

Integration

In project management, you need to be able to monitor project planning, trends, and developments for the entire life of project and over many departments. The high degree of integration in the R/3 System meets this requirement. It offers a common data basis for all applications, covering the different processes and views you need. Data, once entered, can be used as the base for all further planning steps. Changes are copied automatically and updated as appropriate.

This chapter uses examples of some of the important views in engineering and asset construction to illustrate how integrated processing works in the R/3 System.

Sales Order Processing

When you are processing customer projects, you will need the customer view of a project (external view) as well as the technical view (internal view). The external view serves you in defining delivery conditions and activities between you and your customer. It answers the question:

- ☐ What is the service to be rendered?
- ☐ When are deliveries to be made?
- ☐ When are down payments due and what amounts are involved?
- ☐ How are invoices prepared?

You enter this information in the R/3 System in the form of a sales document (customer inquiry, quotation, or order) for the project. You can use a project to link a number of sales documents.

You can use the link between sales and distribution processing and project management as early as the inquiry or quotation phase to help with your planning work.

In assembly processing, the system uses the customer inquiry or quotation for a particular material to create an appropriate project. When the project is generated, the system automatically links the items in the sales documents with the relevant project elements. The network is scheduled, requirement data generated, and the availability of components and capacities is checked. The system confirms the quantity for the required date and copies it to the sales document item. The advantage of assembly processing is that date or quantity changes in the sales document are automatically passed on to the network. In the same way, the system adjusts the confirmed quantities and dates in the customer inquiry/quotation, as well as when the customer makes changes it adjusts the project.

Linking Sales Documents
with Project Structures

Quotation Phase

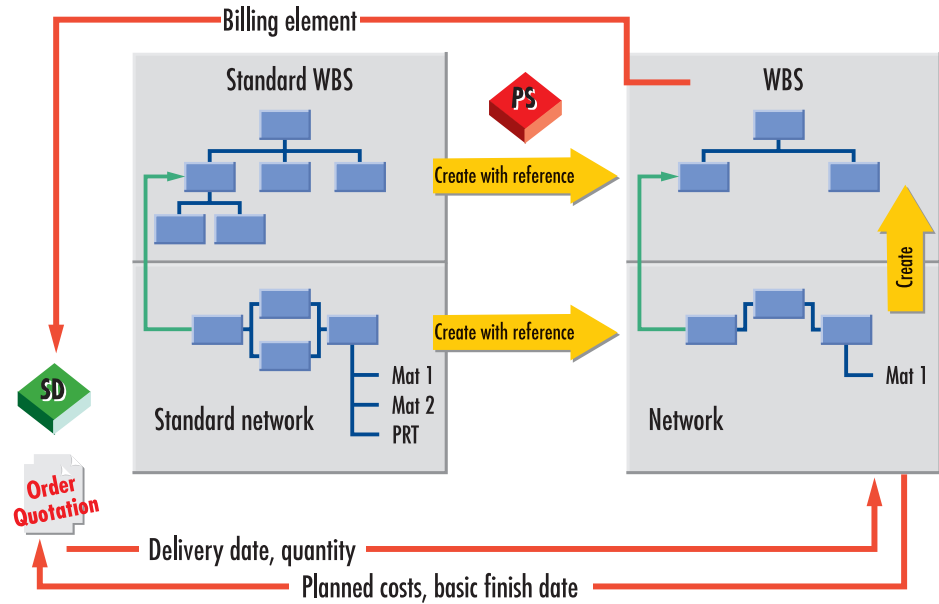


Fig. 2-1: Assembly Processing

You can also create the work breakdown structure and plan dates for it, and then link it with a sales document manually. Inquiry/quotation versions are available which you can use to simulate various possibilities before copying the most suitable one to the sales document.

You can combine the dates for down payment requests and invoices affecting sales in the form of billing plan. To bill according to project progress, you can link dates in the billing plan with milestones (milestone billing). The milestone link means that date shifts in the project lead automatically to new dates in the billing plan.

Plan values for project revenue planning and financial budgeting are automatically derived from the information in the billing plan and are recorded in the project. The customer quotation value is also recorded in the project.

