MRP

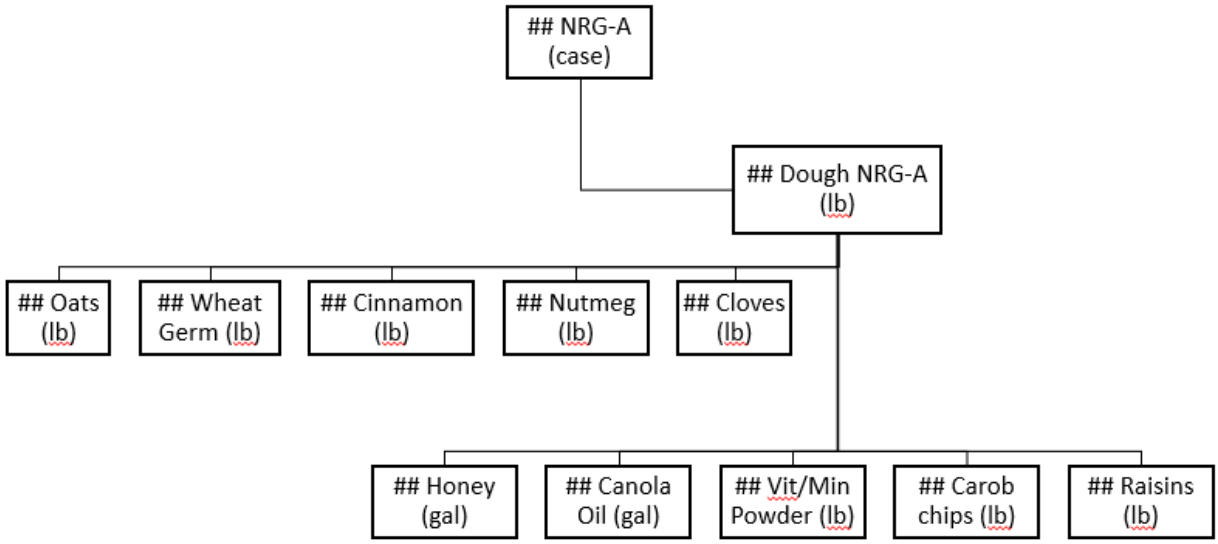
Exercise Introduction

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:

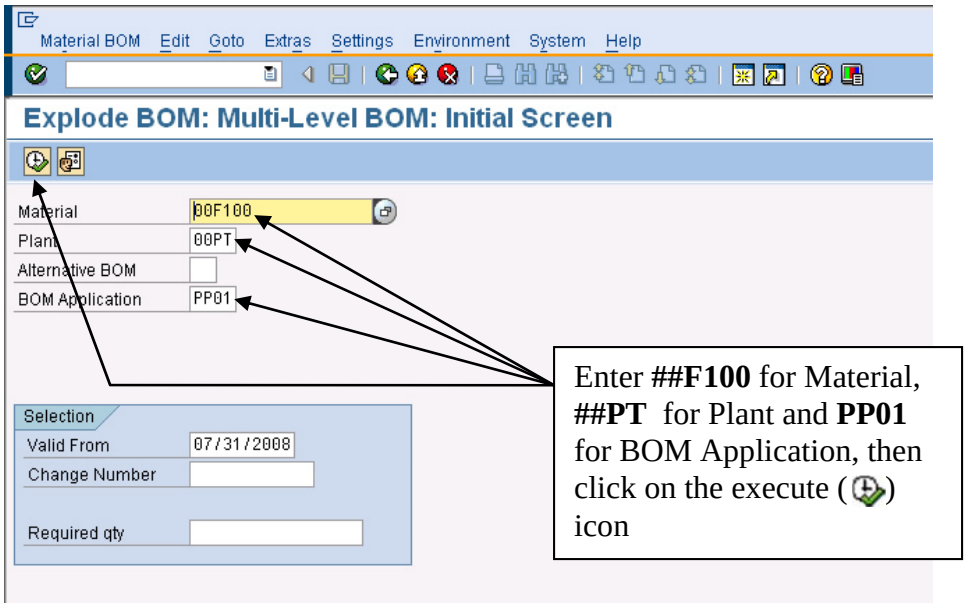


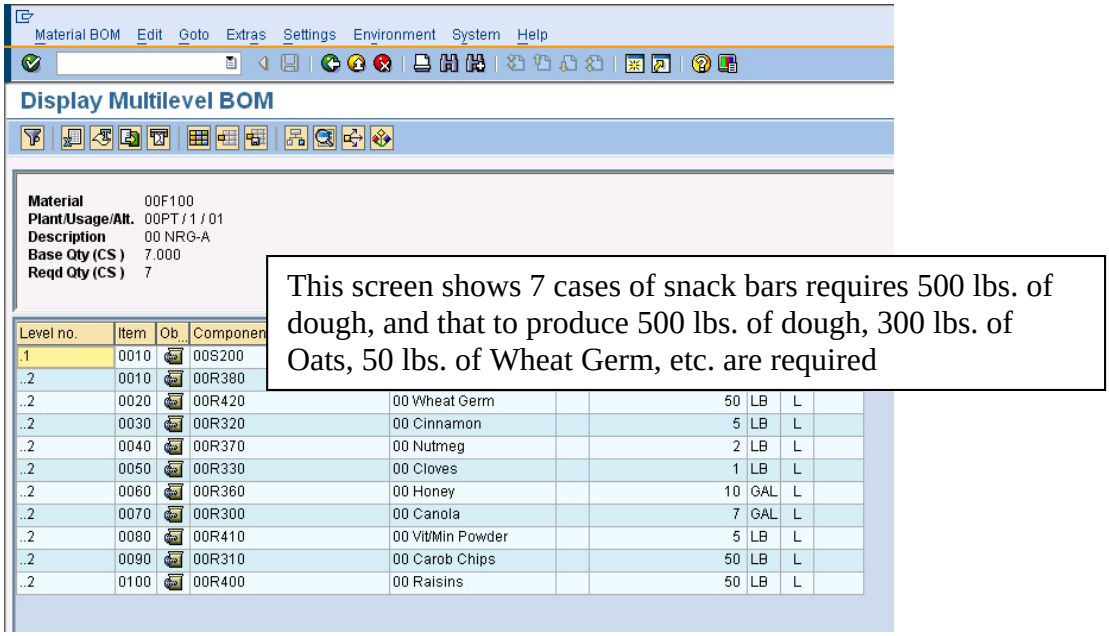
The raw materials (Oats, Wheat Germ, etc.) are combined in a mixer to produce a 500 lb. batch of dough. The dough is then transferred to the baking line, where it is formed into bars, baked and packaged. For simplicity, we have ignored the wrappers, boxes and cases that are needed to produce a complete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

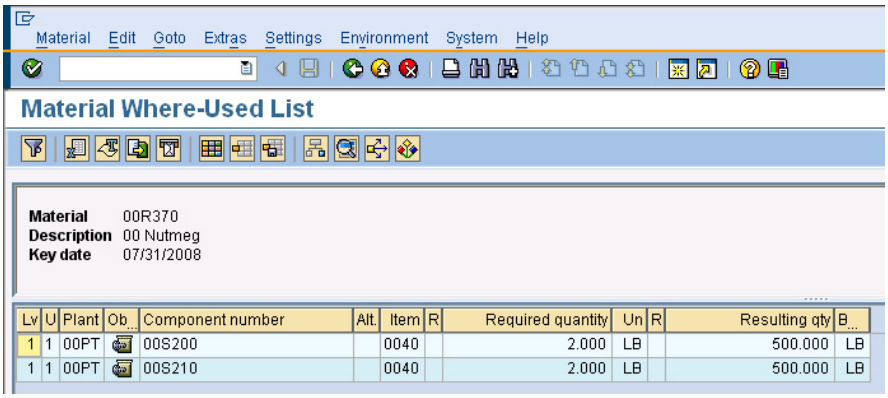
MRP





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:



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

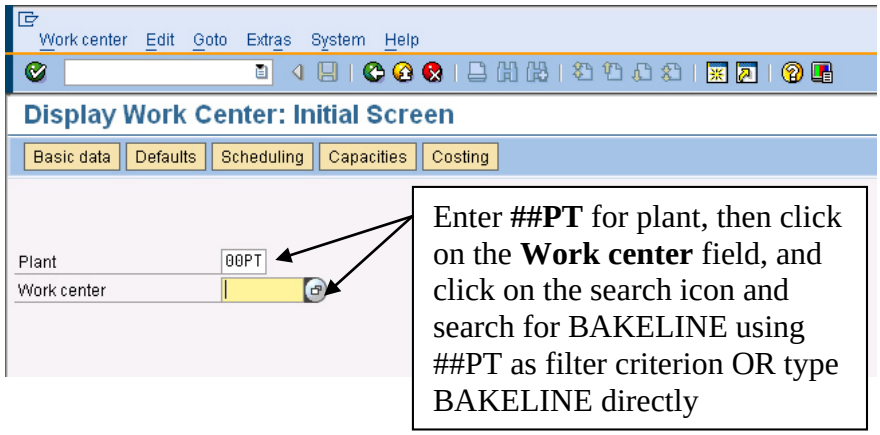
Click on the exit icon ( ) until you return to the SAP Easy Access screen.

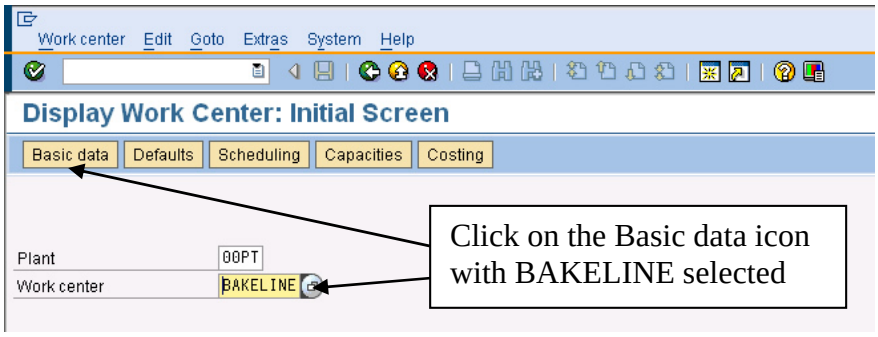
Display Workcenters

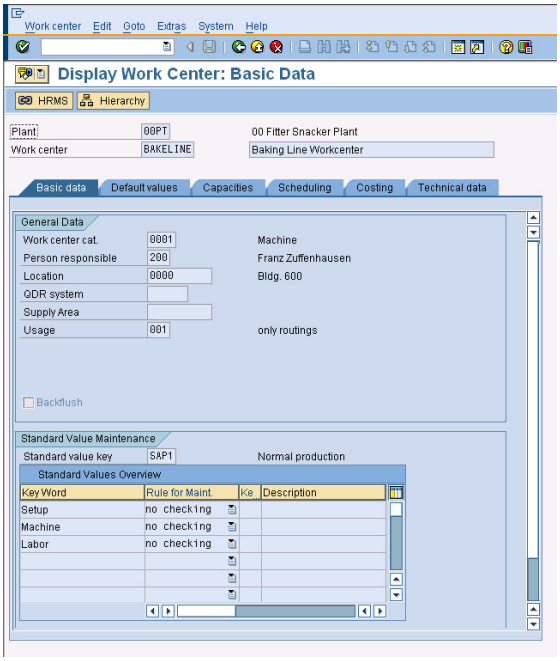
Production is carried out at workcenters. In the SAP ERP system, workcenters can represent machines or groups of machines, production lines, assembly lines, employees or groups of employees.

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







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

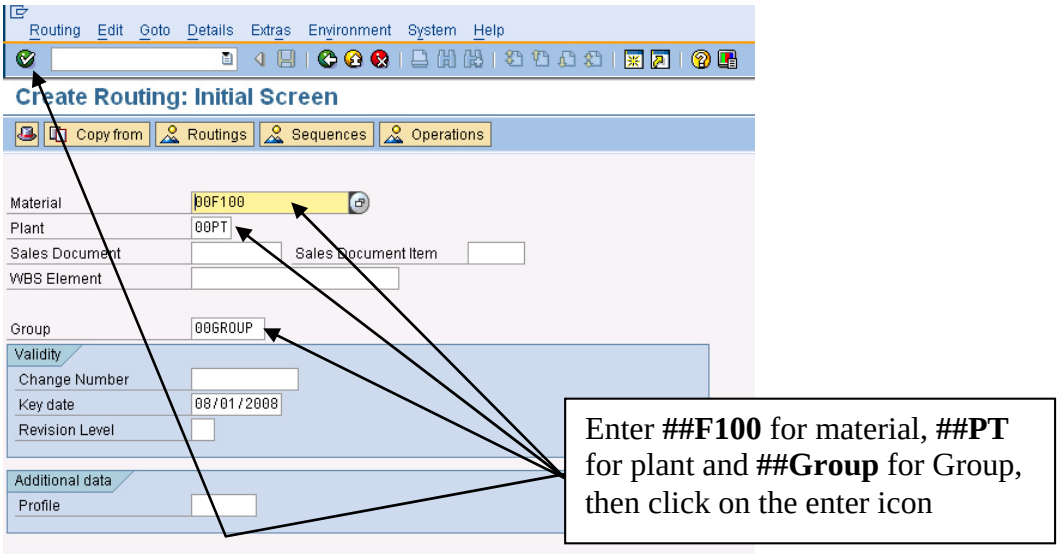
Routings define the work centers that a product must visit in the production process. Routings also define the operations that must be performed at each workcenter and the components that are needed for each operation.

