

## Manufacturing Module

In Ross ERP, the Manufacturing module defines the production process, calculates and tracks product and job cost, and records all of the activities necessary to manufacture products. Stages of the manufacturing are consolidated into a process specification. Actual cost rollups within the process specification are compared to standard job cost for each lot or batch produced. All manufacturing-related activities (including issue of materials which automatically decreases inventory balances, recording of production outputs which increase inventory balances) are tracked and charged to a Job, thereby determining actual job cost and variances. General Ledger journal entries are automatically created for all transactions. And the lot trace information is recorded from the manufacturing activities.

## Manufacturing Specifications

With Ross ERP you can manage all of the resources required to produce a product - in every stage of your manufacturing process – with unlimited inputs and outputs.

The Ross ERP process specification has been designed to meet the most unique and complex manufacturing requirements. Stages in the manufacturing process can be combined to minimize WIP and not force a return to inventory of component stages. Or very detailed separate stages can be created to feed an electronic batch record entirely within Ross ERP.

A recipe or stage is the basic building block of defining the manufacturing process. It defines all of the process steps and resources required to produce a product, including raw materials, intermediate products, resource and labor requirements and any miscellaneous requirements. Multiple outputs can be defined including primary products, co-products and by-products. The Recipe can include the following:

- Materials, labor, equipment and miscellaneous items such as utilities and water.
- Waste streams can be defined as an output for accurate costing and disposal
- Specify the quality requirements for the process or product.
- Include all of the outputs, such as the final product, co-products, and by-products.

The process specification then links one or more recipes or formulas with stages to define the complete manufacturing process for producing a finished good or intermediate product. A process specification can be a complex 50-stage process or a simple 3-step process:

By setting up the process specification into individual stages you are able to summarize costs and activities by stage, as well as view all of the details of every activity by stage. It also simplifies the maintenance of recipes when a common recipe is linked to multiple process specifications.

- Each stage can have unlimited inputs and outputs, and can include instructions that define the activities of the stage.
- Define an unlimited number of stages (group of activities that occur together and can be summarized together) that can be in series or in parallel.
- The stages are linked together, with the output of one stage becoming the input for the next stage.
- Move product from one process step to another – without having to perform an intermediate inventory transaction to reflect the movement of product from one process stage to another, or define unnecessary intermediate products. Optionally, you can require counts at specified stages.

## Quality Control Tests

With Ross ERP, you can define QC requirements for each stage or activity, for both product and process.

- QC Tests can be setup with a target value and high and low limits.
- Multiple QC Tests can be grouped together for recording results and reporting purposes.
- In manufacturing, any time you have an actual test result that is outside of your test limits, the batch is automatically flagged for QC hold.
- QC results, along with high/low limits, are included with the lot traceability inquiries.

## Rate-Based or Fixed-Time Production

You have the flexibility to define equipment and labor rates on either a production or a fixed time basis. Rate-based is variable based upon the number of units of production such as X units per hour, whereas Fixed-based is constant up to the maximum batch size such as Y hours per batch.

## Flexible Units of Measure (UOMs)

Ross ERP provides you with tremendous flexibility in utilizing units of measure within a process specification.

Your process specification can record all resources, including inputs and outputs, in different units of measure for a given production stage – you do not need to use a common UOM throughout a process specification.

## Input- or Output-Based Process Specifications

Ross ERP provides you with the flexibility to define and use both input-driven and out-put driven processing. Traditional methods are output driven, and that determine input material requirements based upon finished product requirements.

You may have a process that is based upon the input of a specific product, with either one or multiple outputs. Input driven processes are based upon the quantity and characteristics of the primary input product. Based upon this, the expected output(s) can be determined. Your process may also include the separation of an input material into its various elements. And you can easily use the input driven process to define this.