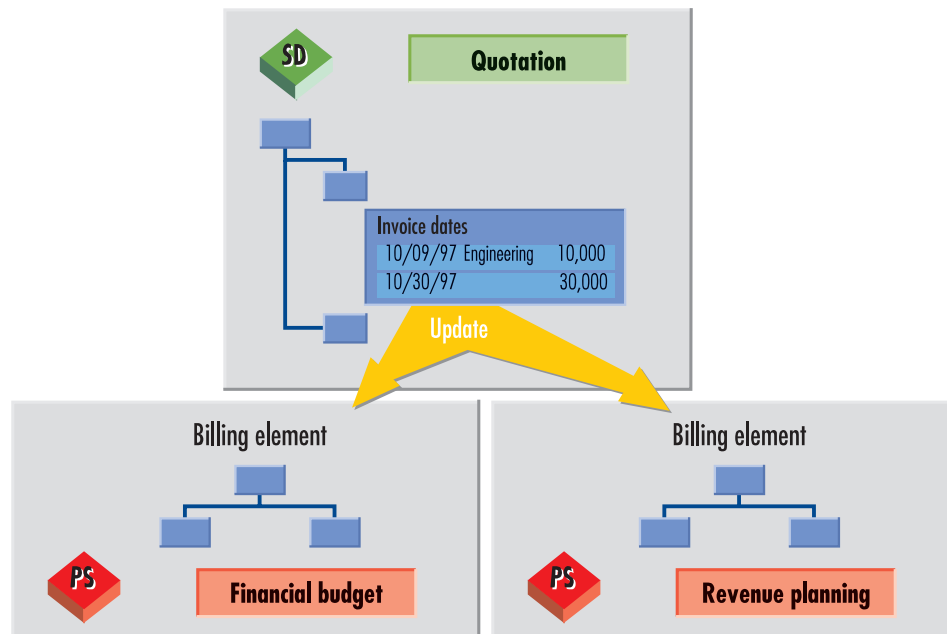


Fig. 2-2: Automatic Plan Value Update in Projects

You can create project versions to document the state of the project at the time the customer quotation is generated. Project versions record the structure of the quotation document and the project, as well as information on costs, revenues, and finances. You can use project versions to compare different quotations in iterative quotation processing.

When you create a sales order, you can reference it to existing customer quotations. If you do, information in the quotations, including links to the work breakdown structure, is copied into the sales order. Adjustments due to differences between the order and the related quotation can be made in the sales order or the WBS. If there was no WBS during the quotation phase, you can create one directly from the sales order.

As in customer quotations, the system automatically calculates values for project revenue planning and financial budgeting using the information in the billing plan. When you create a sales order referencing a quotation, the sales order value overwrites the quotation value. The sales order value is recorded in the project in addition to the quotation value. This means you can compare the current planned and actual revenues with the sales order value and the quotation value in the project.

You can use the Project Information System to evaluate the incoming orders and orders current for the project. To obtain an enterprise-wide view of incoming orders, you can pass on these values from sales projects to Profitability Analysis. You can then evaluate this information in Profitability Analysis, along with the information from other incoming sales orders.

Incoming Orders

Order Processing

Order processing is centered on:

- ☐ Deliveries per agreements in sales orders
- ☐ Billing and down payment processing
- ☐ Changes in projects due to customer requirements, technical changes, or updates to planned dates, resources, or costs

To process deliveries, you can select components in the project and combine them in delivery documents, according to characteristics. The system generates the appropriate goods issue postings on delivery.

Billing is delivery, order, or resource-related. In the case of order-related billing, you can define a billing plan. If you have defined down payment request dates in the billing plan as part of milestone billing, down payment requests are automatically sent to the customer when these dates are reached. The relevant amount is posted as a down payment in financial accounting. If the down payment is made, the system assigns the amount received to the appropriate down payment request.

Billing documents affecting sales are created per the dates stored in the billing plan. In partial invoices and the final invoice, down payments already made are copied to the billing document as down payments for clearing. You can still change the amount for clearing in the partial invoices. When you post the invoice, the down payments made are cleared against the receivable.

Periodic Processing

You can use earned value analysis to obtain information on the progress and current state of the project. This information is useful for internal controlling purposes and for confirming activities to the ordering party.

