The production planning and control functions of mySAP ERP are contained in the PP module. The most important PP processes are sales and operations planning, demand management, material requirements planning, long-term planning, production order creation, production order execution, and capacity requirements planning.

3 Production Planning and Control in mySAP ERP

3.1 SAP PP in the Context of mySAP ERP

The main features of mySAP ERP are as follows: an extensive range of business functions; a high level of modularity alongside close integration of individual modules, support for international requirements in the form of country-specific functions (such as Payroll, which is available in various country versions with the relevant statutory conditions and tax requirements), multi-lingualism, and the ability to run on a range of platforms.

mySAP ERP is based on a three-tier client-server architecture and can be subdivided into two main work areas: the basis and the application. The purpose of the basis layer is to keep the business applications separate from the system interfaces of the operating system and the database and communications systems, and to ensure that business transactions are executed quickly and efficiently. The application layer contains the implemented solutions that support the enterprise’s business requirements.

mySAP ERP consists of business application modules that can be used both individually and in combination with each other. SAP’s delivery strategy is to deliver the complete system to the customer and then to activate and customize the required functions and business processes on-site at the customer’s premises. The disadvantage of this strategy is that the individual customer requires an over-dimensioned computer configuration at the start of the implementa-
tion process. The advantage is that it is easier to activate functionalities in production operations from the existing range of solutions than it is to deliver them retroactively.

mySAP ERP can be roughly subdivided into three main areas: Accounting, Human Resources Management, and Logistics.

**Accounting**

*Accounting* maps business transactions in accordance with their financial value and is responsible for planning, controlling, and monitoring the value flow within the enterprise. It is subdivided into financial accounting and managerial accounting, in accordance with the addressee group. Managerial accounting consists of cost accounting and activity accounting, and its purpose is to provide the decision makers in the enterprise with quantitative information. Financial accounting is structured in accordance with statutory regulations; enterprises use it to comply with requirements for disclosure with regard to external parties, in particular tax authorities and investors. The main components that support the tasks of accounting are: Financial Accounting (FI), Investment Management (IM), and Controlling (CO). These modules are further subdivided into corresponding sub-modules.

**Human Resources Management**

*Human Resources Management* (HR) is divided into the areas of personnel planning and development, and personnel administration and payroll. Personnel planning and development supports the strategic utilization of staff by providing functionality that enables the enterprise to systematically and qualitatively manage its staff. Personnel administration and payroll comprises all administrative and operational human resources activities.

**Logistics**

*Logistics* in the business context structures the flow of materials, information, and production from the supplier through production to the customer. The mySAP ERP logistics application modules enable enterprises to plan, control, and coordinate their logistical processes on the basis of existing integrated data and functions across department boundaries. The integration of the individual application modules in mySAP ERP prevents unnecessary and time-consuming multiple entries on the part of the staff who process business logistics transactions. Likewise, the integration of quantity-based processing steps includes the value-based side of the business transaction and thus fulfils the requirements of accounting. Logistics contains the following individual application modules: Sales & Distri-
SAP PP in the Context of mySAP ERP

The PP link in this chain deals with quantity-based and time-based product planning and controls the production process. Besides its master-data maintenance functions, the PP module supports all quantity-based and capacity-based production planning and control steps. Production planning and control comprises various planning concepts, such as MRP II and kanban, and various production types, such as production by lot size, make-to-order production, variant production, repetitive manufacturing, and process manufacturing.

The various modules are closely interconnected due to integrated data retention, the internal flow of documents, and the functional integration of the modules. This enables many possible scenarios: a production planning process can be triggered by Sales and Distribution; Production Planning can create a purchase requisition; or a production confirmation within the plant data collection process can trigger a value-based update in Controlling and Human Resources Management in order to calculate salaries. Likewise, the high degree of integration between the modules means that the recording of goods movements in the execution of a production order can be based on quantity and values (see Keller, 1999, pp. 67–115).

The several thousands of customers in the different industries and countries have different requirements of production planning. These requirements are reflected in the customer’s system by parameterizing the relevant functions in a process known as Customizing. In this process, the required functions are set in accordance with the requirements of the industry, the product range, the production procedure, the product structure, and organizational and legal requirements. Chapters 6 to 12 use process modules to describe the most important settings.