## Dynamic Potency and Dependency Calculations

Ross ERP performs potency calculations automatically, and enables you to specify the minimum and maximum characteristic value of an input material that is allowed for use in a particular process specification. It also calculates multiple dependencies based upon user defined dependency formulas which can consider actual lot characteristics.

You can specify a unique potency calculation based upon the characteristic values of actual lots in inventory, and Ross ERP will dynamically calculate the physical quantity required.

## Batch Scaling

Ross ERP allows you to define batch sizes in either quantity (i.e. 1,000 Kg) or time (i.e. one hour or a shift). You can set the minimum and maximum allowable batch size and the possible increments within the range. Based upon demand quantities, Ross ERP automatically determines the number of batches along with the size of each batch.

## Version Control and Authorization Safeguards

Version control and authorizations are integrated with the application security which provides you with auditability and traceability of Stages and Process Specifications.

Version control capability enables you to limit changes to an existing recipe, and preserves the full auditability, traceability and version control history of your process specification. It can be either automatic or manual.

Each version contains effectivity dates that specify the time periods during which a process specification is valid. You may have overlapping effectivity dates (with the latest authorized version within the effectivity date automatically selected for use). However you can select to use an earlier version, as long as it remains activated and is within the effectivity dates.

You can set up authorization control as a requirement to ensure that no one can use a new or changed recipe without the required approvals, which are established via a pre-defined routing by department and employee for authorization. This provides you with an audit trail of those approving or rejecting, along with dates and comments.

## Location-Specific Specifications

You may produce the same product in multiple factories, and you may use the same or different ingredients based upon geographic availability, your processes may be different due to different equipment, batch size restrictions may be different due to vessel capacity, and as a result your costs may be different by Factory. With Location/Factory specific Process Specifications you can define the factory specific requirements.

- Your process specification can be location-specific even if you produce the same product at many locations. Each location can have the same or different ingredients, along with location-specific equipment, labor classes, quality requirements and processing times.
- You can compare costs from location to location, compare actual to estimated costs, and calculate a direct cost and an overhead cost for each activity.
- You can use multiple or alternative process specifications to create the same product.
- You can have multiple process specifications per location.

## Product Costing

After you have created the recipes and process specification, you can determine the estimated or standard cost based upon cost rollups.

- A cost rollup can be performed for either a specific product or process specification, for groups of products or process specification, or for all process specifications for a factory or all factories.
- If the product or process specification that is being rolled-up includes an intermediate product(s) the cost rollup will also perform the cost rollups of the intermediate products, through multiple levels.

Part of the process specification setup is to determine the cost categories that you want to use to in calculating product cost. You can use the traditional material, labor, overhead and miscellaneous cost categories, or you can setup additional costs. You may want to separate material costs into primary ingredients, miscellaneous ingredients and packaging supplies. And you may want to separate value added costs by department or operation type. There is no limit to the number of cost categories that you can setup to manage product costs.

For each activity (material input, machine requirement, labor requirement, and miscellaneous input) that you have included on the process specification, you have the ability to define a direct cost category and an overhead cost category.

- The results of the cost rollup can be viewed in a summary mode for one product or process specification or all items included in the cost rollup. The summary compares the current rollup results to the existing standard cost for each item.
- Detailed cost rollup inquiry provides various views and formats of the cost rollup, including the ability to view cost by product, by stage, by cost category and by stage and cost category. If you have questions about how the cost rollup was calculated, you can drill down to each activity line on the process specification and view the associated cost.
- If you have co-products or by-products in your process specification, the cost rollup handles these appropriately. You can allocate the costs across multiple co-products and you can receive credit for the value of any by-products.
- Once you have reviewed the cost rollup results, made any necessary adjustments, you can then easily transfer the cost to be your new standard cost.
- All production jobs track and compare the actual cost to the cost rollup and calculates and reports differences. If you are using standard costing for inventory valuation, then all of the variance postings are also determined.

