Capacity Planning in MPS and MRP

Release 4.6C
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Capacity Planning in MPS and MRP

Capacity leveling in MPS and MRP [Page 6]
Executing capacity planning (MPS/MRP) [Page 9]
The task of material requirements planning is to guarantee material availability. The system calculates which materials must be procured or produced at what time and in what amounts so as to provide the quantities required.

Using MPS you can carefully plan important parts or bottleneck parts in a separate planning run at the highest BOM level before the planning results have an effect on all of the production levels.

Lead time scheduling and the calculation of capacity requirements in MRP and MPS provide the basis for the creation of a master plan that corresponds to capacity planning. This way the MRP controller obtains information about possible bottlenecks and overloads. Before the master plan becomes effective and the planning results affect subordinate BOM levels, the MRP controller can make changes that affect capacity for chosen materials.

**Scheduling**

Before capacity planning can take place you must create capacity requirements within lead time scheduling, that is, determine the production dates. The system only generates capacity requirements if it executes lead time scheduling using the times specified in the routing. Scheduling in MRP and MPS determines the basic dates and the production dates for the planned order. The basic dates define the earliest and latest dates for production. The production dates use the times in the routing to determine the start and finish of production as well as of the individual operations.

You can find more details in:

- Determining basic dates [Page 7]
- Lead time scheduling [Page 8]
Determining Basic Dates

The system carries out a planning run that uses the requirements date to determine the basic order dates. The basic order dates are calculated to the exact day.

The system carries out backward scheduling to determine the basic dates. It starts from the finish date and calculates backwards using the goods receipt processing time and the in-house processing time maintained in the material master and thus calculates the basic start date.

If backward scheduling generates a basic date in the past then the system automatically switches to forward scheduling and sets the current date as the basic start date. You can deactivate the automatic switch to forward scheduling for each plant in Customizing for MRP. Then the system executes backward scheduling even if a basic start date was calculated that starts in the past.
Lead Time Scheduling

Lead time scheduling can be carried out in a second step. Lead time scheduling calculates the concrete production dates. The system uses the times in the routing to carry out lead time scheduling.

Condition

To carry out scheduling and to generate capacity requirements various parameters must be set in Customizing.

You can find information on settings in Customizing necessary for carrying out capacity leveling in MRP and MPS in Settings and profiles for capacity leveling [Ext.].

Scope of functions

In backward scheduling, the system first calculates backwards from the order finish date through the float after production to the production finish date. After this the individual operation dates are calculated backwards, starting from the last operation finish date. The first operation start date gives the start of production.

In forward scheduling the system starts from the current date and calculates through the float before production into the future. Then the individual operation dates are calculated starting from the first operation finish date and working forwards into the future.

You can specify whether lead time scheduling is to be carried out forwards or backwards in the parameters for detailed scheduling in Customizing for capacity planning or in Customizing for MRP.

In lead time scheduling there are three scheduling levels available for capacity planning:

- Detailed scheduling
- Production-rate scheduling
- Rough-cut scheduling

With detailed scheduling you usually use the routing to carry out scheduling and capacity requirements planning for a BOM level. The lead time is divided up into the operation segments: setup, processing and teardown.

Production-rate scheduling is implemented in repetitive manufacturing. Production-rate scheduling is based on the times for the rate routing and is also carried out for a BOM level.

Rough-cut scheduling is based on the scheduling data in the rough-cut planning profiles and at a higher planning level (SOP) provides an initial overview of the capacity situation. The rough-cut planning profile represents a cumulation of the overall BOM structure.

You can find more information on scheduling levels, their setting in Customizing and on setting the scheduling parameters in Parameters for scheduling and calculating capacity requirements [Ext.].

You will find more information in the document PP - Material Requirements Planning.
Carrying out Capacity Planning (MPS/MRP)

You can carry out capacity planning in three different ways, depending on the function called up:

- From within planning as capacity leveling
- From the evaluation “current stock/requirements list” as the capacity situation
- From within planned order processing as the capacity check

Capacity leveling makes it possible to check individual work centers for overloads and if necessary to dispatch planned orders at other times or with other quantities.