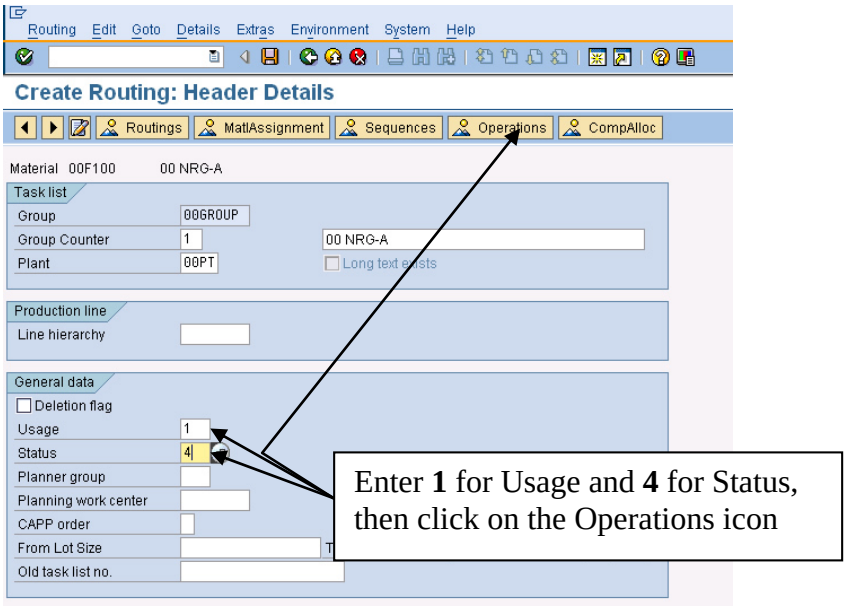
1. Create ##F100 (NRG-A bar) and ##F110 (NRG-B bar) Routings

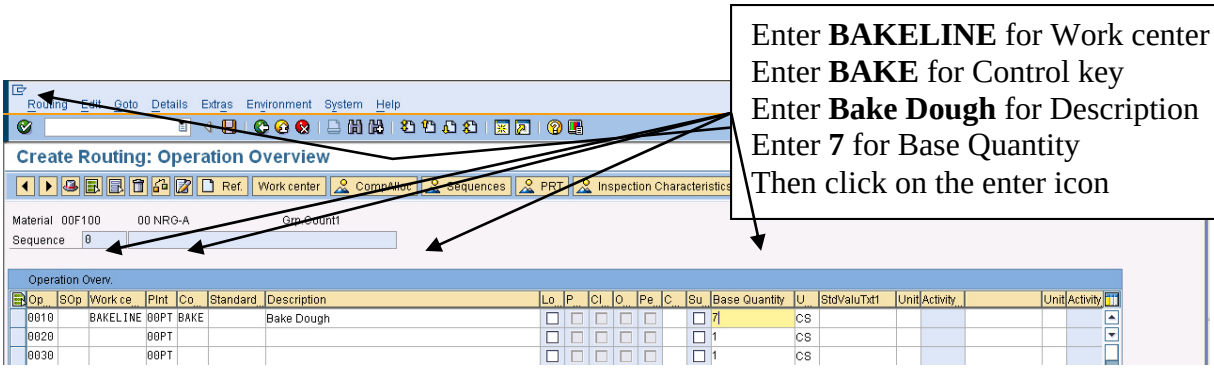
To create a routing for the NRG-A bars, follow the menu path:

MRP

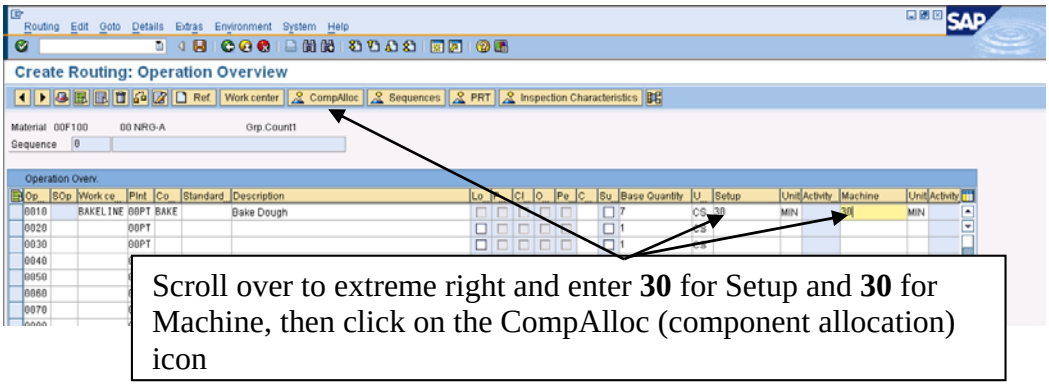
Logistics ▷Production ▷Master Data ▷Routings ▷Routings ▷Standard Routings ▷Create

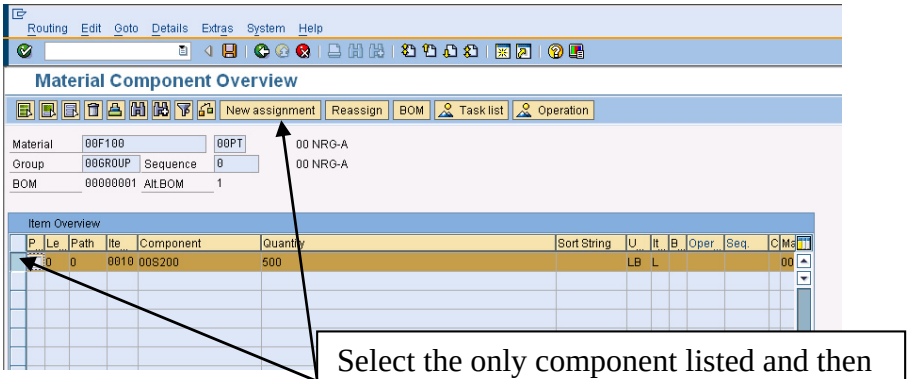


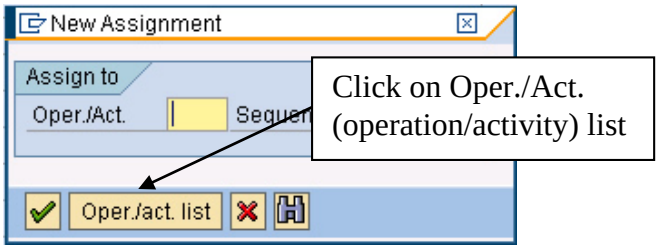


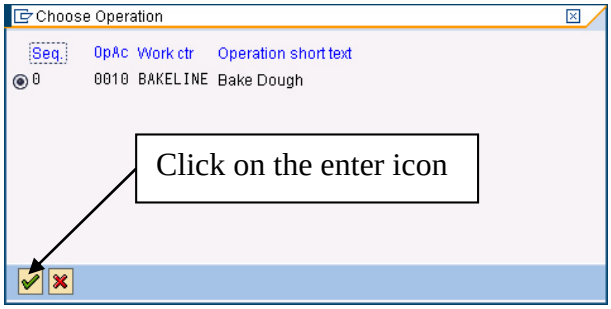


MRP

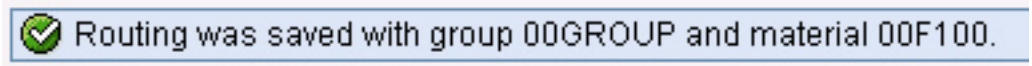








Click on the save icon ( ) to save the routing. You will get a message like the following:

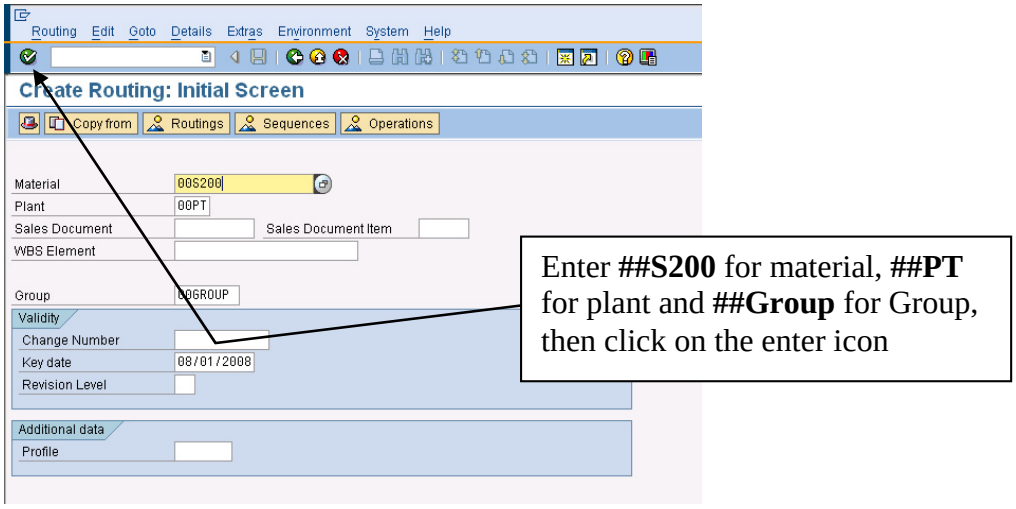


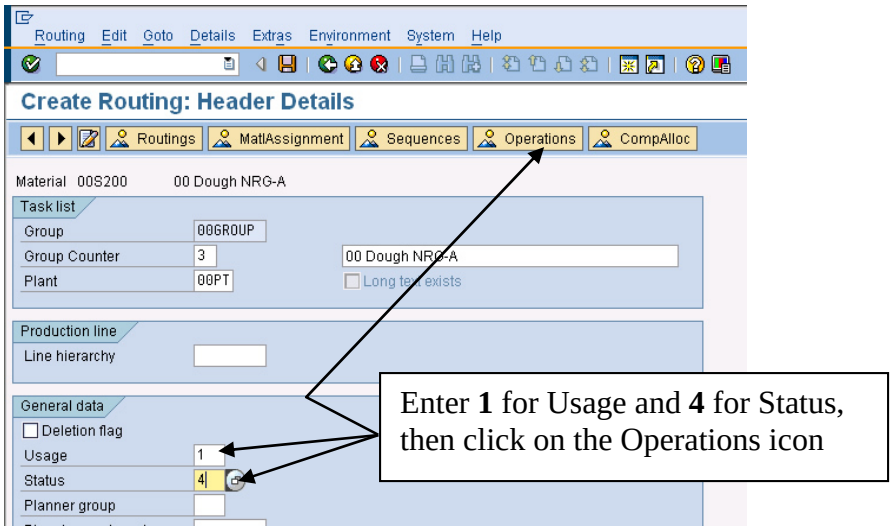
Return to the beginning of section 1 and
repeat the process to create a routing for material **##F110** (NRG-B bars).
All entries are the same as for the **##F100** (NRG-A bars).

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

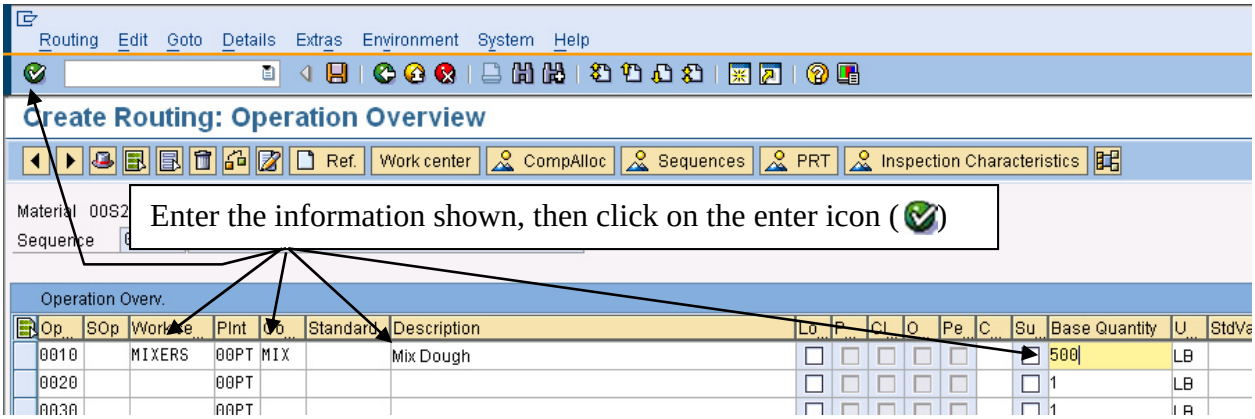
To create a routing for ##S200 (dough for NRG-A bars), again follow the menu path:

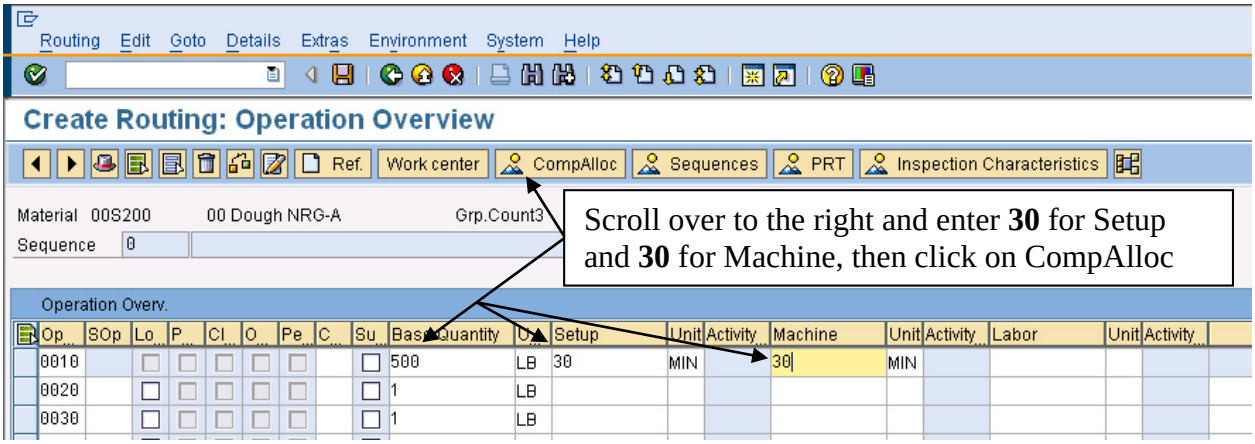
Logistics ▷Production ▷Master Data ▷Routings ▷Routings ▷Standard Routings ▷Create

