

BaanERP 5.0c Manufacturing

Routing

Module Procedure

UP154A US



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Table of contents

1.	The Routing (ROU) module in BaanERP	1-1
1.1	The function of ROU in BaanERP	1-1
1.2	The modules related to ROU	1-2
1.3	ROU's functional procedure	1-4
2.	The routing procedure	2-1
2.1	The main routing procedure	2-1
2.2	The norm-table procedure	2-5
2.3	The bill of critical capacities	2-7
2.4	The sessions that are related to the routing procedure	2-8

About this document

Read this document for an overview of the Routing module's functionality and to learn more about the functional procedures that are related to ROU.

You need no detailed knowledge of the BaanERP software to read this document. However, you are more likely to understand the contents if you are familiar with:

- The overall structure of packages, modules, and sessions in the BaanERP software.
- The general business procedures used in everyday business practice.
- The basic concepts of enterprise resource planning.

For detailed descriptions of the module's sessions, refer to BaanERP's comprehensive online Help.

To use this document

Read Chapter 1, The Routing (ROU) module in BaanERP, if you want to know more about:

- The module's functionality.
- The relationship of the module with other modules.
- The module's functional procedures.

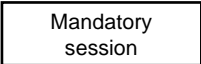
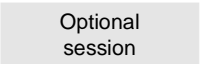
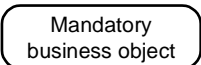
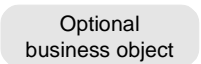



Read Chapter 2, The routing procedure, if you want to know more about:

- The sessions in the procedure.
- The results of the procedure.
- The sessions that are related to the procedure.
- The optional procedures that are related to the procedure.

Acronyms used in this document

BOM	Bill of Material
CCP	Central Calendars and Periods
CF	BaanERP Configurator
COM	Common
CP	BaanERP Enterprise Planning
CPR	Cost Price Calculation
EMM	Enterprise Modeling Management
FAS	Final Assembly Schedule
HRA	Hours Accounting
IBD	Item Base Data
INA	Inventory Analysis
IPD	Item Production Data
PCS	Project Control
ROU	Routing
RPT	Repetitive Manufacturing
SFC	Shop Floor Control
TRP	Tools Requirement Planning

Legend

	Indicates a mandatory session
	Indicates an optional session
	Indicates a mandatory element in a functional procedure
	Indicates an optional element in a functional procedure
	Indicates a package
	Indicates a module
	Indicates a module that is described in the module procedure

1.

The Routing (ROU) module in BaanERP

This chapter provides information on:

- The function of the ROU module in BaanERP
- The modules related to ROU
- ROU's functional procedures

1.1

The function of ROU in BaanERP

A routing describes a particular item's manufacturing process. It contains the (sequence of) operations that need to be performed, on which work centers the operations are performed, the setup times, and the cycle times.

In Baan's ROU module, you can create routings for manufactured items, purchased items, and generic FAS items. You must enter information about the (sequence of) operations in this module, as well as data pertaining to work centers, machines, tasks, norm tables, and critical capacities. For more information, see section 1.3.

Standard routing

You can distinguish between standard routings, and nonstandard routings. A standard routing is an item-independent routing. It can be used for multiple items. They are mainly used in a multimodel flow (repetitive) production environment.

Nonstandard routing

A nonstandard routing is a routing that is uniquely linked to a specific item.

Except for generic FAS items, you cannot create routings for generic items in the ROU module. However, you use Baan's Configurator to create generic routings for generic items. The customized routings that are generated for the customized items that are derived from generic items are stored in the ROU module

The ROU module as input for planning

The ROU module gives input to almost every planning function of production management. The following is calculated according to the routing information:

- The lead time of production orders.
- The load on machines and work centers.
- The cost estimate of an operation.
- The standard operation cost of an item.

Figure 1 shows how the ROU module is positioned in BaanERP.