Periodic project processing also includes the following:

- ☐ Overhead calculation
The overhead cost portions in cost centers for the project are calculated and then updated to the project.
- ☐ Interest calculation
An up-to-date account balance interest calculation is performed, based on payment and cost information.
- ☐ Profitability analysis
The cost of sales is assigned to the revenues earned and WIP balances or provisions are calculated. The system offers various methods, such as revenue-based results analysis or profitability analysis based on a calculated percentage of completion.
- ☐ Settlement
Settlement directs the information gained in the calculation of profits to Financial Accounting, Profit Center Accounting, and Profitability Analysis.

How does the R/3 System support you in managing customer projects?

- ☐ The customer and project views are linked.
- ☐ You can create the work breakdown structure directly from the sales document.
- ☐ You can control activities affecting operations, such as billing and deliveries, from the project.
- ☐ You can process down payments.
- ☐ The system is linked to results analysis, enabling you to calculate work in process and cost of sales.

Project Cash Management

Project Cash Management is targeted toward valuing capital lockup and monitoring project-related cash flows. For example, it is responsible for ensuring that down payments and payments received reach the project as quickly as possible. Conversely, down payments and payments for services and purchase orders are to be made as late as possible.

Safeguarding liquidity is becoming less prominent in Project Cash Management because Treasury is taking over this function.

Planning Phase

As financing costs are included in the quotation costing, you require information on the cash flow right from the planning stage. In the R/3 Project System, you can automatically copy payment-relevant data from the:

- ☐ Billing plan for the sales order
- ☐ Billing plan for the WBS element
- ☐ Vendor payment plan (invoicing plan) from the network costing

You can determine as many down payment and invoice dates as you want in the billing/invoicing plan.

Planning payment receipts in the WBS element billing plan is an alternative to planning in the sales order - for example, if there are no sales documents yet or if you need alternatives. The planned revenues from the billing plan are automatically recorded in the project.

You can also plan the cash flow manually, based on WBS elements, periods, and commitment items (groups of G/L accounts).

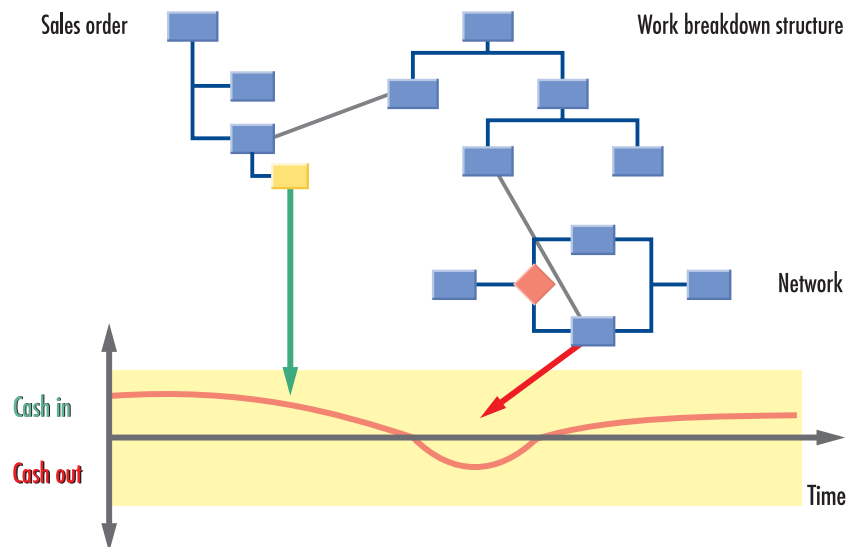


Fig. 2-3: Project Cash Flow

The various business transactions entered during project execution give rise to payment obligations and payments which R/3 records in the project at the proper time. For example, a purchase order leads to a payment obligation in the project which you can then evaluate in the Project Information System. When you enter down payments for the purchase order, the system automatically reduces the payment obligation from the purchase order by the amount of the down payment. When the invoice is received, the more accurate information it contains supersedes the purchase order payment information and is updated to the project in the form of a payment commitment. This is cleared by the payment itself.

Execution Phase

On the revenue side, down payment requests, down payments, invoices, and payments are updated in the project as account receivable obligations.