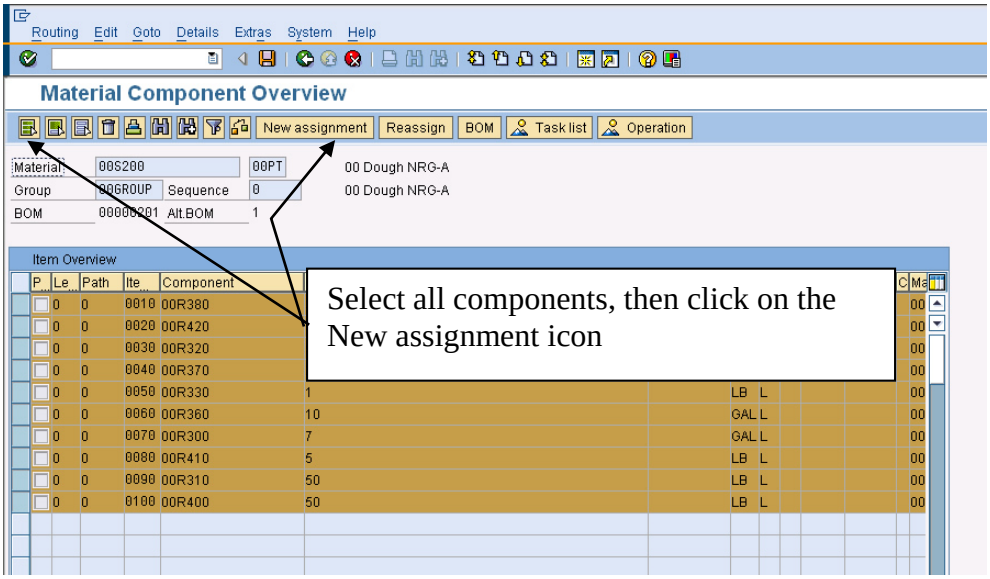


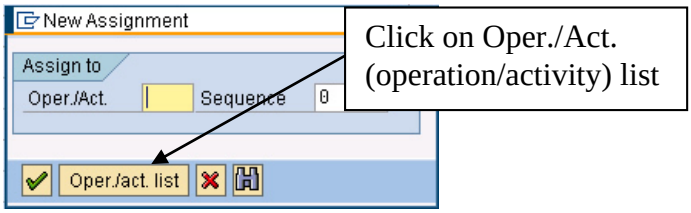


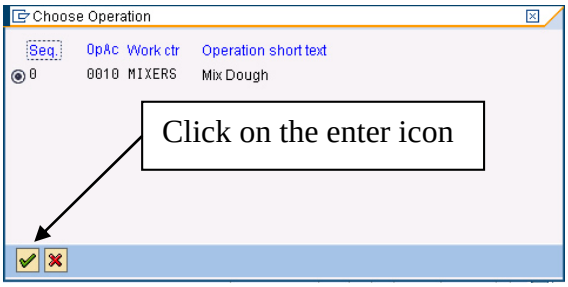
MRP


Routing Edit Goto Details Extras Environment System Help
Create Routing: Operation Overview
Ref. Work center CompAlloc Sequences PRT Inspection Characteristics
Material 00S2
Sequence
Enter the information shown, then click on the enter icon ( )
Operation Overv.
Op SOp Work... Plnt Co... 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

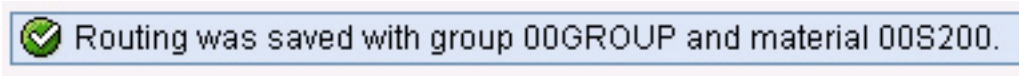

Routing Edit Goto Details Extras Environment System Help
Create Routing: Operation Overview
Ref. Work center CompAlloc Sequences PRT Inspection Characteristics
Material 00S200 00 Dough NRG-A Grp.Count3
Sequence 0
Scroll over to the right and enter 30 for Setup and 30 for Machine, then click on CompAlloc
Operation Overv.
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
New assignment Reassign BOM Task list Operation
Material 00S200 00PT 00 Dough NRG-A
Group 00GROUP Sequence 0 00 Dough NRG-A
BOM 00000201 Alt.BOM 1
Item Overview
P... Le... Path Ite... Component C... Ma...
0 0 0010 00R380 00
0 0 0020 00R420 00
0 0 0030 00R320 00
0 0 0040 00R370 00
0 0 0050 00R330 1 LB L 00
0 0 0060 00R360 10 GAL L 00
0 0 0070 00R300 7 GAL L 00
0 0 0080 00R410 5 LB L 00
0 0 0090 00R310 50 LB L 00
0 0 0100 00R400 50 LB L 00
Select all components, then click on the New assignment icon





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

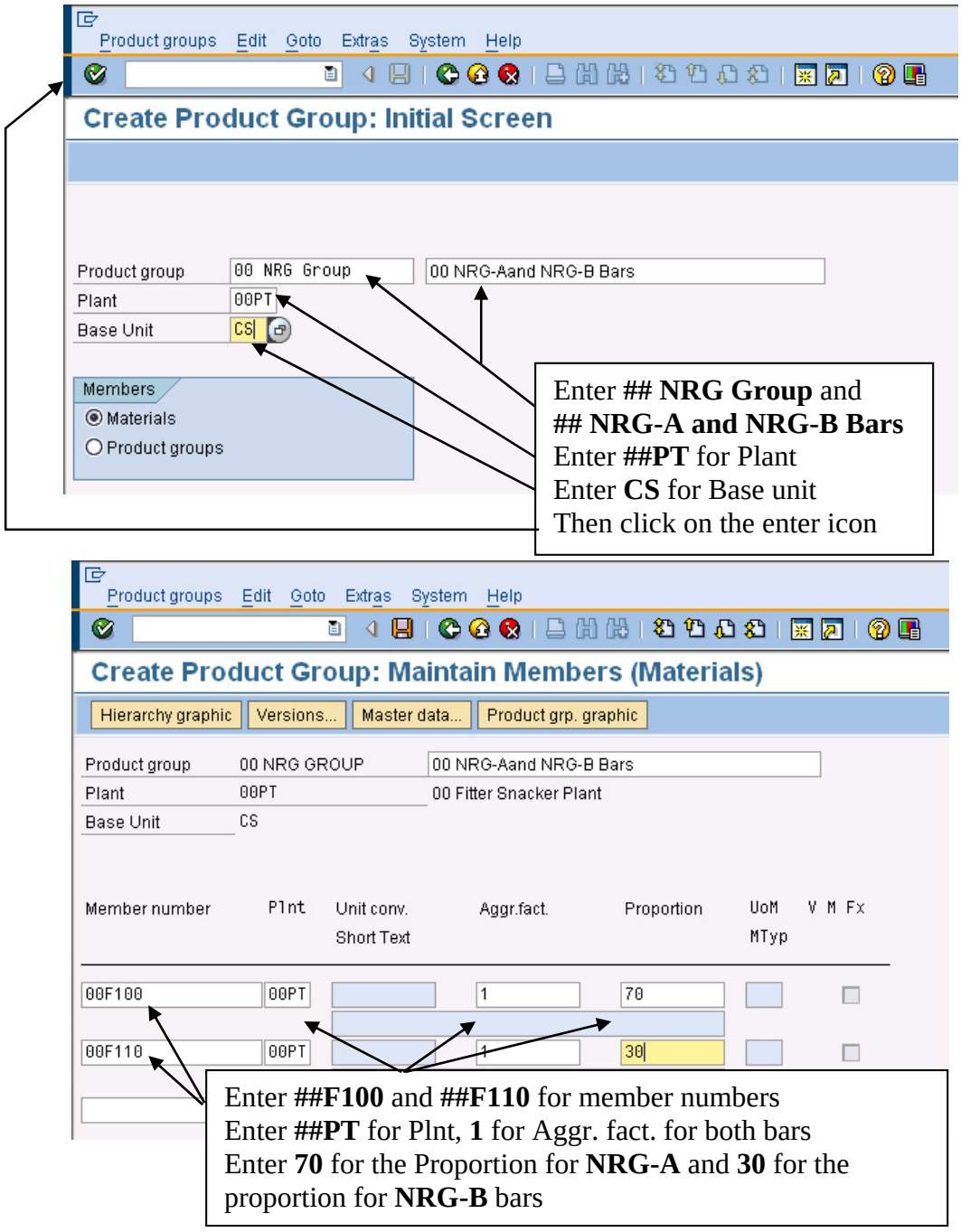
Many firms produce hundreds of products, and planning for each product individually is not feasible or desirable. What these firms do is create product groups, and then plan production for a small number of product groups and then transfer these plans to individual products based on historic percentages. 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:

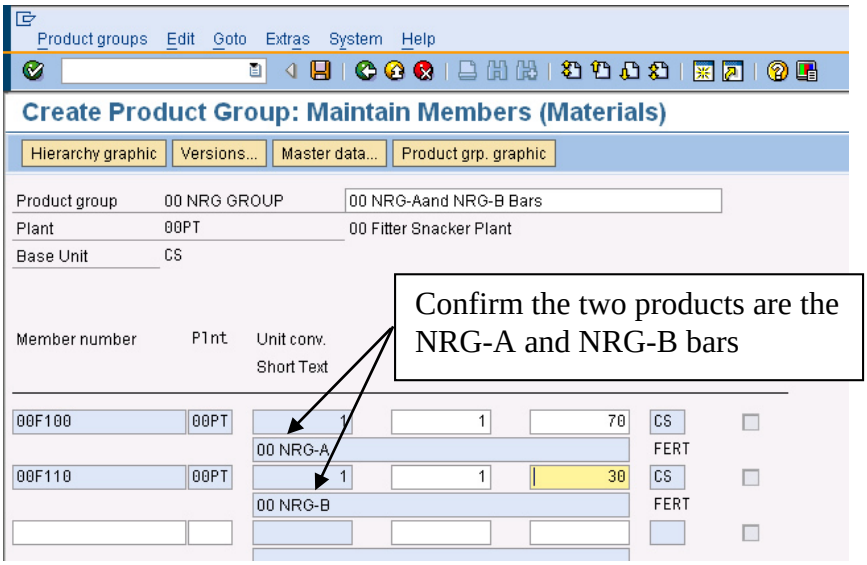
Logistics ▷Production ▷SOP ▷Product Group ▷Create

which will produce the following screen:

MRP



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:

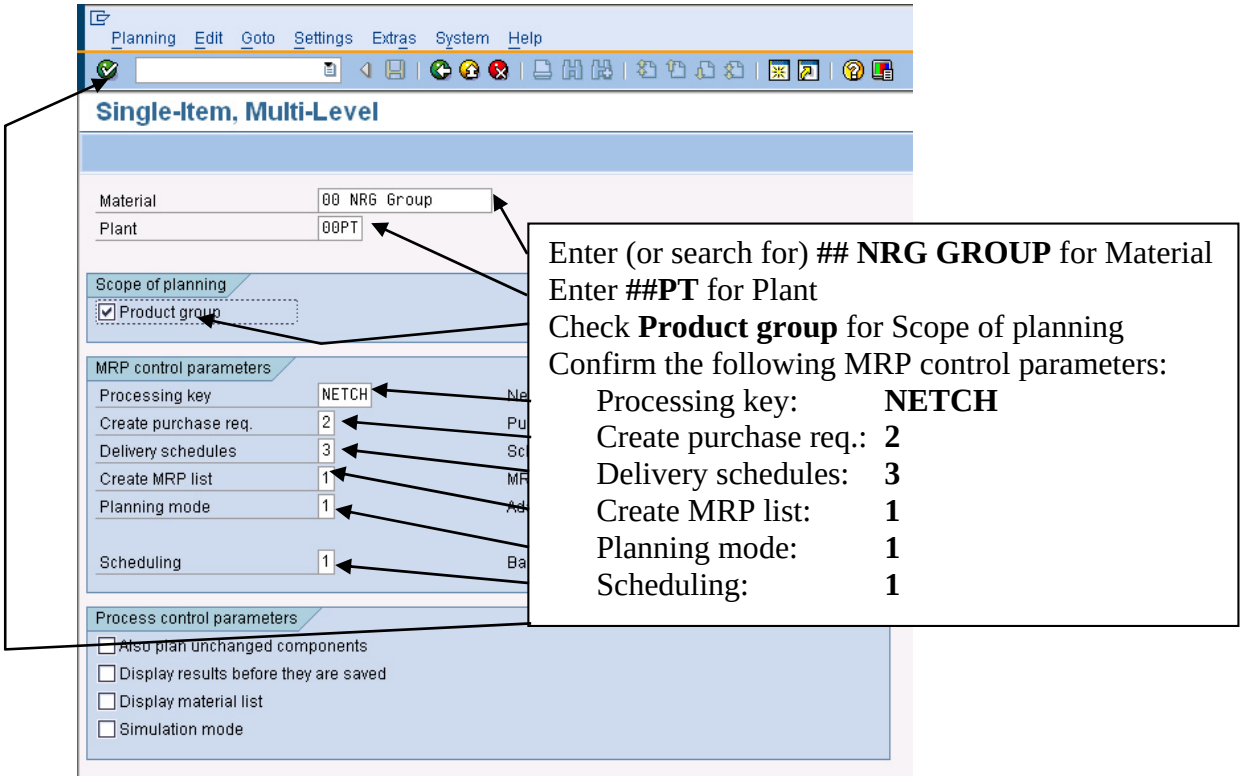


Click on the save icon ( ) to save the product group.

4. Run MRP

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

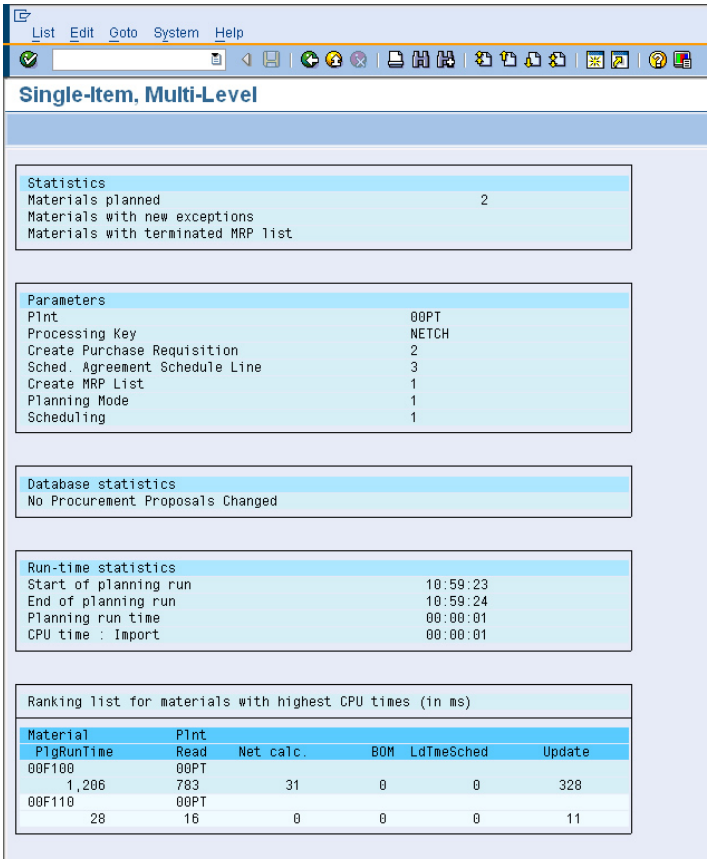
Logistics ▷Production ▷MRP ▷Planning ▷Multilevel Single-Item Planning (MD02)



MRP

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:



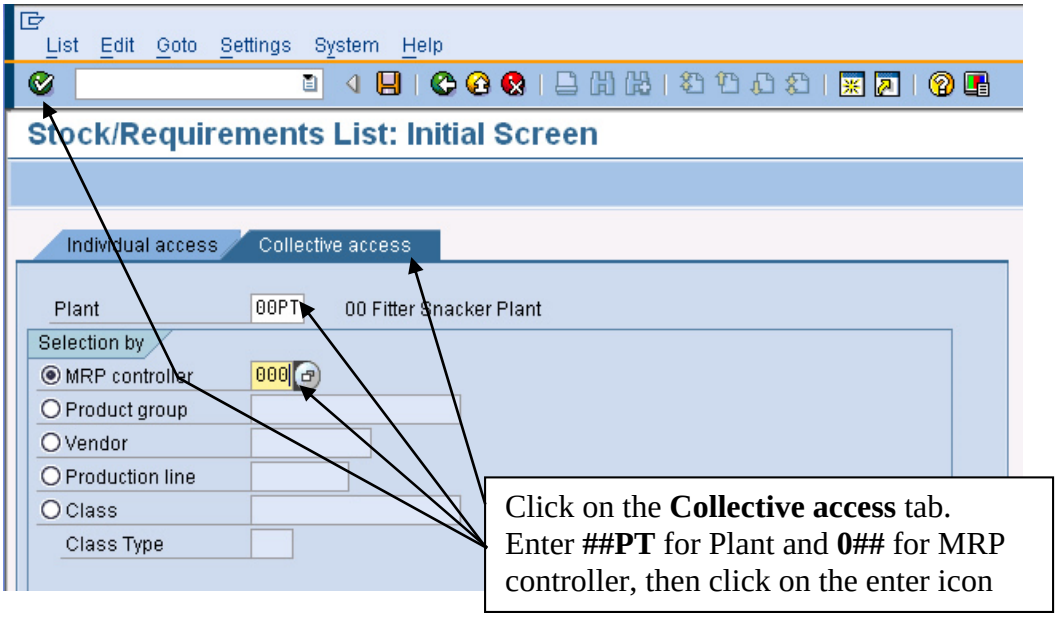
The details of your report may be different, but that is not a problem. As long as you don't have an error messages, things should be okay. To confirm that they are, we can check the status of key materials.