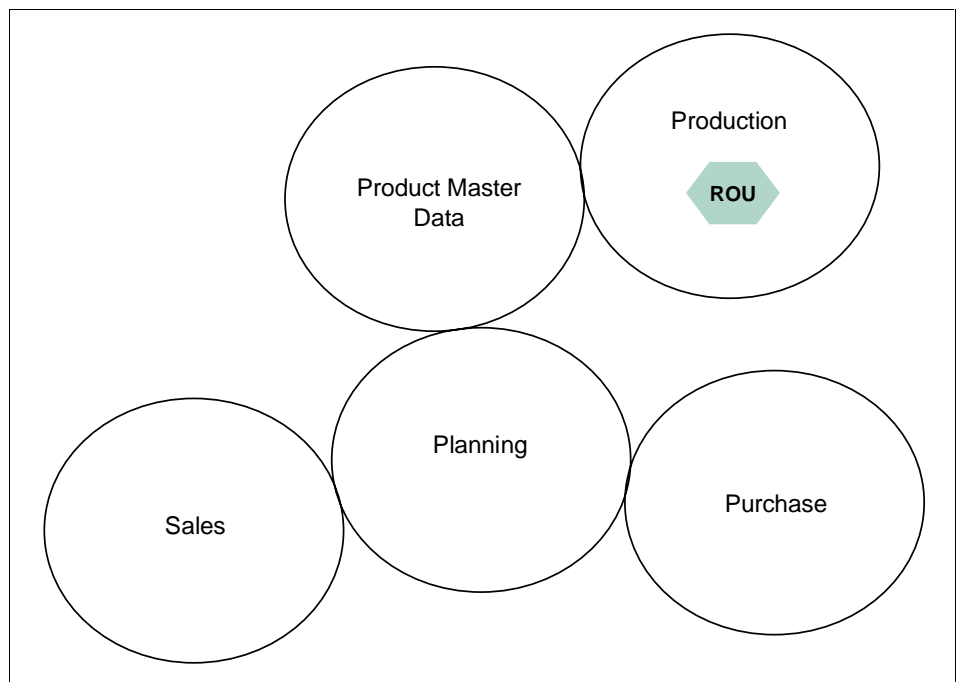


Figure 1, The ROU module in BaanERP

1.2 The modules related to ROU

Figure 2 shows the modules and packages that are related to the ROU module.

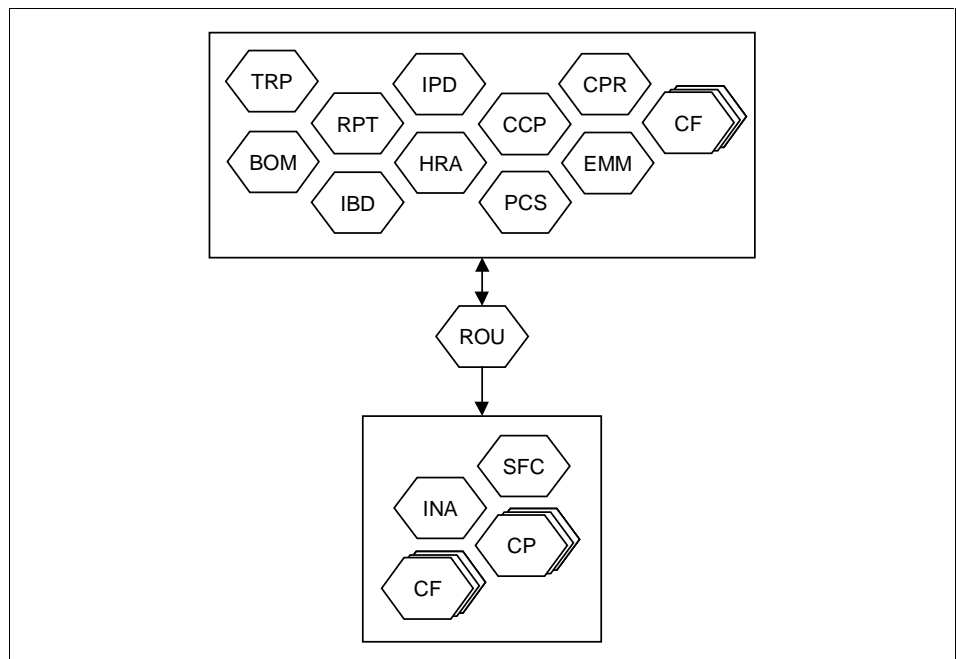


Figure 2, The modules and packages related to the ROU module

The following modules and packages are the input or output of the ROU module:

- **CPR**
The operation rate codes that are defined in the Cost Price Calculation (CPR) module are used in the ROU module when the work centers and the tasks are defined. Data from the ROU module is used in the Cost Price Calculation (CPR) module to calculate and simulate the standard cost of an item.
- **HRA**
Employee data from the Hours Accounting (HRA) module (and the Common (COM) package) is used in the ROU module. The backflush employee's enterprise unit, and the work center to which the backflush employee is attached must be identical. In this way, you can link one backflush employee to multiple work centers.
- **CCP**
The calendars that are defined in the Central Calendars and Periods (CCP) module are used in the ROU module.
- **IBD and IPD**
Routings can be defined for manufactured items, purchased items, and generic FAS items. Those items can be standard items as well as customized items. The items are created in the Item Base Data (IBD) module and the Item Production Data (IPD) module. The lead time of an item is calculated in the ROU module, and can be updated in the item production data of this item.
- **RPT**
The scheduling area that is defined in the Repetitive Manufacturing (RPT) module is linked to the routing codes when you define routing codes by item. The repetitive data is also used in the order planning of repetitive items, and in the calculation of bottleneck work-center rates.
- **TRP**
Tooling information from the Tools Requirement Planning (TRP) module can be linked to a machine, task, or operation in the ROU module to specify the tool(s) that are needed to perform the operation.
- **EMM**
For multisite purposes, a work center can be linked to enterprise units by the Enterprise Modeling Management (EMM) module.
- **CF**
When you define a mix-model line in the Configurator (CF) package (for assembly orders in the Shop Floor Control (SFC) module), work centers of the **Buffer** type and the **Line Station** type are used. These work centers are defined in the ROU module.

- **PCS**
You can link tasks (defined in the ROU module) to activities in the Project Control (PCS) module.
- **BOM**
The operations that are defined in the ROU module are used to maintain a bill of material by operation in the Bill of Material (BOM) module.
- **PCF**
You can use the tasks defined in the ROU module to create generic routings in the Product Configuration (PCF) module. The customized routings that are derived from generic routings (used for customized items) are stored in the ROU module.

Production orders are planned in the following planning modules and packages:

- The Inventory Analysis (INA) module.
- The Shop Floor Control (SFC) module.
- The Enterprise Planning (CP) package.
- The Configurator (CF) package.

These modules receive input from the ROU module. The Configurator (CF) package uses the data from the ROU module for planning purposes in a mixed-model flow environment.

Master data and prerequisites

Before you can use the ROU module, you must set up certain master data:

- You must define manufactured items, purchased items, and/or generic FAS items in the Item Base Data (IBD) module.
- You must define operation rate codes in the Cost Accounting (CPR) module.
- If you want to set up repetitive data, you must define schedule areas in the Repetitive Manufacturing (RPT) module.

1.3

ROU's functional procedure

The main functional procedure in the ROU module is the routing procedure. In the routing procedure, you record the operations to manufacture standard and customized items. The sequence of operations is defined as a routing. In addition, you enter data pertaining to work centers, machines, tasks, and norm tables.

- **Work Centers**
A work center is a group of resource units that is used as a functional planning unit. Resources (man or machines) are linked to a work center. The operation rate code that is linked to the work center can be used to calculate the cost price of an item, or the estimated and actual costs of an operation. The capacity load on a work center can be used in the production planning.

- **Machines**

Machines are linked to work centers and are used to plan operations. The rate defined for a machine can be used to calculate the actual machine costs. The capacity load on a machine can be used in the production planning.