The capacity situation also provides an overview of available capacity and the load for the individual work centers, but you cannot dispatch planned orders differently from within the capacity situation.

The capacity check from within planned order processing checks whether overloads may occur for the work center(s) selected, which might endanger production of the planned order. It is only if there are overloads that the system branches to capacity leveling to make changes there.

Leveling in planned order processing is only possible when creating or changing an order. When displaying the planned order the system branches to the capacity situation.

In the capacity planning table you can dispatch the capacity requirements for detailed planning continuously through time and for specific operations.

You can find out from which functions you can call up capacity leveling, the capacity situation, the capacity check or the planning table in:

- Capacity leveling or capacity situation [Page 10]
- Capacity check [Page 31]
- Capacity planning table [Page 33]

You can find more details in:

- Calling up capacity leveling [Page 17]
- Calling up capacity situation [Page 29]
- Carrying out capacity check [Page 32]
Capacity Leveling or Capacity Situation

In MRP or MPS data is displayed in two lists in which the planning periods are shown on a vertical axis.

- Capacity leveling
- Capacity situation

The capacities are displayed in the same way in both lists. However, whereas you can change data in the capacity leveling list and carry out capacity leveling, you can only display data in the capacity situation.

You can call up the capacity situation or capacity leveling for all planned orders for one material or just for a single planned order. In the following graphic the capacity situation was called up for one planned order.

The following data is displayed for a work center for specific periods:

- Available capacity at the work center in a period
- Total capacity load at the work center caused by all planned/production orders in a period
- Capacity requirements in a period for the material for which a planning run has been carried out

If the capacity situation or capacity leveling has been called up for a planned order then the capacity requirements for the planned order in a period is also displayed.
If the material is processed at several work centers then you can display the data for the various work centers sequentially.

By changing the order quantity and the basic finish date you can reduce under- and overloads at a given work center.

You can call up capacity leveling or the capacity situation from within the following functions:

- Master production scheduling:
  - from the planning result of single-item planning
  - from the planning result of interactive planning
  - from planned order processing
  - from the stock/requirements list

- Material requirements planning:
  - from the planning result of single-item planning
Capacity Planning in MPS and MRP

Capacity Leveling or Capacity Situation

- from planned order processing
- from the current stock/requirements list

- Long-term planning
  - from the planning result of single-item planning
  - from the current stock/requirements list

You can find information on accessing functions, from which you can carry out capacity leveling or check the capacity situation, in

Carrying out single-item planning [Page 13]
Carrying out interactive single-item planning [Page 14]
Planned order processing [Page 15]
Current stock/requirements list [Page 16]
Executing Single-Item Planning

For **single-item planning**, proceed as follows:

1. In the initial screen for planning specify the indicator for lead time scheduling and capacity planning in the field *Scheduling*.
2. Select the field *Display result*.
3. Press ENTER, and check the input parameters.
4. Press ENTER.

You reach the results screen of single-item planning.
Starting from the results screen you can carry out capacity planning with capacity leveling.
Executing Interactive Single-item Planning

For interactive single-item planning proceed as follows:

1. In the initial screen for planning specify the indicator for lead time scheduling and capacity planning in the field *Scheduling*.
2. Press ENTER and check the input parameters.
3. Press ENTER.
   You reach the initial screen for interactive single-item planning.
   Starting from the results screen you can carry out capacity planning with capacity leveling.
Planned Order Processing

In **planned order processing** starting from the MRP or MPS menu, choose *Planned order → Create* or *Planned order → Change* or *Planned order → Display*.

You reach the header of the planned order. From here, either when creating or changing, you can carry out a capacity check or, if necessary, capacity leveling. In display mode you can also carry out a capacity check. If there is an overload then the system branches to the capacity situation, that means that you cannot carry out any changes.
Current Stock/Requirements List

For the current stock/requirements list, proceed as follows:

Choose...

- Starting from the menu for requirements planning: Evaluations → Stock/reqmts list or
- Starting from the menu MPS: Evaluations → Stock/reqmts list or
- Starting from the menu Long-term planning: Evaluations → Stock/reqmts list.