It is absolutely essential for the proper functioning of the system that you set and maintain the required basic data correctly. Chapter 5 describes in detail the basic data required for production planning. The focus there is on describing the basic data for production planning execution in companies with discrete manufacturing.
3.2 Processes in Production Planning and Control

Processes in production planning and production control comprise the following main areas:

- *Sales and operations planning* for determining the quantities to be produced
- *Material requirements planning* to calculate net requirements and component requirements, taking into account scrap and lot sizes
- *Capacity requirements planning* for detailed production planning, taking into account available capacities
- *Production control* to control and record the production process (create production documents, record confirmations)

These four areas represent the scope of the process only roughly. Figure 3.1 shows a detailed overview that explicitly illustrates the process modules that we will deal with in detail in subsequent chapters, along with their most important input and output values.

![Process Overview](image)

*Figure 3.1 Process Overview*
Sales planning plans future requirements without considering stocks and available capacities. The sales history often serves as a basis for sales planning. Operations planning uses the results of the sales planning process to plan the production quantities, and takes initial stocks and capacities into account on a general level.

Demand management aligns sales planning with the customer requirements in accordance with the planning strategy, and thus calculates the independent requirements for production.

Material requirements planning is the central function of production planning. It calculates requirement coverage elements for all MRP levels, based on the demand program, and taking into account lead times, lot sizes, and scrap quantities.

Long-term planning is basically a simulation of material requirements planning. It can examine how a change in planned independent requirements would affect capacity utilization, stocks, and external procurement. Long-term planning is also suitable for short-term simulations.

The central factor in controlling and recording the production process is the production order. Production order creation describes how the production order is created—whether by converting a planned order or by means of interactive order creation—and the functions that are executed in this process, such as master-data selection, scheduling, and availability checking.

Capacity requirements planning schedules in detail the worklist, which usually consists of the processes for created or released production orders. The result of capacity requirements planning is a production sequence that is feasible from the capacity viewpoint.

While the previous processes dealt with production planning, production execution is concerned with how the actual production as specified in the production order is recorded and controlled, from material withdrawal to order confirmation to storage and invoicing.

Chapters 6 to 12 deal with these processes in detail.
3.3 Production Types

3.3.1 Overview of Production Types

The production type characterizes the frequency with which a product is produced in the production process. The frequency with which production of identical or similar products is repeated and the production quantity of production orders are typical characteristics that determine the production type. Production organization is closely related to production type, as the production type often significantly affects the structure of the production process. Thus, the flow manufacturing production type, for example, implies the production of large quantities of identical product types or products. At the same time, flow manufacturing ensures that the production equipment is arranged in accordance with the organizational form of flow manufacturing. A typical example is the assembly of cars in the automobile industry. The degree of product standardization and the depth of the product structure also often affect the actual production type used. Therefore, various forms of production types, implicitly including production organization, have arisen from the basic theoretical types (mass production, repetitive manufacturing, small-lot production, make-to-order production). The following are important production types (see Keller/Curran, 1999, pp. 137–154):

- Discrete manufacturing
- Repetitive manufacturing
- Process manufacturing
- Kanban
- Engineer-to-order production

These types are briefly explained in the following sections. In this book, we restrict ourselves to discrete manufacturing, as this is the most common type of production.

3.3.2 Discrete Manufacturing

Discrete manufacturing (also called shop floor production) describes the production of a product on the basis of production orders. Discrete manufacturing is used if the products in question change frequently, if the pattern of demand is very irregular, and if production is workshop-oriented in character. A range of master data is required
for discrete manufacturing; the most important of these are material, bill of material (BOM), work center, and routing (see Chapter 5).

Discrete manufacturing starts when a production order is created and processed. A production order is created either manually or when a planned order that was created in the production and procurement planning process is converted. A production order is a request to the production department to produce or provide products or services at a specific time and in a specific quantity. It specifies the work center and material components that are to be used for production. The creation of a production order automatically creates reservations for the required material components. Purchase requisitions are created for externally procured material components and services, and capacity requirements are created for the work centers at which the order will be executed.