- **Tasks**

Tasks are used to describe the activities that take place on the shop floor. They are classified according to the nature of the work that is performed. Operation rate codes can be linked to tasks to calculate the cost price of an item, or the estimated and actual costs of an operation. Tasks are also used in production planning.

- **Norm Tables**

Norm tables are used to calculate the production rate of an operation. After you defined a matrix for two physical characteristics (for example, length and thickness), a set of standard operation times can be maintained for each combination of characteristics. The cycle time and production rate can be calculated by using a norm table when tasks and routing operations are defined. For further information, see section 2.2.

- **Bills of critical capacities**

A bill of critical capacities indicates the work centers that are regarded as critical in the master-planning process. Critical capacities are usually the bottlenecks in a routing. For further information, see section 2.3.

Figure 3 shows how the elements in the routing procedure are related.

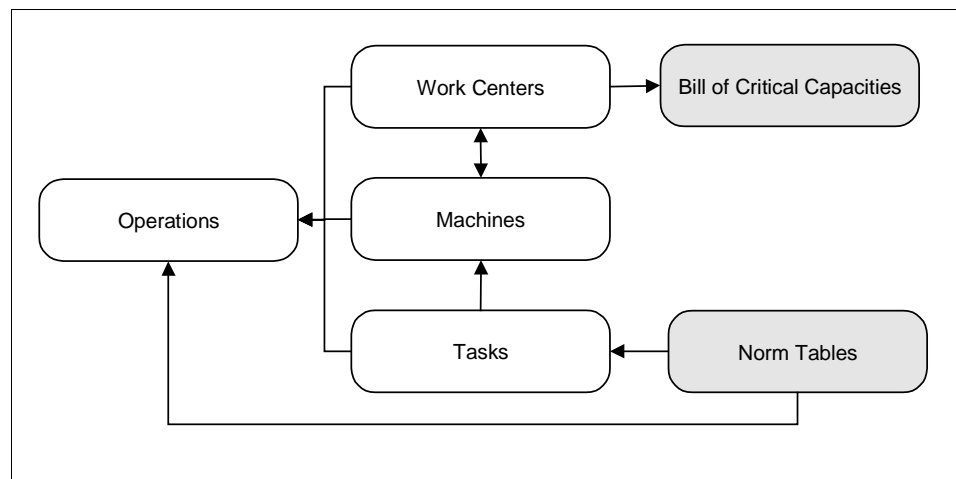


Figure 3, The elements in the routing procedure

2.

The routing procedure

This chapter describes:

- The main routing procedure.
- The norm table procedure.
- The bills of critical capacities.
- The sessions that are related to the routing procedure.

2.1

The main routing procedure

In the routing procedure you define the sequence of operations that is needed to produce a specific item, and the elements (work centers, machines, tasks) that are used in the operations. For more information about these elements, see section 1-3. The routing procedure is part of the data setup process.

If you want to calculate the cycle time and the production rate of an operation by using norm times, you must carry out the norm-table procedure (see section 2-2).

If you want to determine the bill of critical capacities, see section 2-3.

The procedure's results

The result of the routing procedure is the routing for a particular item. The routing procedure gives input to almost every planning function of production management.

Figure 4 shows the steps in the routing procedure.