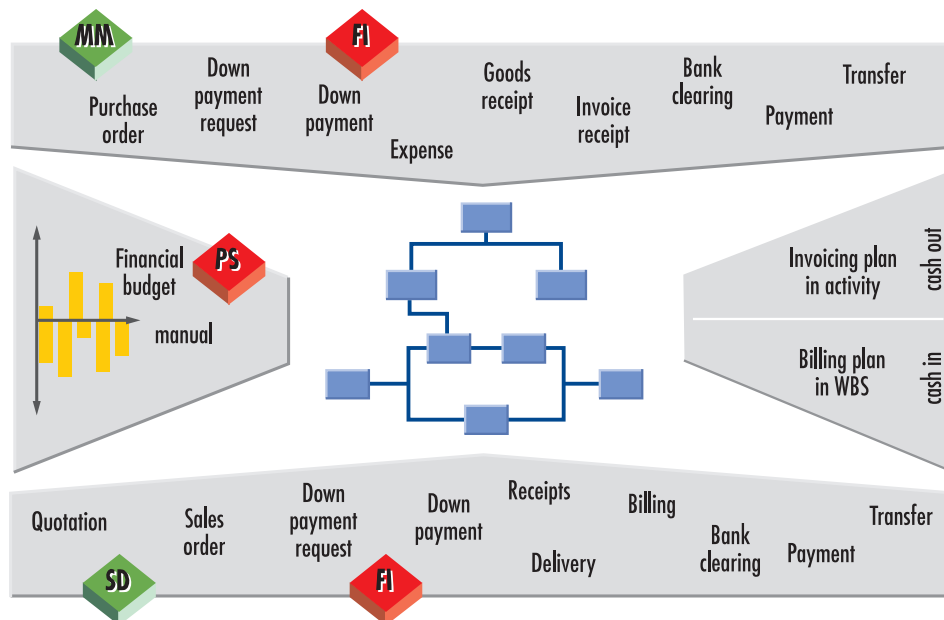


Fig. 2-4: Project Financial Data

Discounts and currency differences can also be covered by this process. You can manually enter the project exchange rates agreed in exchange hedging deals.

You can start an interest calculation program at intervals to calculate the actual financing costs. The interest calculated in this way is included in the project profitability calculation.

Closing

All payment information is recorded in the project currency, controlling area currency and the relevant transaction currency. The information system offers various reports for evaluating project financial data by currency.

What tools are offered by the R/3 Project Cash Management?

- ☐ Cash Flow Planning
Manual planning and automatic data transfer from the sales order
- ☐ Cash Flow Forecast
Information on future payment transactions
- ☐ Cash Flow Monitoring
Monitoring of payments and down payments, including the project history

Materials Management

In Materials Management, you can view the supply chain, even when it extends beyond your own business. The high degree of integration in the R/3 System means that you can plan, control, and monitor the path of the material, starting with the supplier and proceeding through your own business until it reaches the customer.

The term “materials” is used to describe raw materials, components, assemblies, or entire assets.

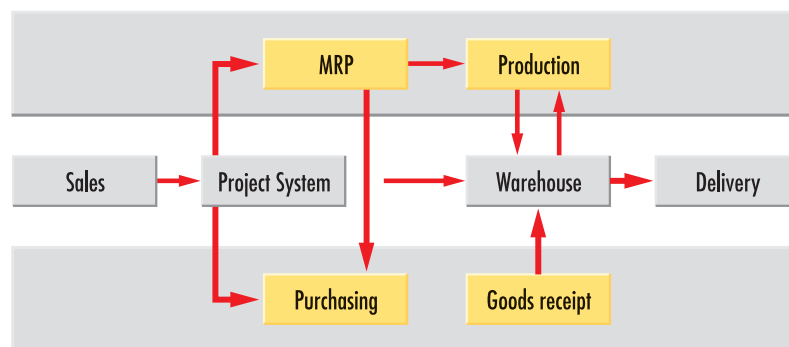


Fig. 2-5: Material Supply Chain

The R/3 System includes different various views showing the material as seen from development, production, procurement, sales and distribution, and service. You only need to enter data once to use the various views.

