Resources

Introduction

Definition of the PP-PI Resource

In the strict sense of the word, the term "resource" refers to all materials, work centers, plants, plant lines and processing units, capacities, production resources, tools and documents to be maintained.

Since however in the R/3 System the term "material" plays a central role - via the material master - it does not make sense to manage materials a second time in the form of resources. In the R/3 System, materials themselves refer to any number of things, from finished products, assemblies, to raw materials, batches and even services.

In the area of PP-PI, the term **resource** refers to all user-defined production, waste disposal or recycling facilities and the persons working within them, as well as, for example, transport or storage facilities and energy sources.

The Resource as an Organizational Unit

The resource can be regarded as a planning-related type of organizational unit within a company, describing the tasks of planning, control and execution of production processes. The organizational unit "resource" serves to structure production in a plant in detail, since it is a main element of shop floor planning as well as of capacity planning. For purposes of capacity aggregation, you can create your own hierarchical resource structures. Different aggregation structures via a number of user-defined resource hierarchies can be represented via any number of parallel resource hierarchies for simulation purposes.

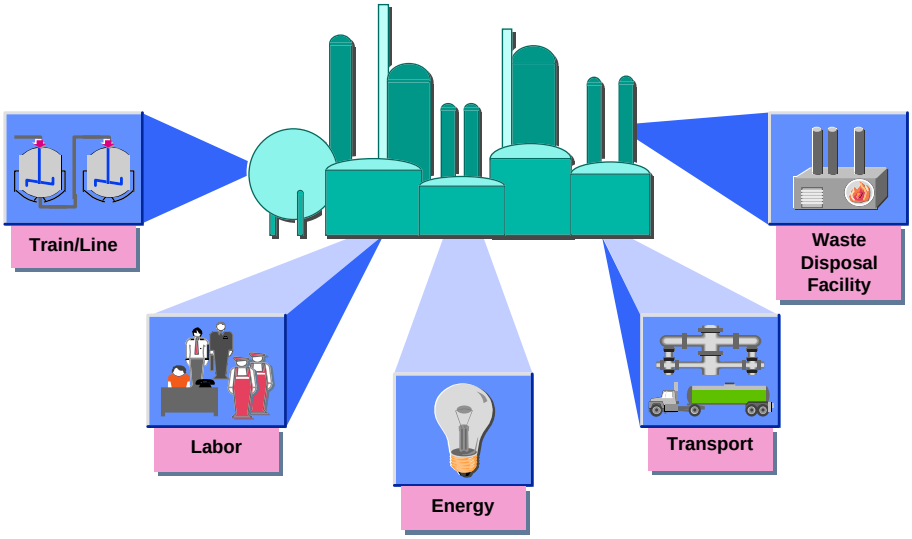

Fig. 4-1: Possible types of user-defined resources

Resource Categories

The user himself can define the different resource categories used in a plant. Here are some examples:

Line This is the line in the production plant, as defined by NAMUR and ISA/SP88, which contains one or several processing units.

It can be a one-way or multi-way plant and can produce a complete batch. It makes no difference whether the goal is to manufacture a product, recycle remaining materials or dispose of wastes.

The production line or plant can be regarded as the root of a resource hierarchy containing several processing units.

Processing unit This is the smallest logistic unit at which a batch can be manufactured. For example, this could be a mixing vessel, in which different process operations, such as charging, mixing, or heating, can be carried out.

Labor The shift foreman, plant or line operator, etc. can be represented as a group whose members have the same qualifications, but also as individual persons.

Transport This can be transport facilities, such as pipes or tanks, which are used to carry out the inner-plant transport runs between warehouse and plant line.

In-process storage These can be storage facilities in which materials are stored between production steps.

The resource category controls the screens and fields which are displayed by the system for user maintenance. In the chemical industry, for example, this would be at least the basic data, the scheduling and capacity data of the resource.

Default Resource

It is also possible to maintain a default resource via Customing, in order to include default values when creating resources. These default values are maintained for a combination of resource category and plant. When a resource of this type and in this plant is created, the default values will be transferred to this resource. This is time-saving if you have to maintain many resources of the same type, for example, many vessels distributed over several buildings.

Commitment and Allocation of Resources

The primary resource is the part of a plant or processing unit on or at which an operation is carried out. It is occupied or "committed" for the duration of the operation, and all phases within this operation are scheduled for this time period, since they automatically have the same primary resource.