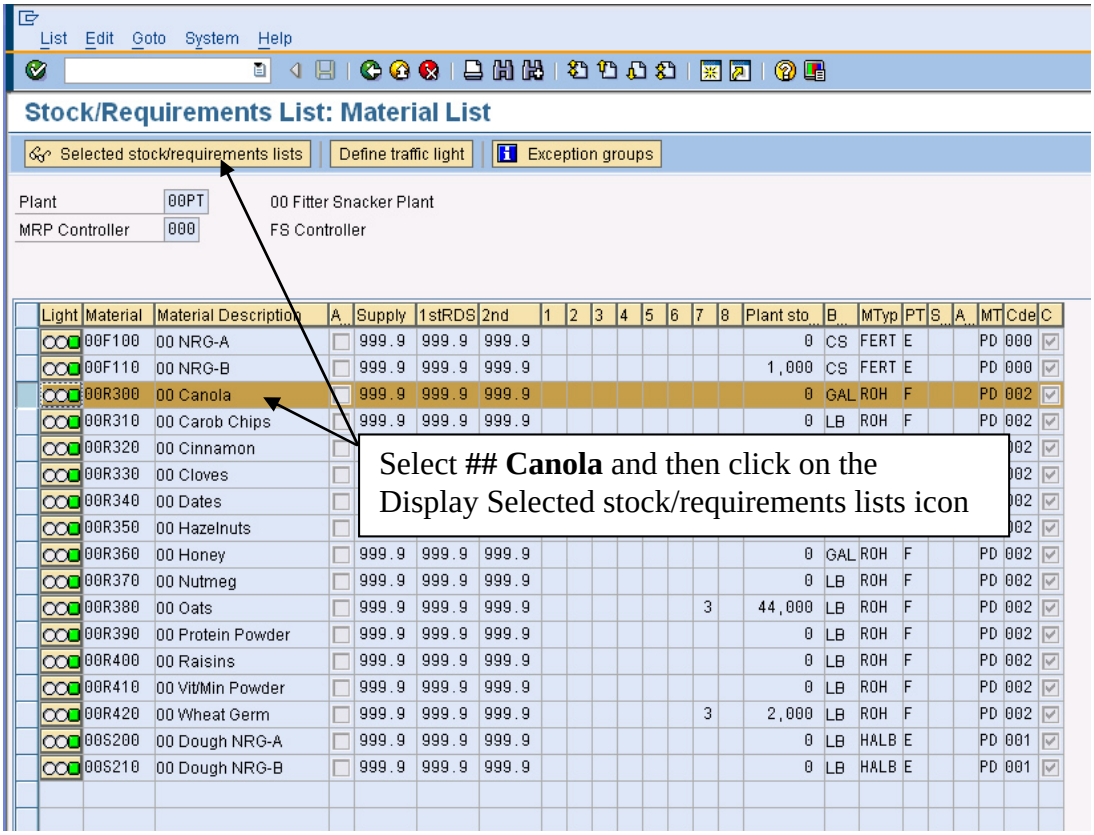
To view the status of a material, we can use the Stock/Requirements list. Like many transactions in the SAP system, there are a number of menu paths that can take you to the Stock/Requirements list. One of these is:

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

which will produce the following screen:

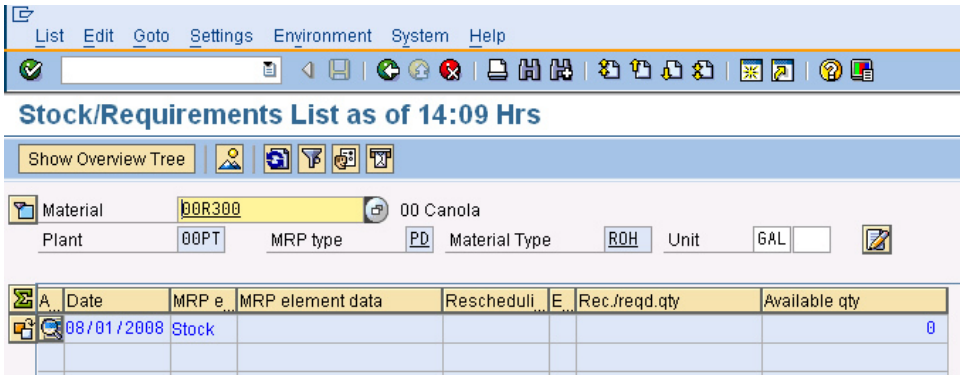
MRP



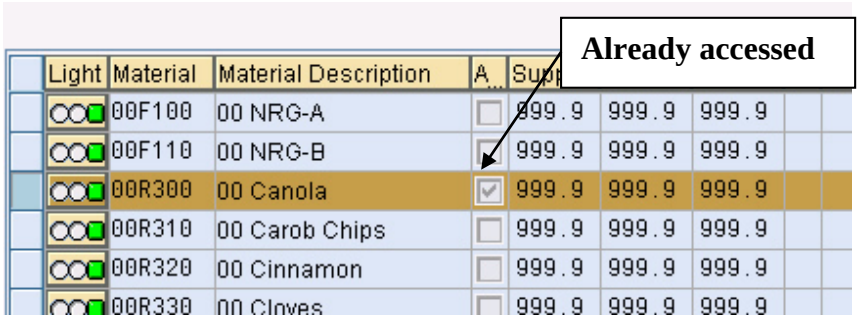


Light	Material	Material Description	A	Supply	1stRDS	2nd	1	2	3	4	5	6	7	8	Plant sto	B	MTyp	PT	S	A	MT	Cde	C
	00F100	00 NRG-A		999.9	999.9	999.9									0	CS	FERT	E			PD	000	
	00F110	00 NRG-B		999.9	999.9	999.9									1,000	CS	FERT	E			PD	000	
	00R300	00 Canola		999.9	999.9	999.9									0	GAL	ROH	F			PD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

MRP



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:**

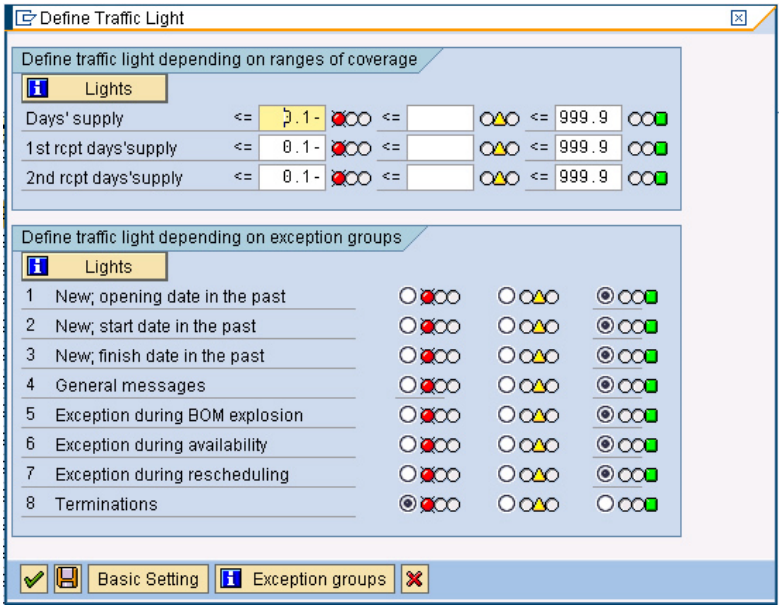


This feature helps the MRP controller keep track of which materials they have already reviewed. The traffic lights also help the MRP controller focus on critical materials. The traffic light concept is used in many areas of the SAP system to help the user prioritize tasks. In our case, the materials 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 (Define traffic light), which will produce the following:

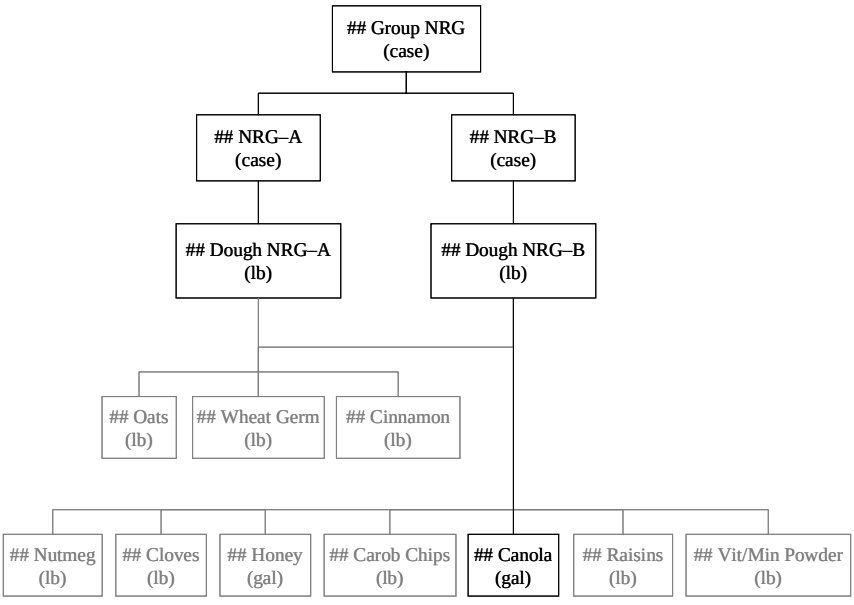
MRP



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



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

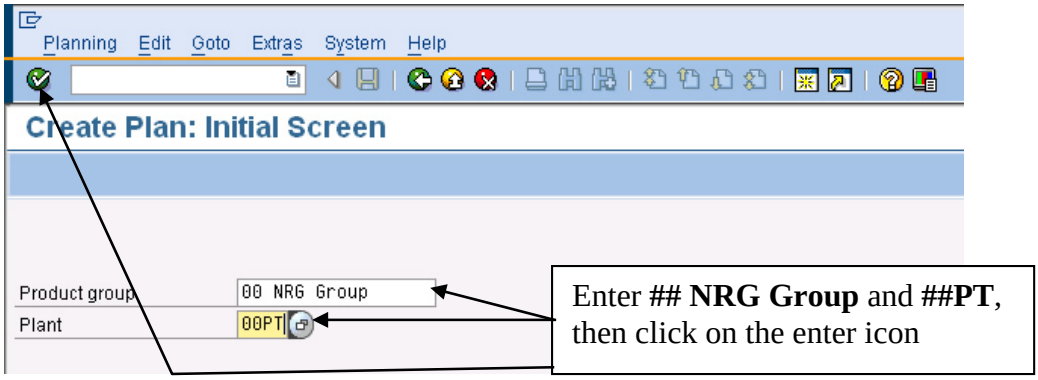
In SAP, the Sales and Operations Planning process is one way to create demand for the MRP process. In practice, Sales and Operations Planning is the process where operations and marketing agree on a demand forecast and a production plan to meet that demand. Ideally, this Sales and Operations Plan should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

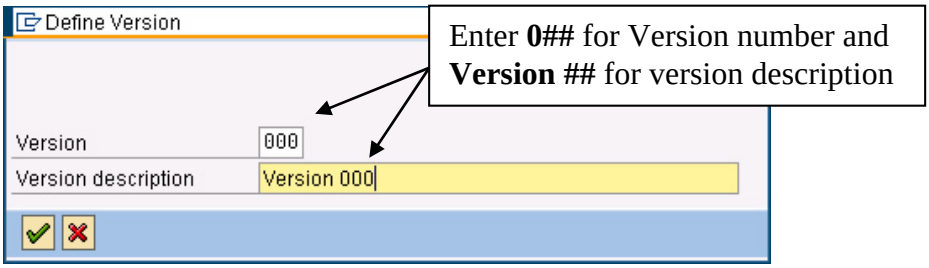
To perform Sales and Operations Planning, open a second session by following the pull-down menu path:

System→Create session

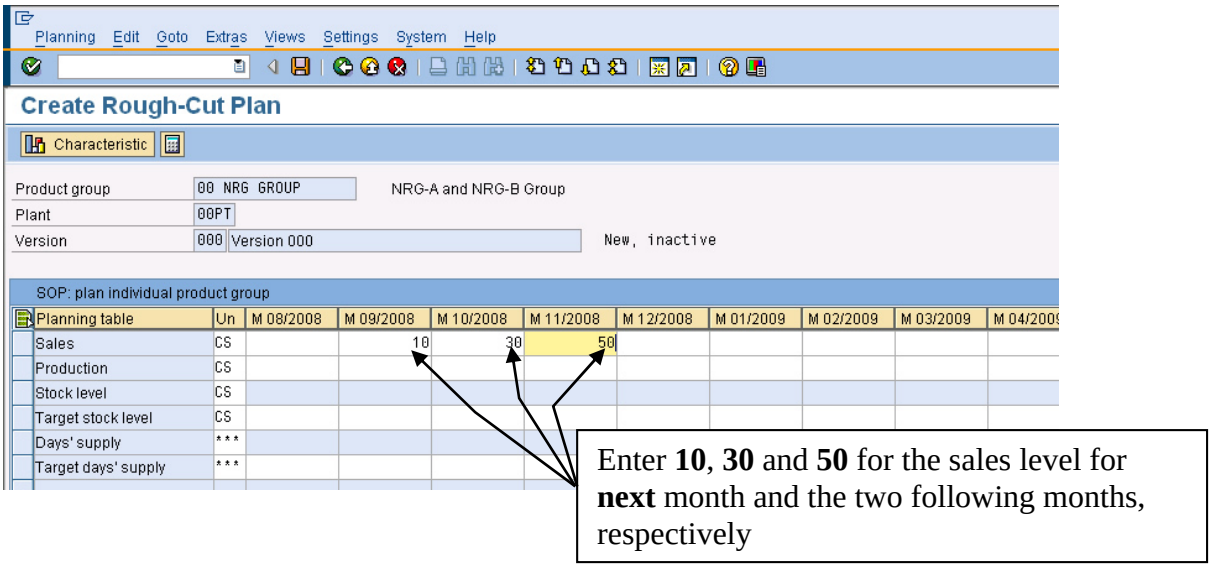
In this second session, follow the menu path:

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





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

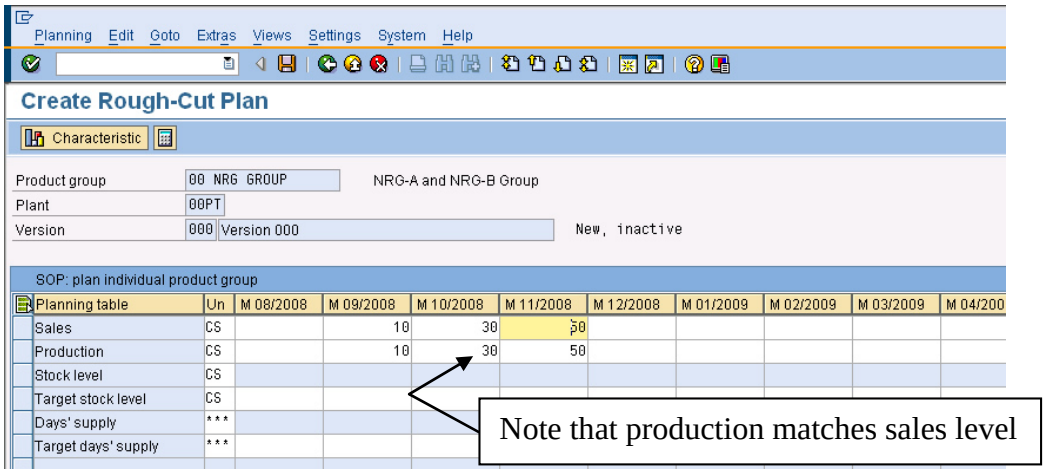


There are a number of ways to develop a sales forecast in the SAP ERP system, however, we'll just enter the values **10**, **30** and **50** as the sales level for **next** month and the two following months, respectively.

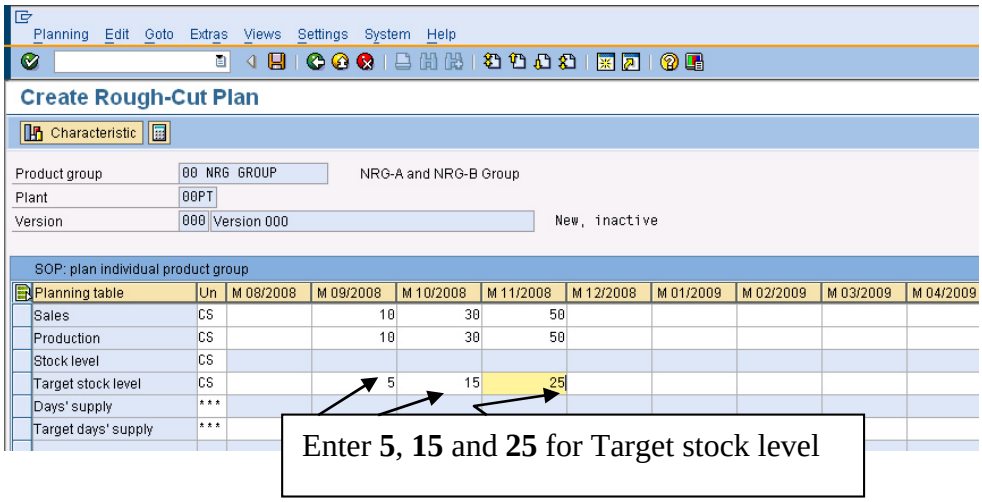
There are also a number of ways to develop a production plan—for example, we can have production match sales. To do this automatically, follow the pull-down menu path:

Edit→Create production plan→Synchronous to sales

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



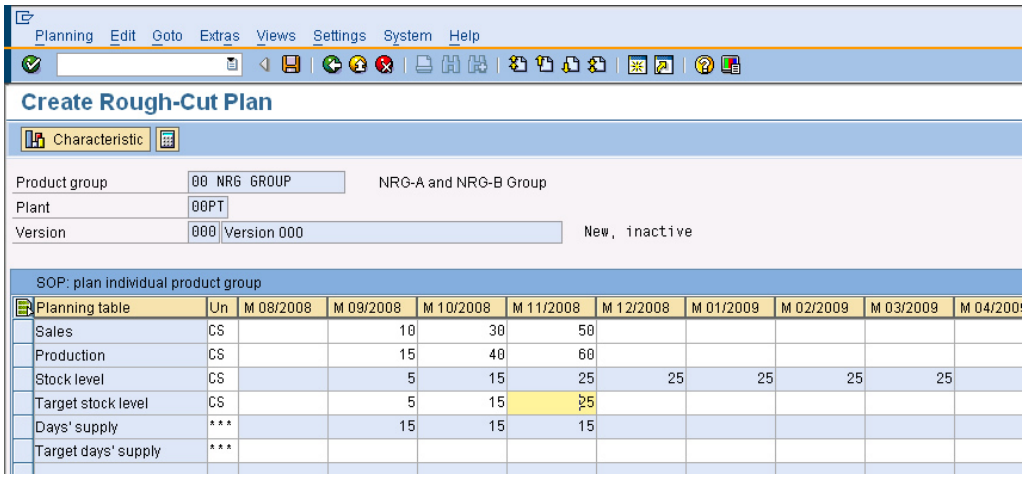
We can also develop a plan that allows for a safety stock—a stock level above the expected sales level.



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:

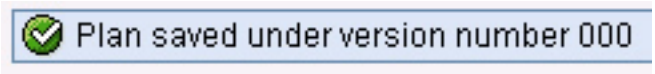


Note that the system calculates a production plan that will produce enough to meet the sales level and have the appropriate Target stock level. The system will also calculate the **Day's supply**, which is calculated as:

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

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

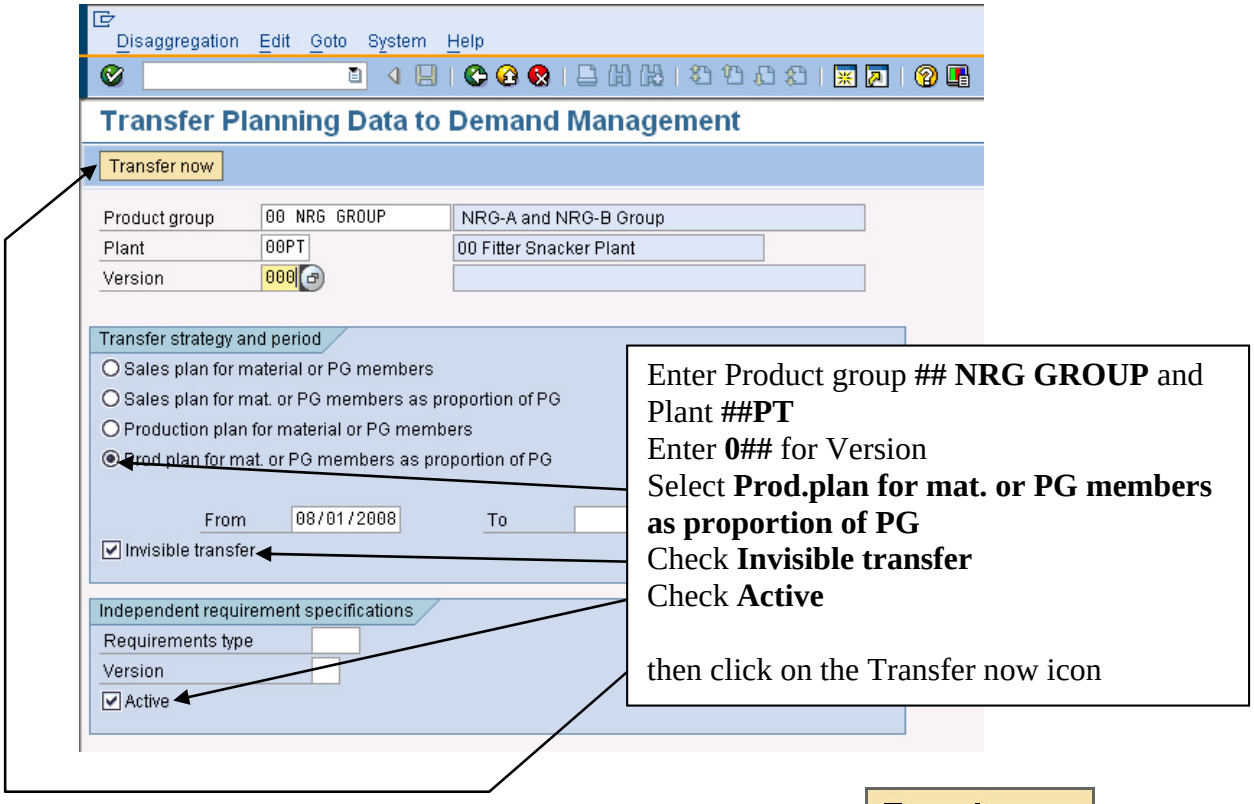
Click on the save icon ( ) to save the Sales and Operations Plan (SOP). You should get a message like the following:



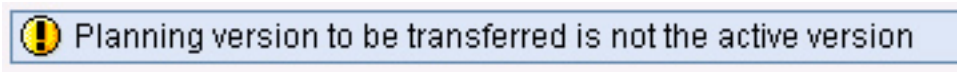
6. Transfer Sales and Operations Plan to Products

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

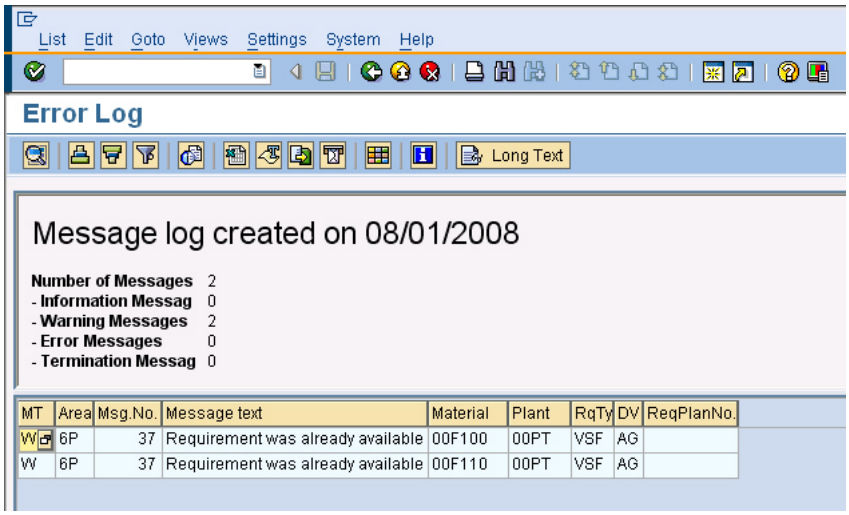


Enter the information shown above, then click on the **Transfer now** icon (Transfer now). This will produce the following screen:

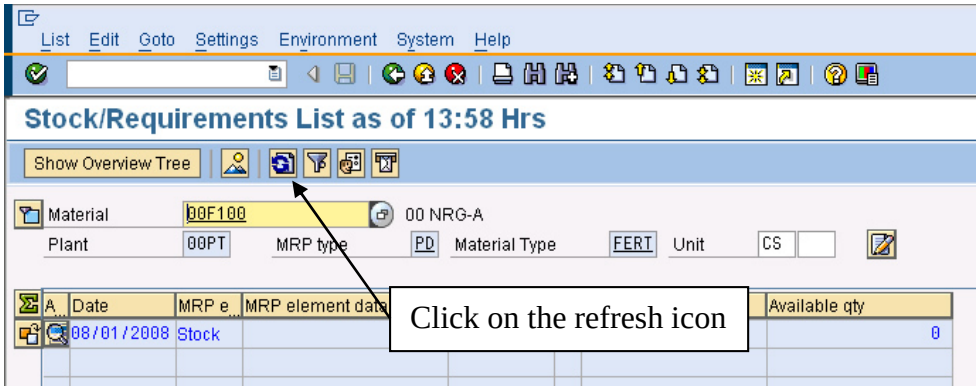


Double-check that you entered **0##** for the Version, then click on the enter icon ( ), which will produce the following message:

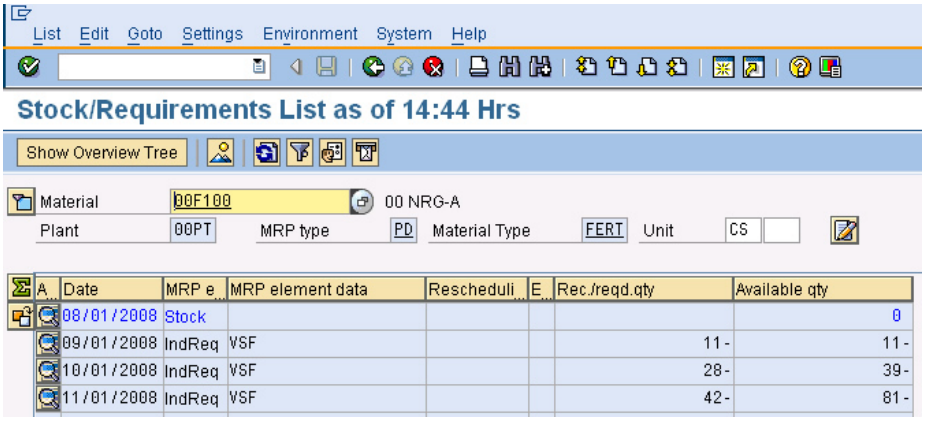
MRP



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:

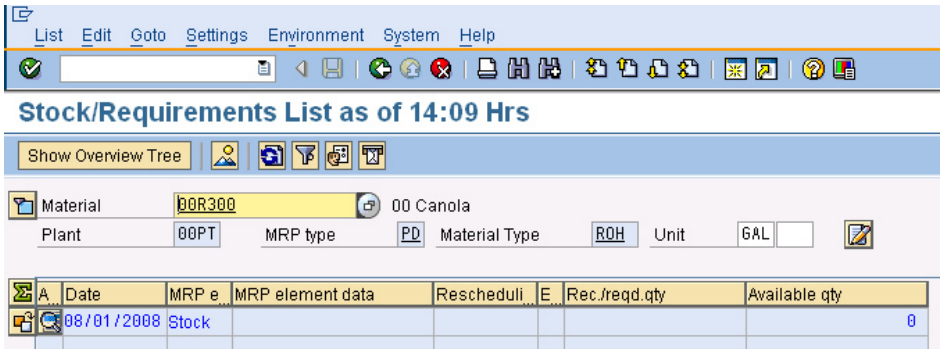


The results from transferring the Sales and Operations Plan are not yet displayed. To update the Stock/Requirements list, click on the refresh icon ( ):



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).