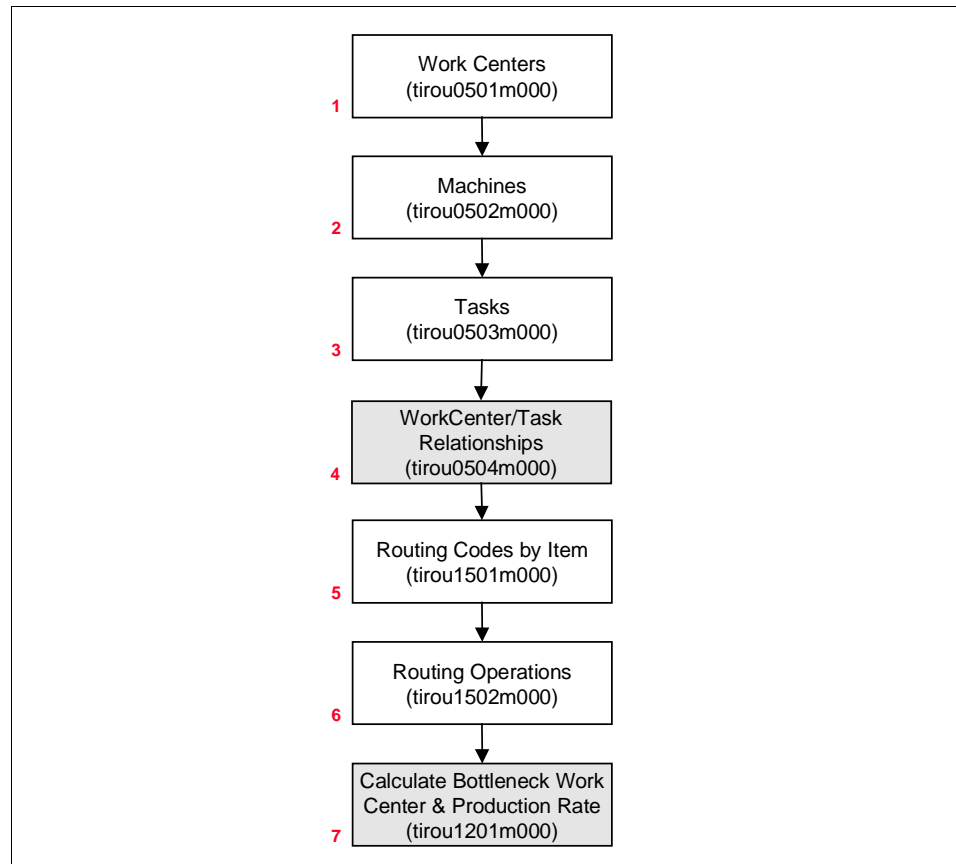


Figure 4, The routing procedure

The routing procedure consists of the following steps.

Step 1 Work Centers (tirou0501m000)

Use the Work Centers (tirou0501m000) session to define work centers. You must define the week capacity, the day capacity, the number of machines, and the number of operators at the work center.

You can link operation rates to a work center if you set the **Type of Operation Rates** field to **Work Center Rate** or **Task/Work Center Rate** in the CPR Parameters (ticpr0100s000) session.

If the **Use of WIP Warehouses** check box is selected in the SFC Parameters (tisfc0100s000) session, a work-in-process (WIP) warehouse can be linked to a work center, allowing material issues for the operation to the WIP warehouse. If BaanSCS Planner is installed, the allocated material is moved to the WIP warehouse when a production order is generated. If BaanSCS Planner is not installed you can select when to move the allocated material: at the generation of a production order, or at the release of a production order (see the **Move Allocation to WIP Warehouse** field in the SFC Parameters (tisfc0100s000) session).

You can also link a backflush employee to a work center in the Work Centers (tirou0501m000) details session. A backflush employee facilitates the backflushing of hours for operations that are planned in the work center.

Step 2 Machines (tirou0502m000)

Use the Machines (tirou0502m000) session to define machines. The machine rate and the basic capacity is defined for each machine. The machine is also linked to a work center. The machine data is used to calculate the actual costs of production orders.

Step 3 Tasks (tirou0503m000)

Use the Tasks (tirou0503m000) session to define tasks. Tasks are used to describe activities that take place on the shop floor. You must define task data that concerns the operation time and the setup time. This data is used in production order planning. You must also define data that concerns the required capacity for the operation to which the task is linked.

You can link an operation-rate code to a task if you enter **Task Rate** or **Task/Work Center Rate** in the **Type of Operation Rates** field in the CPR Parameters (ticpr0100s000) session.

In the **Multiple Work Centers** field, you must specify whether a task can be performed at one work center, or at more than one work center. If you select **Specific**, you must use the Work Center/Task Relationships (tirou0504m000) session to define the links between work centers and tasks. For more information, see the next step.