You reach the current list of the MRP elements for the chosen material.

You can call up the capacity situation from here, if lead time scheduling is being carried out in the planning run for the material in question.
Calling up Capacity Leveling

Capacity leveling gives you an overview of available capacity and the capacity load either from the point of view of the material in question or specifically for individual planned orders. In capacity leveling planned orders can be changed both in terms of dates and quantities.

Firstly, you can choose from within the planning result, whether capacity leveling is to be called up from a material-related point of view, that means for all dispatched planned orders or for a specific planned order as the order view.

Secondly, you can carry out capacity leveling in planned order processing directly for the selected planned order. Here the order view is called up.

The material view displays a list of the periods when capacity requirements arose with the available capacity for these periods and the requirements from a material view. You are able to change individual planned orders after the capacity check.

The order view adds the capacity requirements of the individual planned orders to the material view. The order view is carried out for one specific planned order so that this planned order can be shifted if necessary.

You can find more details in:

Executing capacity leveling for the material view [Page 18]
Executing capacity leveling for the order view [Page 19]
Functions in capacity leveling [Page 20]
Executing Capacity Leveling from the Material View

1. In the screen displaying the results of single-item planning or interactive single-item planning, choose Goto → Capacity planning → Capacity leveling → For material.

   You reach the dialog box Settings for capacity planning, if you have not previously specified parameters for capacity planning.

2. Select the desired planning type and the period type for capacity planning. Choose a view period, if necessary. Press the function key Continue.

   The system determines the work centers and the capacity categories affected and schedules them according to the chosen planning type.

3. If errors arose during scheduling, you get an overview of the scheduling errors relating to the planned order in the dialog box Scheduling errors. From here, you can directly check the details of the scheduling errors in the scheduling log. To do this press the function key Log.

4. Press the function key Continue. You branch to capacity leveling.

   The system displays the capacity situation for one work center and one capacity category as well as the capacity unit from the work center. Note the following: If a planning work center is entered in the routing on the detail screen for the routing header then this work center is displayed first of all with the relevant capacity category, otherwise the selection takes place arbitrarily.

   Besides, the system displays the following data:

   - material number, short text and plant of the material to be processed
   - the available capacity
   - the overall capacity requirements at the work center selected
   - the capacity requirements of the material

   the system highlights periods with overload.
Executing Capacity Leveling from the Order View

1. Select the planned order with a double-click on the results screen for single-item planning or interactive single-item planning. Choose *Goto → Capacity planning → Capacity leveling → For order.*
   In the header of the planned order, select *Goto → Capacity leveling.*
   You reach the dialog box *Settings for capacity planning,* if you have not previously specified parameters for capacity planning.

2. Select the desired planning type and the period type for capacity planning. Choose a view period, if necessary. Press the function key *Continue.*
   The system carries out scheduling using the parameters set in Customizing.

3. If errors occur during scheduling, you get an overview of the errors relating to those planned orders affected. From here, you can directly check the details of the scheduling errors in the scheduling log. To do this press the function key *Log.*

4. Press the function key *Continue.* The system displays the evaluation of the capacity situation.
   The system displays the capacity situation for one work center and one capacity category as well as the capacity unit from the work center. Note the following: If you have entered a planning work center (task list header) in the task list, then this work center is displayed first with the corresponding capacity category, otherwise the selection occurs at random. The system also displays the following data:
   - order number, order quantity and basic finish date
   - the available capacity
   - the overall capacity requirements at the work center selected
   - the capacity requirements of the material
   - the capacity requirements for the planned order selected
   The system separately marks capacity loads generated by the planned order.
Functions in Capacity Leveling

The following functions are available to you in capacity leveling:

- Selecting capacities [Page 21]
- Executing the overload check [Page 22]
- Displaying maximum load and selection of overload periods [Page 23]
- Displaying scheduling data [Page 24]
- Detail display of pegged requirements [Page 25]
- Displaying all planned orders for the material [Page 26]
- Displaying capacity planning material view [Page 27]
- Capacity planning order view [Page 28]
- Branching to the capacity planning table [Page 34]
Selecting Capacities

You can check the capacity situation for all work centers and the capacity categories maintained there.