### Production

**Jobs** Ross ERP uses Jobs to setup and record all manufacturing activities. A Job is the authorization and instruction to produce a specified amount of a product(s), using a specific process specification. Required dates can either be a due date and time, or start date and time, or both. Based upon the job quantity, the inputs are determined for output driven process specifications. For input driven process specifications, all of the other inputs and expected outputs are determined based upon the primary input quantity.

Jobs can be automatically created from planning jobs or created individually by a designated planner at any time.

- If the process specification has by-products or co-products, the job created will produce these multiple products.

When creating a job, you can:

- Select from alternative recipes.
- Optionally, make one-time modifications or one-time deviations for the specific job, if allowed based upon user -defined controls.

When a planner creates a job, the job type can either be inventory or customer.

- For inventory type jobs, the planner enters the process specification, quantity and start or due date.
- For customer type jobs, the planner selects the sales order line that the job is for, and then the system determines the process specification, quantity and due date from the sales order, with optional overrides by the planner.
- Any customer specifications on the sales order are automatically transferred to the job QC test limits, if QC tests have been previously established on the process specification for the specification characteristics. Also, any comments on the sales order are automatically transferred to the job for customer type jobs.
- For customer type jobs, a sales order to job link is automatically created. This allows customer service to inquire on job status during sales order inquiry, and it also allows planning and manufacturing to view sales order requirements from the job status.

After a job has been created, it can be finite scheduled and released to manufacturing.

**Material Inputs** Ross ERP helps you ensure that the materials you need for a key customer or a critical job are not used for another purpose, and are there when you need them.

- You can perform a trial kit (see whether the required materials are on hand, and if any shortages exist, where they are) for a job or group of jobs before releasing the job to production. Any shortages are noted as exceptions and this can then be used as an expedite list.

You can have Ross ERP allocate materials (reserves specific lot numbers and quantities) for a specific job. If you are using potency and dependency formulas, the allocation process determines the amount of each ingredient and lot to use based upon lot characteristics.

- You can also generate a pick list (the list of all the materials needed for the job, the selected lot, and the location of each one) – even if you have not previously allocated material.
- The allocation and/or pick-list processes reduce the quantity available of each input required for the job, but the Quantity on Hand is not reduced until the actual material issue is made by confirming the pick-list.
- When confirming the pick-list, the quantity or lot number can be entered to record any differences in the pick-list and what was actually used.
- You can also use a direct issue to issue material without a pick-list. With the direct issue, you can issue additional materials or substitute materials, with appropriate audit trails created.
- A material return feature provides the ability to return any unused or left over materials back to inventory, optionally going through a QC or Quarantine process to validate materials returned.
- For non-lot controlled items, such as packaging supplies, etc. you can elect to have the system back-flush these materials for you. Back-flushing is the automatic issue of necessary materials based upon the actual quantity of output product recorded.
- All material issues automatically create the lot trace details and make the necessary journal entries for posting to the General Ledger.

**Recording Machine and Labor Time** If you want to record actual machine and labor time used in production for costing and efficiency calculations, you can record this information for each machine and labor activity on a Job. However you can also elect to have the system Backflush machine and/or labor time for you, based upon the quantity of production recorded.

- When recording machine time you can record the actual machine used and either the actual start and stop time or just the elapsed time.
- When recording labor time, you can record either the labor class or the actual employee. Also, you can record the actual start and stop time or just the elapsed time.
- You can elect to record actual time for specific activities and backflush other activities.
- When you record the actual time, this is used in determining actual job cost, calculating efficiency of the operation and job and used in calculating variances if you are using standard costs.

**Recording Process Variables – Lot/Batch Record** Ross ERP can record process variables extracting real time, or historical data from the process control system, maintaining the lot/batch record in a central data repository. User defined tables can be created to store exception reports, high/low levels, moving averages, or any other process control tags made available from your process control system. Ross ERP is capable of communicating to all of the process control systems in the market using common industry standard communication protocols.