Views of the Product

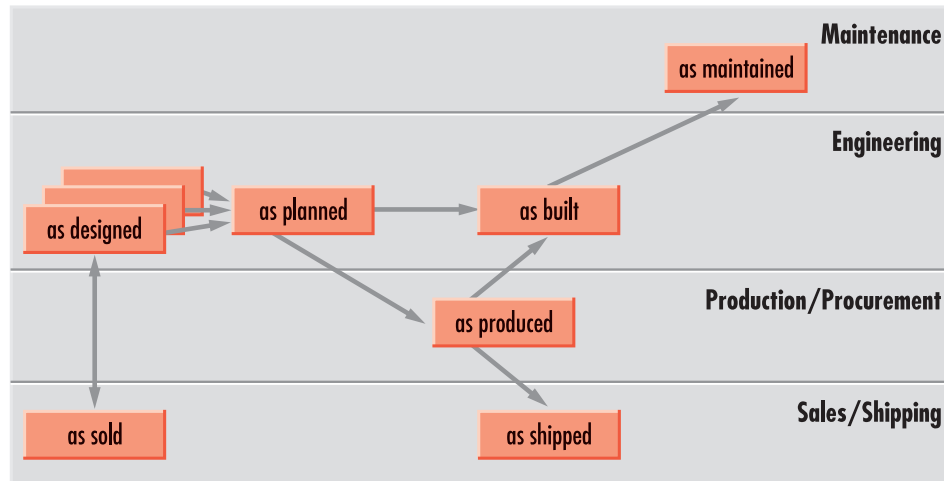


Fig. 2-6: Integration with Materials Management

The engineering BOM is the view from development (the **as-designed** structure). The planned material components in networks and production orders give the view during procurement, production, and assembly (the **as-planned** structure). This view can either be depicted in the R/3 System using a BOM or can be determined by transferring information from the engineering BOM into the material components in the network and production order.

You can use the network component list in MRP, procurement, and production.

Assigning components in your network enables you to start an MRP run directly from the project. In the process, individual MRP requirements are created in your project. They trigger the planned orders (internal processing) or purchase requisitions (external processing). You can convert planned orders and purchase requisitions into production orders and purchase orders, whose commitments and costs are updated directly to the project.

You can use an interface to take over data from the engineering BOM maintained in the R/3 system or from an external PDM system. You can use customer enhancements to include fields you have defined in BOM items and network activities without modifying the system.

The sales order describes the material as seen from Sales and Distribution (the **as-sold** structure).

Deliveries describe the material as viewed from shipping (the **as-shipped** structure). You can have the system generate the delivery automatically from the material components in the sales order or project.

Variances arising during the course of production or assembly must be documented in some industries, such as the aerospace industry. To this end, the state of each individual product and all its components must be recorded (the **as-built** structure). This includes data which only becomes available during the production process, such as manufacturer part numbers, serial numbers, or batch numbers of components as they are assembled.

In the same way, all changes subsequently made to the project because of maintenance work must also be documented and the changes to components recorded (the **as-maintained** structure).

Product Structure

You can maintain neutral bills of material (BOMs), configurable BOMs, and sales order BOMs. To keep work involved with sales orders BOMs down to a minimum, you can have the system generate a default for the sales order BOM during configuration. Often, a product structure may contain a mixture of standard assemblies, assemblies specific to the sales order, and configured assemblies. You do not need to enter new material numbers for assemblies adapted to particular sales orders. This means you can continue to work with the original material numbers in all areas, which makes processing much easier. Engineering change management, document management, and standard interfaces between the R/3 System and CAD systems make up the extensive product data management functions offered by the R/3 System.

Material Procurement

In the R/3 System, you use the Materials Management (MM) and Production Planning (PP) applications for external and internal procurement. The functions important for E&C are:

- ☐ Procurement **with or without material numbers**
- ☐ Procurement in **different currencies** for different items in the same purchase requisition or purchase order
- ☐ **Third-party order processing** for parts delivered directly to the customer site
- ☐ Combination of individual project-related purchase requisitions into one **purchase order**
- ☐ Retrieving of **quotations directly from the Project System**
- ☐ **Cross-plant planning** and allocation of tasks to **sub-contractors**
- ☐ **Collective order for production orders**

Concurrent Engineering

To keep lead times between taking the order and delivery of the finished product to a minimum, the R/3 System supports Concurrent Engineering.