Production orders are released on the release date, provided that the required materials and capacity are available. The relevant documents in the production order can be printed in order to prepare for the execution of the production order. The capacity situation can be evaluated and any required capacity leveling can be carried out in any phase of production order processing, although this is usually done before production starts. The components required to produce the products are read out from the production order, and the goods issue is posted. The product is then produced on the basis of the production order. The finished quantity and the services provided are then confirmed back to the production order. The product is put into storage and the goods receipt is posted. Finally, the production order is settled.

3.3.3 Repetitive Manufacturing

Repetitive manufacturing is characterized by the interval-based and quantity-based creation and processing of production plans (in contrast to single-lot and order-based processing). With repetitive manufacturing, a certain quantity of a stable product is produced over a certain period of time. The product moves through the machines and work centers in a continual flow, and intermediate products are not put into intermediate storage. Figure 3.2 illustrates this concept using the example of motherboard production.
The work required for production control with repetitive manufacturing is significantly reduced compared to single-lot and order-based production control, and the entry of actual data is simplified.

Repetitive manufacturing is suitable for a variety of industries, such as branded items, electronics, semiconductors, and packaging. Repetitive manufacturing also can be used for pure make-to-stock production. Production in this case has no direct connection to a sales order. The requirements are created in the demand management process, and the sales orders are supplied from stocks. Sales order-based production—for example, in the automobile industry (see Geiger/Kerle, 2001, pp. 69–95)—can also be implemented using the methods of repetitive manufacturing. In this case, production is directly related to the sales order or is triggered directly from the sales order.

The most important forms of master data in repetitive manufacturing are as follows:

- Material
- Production version
- BOM
- Production line
- Rate routing

Figure 3.2  Producing a Motherboard on a Production Line
The main differences between this data and the master data for discrete manufacturing are briefly described later.

If a material is to be produced by means of repetitive manufacturing, it has to be flagged accordingly in the material master. This is done in the SAP system in the MRP 4 view by setting the Repetitive Manufacturing flag.

A repetitive manufacturing profile is also assigned to the material. This profile determines the type of planning and confirmation. It specifies, among other things, whether reporting points will be used, whether production activities will be posted to the cost collector for material confirmations, whether a decoupled confirmation will be used, whether a backflush will be carried out for the entry of actual data, and which transaction types will be used.

Because there are different BOMs and routings for a material, depending on the production process, a production version is used to specify which BOM and which routing are to be used to produce the material. The alternative BOM for the BOM explosion, the plan category, the task list group, and the group counter for assignment to the plans also are specified in the production version. The production version also specifies the lot size for which the production version is valid. It is important to set the Repetitive manufacturing allowed flag. There can be one or many production versions for a material, and there has to be at least one production version in repetitive manufacturing. The MRP 4 view is used to create the production version for a material, as before.

The costs that are incurred in repetitive manufacturing are posted to a product cost controller. In the process of entering actual data, the material costs and production costs are added to the product cost controller. Costs are subtracted from the product cost controller when a goods receipt, for example, is posted. The product cost controller is created for a material within a plant in a specific production version.

The BOM for the material to be produced specifies what quantities of which components are required for production. In repetitive manufacturing, not every goods issue is recorded at the same time as the physical withdrawal of the material from stock. Usually, component usage is automatically posted only when the finished product is
received (backflush). To do this, a storage location is specified in every BOM item, and the backflush is carried out from this location.

**Production lines**

Work centers in repetitive manufacturing are called *production lines* (see Section 5.4) because the product moves through the machines in a continuous flow, and the machines are usually spatially arranged in a line. These can be simple production lines, which often consist of just one work center, or complex production lines, which consist of several work centers. The individual processing stations are set up as individual production lines and are grouped into a line hierarchy. A production line determines the available capacity of the processing station and is assigned to a single cost center.

**Rate routings**

In repetitive manufacturing, routings are known as *rate routings*. A rate routing contains the processes that are required to produce the material. Because the same product is produced over a long period of time in repetitive manufacturing, very simple routings can be used, often containing just one process. This kind of process specifies the production rate, which in turn specifies the quantity per time unit that is produced on the line (for example, 100 items per hour).