If you want to display another capacity, that is another work center or another capacity category, press the function key Capacity.

You reach the dialog box Capacities. The system lists all those work centers along with the capacity categories maintained there, at which capacity requirements for the material have arisen. The system displays the maximum load for every capacity category.

To select another work center or another capacity category, place the cursor on the desired capacity category and press the function key Choose.
Executing the Overload Check

To display the overload for individual work centers (capacity categories), proceed as follows:

1. Press the function key Capacities.
   You get to see the dialog box Capacities with a list of the work centers and capacity categories for the material selected.
   It shows the maximum load for every capacity category, that means the absolute value for the maximum load. If the value exceeds the available capacity then it is highlighted.

2. To check the overload(s) in detail for the capacity categories, press the function key Overload. You reach the dialog box Capacities with Overload with a list of all the periods in which too many operations were dispatched for the capacity categories.

The overload, that is the value as of which the availability is exceeded, is usually set at 100%. A capacity is overloaded at a particular date if the requirements are not less than or equal to the available capacity. You can specify any other percentage values you like. To do this proceed as follows:

1. Press the function key Settings in the dialog box Capacities with overload.
   The system displays the dialog box Settings for overload display.

2. In the field “Max. capa. load” enter the desired percentage for the overload check. You can limit the time period for which the overload check takes place in the section “Limit periods”.

3. Press the function key Continue.
   The system carries out the overload check using the changed values.
Displaying the Maximum Load and Selection of the Overload Periods

To check the periods which have maximum load on inspection and to target them for processing, proceed as follows:

1. Press the function key Capacities.

   The system branches to the dialog box Capacities with a list of the work centers and capacity categories for the material selected.

   It shows the maximum load for every capacity category, that means the absolute value for the maximum load. If the value exceeds the available capacity then it is highlighted.

2. To select the precise period(s) where the maximum load was dispatched, place the cursor on the capacity category that is highlighted and press the function key Select.

   You branch to the overview for the selected resource; the system highlights the period with the maximum load.

To check the periods which can be seen to have maximum load on inspection and to target them for processing, proceed as follows:

1. Press the function key Capacities.

   The system branches to the dialog box Capacities with a list of the work centers and capacity categories for the material selected.

2. Press the function key Overload. You branch to the dialog box Capacities with overload.

3. Place the cursor on a period and press the function key Select.

   You branch to the overview for the capacity selected; the system highlights the selected period.
Displaying the Scheduling Data

You can display the scheduling data for the individual orders. You have the following options:

- Call up the pegged requirements in the material view. Place the cursor on the order and press the function key Displays scheduling data.

- Once in the order view place the cursor in the column Order number on any period you wish for the planned order selected and select Edit → Scheduling data.

You get to the screen Scheduling data and can check the basic dates and production dates there as well as any scheduling errors.
Displaying Pegged Requirements in Detail

You can get the system to display which orders have generated the overall capacity requirements for a period. To do this place the cursor in the column Total req. on the appropriate period and press the function key Pegged requirements.

If you only want to display the orders generating the requirements, place the cursor in the column Material on the appropriate period and press the function key Pegged requirements.

The system displays the orders generating the requirements in the lower section of the screen. The following data is displayed:

- Order group
- Order number
- Material number
- Order quantity
- Base unit of measure
- Finish date for the order
- Capacity requirements for the order

If you have maintained several operations in the routing for an order then the individual operations are listed under the same order number.
Displaying all the Planned Orders for a Material

To display all the planned orders for a material, press the function key Planned orders.

The system displays the dialog box *Planned orders for material* with the list of all the planned orders and the following data:

- Planned order number
- Planning plant
- Material number
- Order quantity
- Unit of measure
- Basic start date
- Basic finish date.
Displaying Capacity Planning in the Material View

In the material view you can change the quantity or date of all planned orders.

To do this press the key Planned orders. You get a dialog box Plnd orders for mat. with a list of all the planned orders.