- ☐ Components with long replenishment lead times can be procured in advance, even though complete BOMs may not be available
- ☐ Product structures can be set up and released bottom up. The procurement process can be synchronized with development. In addition to conventional material requirements planning (MRP), which explodes the BOMs starting with the finished product, the R/3 System offers MRP specially suited to the engineering and construction industry. Here the material requirements per assembly are determined using material component lists and network activities.
- ☐ An easy-to-use **engineering change management** enables you to make changes to components already released.

A **complete where-used list** creates the direct reference to the sales order or project at all material planning levels, from procurement through production to inventory management. You can use it analyze the inventory and material requirement situation at any time and promptly identify any parts which are running short.

You plan and control delivery of components to customers or to the construction site using the sales and distribution system. The R/3 System supports you when you export your product with functions for export control documentation. You can combine components into transport units for delivery. The R/3 System selects the components to be delivered and groups them together according to criteria you specified. First, you plan the transport units to be delivered from the plant to the transit warehouse at the port. Next, you can recombine the transport units for the rest of the route by ship. Thus, you can capture the entire delivery and transportation chain in the R/3 System.

You can copy the data for the delivery from external systems or include your own rules for transferring material components from networks and production orders to deliveries.

When you allocate material components directly to the network activities, the basic dates are passed on as requirements dates to materials planning or purchasing. You can determine what effect delays at the supplier or in production will have on the basic dates of your project. When you reschedule your network, you pass on the changed dates directly to material requirements planning (MRP). If the system cannot make any changes automatically because purchase orders are already active, workflow processes are automatically triggered, informing the relevant personnel.

When you schedule deliveries in SD Shipping, the system takes not just the transport times, but also commissioning and unloading times into account.

The material component data is copied directly to accounting and used for costing estimates and cost control. During project execution, planned costs from cost estimates, the purchase requisition commitment values, values already committed for purchase orders, and, finally, actual costs from goods receipts and issues are written to the project automatically.

Delivery

Scheduling the Material Flow

Cost Controlling

How does the SAP R/3 System support you in Materials Management?

- ☐ You can copy data into various product structures.
- ☐ You plan and control **material procurement** by means of purchase requisitions, purchase orders, and production orders.
- ☐ You can monitor **delivery** of materials to the site or to customers, including exports.
- ☐ You can plan and monitor:
Material **scheduling**
Material **costs**
- ☐ **Engineering change management** (design changes, technical changes, changes to sales orders)
- ☐ You can transfer documents directly to **service management**.

Engineering Change Management for Master Data

Engineering Change Management

The ability of a business to react flexibly is vital to its ability to compete. The R/3 System provides first class support in this regard.

Engineering change management covers BOMs, routings, documents, material masters, and the knowledge base for configuration. You can use it to combine individual changes under one change number relating to a unit, to document the changes made, and to control how the changes enter the operative systems.

When you implement changes in your daily business, the R/3 System supports the following:

- ☐ Time-based imputed cost calculation taking account of changes in dates and covering the individual production levels
- ☐ Time-based imputed cost calculation with a fixed date proceeding from a serial number in the finished product
- ☐ Breakdown by serial number (also called unit-effectivity)

You can use the change number to change the effective-in time for all objects maintained under that change number.

You can use the net-change MRP in production planning and control to have the system copy these changes to operative processing automatically.

When you copy BOM data via the BOM interface to the network, you can define some rules for the transfer. For example: if a late change is made to an expensive engine, you can reject this change on the grounds that the purchasing process is too far advanced, but can allow the same change to a less expensive component.

Changing Sales Orders

You can make changes to orders even after production has begun. Changes made to objects in the planning stage, such as planned orders or purchase requisitions, are accepted and passed on to the net-change MRP. However, if you want the changes to be copied to production orders or purchase orders which are already active, you can simulate the effect of the changes in the Project System first. You can use the simulation to evaluate the effects of the change in terms of quantity and date, and for cost controlling. Convenient functions for implementing the change are available if you then decide to accept it.

How does the SAP R/3 System support you in Change Engineering Management?

- ☐ **Engineering Change Management** for master data
- ☐ **Changes to sales orders** flow into orders in process
- ☐ **Change documents** for manual changes to existing orders
- ☐ Documentation of changes caused by **servicing** work in maintenance and asset BOMs