In repetitive manufacturing, the planned orders for a material that result from the production and procurement planning process are managed in a planning table. In these tables, the planner can schedule the production quantities on the assembly lines. In repetitive manufacturing, we use the term *run schedule quantity* instead of planned orders (see Figure 3.3).

<table>
<thead>
<tr>
<th>Capacity Data</th>
<th>Unit</th>
<th>Due</th>
<th>9/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1 Requirement</td>
<td>%</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Available Capacity</td>
<td>h</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Line 2 Requirement</td>
<td>%</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Available Capacity</td>
<td>h</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material Data</th>
<th>Unit</th>
<th>Due</th>
<th>9/4/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material A Requirements</td>
<td>PCS</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>Available Quantity</td>
<td>PCS</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Line 1 Production</td>
<td>PCS</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Line 2 Production</td>
<td>PCS</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Not Assigned</td>
<td>PCS</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Figure 3.3 Planning Table in Repetitive Manufacturing*
In repetitive manufacturing, the components are supplied anonymously to the production line. This can be done very easily using the pull list. The components required on a production line for a specific period can be calculated in the pull list. The missing quantities that are detected can be replaced by means of direct stock transfers; for example from the central warehouse to the production location.

The production of the product usually takes place in a continuous flow along the production line. Entry of actual data is carried out at regular intervals for each finished production quantity. Component use and production activities are automatically posted when the finished product is received. In the case of longer production lead times, actual data can also be recorded along with reporting points within the production line, in order to post consumption data more promptly (see Figure 3.4).

3.3.4 Process Manufacturing

Process manufacturing is characterized by batch-oriented and recipe-oriented production of products or co-products in the process industry. Process manufacturing is used mainly in the following industries: chemicals, pharmaceuticals, food and luxury foods, and process-based electronics (see Datta, 2001, pp. 145–172). A number of processes can be used in process manufacturing. These are described as follows:
Continuous production

Continuous production is the name given to a process in which production runs within a specific period in an ongoing procedure. Material components are continuously supplied to the production line, and the finished product is continuously produced. The plant and machinery are continuously and fully in use, with the result that partial orders and partial allocations cannot be handled.

Discontinuous production

In discontinuous production, as the name suggests, the products are not produced in a continuous process. Instead, the material components are provided and weighed out as required for each step of the procedure. The same line can be used to produce multiple products.

Regulated production

Regulated production is used if the product quality requirements are very specific, or if legal regulations apply, such as the Good Manufacturing Practices (GMP) overseen by the U.S. Food and Drug Administration (FDA). Examples of this process can be found in the pharmaceuticals industry, and certain parts of the food and cosmetics industries. In regulated production, orders can be created only with approved recipes. If changes need to be made to master recipes, these are subject to change administration procedures. Filling processes that are separate from and take place after the actual production process can also be handled in process manufacturing. Loose goods (bulk) are moved from production and held in intermediate storage containers until they are filled. This production type supports complex filling procedures and simple manual filling procedures. Process orders that are created on the basis of a filling recipe are a prerequisite for the filling process.

The central master data elements in process manufacturing are the material, the BOM, the resource, and the master recipe.

Process order

Process manufacturing starts when a process order is created and processed in accordance with a master recipe. A production order is created either manually or when a planned order that was created in the production planning process is converted. A production order is a request to the production department to produce or provide products or services at a specific time and in a specific quantity. It specifies the resource and material components that are to be used for production. The creation of a production order automatically creates reservations for the required material components. Purchase requisitions are created for externally procured material components and services, and capacity requirements are created for the resources at
which the order will be executed. Production orders are released on the release date, provided that the required materials and capacity are available. At the time of release, an automatic batch-determination process can be run for components that are subject to a batch management requirement. The relevant documents in the production order can be printed in order to prepare for the execution of the production order.

The capacity situation can be evaluated and any required capacity leveling carried out in any phase of the production order-processing process, although this is usually done before production starts. Production can now begin, with or without the use of process management. If process management is used to execute a process order, this serves as the interface between the SAP system and process control. The flexible structure of this interface makes it possible to connect automated, semi-automated, and manually controlled plant and equipment to the production process.

