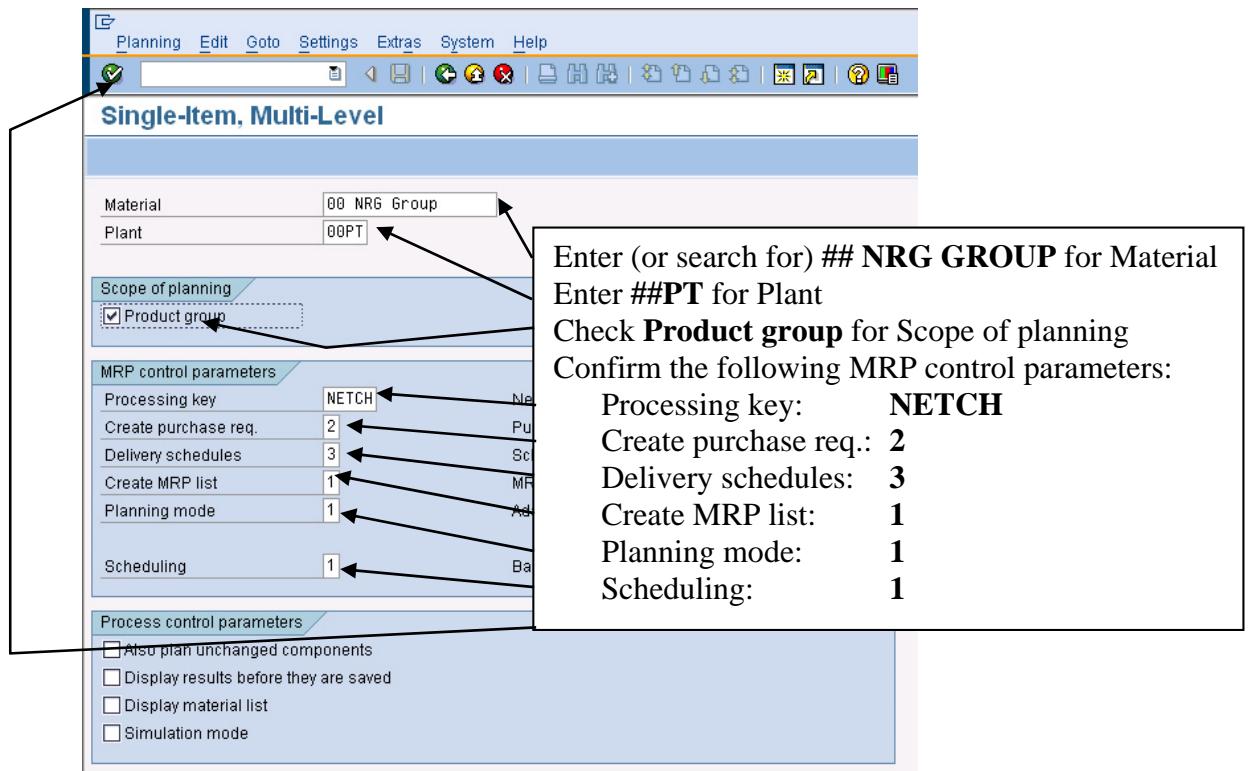


Click on the save icon (H) to save the product group.

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)



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Enter the information shown above, then click on the enter icon (✓). This will produce the following message:



Click on the enter icon (✓) again and you should get a report like the following:

Single-Item, Multi-Level																									
Statistics Materials planned 2 Materials with new exceptions Materials with terminated MRP list																									
Parameters Plnt 00PT Processing Key NETCH Create Purchase Requisition 2 Sched. Agreement Schedule Line 3 Create MRP List 1 Planning Mode 1 Scheduling 1																									
Database statistics No Procurement Proposals Changed																									
Run-time statistics Start of planning run 10:59:23 End of planning run 10:59:24 Planning run time 00:00:01 CPU time : Import 00:00:01																									
Ranking list for materials with highest CPU times (in ms)																									
<table border="1"><thead><tr><th>Material</th><th>Plnt</th><th>PlgRuntime</th><th>Read</th><th>Net calc.</th><th>BOM</th><th>LdTimeSched</th><th>Update</th></tr></thead><tbody><tr><td>00F100</td><td>00PT</td><td>1,206</td><td>783</td><td>31</td><td>0</td><td>0</td><td>328</td></tr><tr><td>00F110</td><td>00PT</td><td>28</td><td>16</td><td>0</td><td>0</td><td>0</td><td>11</td></tr></tbody></table>		Material	Plnt	PlgRuntime	Read	Net calc.	BOM	LdTimeSched	Update	00F100	00PT	1,206	783	31	0	0	328	00F110	00PT	28	16	0	0	0	11
Material	Plnt	PlgRuntime	Read	Net calc.	BOM	LdTimeSched	Update																		
00F100	00PT	1,206	783	31	0	0	328																		
00F110	00PT	28	16	0	0	0	11																		