**Record QC Test Results** With Ross ERP you can record and monitor the results of QC testing for both product-related tests and process-related tests. Optionally the test results on the final product then automatically become the characteristic values for the product in inventory.

- You can record virtually an unlimited number of readings for each test and Ross ERP automatically maintains the highest reading, the lowest reading, and the average for each test.
- Ross ERP compares actual results to the minimum and maximum allowed for the test.
- Out of range test results are automatically flagged for QC hold, allowing you to continue to record all production related activities. This then goes into the centralized quality area for tracking and disposition.
- You have the ability to record production outputs into a QC or Quarantine status and then report QC Test results afterwards. After test results have been entered, the output lot can be transferred from QC or Quarantine into Quantity on Hand status.

**Recording Production Outputs** Production outputs can be recorded for output products going into inventory as well as the quantity produced (Stage Count) at any stage. They can be subdivided into counts, count approvals and inventory put-away. Based upon your processes and procedures, you determine if you want to setup the recording of outputs into consolidated, separate, or individual steps.

- Inputs set up for back-flushing are automatically charged to the job.
- Inventory put-away automatically updates inventory balances, creates all lot trace records and creates journal entries for General Ledger postings.
- You have the ability to record multiple output transactions (counts) for the same job with each subsequent count defaulting to the same output lot number.
- If the output product has shelf life restrictions, all of the lot dates are automatically calculated and recorded for the output lot.
- If you have co-products and by-products you can record the count of all outputs either at one time or individually.
- Inventory put-away is based upon the pre-established put-away controls for the output product and warehouse. Or if you chose, the operator may be allowed to control the put away location.

**Job Status and Performance Reporting** From the time that a Job is created until after it has been completed and closed, Job Status and Performance Reporting is available on-line.

- The status function determines and reports if the job is early, on-time, behind schedule or late based upon the job schedule and current status. The status function also reports where the job is located in the process and if it is waiting or running, all based upon inputs of machine and labor activity.
- Performance reporting compares actual inputs and usage to the standard amount required for the job. For material Inputs, the actual quantity is compared to the standard quantity with quantity and percentage variances calculated. For labor and machine inputs, the actual time is compared to the standard time with variances also calculated as well as efficiency reported for each machine and labor requirement and total for the job. Actual output quantities for each stage count and production outputs are tracked and compared to planned outputs.

**Yield Reporting** For each process specification, the user can setup one or multiple yield measurements based upon the recipe material inputs and production outputs.

Yields are easily established – first you specify the Unit of Measure to use for inputs and outputs, and then indicate the inputs and outputs to include in the yield measurement calculation. From this, standard yields are automatically calculated by the system.

From entering the material inputs and recording the material outputs Ross ERP can then determine the actual yield(s) of each job.

- The actual yield of each yield measurement is automatically calculated and compared to the standard yield, with the ability to see the details of both the standard and actual yield calculations.
- Yield measurement and tracking can be a very effective performance measurement tool for operations and management to measure material usage and variances.

**Job Costing** Ross ERP automatically calculates an estimated or standard cost for each job based upon the process specification and quantity to be produced. Any planned one-time modifications or deviations to the job are also included in the estimated job cost.

The reporting of actual job cost is very similar to that of product costing with various formats available to view total cost, unit cost, cost by stage, total cost by cost category and detail activity, and unit cost by cost category.

- Unlimited cost categories are used for tracking and reporting actual job cost, based upon the cost categories defined in the process specification.
- For every job the actual cost is recorded and calculated based upon all of the actual inputs with the ability to compare to standard cost, either in total or unit cost, by cost category, by stage, by stage and cost category.
- Direct and an overhead costs are automatically calculated for each activity.
- Information is summarized by stage and by category, and for each activity the amount used as well as the actual cost is tracked, and this is compared to the standard or estimated cost and usage. In the case of labor, for example, it will record employee hours in addition to labor costs.