Once the process order or the relevant phases of the process order is released for production, control recipes are generated from the process instructions in the process order. Control recipes contain all the information required for the process control function to execute a process order. Next, either the control recipes for the process control system themselves, or the control recipes in the form of process instruction (PI) sheets, are sent to the relevant process operator. In the latter case, the process instructions are expressed in natural language, so that the process operator can display them on-screen and process them.

The process data that results from the execution of the process order is sent back to the SAP system or is transferred to external function modules for further processing, or both. This data is transferred from the process control function to the various recipients by means of the process-coordination interface with the help of process messages. A material consumption message, for example, causes a goods issue to be posted for a component.

If a process order is executed without process coordination, the material components required to produce the finished product are withdrawn for the process order, and the goods issue is posted in the inventory management menu. The required finished product is then produced in accordance with the process order. The quantities cre-
ated and the products produced are then confirmed to the process order, the finished product is put into storage, and the goods receipt is posted.

In the invoicing process for a process order, the actual costs incurred for the order are assigned to one or more recipient objects (such as the finished material or a sales order). The process data documentation process creates lists of production-relevant and quality-relevant data that can be optically archived. We draw a distinction here between order logs and batch logs. Order logs contain all the quality-relevant SAP data that is created for a process order, while batch logs contain all the quality-relevant data having to do with producing a batch. The structure, content, and processing of batch logs comply with the international standards defined in the GMP guidelines for the pharmaceuticals and food industries.

### 3.3.5 Kanban

*Kanban* is a procedure for production control and material flow control that avoids any time-consuming requirements planning and implements requirements-oriented production control. With kanban, a material is produced or procured only when it is actually required. A specific quantity of the components required to produce a material are stored on-site in containers. Once a container is empty, this component is replenished in accordance with a predefined strategy (in-house production, external procurement, or stock transfer). In the interval between the request for replenishment and the delivery of the re-filled container, the other containers simply do the work of the empty one. Figure 3.5 illustrates the basic principle of kanban.

![Figure 3.5 Basic Principle of Kanban](image-url)
The replenishment process is largely automatic in the kanban process, which greatly reduces the amount of manual posting work required. Also, the kanban process reduces stock levels, as only components are produced that are genuinely required. The material is not pushed through the production process in accordance with an overall plan; rather, it is requested by one production level (consumer) from the previous production level (source) as needed.

With kanban processing, the plant is divided into production supply areas (PSAs). The components required for production are stored in these PSAs and various work centers can take what they need from the PSAs. A kanban control cycle is defined in order to specify how a material should be obtained within a PSA. The control cycle defines a replenishment strategy for the material that specifies whether the required material is to be produced in-house or procured externally, for example. The control cycle also specifies the number of containers in circulation between consumer and source and the quantity per container.

Replenishment strategies specify how a material component should be replenished and which of the following replenishment elements are created for this purpose:

- In-house production
  - Manual kanban
  - Replenishment with run-schedule quantity
  - Replenishment with production order
- External procurement
  - Replenishment by order
  - Replenishment with schedule agreement
  - Replenishment with summarized just-in-time (JIT) call
- Stock transfer
  - Replenishment with reservation
  - Replenishment with direct transfer posting
  - Replenishment by transport requirements of warehouse-management (WM) administered storage location

Replenishment with kanban is very simple. First, a material is produced at a machine. The components required to produce it are avail-
able on-site in containers, ready for withdrawal. If one of these containers is empty, the source that is responsible for its replenishment has to be informed accordingly. If kanban processing without SAP system support is being used, the consumer sends a card (by courier, for example) to the work center (source). The card contains the information about which material is required, in what quantity, and where it should be delivered to. The process gets its name from the Japanese word for these cards (kanban). The source can now produce or procure the material and then re-fill the container (see Figure 3.6).

If kanban processing with mySAP ERP system support is being used, the containers are managed in the system and have a specific status. Once the last component is withdrawn from a container, the status of that container is simply changed from “full” to “empty.” This status change is the kanban signal and can be set by passing a barcode reader over the card that is attached to the container. It is also possible to have the system display the containers in a production area in the form of a kanban table and to make the status change there. The kanban signal now triggers the replenishment process and creates—for example—a production order in accordance with the replenishment strategy. The source then processes the production order and the finished material is transported back to the container. The status of the container is set to “full” again (barcode or kanban table), and
the goods receipt for the material is posted with reference to the procurement element.