Step 4 Work Center/Task Relationships (tirou0504m000)

You must use this session to define in which work centers a specific task can be used, or which tasks can be carried out in a specific work center. You must only use this session if you selected **Specific** in the **Multiple Work Centers** field in the Tasks (tirou0503m000) session. The defaults entered in the Work Center/Task Relationships (tirou0504m000) session are used in the Routing Operations (tirou1502m000) session, and can be retrieved when entering an operation.

Step 5 Routing Codes by Item (tirou1501m000)

Use the Routing Codes by Item (tirou1501m000) session to define a routing code and to link it to an item. If you define a routing code for an open (blank) item code, it is a standard routing code. A standard routing can apply to multiple items.

You can link one or more routings to an item, and each routing can depend on a specific order quantity of the item. The result is, for example, that the operations for a small order differ from the operations for a large order. To link a quantity-dependent routing to an item, the following two conditions must be met:

- You must select the **Order Quantity Dependent Routing** check box in the Item Production Data (tiipd0101s000) details session.

- You must enter the maximum order quantity for which the routing is valid in the **Up to Order Quantity** field in the Routing Codes by Item details (tirou1101s000) session.

In this session, you can also link the default routing (defined in the ROU Parameters (tirou0100s000) session) to an item. The default routing is used in the following cases:

- If the routing must be independent of the order quantity.
- If no routing is defined for the required quantity.

Step 6 **Routing Operations (tirou1502m000)**

A series of operations must be performed to manufacture an item. Use the Routing Operations (tirou1502m000) session to define a sequence of operations for a routing code. For each operation you define the task, the work center, the machine, the cycle time, and setup times.

An item's routing code can be linked to a standard routing. The routing will then reuse all the operation data of the standard routing.

If the **Use Production Rates** check box is selected in the ROU Parameters (tirou0100s000) session, you can use both the **Production Rate** field and the **Cycle Time** field in the Routing Operations (tirou1102s000) details session. Enter the production rate, and BaanERP automatically calculates the corresponding cycle time. If the **Use Production Rates** check box is cleared in the ROU Parameters (tirou0100s000) session, you can only enter a value in the **Cycle Time** field. Click the **Calculate Rate** button to calculate the corresponding production rate.

If you want to use norm time tables to calculate the production rate or the cycle time, you must zoom from the **Production Rate** field or the **Cycle Time** field to the Calculate Norm Times (tirou3201s000) session. For that purpose you must define norm time tables. For more information, see section 2.2.

Step 7 **Calculate Bottleneck Work Center and Production Rate (tirou1201m000)**

Use the Calculate Bottleneck Work Center and Production Rate (tirou1201m000) session to determine the bottleneck work center for (a range of) repetitive items, and to calculate the production rate.

A bottleneck work center is a work center that governs the production rate of an item. The production rate of the bottleneck work center is used to calculate the production order quantity of repetitive items.

The work center data and the routing of an item are used to determine the bottleneck work center and the production rate. If you enter a percentage of the setup time in the **Percentage Setup Time for Rate Calculation RPT Items** field in the ROU Parameter (tirou0100s000) session, the setup time that is defined for an operation is also used in the calculation.

If the production rate is calculated, the value in the **Rate Factor for Planning** field in the Item Production Data (tiipd0101s000) details session is also taken into account.

2.2

The norm-table procedure

The determination of a task's cycle time can be complicated. For example, the cycle time of a drilling operation depends on many factors, such as the spindle speed of the drill (that is, the revolutions per minute), the thickness of the plate, the diameter of the hole, and so on. As a result, the cycle time varies depending on all these variables. Norm tables are used to determine the cycle time and the production rate of an operation. When the cycle time depends on two variables, a matrix can be set in BaanERP to define several possible values for the combinations of the two variables' values.

After a matrix is defined for two physical characteristics (for example, length and thickness), you can maintain a set of standard operation times for the combinations of the variables' values.

Norm tables are also used in the following parts of BaanERP:

- The Project Control System (PCS) module: to budget customized routings and routing sheets.
- The Product Configuration (PCF) module: to calculate the cycle time and the production rate in a generic routing.