Besides the primary resource, you can allocate other required resources to an operation or to a phase. These are called secondary resources. This allocation can be flexible, meaning that you can define a variable start and finish time which is relative to the start or finish time of the operation or phase to which the secondary resource is allocated.

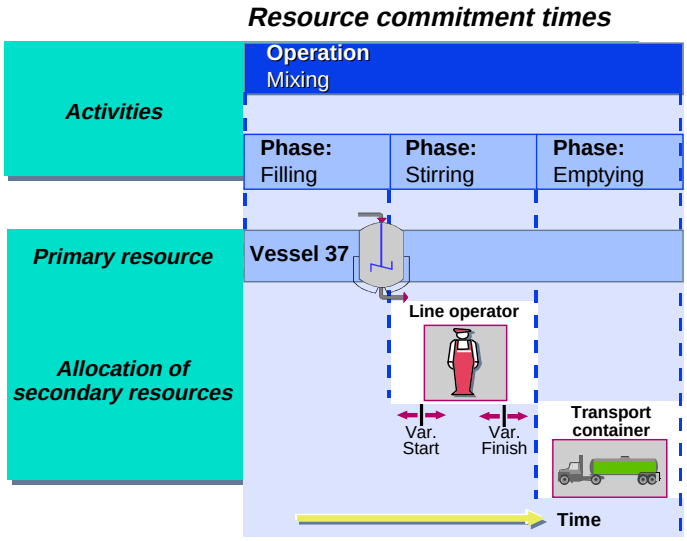

Fig. 4-2: Allocation of secondary resources

Grouping within Resource Classes

If resources have the same attributes with respect to their usage in a process, it is possible to group them into a class via the classification system. This is useful, for example, when maintaining a recipe, since you do not have to allocate all the possible alternative processing units to the operations of the recipe. Instead, you can classify the operation with the same class as the resource (for example, operation "mixing" is carried out via the resource class "mixers"). The characteristics of the class (see Fig. 4-3) are then the selection conditions for the resource in the process order. In this way, you can select a processing unit shortly before production, i.e. when releasing a process order.

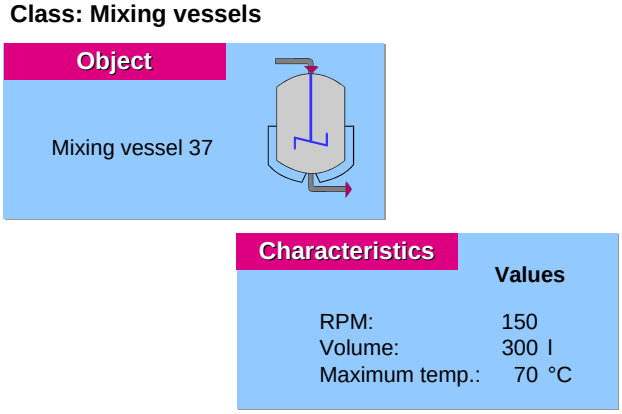

Fig. 4-3: Classification of resources

Aggregation of Resource Data via Hierarchy

The resource hierarchy serves to aggregate available capacity and requirements data at a resource (for example, the plant) on a higher level of the resource hierarchy. In particular, rough-cut capacity planning and medium-term planning need to have

aggregated available and required capacity data. An allocation of new resources to a hierarchy is possible at any time. You can display and maintain the hierarchy in the R/3 graphic editor (Fig. 4-4), with the results being written back to the resource record.