The SAP system also supports other kinds of kanban procedures besides the classic procedure described above. While in classic kanban the user sets the container to “empty” using a barcode or a kanban table, thus triggering the kanban signal, in kanban with a quantity signal the user or a plant data-collection system enters the relevant withdrawn quantities into the system. As soon as the quantity in the container equals zero or drops below a specific threshold value, the system automatically changes the status.

Unlike classic kanban, where the number of containers and their quantities are fixed in advance, in event-driven kanban a container is created only when required. The required quantity is then entered directly. Once the replenishment has been made, the container is deleted.

Kanban can also be used for production supply with the use of anticipatory material requirements planning. The replenishment elements in this case are created by a material requirements planning run. However, the replenishment elements function as a preview for the source; they do not directly trigger production or procurement. Now, the setting of the kanban to full or empty controls only the flow of material itself and the actual production process. Confirmations and goods receipts are usually posted without reference to the kanban process.

### 3.3.6 Engineer-to-Order Production

Experience has shown that conventional production processes are not particularly successful for complex make-to-order production processes.

The production orders used for the MRP II system are scheduled and handled separately without any coordination support between processes of different production orders. For example, process 25 of production order A-100 cannot start until process 10 of production order B-50 has started. Therefore, engineer-to-order production uses network techniques for scheduling and coordinating processes and cost accounting.
MRP II uses the BOM to split up the production of the finished product into smaller units, while engineer-to-order production divides the overall production process into work packages, which are specified in a work breakdown structure (WBS). There is not always a one-to-one correspondence between these structures and the units defined in the BOM.

MRP keeps technology, maintenance, and other customer-specific activities from production. Engineer-to-order production, on the other hand, requires that production-specific and non-production-specific processes be handled together.

Another difference is that standard costs are used for MRP II, while actual costs are used for engineer-to-order production.

Classic network systems are not very suitable for production management. They do not support inventory management, material requirements planning, or scheduling and tracking tasks within the factory. What engineer-to-order production needs is a system that combines the best of both procedures. You need a solution that can execute production orders, inventory management, and material requirements planning, like MRP II, and also handle task coordination, budget planning, and actual cost calculation.

You also need a system for processing complex production processes for industry, such as those for aircraft, ships, and large machines. A significant part of the lead time and added value of these product types is not taken into account in production-based processes such as design, work scheduling, and order costing.

For these reasons, engineer-to-order production uses work breakdown structures and networks. A WBS is a hierarchical model of the tasks that need to be carried out in a project and is the basis for the organization and coordination of the project. It contains the work, the time, and the costs that are associated with every task. A provisional WBS is created for the preparatory planning stage (that is, during the tender procedure). It then can be extended dynamically during the lifetime of the project.

Networks are used to model detailed processes, such as the staff, capacities, materials, production resources, tools, and services that are required for the project. Networks also can describe extensive relationships between processes. They are connected to the WBS and
thus provide an extra level of detail for representing the overall structure of the work.

The starting-point is to set up a project structure in order to create a customer quotation. Once the project structure has been set up, detailed cost plans are developed and integrated into the budget. Based on the level of detail, plans are developed from bottom to top, while budgets are developed from top to bottom. Capacities are also checked, and the project details are combined to form a customer quotation. A sales order can be created as a special order type with project reference (project order). The project is then released for project structure plan-driven and network plan-driven processing. Down payments, invoice payments, and any other customer payments are assigned to the relevant WBS element. Costs and material withdrawals are posted directly to the network or WBS elements. The system monitors the availability of the budgeted funds. The costs are invoiced at regular intervals or at the close of the project, either to the general ledger, the cost center, or directly to the revenue calculation system.

The finished products are listed in the sales order and are managed using the make-to-order production scenario. Production orders are created either manually or automatically by the system. These orders are then linked to the relevant WBS element. Thus, production is controlled by conventional production orders, and the actual production costs and milestones are posted to the relevant assigned WBS element.
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