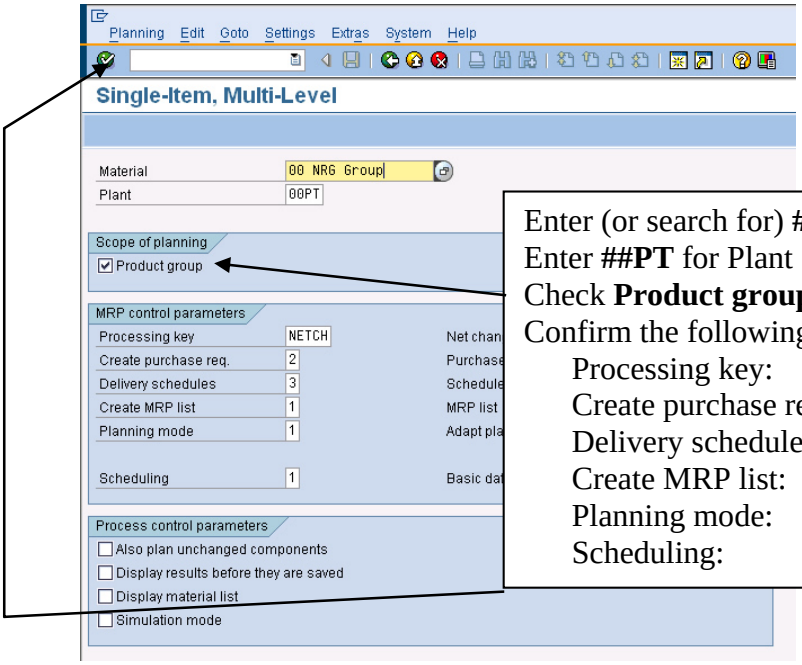
Check on **## Canola** to verify that it has remained unchanged:



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)

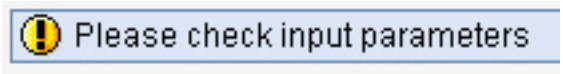


Enter (or search for) **## NRG GROUP** for Material
Enter **##PT** for Plant
Check **Product group** for Scope of planning
Confirm the following MRP control parameters:

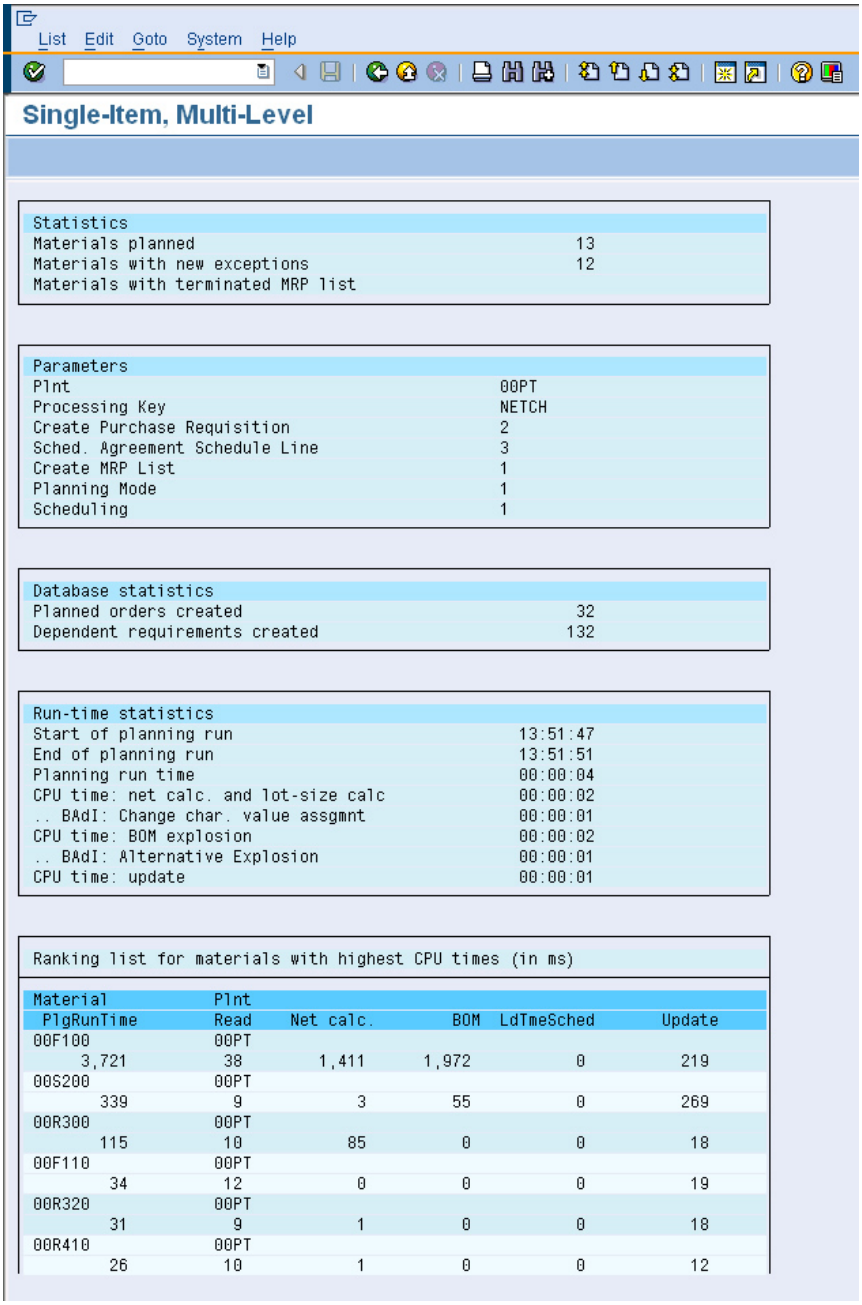
Processing key:	**NETCH**
Create purchase req.:	**2**
Delivery schedules:	**3**
Create MRP list:	**1**
Planning mode:	**1**
Scheduling:	**1**

MRP

Then click on the enter icon ( ). This will produce the following message:



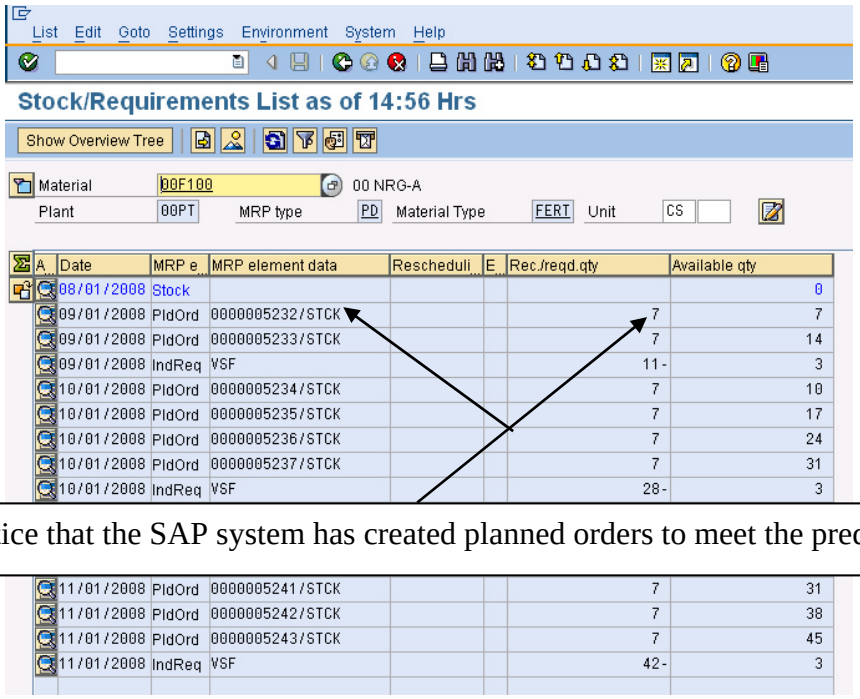
Click on the enter icon ( ) again and you should get a report like the following:



This message shows that, because of the demand we created in the SOP process, there have been a number of calculations made in the MRP process.

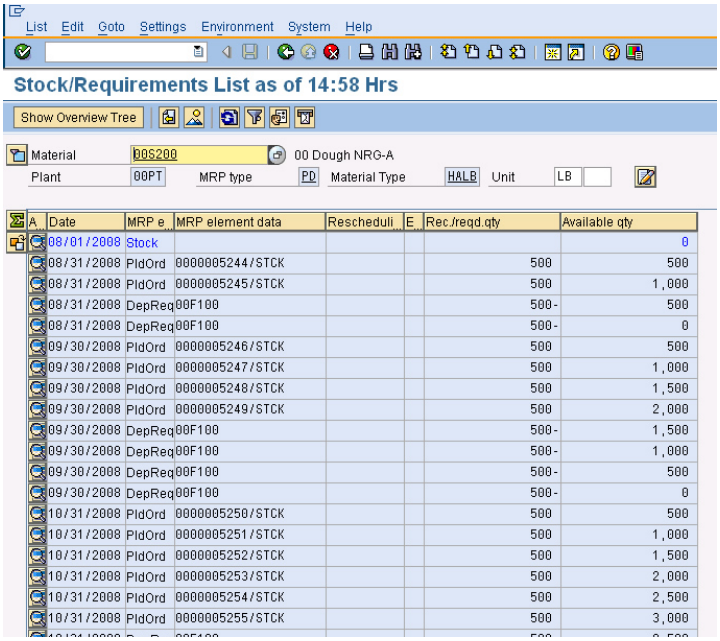
MRP

Switch to the session with the Stock/Requirements list, and look at the material **##F100** (NRG-A bars). Remember to use the refresh icon ( ):



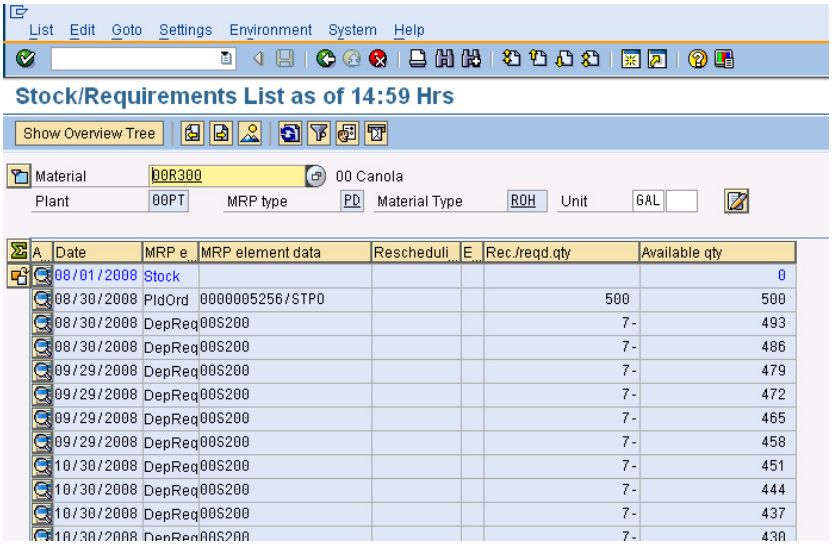
Notice that the SAP system has created planned orders to meet the predicted demand

Note that the SAP system has created production orders of 7 cases (which is the fixed lot size for NRG-A bars) to meet the demand. Check on the material **##S200** (dough for NRG-A bars) by entering the material number (##S200) and clicking on the refresh icon ( ):



MRP

As the dough has a lot size for dough is 500 lb., the SAP system has create planned orders in 500 lb. batches. Check on the material **##R300**, Canola:



A	Date	MRP e	MRP element data	Rescheduli	E	Rec./reqd.qty	Available qty
	08/01/2008	Stock					0
	08/30/2008	PldOrd	0000005256/STPO			500	500
	08/30/2008	DepReq	00S200			7-	493
	08/30/2008	DepReq	00S200			7-	486
	09/29/2008	DepReq	00S200			7-	479
	09/29/2008	DepReq	00S200			7-	472
	09/29/2008	DepReq	00S200			7-	465
	09/29/2008	DepReq	00S200			7-	458
	10/30/2008	DepReq	00S200			7-	451
	10/30/2008	DepReq	00S200			7-	444
	10/30/2008	DepReq	00S200			7-	437
	10/30/2008	DepReq	00S200			7-	430

Note that the SAP system has created a planned order for 500 gal. of Canola to meet the predicted demand.

Production Orders

Purchase Additional Raw Materials

To manufacture Snack Bars, we need to purchase the remaining raw materials. Previously, we created a purchase requisition, then used the requisition to develop a production order. This time, we will create a production order directly.

Note: We will only be purchasing and receiving the raw materials. We will not receive an invoice or make a payment to the vendor. Also, this section will only provide an overview of the purchase order process.

Please refer back to purchase order lab for any clarifications since these two labs are related.

1. Purchase Order Creation

To create a purchase order, follow the menu path:

Logistics ▷Materials Management ▷Purchasing ▷Purchase Order ▷Create ▷Vendor Unknown (ME25)

Use order type **NB** and purchasing group **##S**.