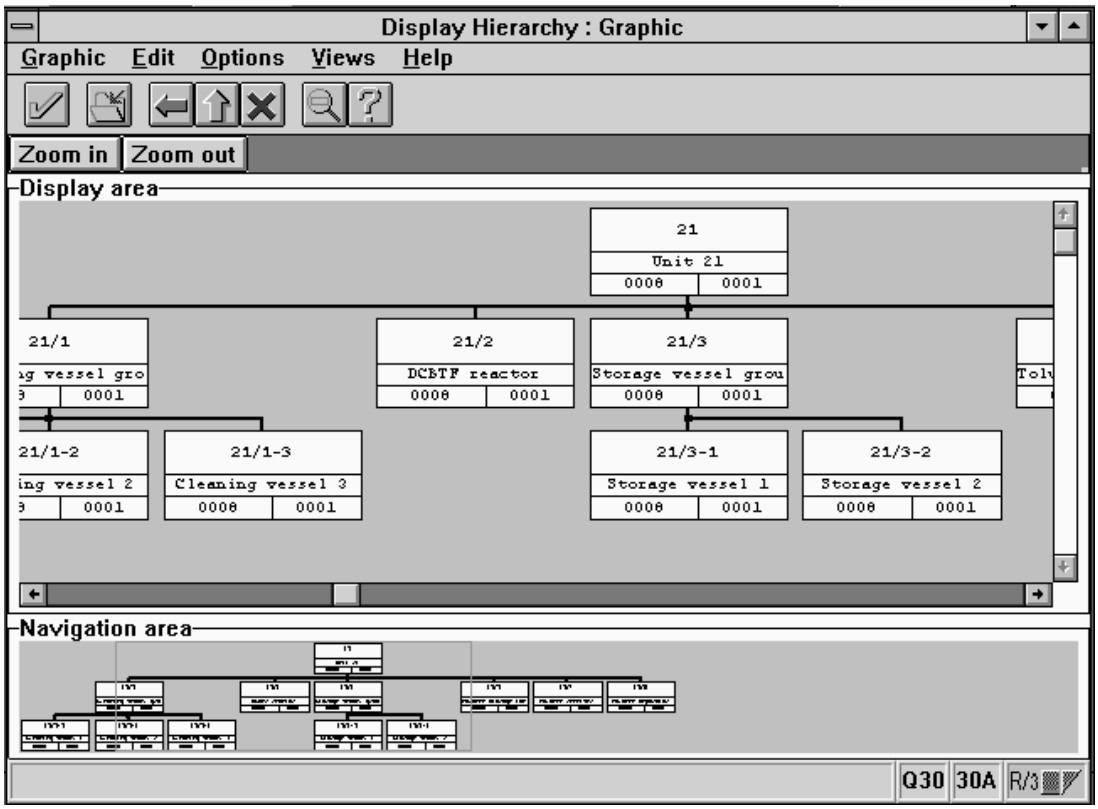

Fig. 4-4: Resource hierarchy

Resource networks

Processing units can often not be used in any sequence. If a batch was started in a particular mixing vessel, it can only be continued in vessels which are available and to which, for example, there is a pipeline. The possible resources with their predecessor/successor relationships are created as resource networks in the system (see Fig. 4-5).

During process planning, resources can then serve to find the possible paths which a process order can take through a plant. The resource network is thus accessible when resources are defined for operations.

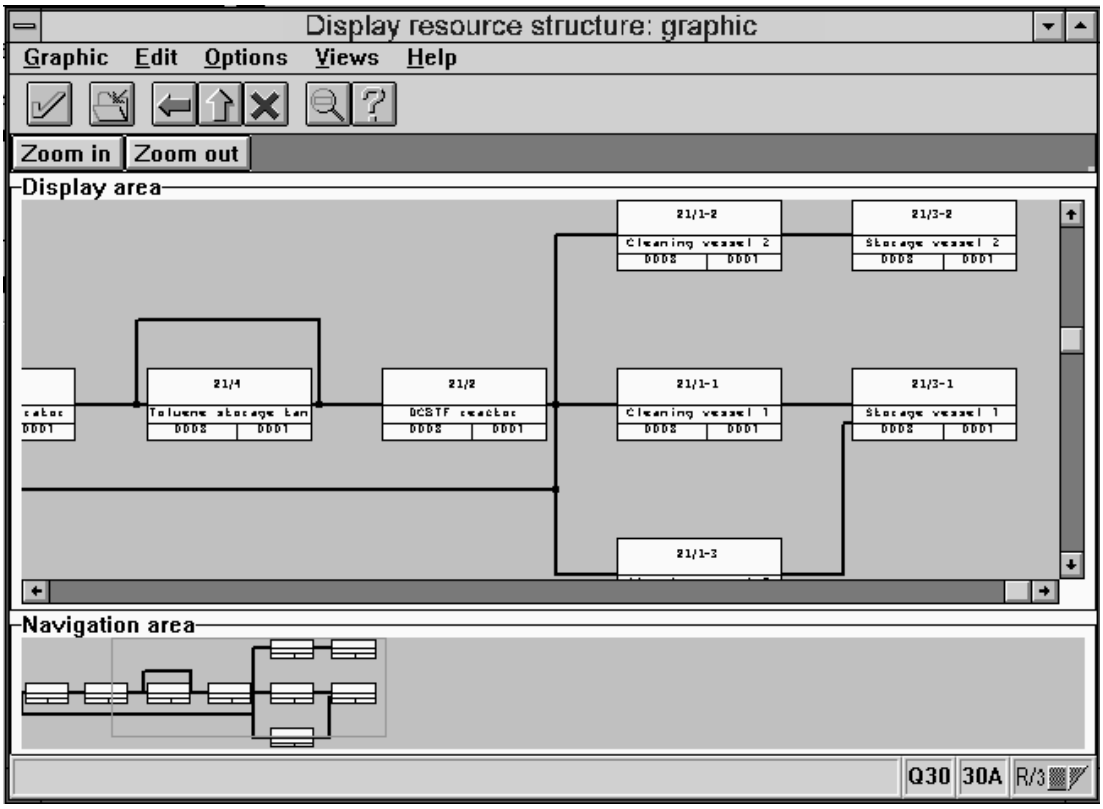

Fig. 4-5: Networking of resources

Links

You can link resources with the following objects:

- with a cost center
- with a person
- with a position in personnel administration (PA)
- with a specific qualification or a qualification/requirements profile

Link between Resource and Cost Center

Every resource is allocated to a cost center. In this way, product or order costing provides a link between CO and PP. More information on this topic can be found under “Costing data” further on in this chapter.

Integration with Personnel Administration (PA)

The link of a resource with a person is used in order to find out who is working at which resource, for example.

- If the Personnel Administration system is not active, you can define a person responsible for the resource. This can later be used as a search field.
- If the Personnel Administration system is active, the resource data is made available to PP-PI.

Furthermore, when creating a personnel resource, you can refer to a work center maintained in the Personnel Administration system. In this way, the R/3 System ensures that personnel data for an employee is unique.

Link to Positions

Positions in the PA system are planned and approved jobs. The link of a personnel resource with a position enables you to find out which position this resource belongs to.

Allocation of Qualifications

Qualifications serve to more closely describe personnel resources.

- If the Personnel Administration system is not active, you can define a qualification in the form of a “suitability” necessary for a person to carry out a

specific task or operation at this resource. For this, the R/3 classification system is used.

- If the Personnel Administration System is active, you can define several qualifications for employees, which can then be grouped into a qualifications profile.

Requirements Profile

Furthermore, you can define requirements for every resource, such as requiring that a specific operation be carried out by someone with a certain level of experience or training.

Resources and Capacities

Link between Capacity and Resource

The term “capacity” refers to the ability of a resource to perform a specific task, i.e. the available work of people, machines, processing units and other resources within a particular period of time. Capacities are differentiated according to capacity category (like resources and resource categories).

You can allocate any number of capacities to each capacity category. The capacities used during a production process do not need to be allocated individually, since when selecting a resource, the capacity categories are automatically linked to the resource.

These capacities form the basis of scheduling for process orders, as well as of capacity planning and shop floor control.

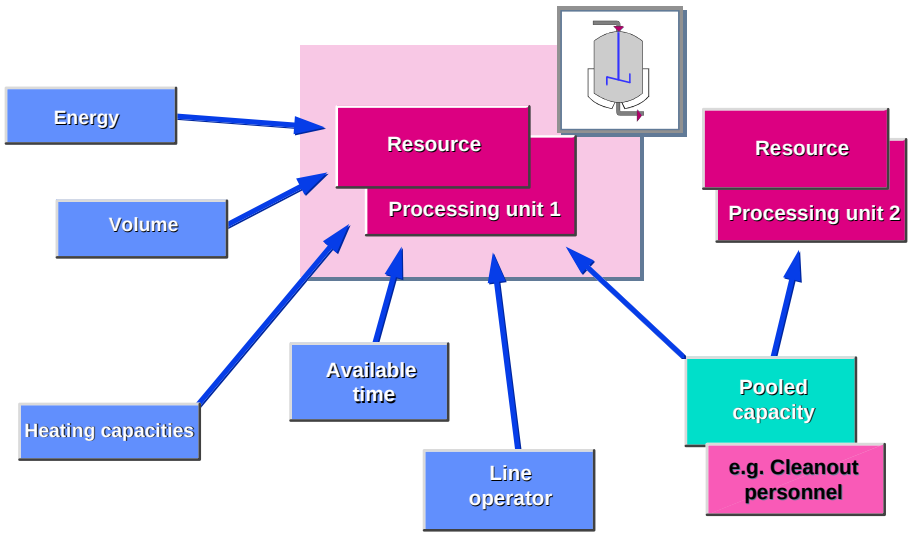

Fig. 4-6: Capacity categories for resources

Capacity Categories

A capacity category classifies a capacity of a resource. It can only exist once for each resource; however, capacities defined for different resources can belong to the same capacity category. Via an internal conversion factor, the capacities not maintainable in hours can be maintained, for example, in liters or kilowatt.

Pooled Capacity

A pooled capacity refers to a capacity whose availability is used conjointly by several resources. An example of a pooled capacity is the cleanout team, whose members work together at several different plant lines, for example.

Exclusive/Non-exclusive Use of Capacities

Capacity commitment can be *exclusive or non-exclusive*. For example, the capacity of a mixing vessel described in cubic meters can be completely used up, even if a batch occupies only half of the vessel space available. In another case, one capacity might be allocated to several operations of the process order, or even several orders. In Fig. 4-7 below, for example, the capacity of a flare conduit can be used fully, since the operations of several process orders can send their gaseous wastes to it.

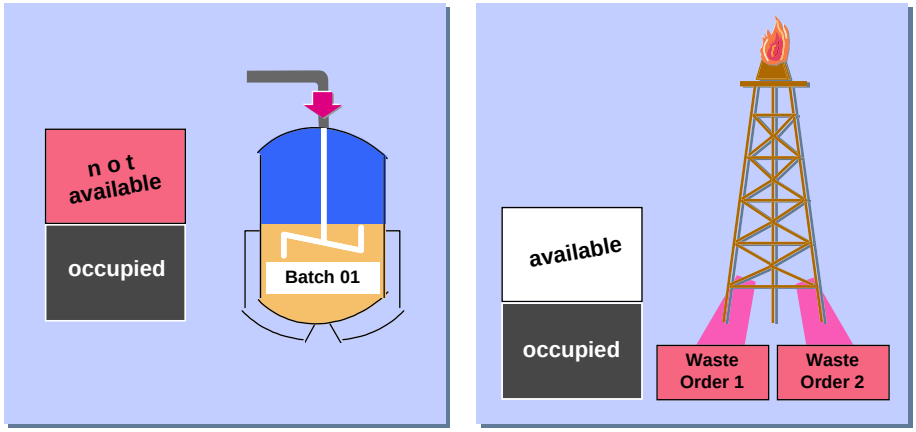

Fig. 4-7: Commitment and allocation of capacities

Subdivisions into Individual Capacities

In order to carry out detailed resource planning (for example, committing resources for specific periods of time), capacities can be subdivided into individual capacities (for example, individual vessels), for which you can maintain availability data. The requirements can be allocated to these individual capacities in the planning table. Furthermore, you can allocate a capacity to persons working at a particular resource, as well as allocating qualifications to such persons. Via the allocation of a capacity to a PA position, the system will enable you to select the most suitable person to carry out the work.
The capacity category determines the objects to which you can link a capacity.

Maintaining Resource Data

Default Values for Operations

In order to simplify the maintenance of operations in recipes, you can enter default values for an operation to be carried out at a resource. This information is copied or referenced in the operation by the system. In this way, for example, the standard texts stored for a resource simplify the maintenance of operation texts in the recipe. Other default values are, for example, the control key of the operation to be carried out at this resource or the wage group of the employee at this personnel resource.

Standard Values

Standard values enable planners to specify values (for activities such as “mixing” or “charging”) to be maintained for an operation at a particular resource. In this way, complex calculations of costs, durations or capacity requirements for a resource can be carried out. The user specifies whether a standard value must be verified, for example, or is required/optional.

Standard value	*Unit*	*Rule for maintenance*
Charging	**Liter**	**required**
Mixing	**Time**	**optional**
Heating	**°C**	**-- (none)**

Fig. 4-8: Standard operation values used in the resource (example)

Formulas

Formulas defined for a resource are used within costing, scheduling and capacity planning. You can define formulas specific to your firm, in order to carry out calculations for execution times, costing, and capacity requirements for a process order.

- Via the formulas for the *calculation of the execution times*, the scheduling functions enable you to schedule the duration of operations (see Fig. 4-9).
- Formulas for the *calculation of costs* enable you to cost operations being carried out at a particular resource. They specify how costing is to be carried out.
- Every capacity defined for a resource can have a formula for the *calculation of capacity requirements* in the operations of a process order allocated to it.

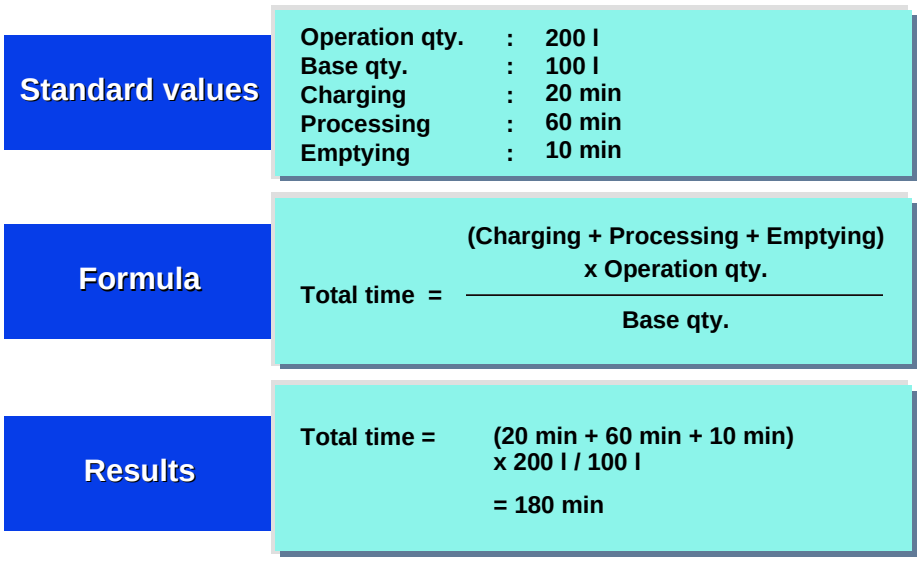

Fig. 4-9: Standard values for formulas and calculation results

Scheduling Data

Via the scheduling functions, the start and finish dates for operations are calculated. For this, the system needs to calculate the execution times and relate them to the operating times of the resources.

Costing Data

Using the costing data, the production costs of an operation can be calculated. Costing has the goal of allocating individual costs to the cost objects (material, order, etc.) involved.

If a resource is used in a recipe, standard values can be entered for the *activity types* defined for this resource. Using these activity types, you can specify how the standard values are to be costed. The valuation of in-house activities uses the cost rates defined for these activities in the cost center.

Further Resource Functionality

Capacity Requirements Planning

Capacity requirements are calculated on the basis of the standard values and quantities stored in the operations themselves. These in turn stem from formulas stored for the resources. During CRP, the capacity requirements of the operations in an order are calculated and compared with the available capacity defined for the resources. This results in a so-called capacity load analysis.

You can use the interactive graphic planning table to dispatch operations to resources and to carry out capacity leveling. More information on this subject can be found in Chapter 7.

Interface to MS-EXCEL

Via an interactive interface, you can then transfer the results of the load analysis to MS-EXCEL. In this way, load profiles can be processed further with MS-EXCEL, or placed in word processing systems. Planners and schedulers can obtain a clear picture of the load situation of the capacities in their plant or company.

Capacity Availability at Time of Order Dispatch

Using availability checks, the available capacity of a process order or for entire order structures can be checked and monitored in every stage of planning.

For every operation of a process order, the system checks to see if there is available capacity at the specified resource. If there is not enough capacity, the system will propose a date to the planner at which the process order can be carried out without bottlenecks.

Evaluations for Resources

You can carry out many different types of evaluations for the resources maintained in your plant, such as:

- ❑ Which resources are available?
- ❑ Which cost centers are allocated to them?
- ❑ Which capacities have been defined for the resources; at which resources is a capacity being used?
- ❑ What resource hierarchies exist?
- ❑ In which recipes or for which materials is a resource being used?

Note:
You can find further information on the topic of capacity planning and leveling in Chapter 7 *Capacity planning and leveling.*

User-defined resources with any number of allocated capacities, grouped into capacity categories, ensure that a firm can precisely control and monitor the availability and the costs of its resources.

What types of resources can be maintained in PP-PI?

In PP-PI, you can define plants with individual processing units (for example, reaction vessels), labor, transport facilities, storage tanks and many other types of resources.

How are the capacities of resources used in PP-PI?

User-defined resource categories, factory calendars, shift schedules, and resource hierarchies make it possible to realistically represent the capacity of any type of resource. Furthermore, you can define single and multiple allocation of capacities, as well as the exclusive use of a capacity for a resource.