Figure 5 shows the steps in the norm-table procedure.

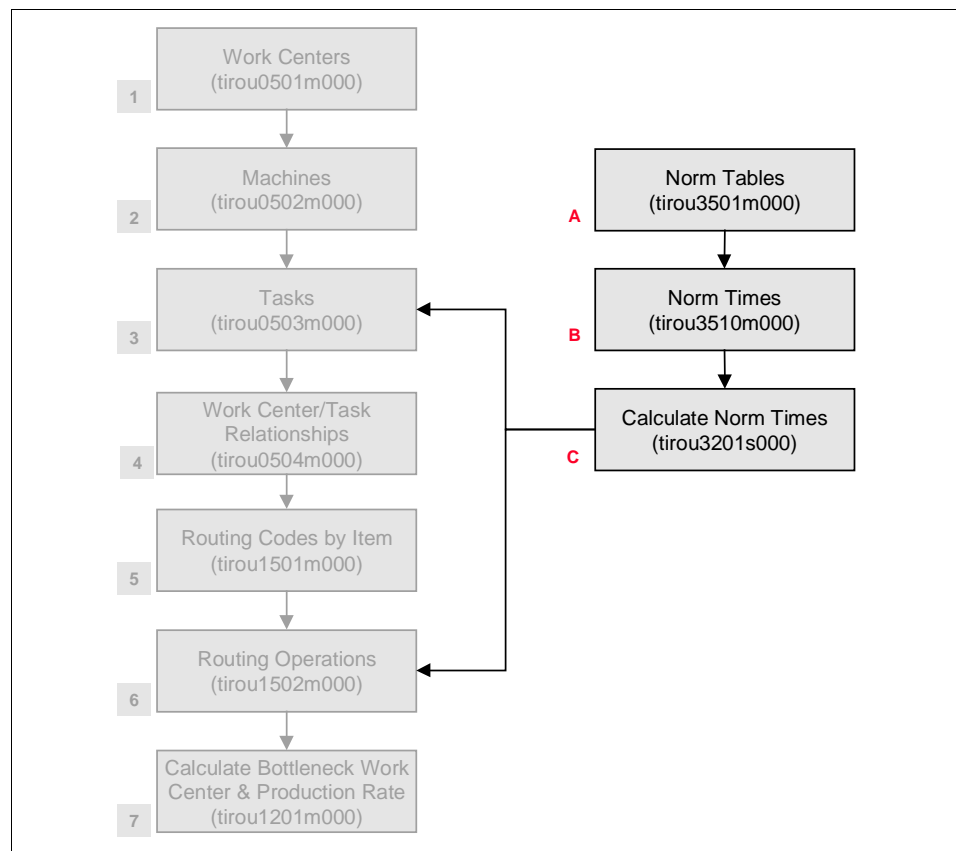


Figure 5 The norm-table procedure

The norm-table procedure consists of the following steps.

Step A Norm Tables (tirou3501m000)

Use the Norm Tables (tirou3501m000) session to define a norm table and its structure. You can enter two physical characteristics (for example, length, thickness) that affect the cycle time and the production rate. You must also enter the corresponding values of the two characteristics. For example, the values for the characteristic length can be 2, 3, 4, and 5; the values for the characteristic thickness can be 0.1, 0.2, and 0.3.

Step B Norm Times (tirou3510m000)

Use the Norm Times (tirou3510m000) session to define the task's cycle times given the values of the variables that you defined in the Norm Tables (tirou3501m000) session.

Step C Calculate Norm Times (tirou3201s000)

Use the Calculate Norm Times (tirou3201s000) session to calculate the cycle time or production rate. You can start this session in the ROU module from the **Cycle Time** field or from the **Production Rate** field in the Tasks (tirou0503m000) session and the Routing Operations (tirou1502m000) session.

2.3

The bill of critical capacities

A bill of critical capacities indicates the work centers that are regarded as critical for a specific plan item. Critical capacities are usually the bottlenecks in a routing.