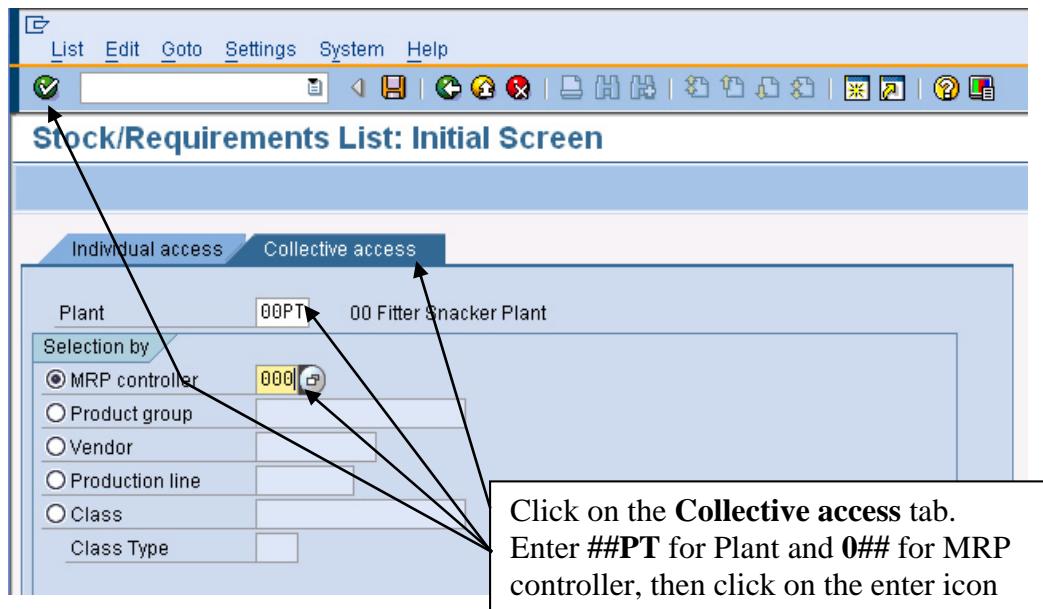
The details of your report may be different, but that is not a problem. As long as you don't have an error messages, things should be okay. To confirm that they are, we can check the status of key materials.

To view the status of a material, we can use the Stock/Requirements list. Like many transactions in the SAP system, there are a number of menu paths that can take you to the Stock/Requirements list. One of these is:

Logistics ▷ Production ▷ MRP ▷ Evaluations ▷ Stock/Requirements List (MD04)

which will produce the following screen:

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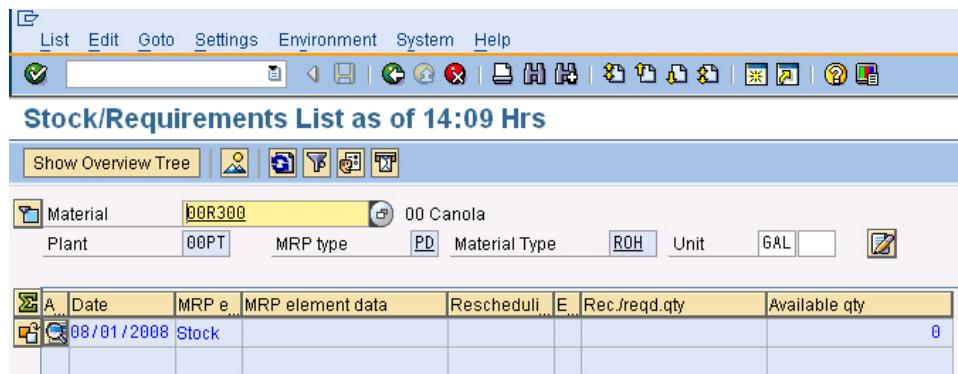
Stock/Requirements List: Material List

