

## Quality Management in the Logistical Processes

This chapter describes the integration of the quality management module in the business-related applications of the R/3 System: procurement, production, and sales/distribution. The quality inspection and inspection lot play an important role within these processes.

The inspection lot data records or inspection lots, as they are more commonly called, fulfill a number of different functions from the time they are created until they are archived. First of all, they document an inspection requirement; an event has taken place that makes it necessary to carry out a quality inspection. During the inspection process, the inspection lot becomes the central control record that contains the current status of the inspection. It is the repository for all inspection data, including the inspection specifications, inspection results and usage decisions. More detailed information on inspection processing can be found in Chapter 5, "Quality Inspection."

Quality inspections are usually not triggered in the quality department. In most cases, the request for an inspection comes from the various links in the logistics chain, for example from goods receipt or production. In such cases, the affected modules in the R/3 System create the inspection lots and place them at the disposal of the QM module. Of course, the quality department - or another department with the proper authorization - can also create inspection lots manually.

### Procurement

The QM module is involved in the decision-making phases of the procurement process: inquiry, vendor selection, purchase order, goods receipt, incoming inspection, and releasing the goods receipt quantity.

#### Inquiry

As a supplement to the inquiry, the vendor can automatically receive the technical delivery terms for the material, as defined by the quality department. If the material has to be released by the quality department, the purchasing agent is notified accordingly. If the vendor consistently has critical

#### Vendor Release

quality problems, the quality department can block inquiries, purchase orders, or goods receipt for specific materials supplied by this vendor.

### Vendor Selection

**Vendor Evaluation** The materials management (MM) module informs the purchasing agent of the vendor's delivery reliability and price behavior. The QM module provides information on the quality of the previously delivered goods and the vendor's quality management system. For this purpose, the system maintains summarized quality scores that are automatically updated for the vendor evaluation.

### Purchase Order

**Technical Delivery Terms** When the purchase order is issued, the vendor must have been released by the quality department to deliver the material in question, if this has been specified. The release of the supply relationship may be limited to a specific period of time and a specified quantity. With the purchase order, the vendor automatically receives information about the latest technical delivery terms and the currently valid quality management agreement, as well as the vendor's obligation to include a quality certificate with the delivery.

**Quality Management Agreement**

### Inspection at the Vendor's Premises

Occasionally, inspections carried out at the vendor's premises will replace a goods receipt inspection. In such cases, the system permits the user to monitor the scheduled delivery dates and create inspection lots in time for the receiving date.

### Goods Receipt

**Compulsory Certificates** If a certificate is required for a material, it must be available no later than when the goods are received. A certificate may be required for each purchase order item, batch, or goods receipt.

**Inspection Stock** Normally, the quantity of goods received is posted to inspection stock for the duration of the goods receipt inspection. This stock is classified as "not available." It is managed solely within the scope of inspection lot processing

and cannot be posted separately using the functions of materials management. The material planning department also takes the duration of the goods receipt inspection into consideration.

### Inspecting and Releasing the Goods Receipt Lot

Inspection lot processing is automatically triggered upon goods receipt. In addition to the goods receipt document, the system also creates an inspection lot record. Furthermore, it selects an appropriate inspection plan and determines the sample size for all inspection characteristics, based on the quality level. The inspection is now ready to begin and the necessary documents, such as the sample drawing instruction and inspection instruction, can be printed out immediately.

The processing of the inspection lot in the QM module ends with the usage decision. Under special circumstances, the inspection lot quantity can be withdrawn from the inspection stock in advance, providing the user has the proper authorization to make the withdrawal. Normally, however, posting takes place after inspection completion in conjunction with the usage decision.

After the inspection has been completed, the accepted inspection lot quantity is posted to unrestricted-use stock. Special posting is possible for rejected quantities. When the goods receipt quantity has been released, the QM module is no longer responsible for managing the stock.

With the usage decision, the system updates the quality level and makes the inspection lot quality score available for the vendor evaluation. It also updates all data in the quality information record relating to material and vendor. For example, the status of the supply relationship can be changed from prototype delivery to production delivery, once the inspection lot has been accepted.

After the usage decision has been made, the system may trigger an additional series of individually programmed follow-up actions. For example, if defective goods have been received, vendor may be notified of the complaints by letter or through a system-supported quality notification.

### Status of Supply Relationships

The QM module monitors the step-by-step release of supply relationships. The user can define certain statuses such as prototype, preliminary series or production series. These statuses represent the stages that a vendor's material delivery must sequentially pass through. The system then creates

#### Inspection Lot Creation

#### Quality Inspection

#### Usage Decision

#### Follow-Up Action

#### Prototype

inspection lots with an inspection lot type that matches the status of the supply relationship, and automatically updates the statuses, based on the usage decision.

**Quality management is involved in the decisive phases of the procurement process.**

What are the objectives of quality management in the procurement process?