Enter the following materials, quantities and storage location:

Material	Description	Qty	Deliv. date	Storage Location (Sloc)
##R300	## Canola	1000	↑	100
##R310	## Carob Chips	1000	|	100
##R320	## Cinnamon	500	Two	100
##R330	## Cloves	500	Weeks	100
##R340	## Dates	1000	From	100
##R350	## Hazelnuts	1000	Today	100
##R360	## Honey	500	|	100
##R370	## Nutmeg	500	|	100
##R390	## Protein Powder	2000	|	100
##R400	## Raisins	1000	|	100
##R410	## Vit/Min Powder	500	↓	100

For the units of each material, see the screen on page 91. For plant enter ##PT for all items. After entering information for one row, **hit the enter key**.

Select all items, and then click on **Assign Supply Source**. On the screen that comes up, choose any vendor you wish by clicking on the row for it (but use the same source for all materials to simplify the receiving process). After selecting a vendor, click the check box on the bottom left. You will repeat the supply source selection in this way for each material separately.

Select all items again (by clicking the first icon on the screen menu above) and then click on Generate Purchase order (red and white circle in the menu).
Click on the item **Open requisitions** under your vendor in the vertical window on the left, then click the **Adopt** ( ) icon (the second icon in the menu above). Save the purchase order, ignoring any system messages. You should receive a message at the bottom of the screen to the effect that a standard PO was created. **Note down this PO number.**

2. Create a Goods Receipt

To create a goods receipt, follow the menu path:

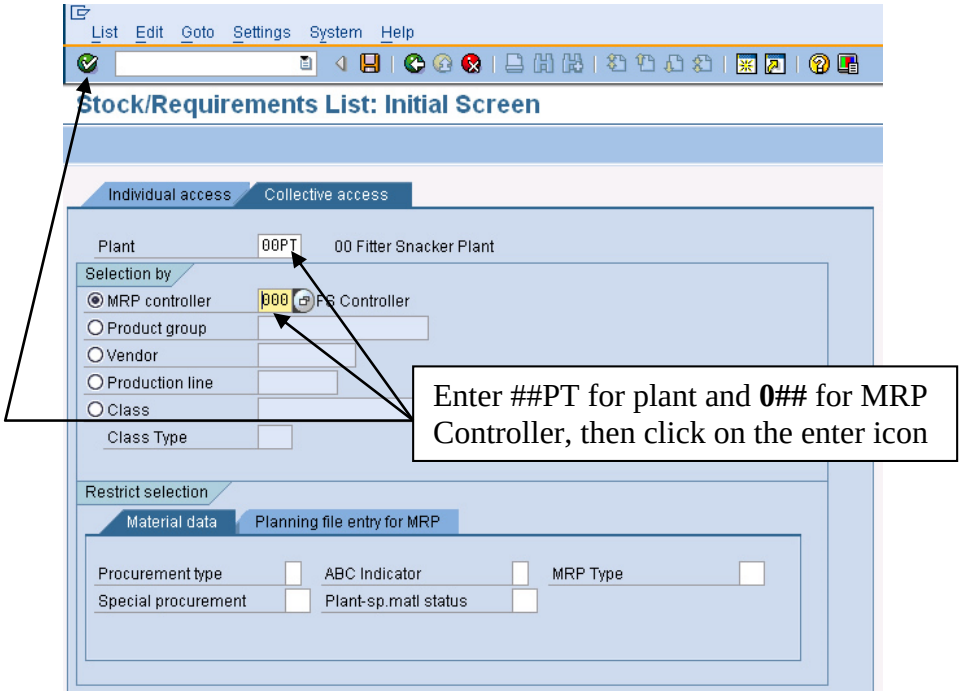
Logistics ▷Materials Management ▷Inventory Management ▷Goods Movement ▷Goods Receipt ▷For Purchase Order ▷GR for Purchase Order (MIGO)

Search for your purchase order, then click on the enter icon to call up the materials on the purchase order. Click on the check mark for every item in the purchase order (under the OK column or at the bottom of the screen), then click on the **Post** icon. You should get a message to the effect that the material document was posted.

3. Check Material Levels

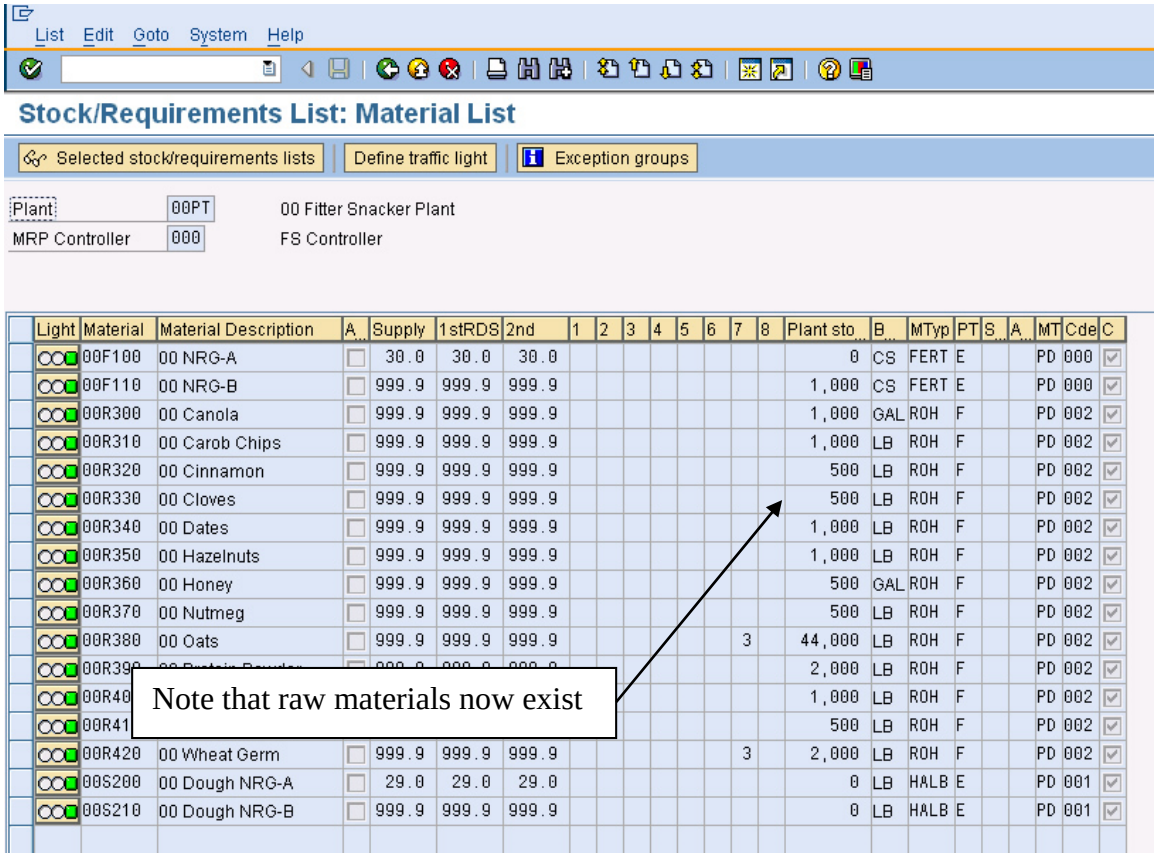
To view the Stock/Requirements list, follow the menu path:

Logistics ▷Production ▷MRP ▷Evaluations ▷Stock/Requirements List Collective Display



Production Orders

Enter **##PT** for the plant and **0##** for MRP Controller, then click on the enter icon to produce the following screen:

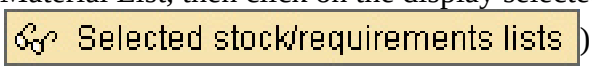


Light	Material	Material Description	A	Supply	1stRDS	2nd	1	2	3	4	5	6	7	8	Plant sto	B	MTyp	PT	S	A	MT	Cde	C
	00F100	00 NRG-A		30.0	30.0	30.0									0	CS	FERT	E			PD	000	
	00F110	00 NRG-B		999.9	999.9	999.9									1,000	CS	FERT	E			PD	000	
	00R300	00 Canola		999.9	999.9	999.9									1,000	GAL	ROH	F			PD	002	
	00R310	00 Carob Chips		999.9	999.9	999.9									1,000	LB	ROH	F			PD	002	
	00R320	00 Cinnamon		999.9	999.9	999.9									500	LB	ROH	F			PD	002	
	00R330	00 Cloves		999.9	999.9	999.9									500	LB	ROH	F			PD	002	
	00R340	00 Dates		999.9	999.9	999.9									1,000	LB	ROH	F			PD	002	
	00R350	00 Hazelnuts		999.9	999.9	999.9									1,000	LB	ROH	F			PD	002	
	00R360	00 Honey		999.9	999.9	999.9									500	GAL	ROH	F			PD	002	
	00R370	00 Nutmeg		999.9	999.9	999.9									500	LB	ROH	F			PD	002	
	00R380	00 Oats		999.9	999.9	999.9							3		44,000	LB	ROH	F			PD	002	
	00R390	[illegible]		[illegible]											2,000	LB	ROH	F			PD	002	
	00R40														1,000	LB	ROH	F			PD	002	
	00R41														500	LB	ROH	F			PD	002	
	00R420	00 Wheat Germ		999.9	999.9	999.9							3		2,000	LB	ROH	F			PD	002	
	00S200	00 Dough NRG-A		29.0	29.0	29.0									0	LB	HALB	E			PD	001	
	00S210	00 Dough NRG-B		999.9	999.9	999.9									0	LB	HALB	E			PD	001	

You should now have inventory on hand for all raw materials.

4. Create Production Order for ## Dough NRG-A

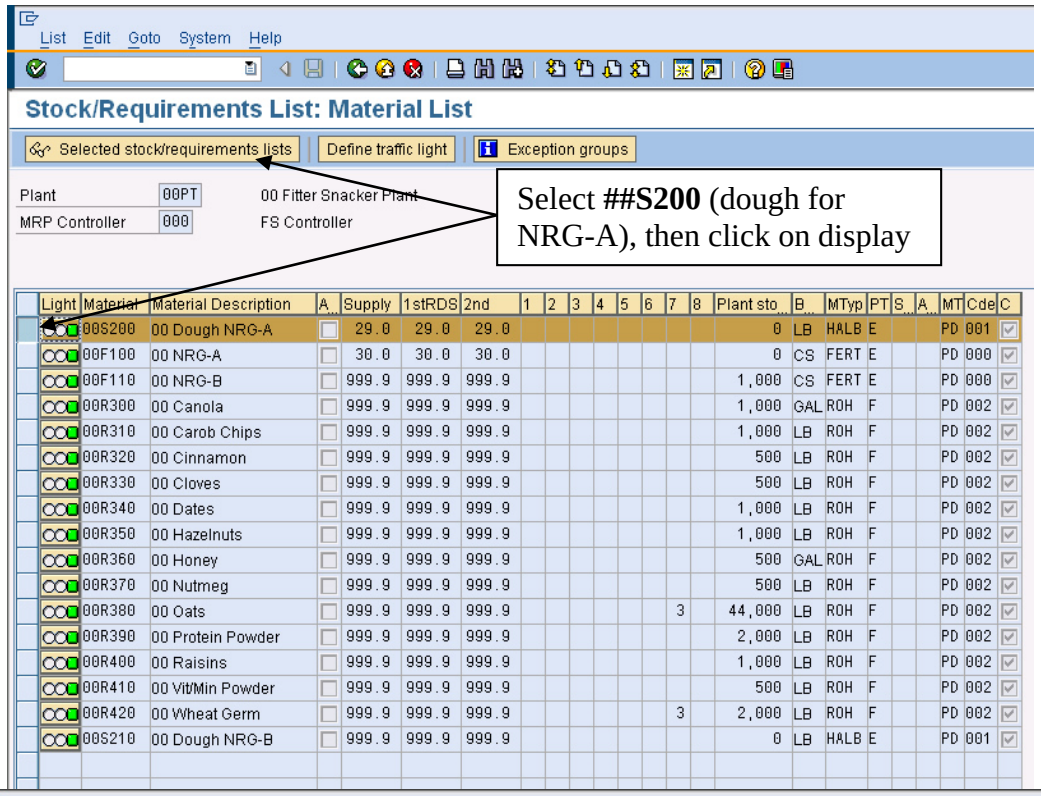
The MRP system merely suggests production orders to the scheduler, which is why they are called **planned orders**. To create a production order, the planned order must be converted. To do this, select the material **##S200** (dough for NRG-A bars) in the Stock/Requirements list: Material List, then click on the display selected Stock/Requirement lists icon (

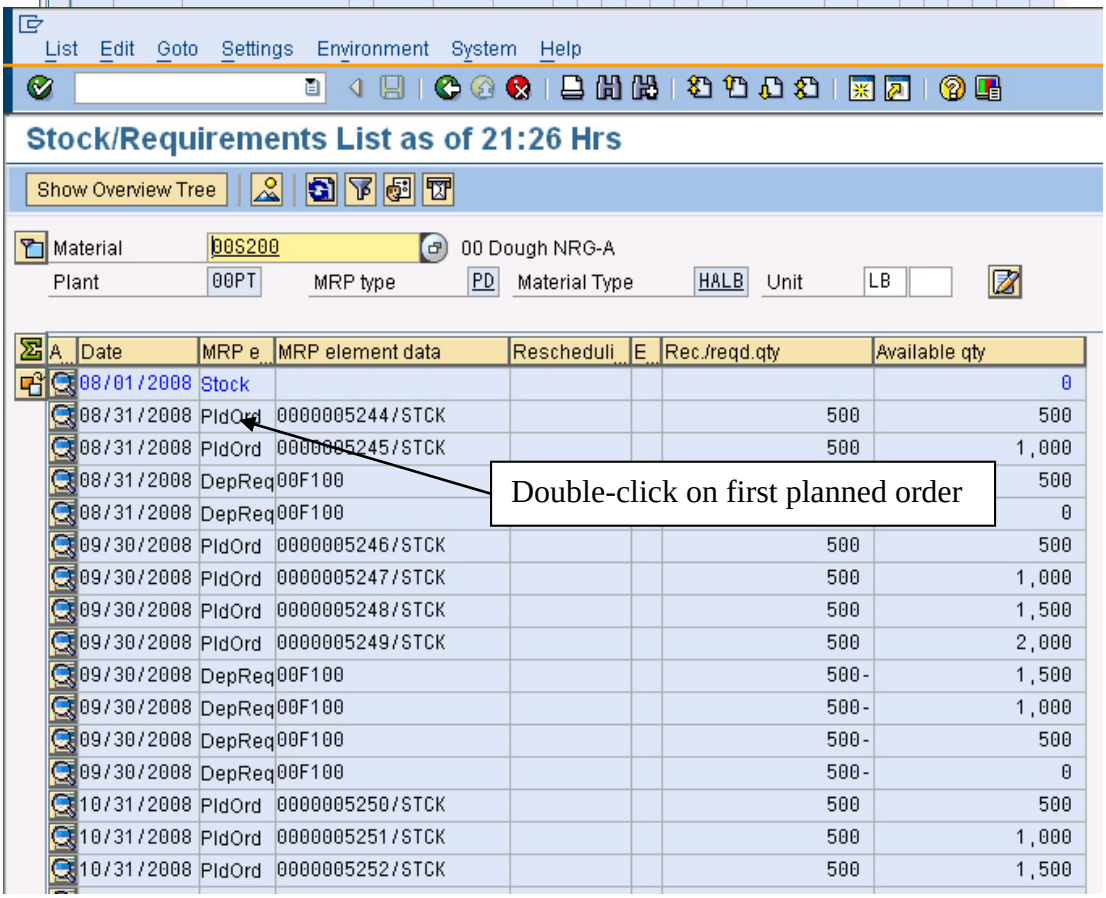


):