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
CO0	00F100	00 NRG-A		999.9	999.9	999.9									0	CS	FERT	E		PD	000	<input checked="" type="checkbox"/>	
CO0	00F110	00 NRG-B		999.9	999.9	999.9									1,000	CS	FERT	E		PD	000	<input checked="" type="checkbox"/>	
CO0	00R300	00 Canola		999.9	999.9	999.9									0	GAL	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R310	00 Carob Chips		999.9	999.9	999.9									0	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R320	00 Cinnamon																					
CO0	00R330	00 Cloves																					
CO0	00R340	00 Dates																					
CO0	00R350	00 Hazelnuts																					
CO0	00R360	00 Honey		999.9	999.9	999.9									0	GAL	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R370	00 Nutmeg		999.9	999.9	999.9									0	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R380	00 Oats		999.9	999.9	999.9									3	44,000	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>
CO0	00R390	00 Protein Powder		999.9	999.9	999.9									0	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R400	00 Raisins		999.9	999.9	999.9									0	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R410	00 VitMin Powder		999.9	999.9	999.9									0	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>	
CO0	00R420	00 Wheat Germ		999.9	999.9	999.9									3	2,000	LB	ROH	F		PD	002	<input checked="" type="checkbox"/>
CO0	00S200	00 Dough NRG-A		999.9	999.9	999.9									0	LB	HALB	E		PD	001	<input checked="" type="checkbox"/>	
CO0	00S210	00 Dough NRG-B		999.9	999.9	999.9									0	LB	HALB	E		PD	001	<input checked="" type="checkbox"/>	

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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**:

The screenshot shows a list of materials in the SAP MRP controller. The material 00R300 (00 Canola) is highlighted. A checkmark is present in the 'Already accessed' column for this material.

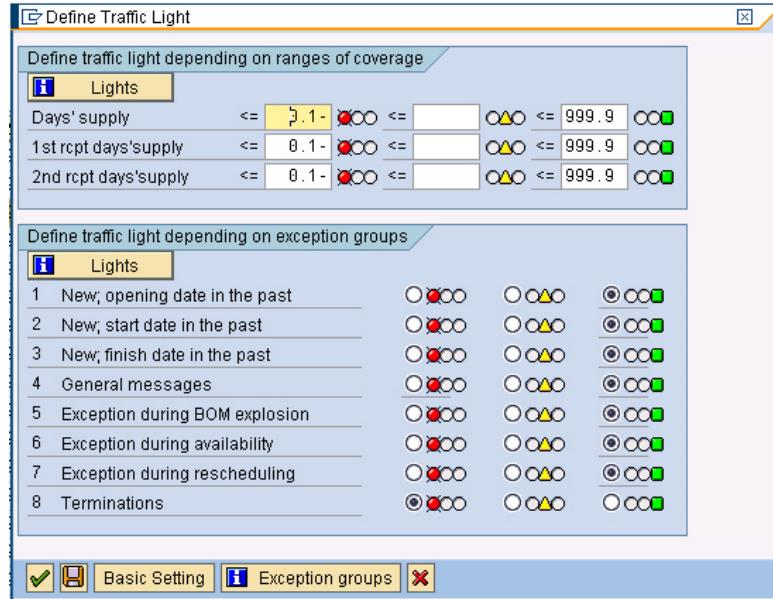
Light	Material	Material Description	A	Suppl	999.9	999.9	999.9
00	00F100	00 NRG-A	<input type="checkbox"/>	<input type="checkbox"/>	999.9	999.9	999.9
00	00F110	00 NRG-B	<input type="checkbox"/>	<input checked="" type="checkbox"/>	999.9	999.9	999.9
00	00R300	00 Canola	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	999.9	999.9	999.9
00	00R310	00 Carob Chips	<input type="checkbox"/>	<input type="checkbox"/>	999.9	999.9	999.9
00	00R320	00 Cinnamon	<input type="checkbox"/>	<input type="checkbox"/>	999.9	999.9	999.9
00	00R330	00 Clives	<input type="checkbox"/>	<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:

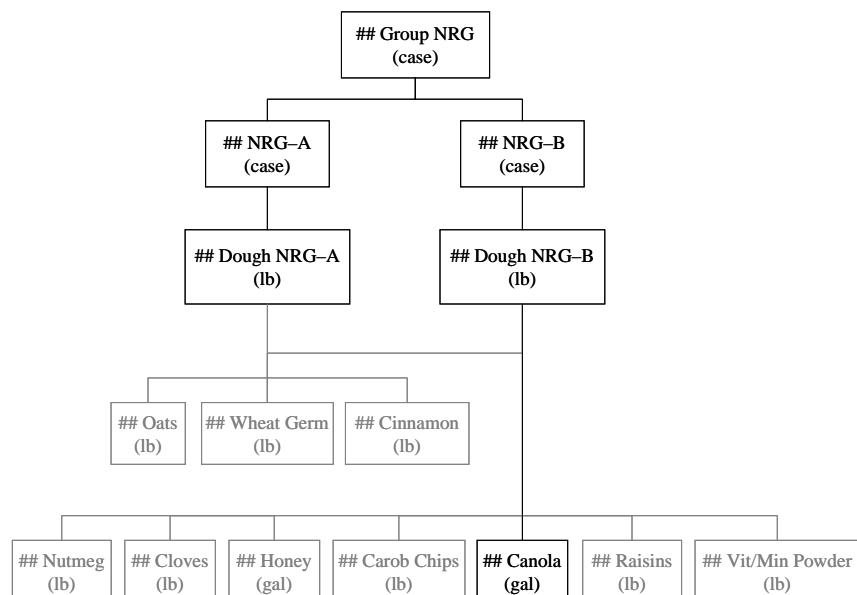
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This screen shows that the SAP system provides the user with a great deal of flexibility in how to configure the traffic light system for issuing warnings as required. Click on the cancel icon () to close this window.

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

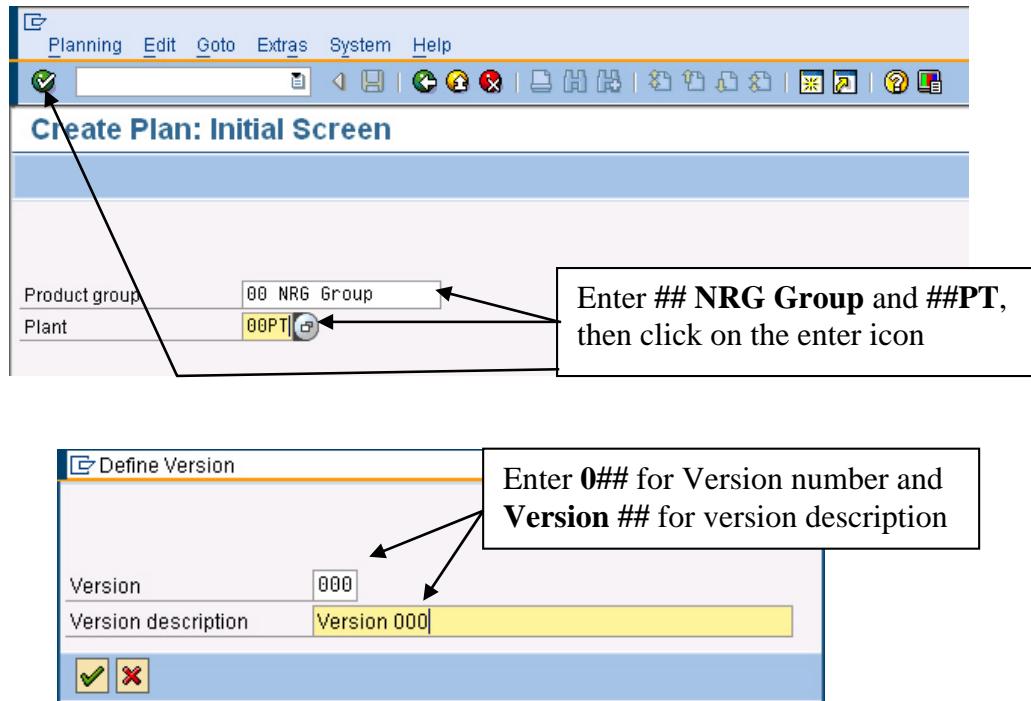
In SAP, the Sales and Operations Planning process is one way to create demand for the MRP process. In practice, Sales and Operations Planning is the process where operations and marketing agree on a demand forecast and a production plan to meet that demand. Ideally, this Sales and Operations Plan should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

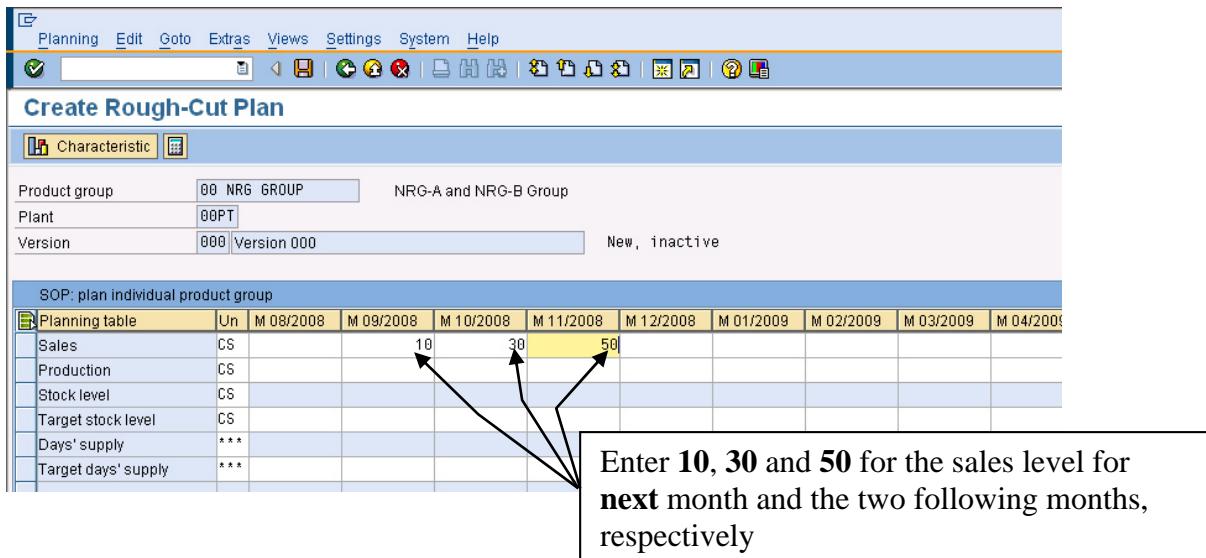
In this second session, follow the menu path:

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



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

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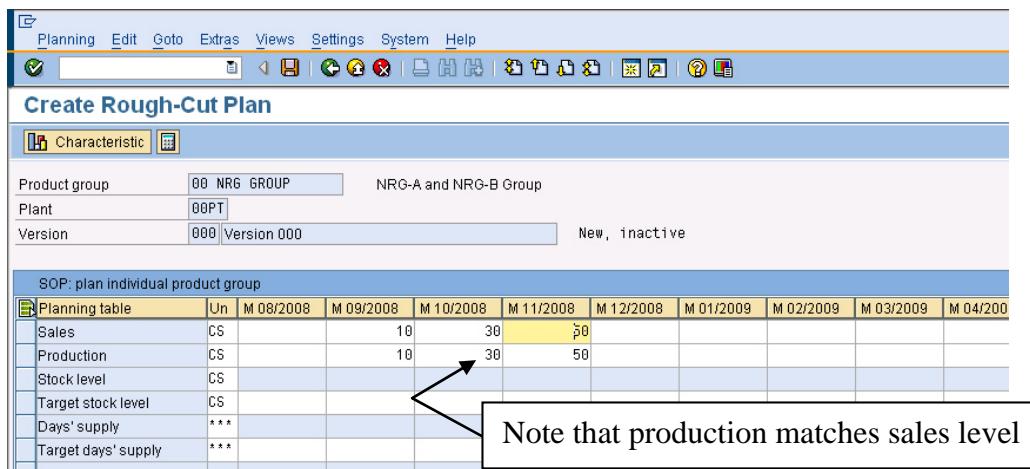


There are a number of ways to develop a sales forecast in the SAP ERP system, however, we'll just enter the values **10, 30 and 50** as the sales level for **next** month and the two following months, respectively.

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:



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

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		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:

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		15	40	60					
Stock level	CS		5	15	25	25	25	25	25	
Target stock level	CS		5	15	25					
Days' supply	***		15	15	15					
Target days' supply	***									

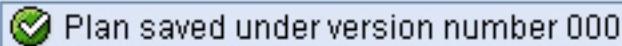
Note that the system calculates a production plan that will produce enough to meet the sales level and have the appropriate Target stock level. The system will also calculate the **Day's supply**, which is calculated as:

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

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

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Click on the save icon (disk) to save the Sales and Operations Plan (SOP). You should get a message like the following:



6. Transfer Sales and Operations Plan to Products

Next, we have to transfer the production plan developed in the SOP transaction to the products in the product group. To do this, follow the menu path:

Logistics >Production >SOP >Disaggregation >Transfer Product Group to Planning

The screenshot shows the SAP Disaggregation interface. A dialog box titled "Transfer Planning Data to Demand Management" is open. It contains the following fields:

Product group	00 NRG GROUP	NRG-A and NRG-B Group
Plant	00PT	00 Fitter Snacker Plant
Version	000	(with a small edit icon)

Below these fields is a section titled "Transfer strategy and period" with the following options:

- Sales plan for material or PG members
- Sales plan for mat. or PG members as proportion of PG
- Production plan for material or PG members
- Prod.plan for mat. or PG members as proportion of PG

There are "From" and "To" date fields, and a checkbox for "Invisible transfer".

At the bottom is a section titled "Independent requirement specifications" with "Requirements type" and "Version" fields, and a checkbox for "Active".

To the right of the dialog, there is a callout box with instructions:

- Enter Product group ## **NRG GROUP** and Plant ##**PT**
- Enter **0##** for Version
- Select **Prod.plan for mat. or PG members as proportion of PG**
- Check **Invisible transfer**
- Check **Active**

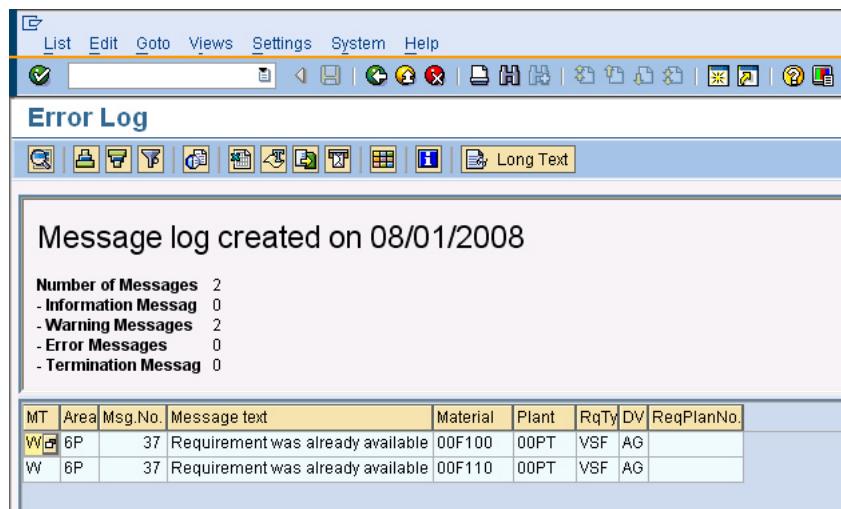
Below the callout box, it says "then click on the Transfer now icon".