The QM module

- evaluates vendors on the basis of quality
- monitors the status of supply relationships
- prevents the delivery of defective goods
- prevents goods receipt lots from being used as long as the inspection has not been completed
- manages quality documents and internal quality audits

## Production

Production operations and inspection operations in the production process are becoming increasingly more interdependent or are being combined altogether. A strict division can no longer be maintained between such activities as a worker carrying out an inspection and controlling process characteristics, since both affect the quality of the products. As a result, teams from both the production and quality inspection areas are creating the routings together.

For this reason, the inspection characteristics in the QM module are integrated into the work scheduling and production processing activities of the production planning and control (PP) module. The characteristics - consisting of either inspection characteristics or process characteristics - are created for a production operation. Test equipment is assigned as production resources and tools. Both production and inspection activities can be combined within the same production operation. The operation is treated as a production operation in all other respects.

When a production order is created, the system also creates a special inspection lot record for managing the inspection specifications and inspection results for all operations. Relevant changes to the production order, such as changes in quantity, will be copied into the assigned inspection lot record.

It is possible to link the confirmation of inspection results in the QM module with the confirmation of production operations the PP module.

The routings may prescribe regular inspection intervals. It is possible to define a time-based or quantity-based inspection grid for a production run. With the help of the inspection grid in the QM module, the production process can be monitored continuously with respect to the process or inspection characteristics.

The inspection grid permits the total quantity of a production order to be divided into partial lots. This may be necessary if the partial quantities exhibit unlike qualities. If the final product is maintained in batches, the partial lots can be assigned to individual batches when the production order is completed. The inspection results will be used as batch characteristic values.

The grid-controlled inspection provides the basis for implementing statistical process control with the help of control charts. Control charts are graphical tools that document the quality trend in a production process.

**Integrated Planning**

**Inspection Operations**

**Inspection Lots**

**Confirmations**

**Inspection Intervals**

**Partial Lots**

**Control Charts**

The QM module supports the following types of control charts for inspection characteristics with a normal distribution pattern:

- mean value chart with tolerances (acceptance chart)
- mean value chart without tolerances (Shewhart chart)
- standard deviation chart

Control charts are updated and displayed during results recording. The system calculates the action limit and warning limits upon request, based on the current inspection results or results from a previous inspection. A control chart may include several inspection lots or production orders. Although control charts are primarily intended for quality management purposes during production, they may also be used with inspection lots of other origins, such as goods receipt.

#### Process Capability Index

A process capability index is created when the mean values calculated on the basis of inspection results and the variances of inspection characteristics are viewed in relation to the predefined limits set by the planner.

**Production and inspection operations are integrated. Time-based or quantity-based inspection intervals permit the process to be monitored continuously and provide the basis for defining control charts, partial lots, and batches.**

What are the objectives of quality management in the production process?

The quality management module:

- integrates production and inspection operations
- supplies data for statistical process control
- separates partial lots of material with dissimilar characteristics

For which types of processes is a quality inspection in production suited?

The QM module supports flexibly defined inspection intervals and is suited for a wide variety of processes in many different industries. This includes:

- made-to-order production (for example, plant engineering and construction)
- lot-based production (for example, parts and equipment)
- batch production (for example, in chemical and food industries)
- continuous flow production (for example, mass-produced commodities)

## Sales and Distribution

Within the scope of sales processing, the system allows goods to be inspected on the basis of the delivery note (or delivery as it is commonly referred to). When the delivery is created, an inspection lot is also created and released. The picking and inspection procedures can be coordinated flexibly, since the system does not prescribe any specific procedures.

### Inspection of Goods

If the stock of a material is managed in batches, the QM module supplies the specifications with inspection results, thereby supporting the selection of suitable batches indirectly.

### Batch Specification

In some industries it is customary to include quality certificates with the delivery. Quality certificates document the material specification or the inspection results of a batch. Triggered by the central message control function in the SAP System, the certificate is printed at the same time the shipping documents are created.

### Certificates

To be able to use the certificate processing capabilities, the user must

- design the forms for the certificate layout (using SAPscript)
- create certificate profiles to represent the characteristics contained in the certificates
- assign master data such as materials
- determine the method for distributing the certificates (recipient, language, shipping method)
- provide a means of documenting the information in several languages

Once these requirements have been met, the system will automatically generate the quality certificates and distribute them using the following output devices:

- printer
- telefax
- EDI interface (planned for a later release)

The system can store the quality certificates in the optical archive using the SAP ArchiveLink function.

When the quality certificates are created, the system retrieves information from its environment. This includes data from

- quality management
  - inspection lot
  - usage decision
  - inspection results
- materials management
  - material master
  - batch master
- sales and distribution
  - delivery
  - customer order
  - customer master

**Complaints** Occasionally customers may not be satisfied with the delivered goods. Customer complaints can be processed by quality notifications, a special component of the QM module. Detailed information on this subject is contained in Chapter 6, “Quality Control.”

**Created on the basis of a delivery, quality certificates are available in time for shipment.**

What assistance does quality management provide for sales and distribution?

The QM module supports the quality documentation by

- triggering inspections when deliveries are created
- transferring inspection results to the batch characteristic values
- providing custom-designed quality certificates with the delivery