The Baan Enterprise Planning package uses the bill of critical capacities for planning purposes. It generates the rough capacity requirements for critical capacities.

Note

If BaanSCS Planner is implemented, no bills of critical capacities can be defined in the Routing (ROU) module.

The following sessions are used in the ROU module to determine the bill of critical capacities:

Bills of Critical Capacities (tirou2530m000) session

Use the Bills of Critical Capacities (tirou2530m000) session to list the bills of critical capacities for items that meet the following conditions:

- The items are plan items (that is, they are items with the **Planned** order system, as defined in the Item Order Data (tcibd2500m000) details session).
- The work center is defined as **Critical in Master Planning** in the Work Centers (tirou0101s000) details session.

This session allows you to gain insight into the future bottlenecks in the production process.

Generate Bills of Critical Capacities (tirou2230m000) session

Use the Generate Bills of Critical Capacities (tirou2230m000) session to generate a bill of critical capacities based on the bill of materials (BOM) and the routing data. To generate a bill of critical capacity, BaanERP takes into account the effectivity dates and expiry dates of the BOM components. A bill of material (BOM) explosion is carried out up to the next critical plan item. During the explosion, BaanERP computes the capacities of the work centers that you defined as critical. These capacities are then included in the bill of critical capacities for that specific critical plan item.

You cannot generate bills of critical capacities for generic items. A generic item's bill of critical capacities must be maintained manually.

2.4

The sessions that are related to the routing procedure

Update Number of Resource Units by Work Center (tirou0201m000)

Use the Update Number of Resource Units by Work Center (tirou0201m000) session to update the number of machines and operators that you entered in the Work Centers (tirou0501m000) session. The number of machines and operators that is linked to a work center is used to calculate the work center's available capacity.

The results of the calculation are stored in the **Number of Operators** field and the **Number of Machines** field in the Work Centers (tirou0501m000) session.

Update Order Lead Times (tirou1202m000)

Use the Update Order Lead Times (tirou1202m000) session to update order lead times for manufactured items. The order lead time of an item is entered in the Item Production Data (tiipd0501m000) session. To update the order lead time, a routing is used. Which routing is used depends on the **Order Quantity Dependent Routing** check box in the Item Production Data (tiipd0501m000) session:

- If the **Order Quantity Dependent Routing** check box is cleared, the default routing (defined in the ROU Parameters (tirou0101s000) session) is used to calculate the order lead times.
- If the **Order Quantity Dependent Routing** check box is selected, and the item's order method is **Fixed Order Quantity** or **Economic Order Quantity**, the routing that is linked to that item is used to calculate the order lead time. If no routing is linked, the default routing is used.

The item's order quantity is defined in the Item Ordering Data (tcibd2500m000) session.

Assembly Lines (tirou1506m000)

To manufacture FAS (Final Assembly Schedule) items, you must set up an assembly line in the Baan Configurator package. An assembly line is subdivided into a number of line segments. A line segment consists of a number of line stations, and one buffer. Line stations and buffers can be considered as work centers. Items are manufactured by passing them from line station to line station, and by carrying out operations at each line station.

You can use the Assembly Lines (tirou1506m000) session for an overview of your assembly lines. You can start the following sessions from the Specific menu:

- The Cycle Times by Effectivity Date (tirou1507m000) session to display the time between completion of two separate units of production.
- The Line Segments (tisfc7521m000) session to display the line segments that are part of the assembly line.

Cycle Times by Effectivity Date (tirou1507m000)

You can use the Cycle Times by Effectivity Date (tirou1507m000) session to display the time between completion of two separate units of production on an assembly line.

Tooling per Operation (tirou1510m000)

You can use this session for an overview of the tools and tool kits that are needed to perform an operation. You can also enter data in the Tooling per Operation (tirou1110s000) details session to link the tools and the tool kits to a specific operation. The data entered in this session is used in the availability planning of tools that is performed before production orders are planned.

You can only enter this session if the **Tooling Implemented** check box in the Company Data (tccom0500m000) session is selected.