Place the cursor on the desired planned order and press the function key Choose.

The system displays the selected planned order in the screen section "Planned order" with the following fields:

- Planned order number
- Material number
- Planning plant
- Order quantity
- Production version
- Basic start date
- Basic finish date

The order quantity, basic finish date and production version can be changed.
Capacity Planning in the Order View

In the order view you can only change the dates or quantities of the selected planned order. The system displays the selected planned order on the screen section *Planned order*:

- Planned order number
- Material number
- Planning plant
- Order quantity
- Production version
- Order start date
- Order finish date

The order quantity, basic finish date and production version can be changed.
Calling up the Capacity Situation

The capacity situation is a display function in the current stock/requirements list. It provides an overview of the available capacity and the load of individual work centers. You cannot dispatch planned orders in any other way.

The capacity situation is called up as the material view.

1. In the current stock/requirements list: Choose Goto → Capacity planning → Capacity situation.

   You reach the dialog box Settings for capacity planning, if you have not previously specified parameters for capacity planning.

2. Select the desired planning type and the period type for capacity planning. Choose a view period, if necessary. Press the function key Continue.

   The system reads the work centers and capacity categories affected.

   You branch to the capacity situation.

   The capacity situation relates to one work center and one capacity category as well as the unit of capacity from the work center. Note the following: If you have entered a planning work center (task list header) in the task list, then this work center is displayed first with the corresponding capacity category, otherwise the selection occurs at random.

   The system also displays the following data:
   - material number, short text and plant of the material to be processed
   - the available capacity
   - the overall capacity requirements at the work center selected
   - the capacity requirements of the material
   
   The system highlights periods with overload.

You can find more details in:

Functions in the capacity situation [Page 30]
Functions in the Capacity Situation

The following functions are available in the capacity situation:

- Overload check
- Displaying the maximum load and select overload periods
- Displaying scheduling data
- Displaying Pegged Requirements in Detail
- Selecting Capacities
- Displaying all the planned orders for the material
- Branching to the planning table

You can find a description of the functions in Functions in capacity leveling [Page 20].
The Capacity Check

The capacity check can be called up from the following functions:

- MPS:
  - from planned order processing
- MRP:
  - from planned order processing

You can find information on accessing planned order processing in:

Planned order processing [Page 15]
Executing the Capacity Check

When creating or changing a planned order you can check the available capacity. The planned order must already have been scheduled. For every operation the system checks whether there is sufficient capacity at the appropriate date for the requirements of the operation at the work center where the operation is to be processed. The capacity requirements of other orders or operations at this work center are taken into account here.

You call up the capacity check in planned order processing for an individual planned order. Starting from the planned order header select the menu options Edit → Capacity check. The system checks for the planned order selected whether there is an overload situation. If this is not the case then the check is terminated. You get the message: "Capacity checked. No overload found".

If there is an overload situation, then the system displays a dialog box in which the overloaded capacities are displayed per period. From there the system branches to capacity leveling in change or display mode so rescheduling can be carried out there if necessary. In display mode the system branches to the capacity situation in the case of an overload situation.
You can call up the **capacity planning table** from the following functions:

- **Master production scheduling:**
  - from the planning result of single-item planning (material view)
  - from the planning result of interactive planning (material view)
  - from the current stock/requirements list
- **MRP:**
  - from the planning result of single-item planning (material view)
  - from the current stock/requirements list
- **Long-term planning**
  - from the planning result of single-item planning (material view)
  - from the current stock/requirements list

You can find information on accessing functions from which you can branch to the capacity planning table:

- Carry out single-item planning [Page 13]
- Carry out interactive single-item planning [Page 14]
- Current stock/requirements list [Page 16]
Branching to the Capacity Planning Table

The capacity planning table allows you to dispatch operations.

To call up the capacity planning table choose Goto → Capacity planning → Capacity leveling.

The system displays the planning table. The functions on the capacity planning table are described in the section Functions in the capacity planning table [Ext].

The changes that you make from the current stock/requirements list are copied to the evaluation when you save the capacity planning table.

The changes that you make starting from the planning result only take effect when you save the planning result.