Enter the information shown above, then click on the **Transfer now** icon (). This will produce the following screen:

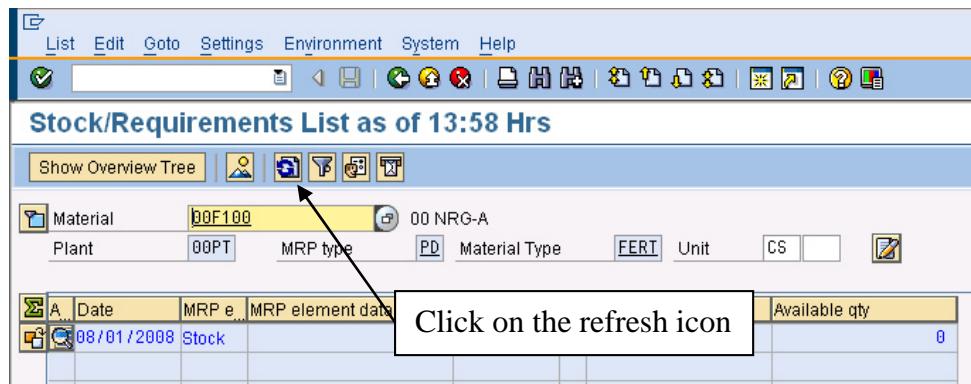


Double-check that you entered **0##** for the Version, then click on the enter icon (), which will produce the following message:

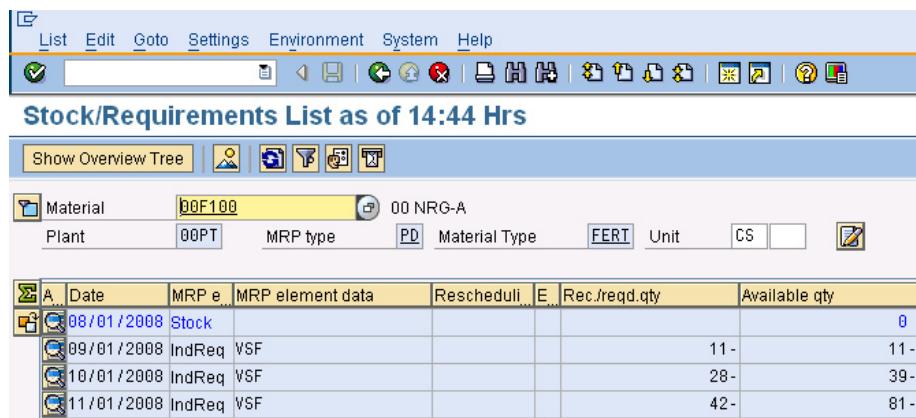
MRP



While this sounds ominous, ignore it (it's just a warning). **Switch to the other session**, make sure you have selected the material ## NRG-A and are in the Display Stock/Requirements list screen:



The results from transferring the Sales and Operations Plan are not yet displayed. To update the Stock/Requirements list, click on the refresh icon ():



MRP

Note that there are planned independent requirements for three months. Where did the quantity 11 come from in this month? In the Sales and Operations plan, the production quantity planned for NRG bars in this month was 15 (10 for sales, 5 for the target stock level). Seventy percent of 15 is 11 (actually, 10.5). Thirty percent of 15 is 4 (actually 4.5).

Check on ## Canola to verify that it has remained unchanged:

A	Date	MRP e...	MRP element data	Reschedule...	E	Rec./reqd.qty	Available qty
	08/01/2008	Stock					0

7. Create Planned Orders with MRP

To meet the demand that is predicted by the SOP process, the MRP process will create planned orders. These planned orders can be converted into production orders (for internally manufactured materials) and purchase requisitions (for externally procured materials). To do this, we will repeat the MRP process as we did before. To run MRP, switch back to the other session (the one without the Stock/Requirements List) and follow the menu path:

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

Single-Item, Multi-Level

Planning Edit Goto Settings Extras System Help

Material: 00 NRG Group
Plant: 00PT

Scope of planning
 Product group

MRP control parameters

Processing key: NETCH	Net chan...
Create purchase req.: 2	Purchase...
Delivery schedules: 3	Schedule...
Create MRP list: 1	MRP list...
Planning mode: 1	Adapt pla...

Scheduling: 1 Basic data

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