Note that all display buttons in SAP are accompanied with the picture of a pair of reading glasses

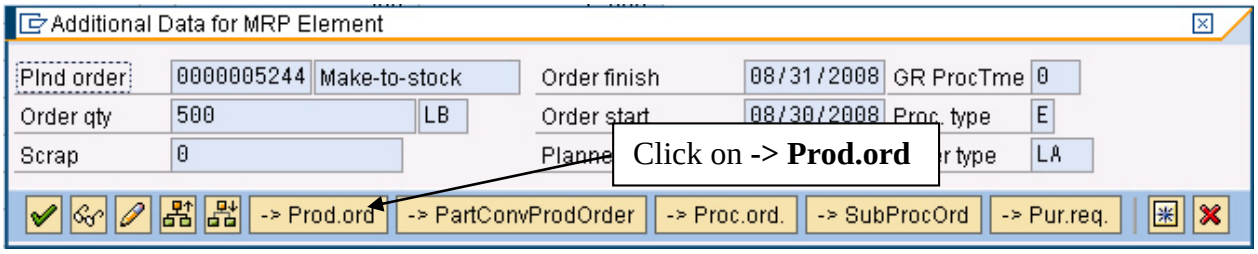
Production Orders



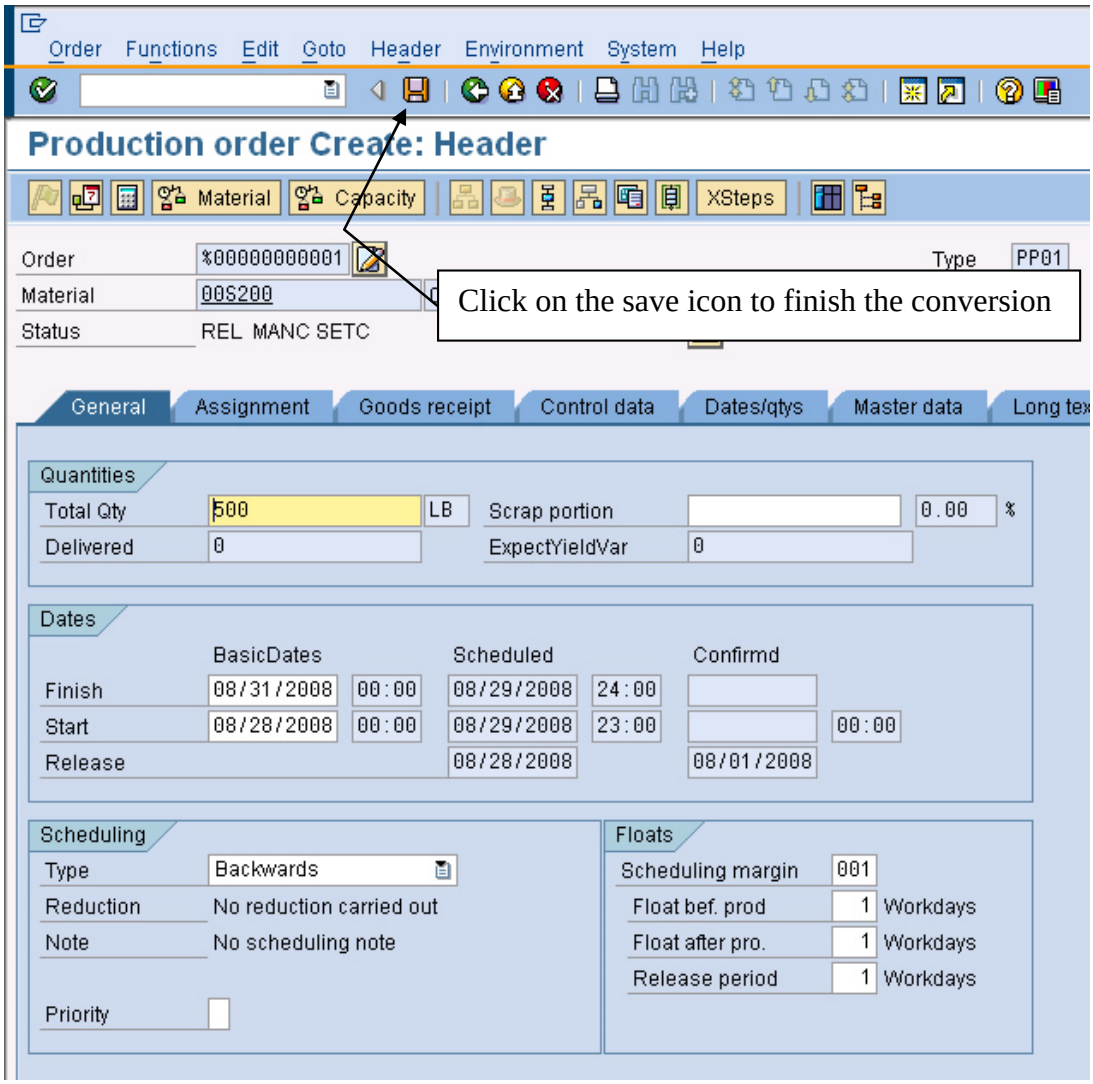


Production Orders

Double-click on the first planned order, which should bring up the following screen:

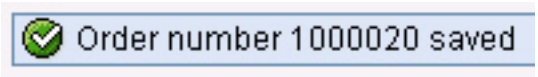


Click on the Prod.Ord button (that converts planned orders to production orders) Icon (-> Prod.ord), which will produce the following screen:

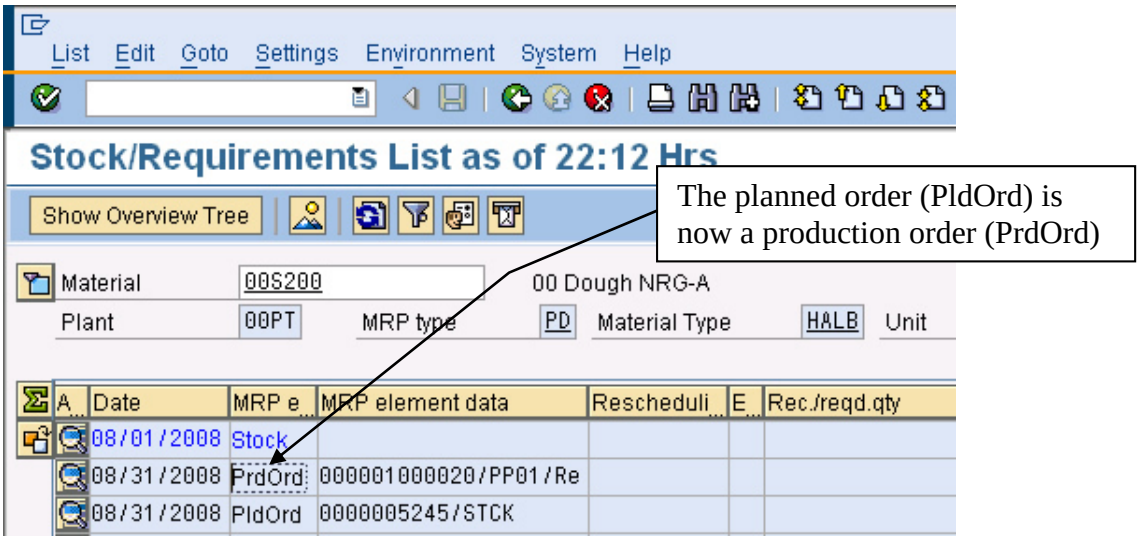


Production Orders

You should get a message like the following:



Switch back to the Stock Requirements list. Click on the refresh icon ( ) to see the production order:



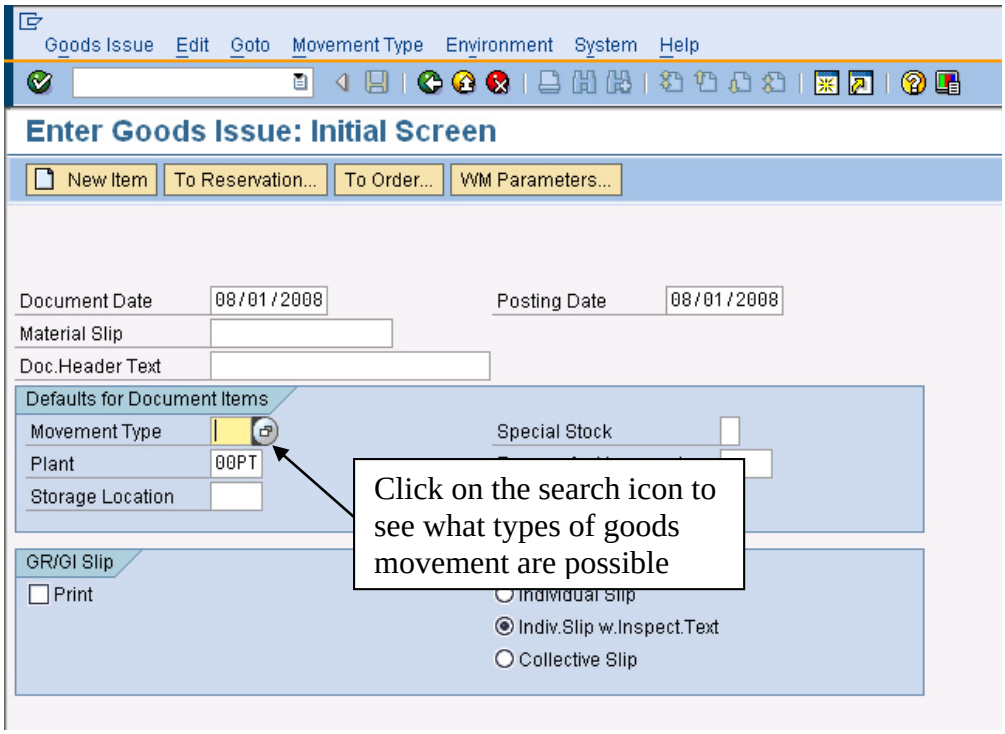
5. Goods Issue

To complete the production order for ## Dough NRG-A, we need to issue the raw materials that make up the dough so they can be taken to the mixer and mixed into dough. To issue good (raw materials) to the production order, follow the menu path:

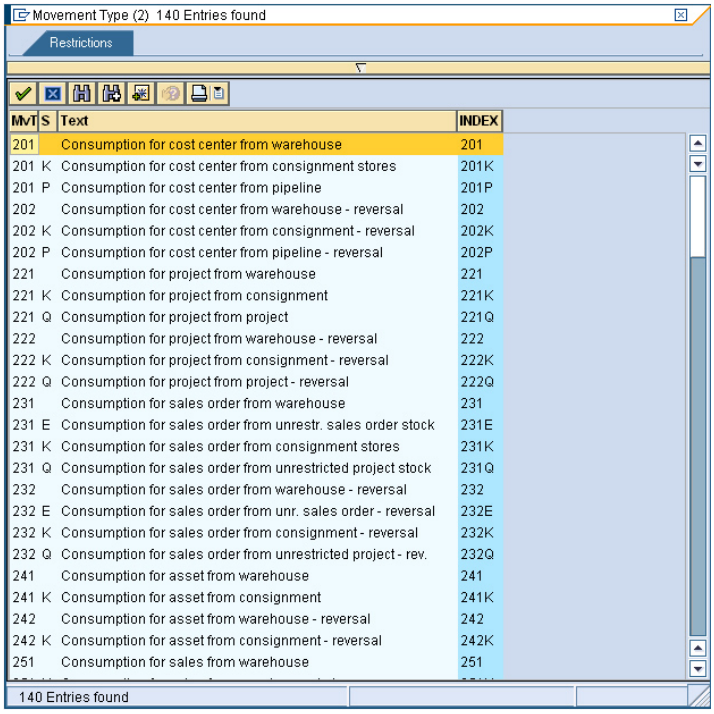
Logistics ▷Production ▷Shop Floor Control ▷Goods Movement ▷Goods Issue (MB1A)

which will produce the following screen:

Production Orders

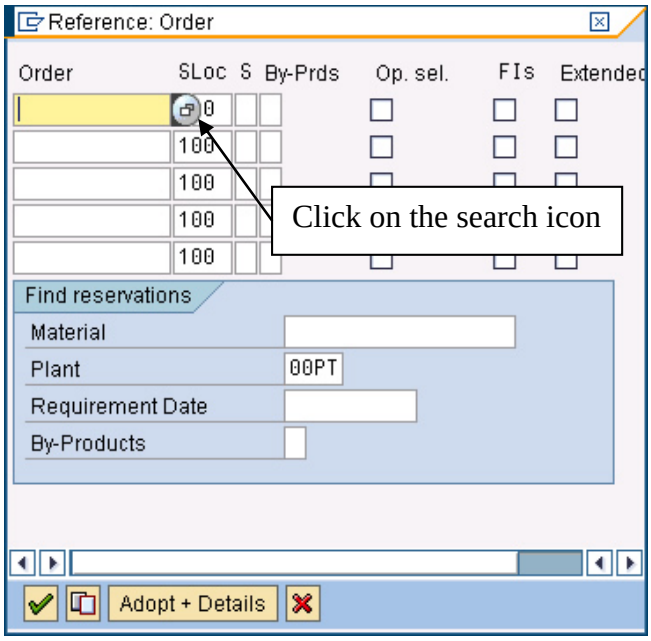


Now, you will see the types of goods movements possible:



Production Orders

There are a lot of types of goods movements allowed by the SAP system. Select movement type **261 (goods issue to consumption for order from warehouse)**. Enter storage location **100**, then click on the To order icon (To Order...):



This will call up the following search screen: