Process Orders

Introduction

The process order describes the actual production of one or several lots or batches in a production process and contains dates and production quantities. Process orders belong to the transaction data of the R/3 System and are similar to PP production orders in their structure.

The process order is usually generated on the basis of a master recipe. In the period between dispatching of operations and the release of an order for the production of a batch, the user needs to put information such as dates, floats, specific resources, etc. into the process order.

Process planning uses the planning data provided by MRP or campaign planning runs to generate process orders for the manufacturing of batches. For this, it also has to coordinate the production process with all available resources.

Dates; **Quality**; **Costs**; **Inventory**

The following graphic shows how the process order forms part of the data flows of production planning, capacity requirements planning and costing.
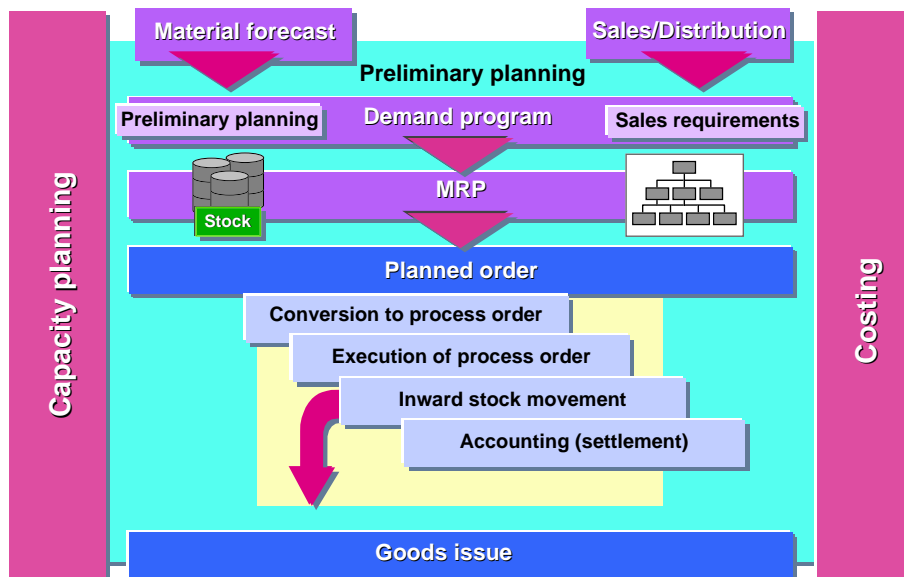

Fig. 6-1: The process order within the PP data flows

The process order is the main control instrument for carrying out production. It contains all planned and actual production-related data, which can

then be monitored effectively. The process order and its functions provide answers to the following questions:

❏   What and how much is being manufactured?

❏   What exact dates and times are scheduled?

❏   What elements are involved in production (material, resources with capacities, etc)?

❏   What costs are involved and how are they settled?

Functions of the Process Order

When a process order is created, the operations and phases of the master recipe selected to carry it out are copied into the order. At the time that a process order is released for production, control recipes are generated from these operations and phases, bundled for each control recipe destination.

Data from Master Recipe

If you do not select a master recipe, the system automatically creates a process order with one operation.

Availaibility checks for material components ensure that only process orders are released for which the raw or semi-finished materials are available. When you release the order, reservations are made for the material components involved.

Availability Check for Material

The material availability can be checked either statically or dynamically. Although this availability is usually ensured by MRP runs, this additional check ensures that work schedulers will be informed of material shortages even in exceptional situations. A status function as well as a missing components list are available for schedulers to obtain a quick overview of material availability.

Using the basic order dates from an MRP run, the scheduling function then determines the actual start and finish dates for the order and its operations.

Scheduling

If capacity requirements and dates (scheduling) were already carried out in the rough-cut planning phase, these results can be transferred automatically into the process order.

The graphic presentation of the scheduling results in the planning table enables schedulers to obtain a current overview of the date/time situation of orders at any time (see Chapter 7 *Capacity Planning and Leveling*).

When a process order is released, the following functions are activated:

Release

❑ The material reservations generated for available and reserved stock are updated in the corrresponding material master record. At this time the availability of the material is checked by the system.

❑ The specified resource classes can be replaced by individual resources by means of a selection function.

❑ You can allocate an inspection lot record.

❑ You can print shop floor papers.

❑ After you can carry out material movements (to and from the warehouse) for the order.

❑ You can carry out confirmations for the order.

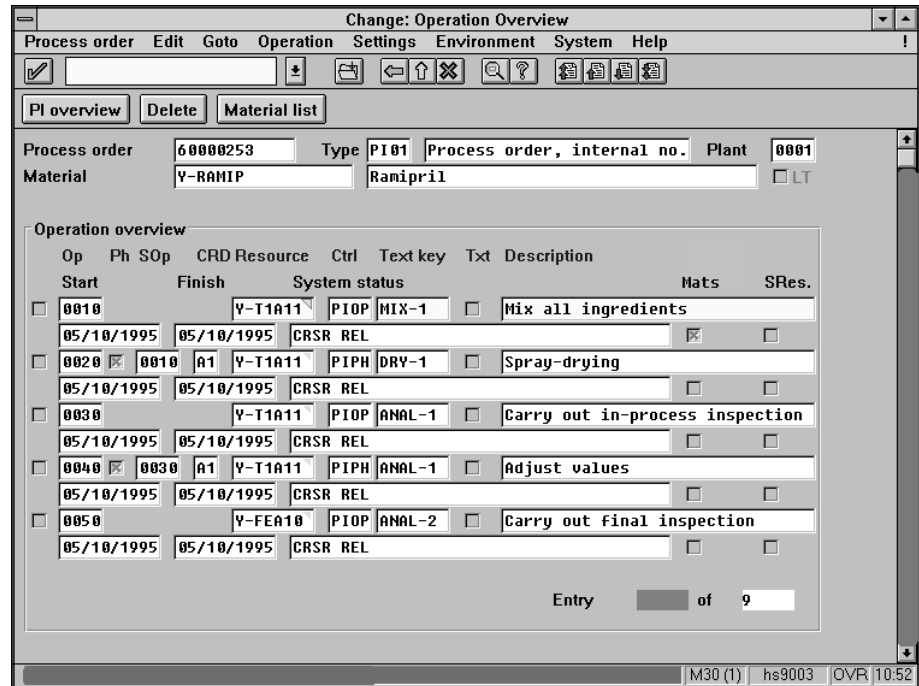The following screen shows the two-line operation overview of a process order.

Fig. 6-2: Two-line operation overview of the process order

Printing Shop Floor Papers

After scheduling and releasing a process order, you can carry out the printing of shop floor papers. This can include detailed information on the operations of a process order, such as found in the operation control ticket, job ticket, goods issue slip, picking list, confirmation sheet and time ticket.

Materials in the Process Order

The material list used in a process order stems from the master recipe. Material lists can be changed in the process order in the same way as in the master recipe, for example, if you need to add other materials/components.

When a material list is changed, the system will carry out a re-calculation of the material quantities involved in this process order. In this way new mixing ratios for the input substances can be calculated.

Further information on the material list can be found in Chapter 5 *Master Recipes.*

Batch Determination/ Batch Splitting

In the material list, it is possible to allocate a batch to every material that is managed in batches, i.e. has a batch record. This batch is found using the functionality of the classification system (valuation of characteristics), provided you have classified the materials beforehand.

This ensures that the corresponding batch can be found from the existing batches, via the characteristics of a material (for example, strength of active substance) defined in the material list.

It is also possible to split a batch. Depending on the availability situation, in this case several batches can be allocated to a reserved material component, in order to remove a shortage in the material list.

For each process order, you can obtain logs on scheduling, on material availability and on the costing run. These logs can be displayed at any time, and updated in order to obtain detailed information on the results of the functions carried out.

Logging of Events

Material issues can be carried out for an entire order or for individual reservations (materials reserved for operations).

Material Issues

These material issue postings do not have to be carried out manually, but can be generated automatically from the corresponding process messages contained in the process instruction sheet (PI sheet) and carried out by the lower-level process control system involved.

When the materials are issued, the actual costs are updated automatically in the process order.

It is also possible to carry out backflushing (retrograde issue posting) of components. In this case, the confirmation of an operation automatically generates an issue posting for the material components allocated to the respective component.

During production, confirmations of actual quantities are carried out, involving finished products, co- and by-products, as well as wastes. Furthermore, actual times (start/finish times and durations) and actual costs are also confirmed. These confirmations are carried out via the process management component and partially also via the process order itself. The data to be archived is then written to the batch protocol.

Confirmations

Status maintenance ensures that you can get an overview of the current situation of a process order at any time. User-defined status sequences support the company-specific processing of an order. Furthermore, the system sets a so-called system status at important events in the business process. An example: The status "created" designates a created process order. After release, the status changes to "released". When the control recipe is generated, a further status is set.

Status Maintenance

Planners and schedulers have a number of evaluations or analyses at their disposal, thus enabling them to see at a glance what the order situation is like:

Evaluations/Analyses

❑ You can display all process orders, for example, for a material, MRP controller, shop floor controller, etc.

❑ You can display a list of the missing materials.

❑ You can display the pegged elements (planned orders, process orders, etc).

❑ You can display the orders in backlog.

❑ You can branch directly to the Shop Floor Information System, in order to carry out evaluations on resources, materials, operations/orders, material consumption or product costs.

Warehouse Receipts Warehouse receipts from finished process orders can be carried out for batches, partial lots or the entire production lot. The receipt posting can be carried out with reference to a specific customer order or to customer stock defined as such.

Order Settlement/ Valuation As soon as a process order has been completely delivered to the warehouse, the costs can be settled. For this, the balance between order debits (for example, issues, confirmations) and order credits via receipts to the warehouse is calculated and the order account is debited or credited accordingly.

The valuation of warehouse receipts is carried out according to the valuation strategy defined in the material master (for example, according to production costs, planned price, standard price, etc.). The so-called "settlement receiver" is usually the material to be produced (finished product). This is explained in more detail in the following section on cost object controlling.

Cost Object Controlling

Cost object controlling allocates the costs incurred in a firm to various cost objects. Cost objects are objects used to allocate costs according to how they were incurred. This could be an order, a material, a network, etc.

Introduction

For this, the costs for cost objects are derived directly from the single costs involved (for example, goods issues, G/L accounts), or using costing procedures (such as internal activity allocation, overhead surcharges) from cost-center accounting. All costs per cost object or for an entire accounting period can be displayed.

Costing of process orders is based on planned material consumptions and the charge rates used for in-house production activities of these planned rates (actual production costs). The basis of this is formed by the data on resources, master recipes and material lists.

For a process order, you can carry out the following functions:

Functions of Cost Object Controlling

❑ Calculate planned costs

❑ Calculate actual costs

❑ Transfer actual costs to other objects, such as materials or customer orders, in the SAP System

❑ Analyze planned and actual costs

Via the CO information system, you can select all process orders corresponding to specific criteria, for example, all process orders for a particular material. For these orders, you can display the cumulated costs, in order to obtain an overview of your total costs.

CO Information System

The extended functionality of process orders enables you to determine the costs of process orders which have not been settled yet, and to periodically transfer the value of work in process to financial accounting.

Value of Work in Process (WIP)

In process manufacturing, costs are settled to stock as soon as you have posted a receipt to the warehouse (for example, for an operation). At the end of the production run, all remaining costs for the order are also settled.

Scheduled dates are relevant to cost object controlling, since the planned costs have to be distributed over the scheduled periods. The planned costs for an operation or phase are updated in the period in which an operation or phase is carried out. The distribution of costs is carried out according to calendar days.

Scheduling of an Order

The following screen shows the results of a costs analysis. The costs expected for a process order are displayed according to cost elements. There are the following types of cost elements:

❑ **Primary cost elements**
The primary cost elements correspond to G/L accounts in financial accounting (for example, for raw materials or semi-finished goods).

❑ **Secondary cost elements**
These cost elements contain costs from the CO area (for example, for internal activity allocation, overhead costs).

Fig. 6-3: Results of a costs analysis

It is furthermore possible to use the following types of cost calculation:

❑ **Cost itemization**
Cost itemization structures the costs according to cost elements and origin groups, or according to costing items. The costing items are the individual materials and activities whose costs were calculated in a costing run.

❑ **Cost component split**
Here, planned costs are displayed according to individual cost elements. These are defined in Customizing and determine the costs which are relevant for material valuation and profitability analysis.

Costs for Co-Products
When you are manufacturing co-products, the extended functionality of the CO module for process manfacturing enables you to:

❑ distribute the costs incurred for a process over the co-products (see following section) and

❑ settle the costs allocated to the co-products to stock.

Co-Products

The manufacturing of co-products enables firms to produce several different materials using one process order. Within an order containing co-products, these can be allocated to the operation or phase in which they are to be produced.
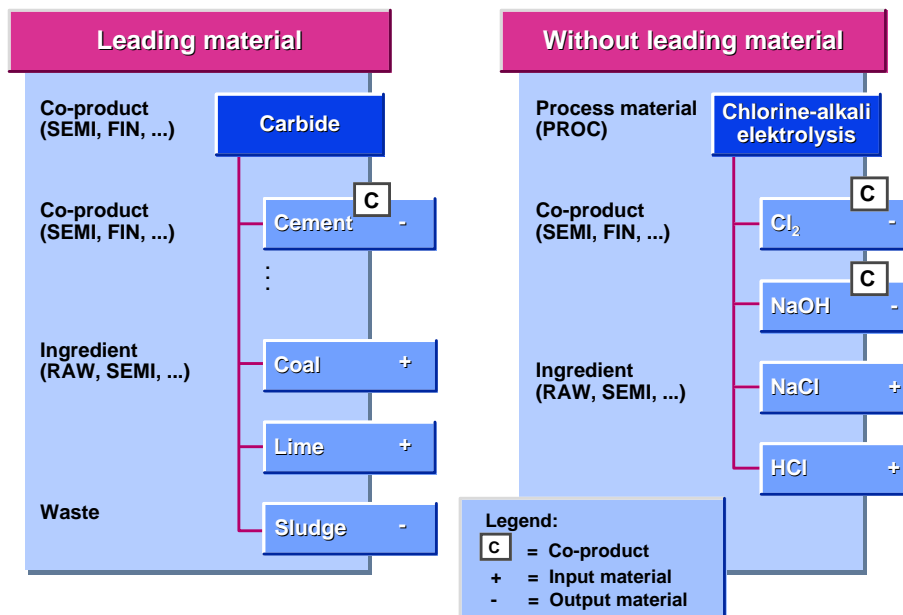

Fig. 6-4: Representation of co-products

If several co-products are to be manufactured in one run, of which none is a leading material, you can create a "dummy material" for the process, called a process material. The creation of the process order can take place using such a process material or using one of the co-products (see Fig. 6-4).

Material Type "Process Material"

Furthermore, you can maintain several order items with different materials. The co-products are taken from the material list of the master recipe and written into the order item fields.

Co-products as well as wastes or by-products can be represented in the material list via a negative component quantity. Co-products are also marked via an indicator. In the MRP run as well as in the costing run, these negative quantities are taken into consideration.

Co-Products in the Material List

Links of the Process Order

Integration beteween Process Order and Inspection Lot

Planned inspection characteristics for operations and phases are maintained in the master recipe. This data is then taken over into the process order.

For a process order involving a material to be inspected, an inspection lot is generated automatically. A material is marked as "to be inspected" if you have maintained the quality management screen of the material master and activated it.
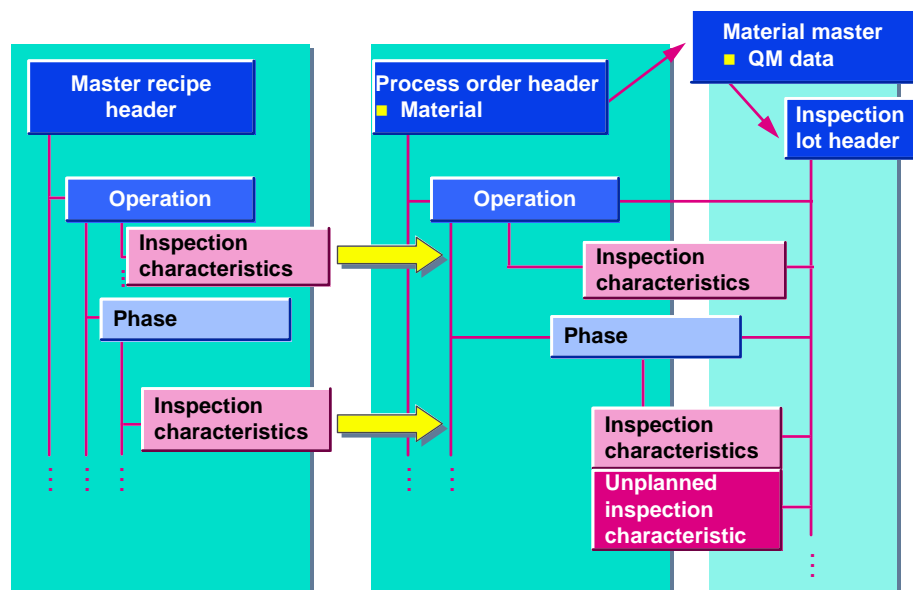
Fig. 6-5: Integration of QM functionality in PP-PI

The inspection lot is generated automatically as soon as the first operation or phase of the process order has been released. It is also possible to generate an inspection lot manually previously to this.

Unplanned (process-order specific) inspection characteristics can be entered from the operation/phase screen of the order. For this, the system branches to the QM inspection results entry screen.

You can get further information on the link between PP-PI and R/3-QM and external LIMS systems in Chapter 9.

Integration with Higher-Level Systems

From the R/2 System, as well as from other external applications, it is possible to transfer single and multi-level orders in the form of so-called production requirements. All production requirements can be displayed and changed via the PP-PI menu.

You can get further information on this topic in Chapter 10 *Integration with Higher-Level Systems.*

The maintenance of process orders in PP-PI enables you to control dates, costs, inventory and quality of your production runs. The process order is completely integrated in other R/3 production data flows, such as MRP or CRP.

How can a process order be created?

A process order can be created with or without a planned order (from MRP runs), i.e. with or without previous planning. You can also use requirements defined by an external system for process orders.

How are resources selected for a process order?

❑   In the resource network, you can display the "path" of a product.
❑   Via the classification system, you can select a suitable resource.