



MAS 90
MAS 200

Channel Partner
Guide to Manufacturing

Best Software, Inc.

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Introduction to the Guide

Many manufacturing businesses are relatively small, and as a result, may have unfulfilled needs in automating their processes due to the lack of an affordable solution. MAS 90 and MAS 200 offer some of the most cost-effective software products available for manufacturers. There is, therefore, an excellent opportunity to sell our solutions to these companies. Channel partners who understand this market may enjoy a significant boost in sales.

Manufacturing companies can be classified by the production method(s) they use. These classifications help to pinpoint the system features that can be important to a company evaluating the MAS 90 or MAS 200 manufacturing solutions.

This white paper will help you understand the needs of six types of manufacturers:

1. *Discrete*
2. *Job Shop*
3. *Assemble-to-Order*
4. *Engineer-to-Order*
5. *Process*
6. *Repetitive*

A description of the classification, pertinent SIC codes, system features and examples of manufacturing companies using MAS 90 and MAS 200 are provided for each of the six types. This information will help you to identify the manufacturers who will benefit most from the MAS 90 and MAS 200 manufacturing modules.

This white paper also describes three MAS 90 and MAS 200 manufacturing solutions, provides overviews of their powerful capabilities, and identifies the manufacturing types best suited for each.

Larger companies that need enterprise-level applications will benefit from the Best Enterprise Suite manufacturing solution. Please contact Best for information on this advanced suite of products.

MAS 90 and MAS 200 meet the needs of small and medium sized manufacturing businesses by providing a fully integrated, affordable solution.

Best shows you how to identify the companies that are best served by the MAS 90 and MAS 200 manufacturing solutions.

There are six classifications used to describe how a manufacturer converts raw materials into finished products.

Manufacturing Production Types

There are six manufacturing production types (manufacturing method classifications) used to describe how a manufacturing company converts raw materials into finished products. Many companies use a hybrid of multiple production types, however there is typically a dominant production type.

Identifying the primary and secondary production processes is the first step in understanding a manufacturer's system requirements. System requirements and priorities can differ based on the manufacturing production methods used by the company.

Classifying a manufacturing company by its manufacturing method(s) enables you to understand the types of transactions and activities that must be handled by the system. It also enables you to leverage your manufacturing knowledge and experience into a variety of manufacturing environments.

Discrete Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, discrete manufacturers are involved in the "*production of distinct items, automobiles, appliances, and computers.*" In discrete manufacturing industries, units (for example, CD players) are typically made by the assembly of a large number of component parts.

Discrete manufacturers may make to order, make to stock or do both (referred to as "mixed mode" manufacturing). *Make-to-order* is a manufacturing process where raw material procurement does not begin until the actual customer order is received. *Make-to-stock* is a manufacturing process where finished goods are completed prior to receipt of an actual customer order and maintained in inventory or warehoused until a customer order is received.

Production costs, material availability, and lead times are important control points for a discrete manufacturer.

System Features

Discrete manufacturers need a strong bill of materials application to develop and maintain accurate bills. They also need routings that reflect how the product or subassembly is actually built. Bills of material and routings are used to determine costs and lead times. Mixed mode discrete manufacturers need support for both custom and make to stock work orders.

Examples

MAS 90 and MAS 200 can be a good fit for many make-to-order, make-to-stock or mixed-mode discrete manufacturers. Examples of discrete manufacturers using MAS 90 and MAS 200 include companies that manufacture consumer products (hand tools and cleaning products), as well as those that manufacture industrial equipment and machines (pumps, fuel pump controllers and wire processing equipment).

Typical SIC Codes

Discrete manufacturers are generally categorized in the following SIC codes:

245-254	300-301	306-309	316-319	342-344
348-349	350-375	377-389	393-394	399

Job Shop Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, job shop manufacturers “*utilize intermittent production methods.*” Job shops can be characterized as manufacturers that make limited product runs or a limited quantity of product when the production process takes place.

A job shop manufacturer typically receives all or most engineering specifications from the customer. Intermittent production methods are used due to a limited customer demand. Job shop manufacturers sell based on their capacity and ability to deliver quality product on time.

Some job shops may have a different product structure each time a product is built (e.g. specialty equipment and machines).

Some job shops are *jobbers* who typically add value to materials provided by their customers. Examples include heat

Discrete manufacturers using MAS 90 and MAS 200 include consumer products and industrial equipment.

Job shop manufacturers using MAS 90 and MAS 200 include custom printers, stamping shops and cabinetmakers.

treaters, chemical coaters, and computer-controlled machining.

Other job shops are *custom crafters* or *fabricators* who typically have expertise and equipment for processing a certain type of material to customer-specific requirements. Examples include custom furniture manufacturers, sheet metal fabricators and plastic injection molders.

System Features

It is common for a job shop to add new part numbers as new products are offered or configured. This can result in a long item master with many inactive parts. Deleting “one time” products and parts from the active parts file may be important.

A strong job costing system is typically an important system requirement and must include budgets and profitability analysis. Job shops often require matching revenue with the cost incurred to determine profit by job, customer and department.

Examples

A MAS 90 or MAS 200 manufacturing solution can be a good fit for job shop manufacturers that have either unique or repeat product orders. Examples of job shop manufacturers using MAS 90 and MAS 200 include custom printers, stamping shops and cabinetmakers.

Typical SIC Codes:

Job shop manufacturers are generally categorized in the following SIC codes:

230-239	242	270-279	310-311	316-319
330-339	346-347	373	390-392	

Assemble-To-Order (ATO) Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, assemble-to-order (ATO) manufacturers “*produce and stock all product components in anticipation of a customer order.*” When a customer order is received, final assembly and packaging is completed. ATO is a production process in which components (bulk, semi-finished, intermediate, fabricated, purchased) used in the assembly are

built and stocked at the subassembly level and configured at the time of a customer order.

System Features

Certain ATO manufacturers can be the most sophisticated of the six manufacturing types. Their requirements may include sophisticated product routings, a sophisticated product configurator and forecasting and scheduling at the subassembly level.

Examples

MAS 90 and MAS 200 can be a good fit for ATO manufacturers with moderately complex system requirements. Examples of ATO manufacturers using MAS 90 and MAS 200 include manufacturers of fencing, garden sheds and belly-trailer trucks.

Typical SIC Codes

ATO manufacturers are generally categorized in the following SIC codes:

352-353	357	365-366	370-372	375	382-384
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ATO manufacturers using MAS 90 and MAS 200 include manufacturers of fencing, garden sheds and belly-trailer trucks.

Engineer-To-Order (ETO) Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, engineer-to-order (ETO) manufacturers produce “*products whose customer specifications require unique engineering design or significant customization. Each customer order then results in a unique set of part numbers, BOMs [bills of material] and routings.*”

ETO manufacturers are half consulting engineering firms and half manufacturers. ETO manufacturers sell design expertise in addition to selling their capacity and ability to deliver quality product on time.

Jobs typically require formal bids with a considerable investment of engineering time and resources prior to winning the job. After the job is awarded, the client and ETO manufacturer complete the details of the job and then the

ETO manufacturers using MAS 90 and MAS 200 include fuel-dispensing systems, custom overhead cranes, trade show booths and mining equipment manufacturers.

actual manufacturing begins. ETO jobs can span many months and sometimes years.

System Features

The ETO manufacturer needs control over materials and cost estimates. The job and materials can change over time. New part numbers are added for new projects. The item master may contain many inactive parts.

The revenue generated from jobs is typically very large and is usually tracked on a project basis with clients billed on a percentage-of-completion basis. Some ETO manufacturers want job information broken down into categories and sub-categories, as well as sophisticated project management functionality. Job costing and time phased purchasing of material and services for a specific job can also be important requirements.

Examples

A MAS 90 or MAS 200 manufacturing solution can be a good fit for ETO manufacturers that require bills of material with routings. Examples of ETO manufacturers using MAS 90 and MAS 200 include fuel dispensing systems, custom overhead cranes, trade show booths and mining equipment manufacturers.

Typical SIC Codes

ETO manufacturers are generally categorized in the following SIC codes:

344	350-351	354-356	360-362	367-368	376-379
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Process Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, process manufacturers use a “*production approach where there are minimal interruptions in actual processing in one production run or between production runs of similar products.*” Those industries are characterized by continuous operation or treatment in manufacturing executed in a definite, uninterrupted manner. Major process industries include steel, chemicals, pharmaceuticals, petroleum, paints, coatings, soaps, cosmetics, food and beverages.

The primary characteristic of a process manufacturer is their fixed production capabilities and “batch” orientation to production. The production process can either mix or separate. When process manufacturers mix product, they blend a series of ingredients to produce a “batch” of product. Typically a limited number of raw materials are processed to produce numerous variations of a limited number of product types. When process manufacturers distill product, they may take a single ingredient and distill several by-products.

Routings are determined by the physical plant and equipment. There is typically very little work in process to track.

Process manufacturers have a fairly high level of sophistication. Due to their fixed plant and equipment, they typically have a fairly strong control of costs and production capabilities.

System Features

Process manufacturers do not use BOMs (bills of material); instead they use formulation management. In reality, formulation management is fairly close to BOM management. The formula management application may need extensive decimal precision in quantity fields. If changes to formulas are common, more extensive capabilities may be required; e.g. a food manufacturer may want to track nutritional values or calories by formula. Each time product is mixed it is recorded as a “batch.”

Some process manufacturers have a limited number of products but a large number of packaging differences. For example, a single liquid shampoo formula may be bottled and sold in over 50 different packages. Some process manufacturers have by-products or co-products that result from the production process. An example is the oil and gas industry where a number of fuels and other products can be produced in the same batch.

Other features required or desirable for certain process manufacturers may include the following:

- Tracking weight, volume, density, potency and formula conversions from volume to mass or mass to volume.
- Laboratory management capabilities (supporting product development with physical properties analysis), regulatory compliance related capabilities (e.g. material safety data

Many manufacturers of foods and beverages use MAS 90 and MAS 200.

sheets and SARA reporting), and issuing materials to production by batch/lot number.

Examples

MAS 90 or MAS 200 can be a good fit for process manufacturers with simple system requirements. Although both MAS 90 and MAS 200 provide an option for handling negative component quantities, process manufacturers who need more sophisticated support for by-products and co-products may not be a good fit. Examples of process manufacturers using MAS 90 and MAS 200 include many manufacturers of foods and beverages.

Typical SIC Codes

Process Manufacturers are generally categorized in the following SIC codes:

200-229	239-241	243-244	260-269	280-299	310-311
320-321	324	330-334	336	395-398	

Repetitive Manufacturers

According to the American Production and Inventory Control Society (APICS) dictionary, repetitive manufacturers are involved in the “*production of discrete units, planned and executed to a schedule, usually at relatively high speeds and volumes. Material tends to move in a continuous flow during production.*” In repetitive manufacturing, products flow continuously along a direct route until they are finished, and there is little in-process inventory. Parts rarely stop moving.

Manufacturers that use this production process include manufacturers of small hardware items such as standard bolts and washers.

Repetitive manufacturers typically have high volumes associated with production. In some cases, machines or complete production lines are dedicated to either one product or a family of products. Due to either the low unit cost of the product or extensive cost production experience, there is typically little need to collect production cost history. Work-in-process inventory is typically very low.

System Features

Repetitive manufacturers typically have a small item master. Bills of material and routings are usually simple and straightforward, as the production process is typically quick and simple.

High volume production runs require support for large quantities. If work orders are used, quantities to make may be one million units or more.

Scrap and yield factors may be important system requirements to some repetitive manufacturers.

Examples

MAS 90 and MAS 200 can be a good fit for repetitive manufacturers. Examples of repetitive manufacturers using MAS 90 and MAS 200 include consumer and industrial product manufacturers, as well as software developers (including Best Software).

Typical SIC Codes

Repetitive manufacturers are generally categorized in the following SIC codes:

246-249	255-279	302-309	312-315	322-323	325-329
340-342	345	348	349	367-368	384-399

Consumer and industrial product manufacturers and software developers (including Best Software) use MAS 90 and MAS 200.

MAS 90 and MAS 200 Bill of Materials Maintenance allows you to create and maintain detailed bills of components and miscellaneous charges that make up your finished items.

MAS 90 and MAS 200 Manufacturing Solutions

MAS 90 and MAS 200 provide three exceptional manufacturing solutions described in detail below.

I. Bill of Materials

A **Bill of Material** defines the relationships among the component items that make up a product. Each bill has a parent item number and one or more component item numbers. In MAS 90 and MAS 200 Bill of Materials Maintenance you can create and maintain detailed bills of the components and miscellaneous charges (labor, overhead and other costs) that make up your finished items and subassemblies. A bill of material can be set up for each operation through which production will be recorded.

Backflushing (also referred to as “after-the-fact” production entry) is used to record production activities after production is complete. Backflushing promotes accurate inventory and cost information, and streamlines transaction-processing activities. Reporting completion at milestone activities or after the last activity reduces data entry transactions for both material and labor. In MAS 90 and MAS 200 production entry one completion transaction triggers both material disbursements and labor consumption.

The way backflushing works is simple. During the production entry process, component materials, subassemblies, labor and other miscellaneous charges used in an assembly or subassembly are automatically issued by exploding the bill of material requirements based on reporting a quantity completed. Materials and subassemblies are issued out of inventory based on the bill of material, and the quantity of the assembly or subassembly produced is added to inventory. Labor and other miscellaneous charges are also consumed based on the standard as specified in the bill of materials.

The potential reduction in data entry can be significant depending on the number of materials and miscellaneous charges contained in your bills, as well as the number of labor transactions. Fewer transactions mean less overhead is needed to support the recording of manufacturing activities.

Backflushing can be performed at a milestone operation or at completion of the production process. A milestone operation is an intermediate reporting point in the manufacturing process. Milestone operation reporting allows recording material and labor consumption at multiple stages in the manufacturing process. Milestone reporting points are typically strategic (limiting or gateway) operations at which completions are recorded, component material is deducted, and standard labor is earned. Defining milestone reporting points generally depends on the length of the manufacturing process and the importance of feedback information to trigger other activities (e.g. productivity reporting, material movement, quality inspection and material replenishment.)

Milestone reporting is commonly used for production processes with long manufacturing cycle times. Milestone reporting allows consumption of both material and labor to be reported in a timely manner to assure that perpetual inventory and accounting records are up to date.

Bill of Materials – Advanced Functionality

Advanced functionality in the Bill of Materials module includes the following:

Yield and Scrap	Material Substitution
Lot and Serial Items	Multi-level Production Entry
Multiple Warehouses	Disassembly Entry
Bill Revisions	Copy From Feature
Engineering Change Control	User Defined Fields

Yield and Scrap

A yield percentage can be applied to each bill. The yield percentage is collectively applied to all components of a bill. Because the yield percentage applies directly to the bill's parent item, it is applied against all components and labor used to manufacture the parent item.

Although one yield percentage is applied to a complete bill, a variety of scrap percentages can be applied to individual components within the same bill. This allows for great flexibility when forecasting component requirements because scrap is calculated on a component-by-component basis.

Yield and scrap percentages enable accurate forecasting of the production of finished goods and component requirements.

The scrap percentage is entered and stored as a separate data element. This keeps the quantity required accurate and allows for a review of scrap percentages in seeking process improvements.

Component scrap percentages are entered in the Bill of Materials module instead of the Inventory module. This enables the manufacturer to compensate for variances in the scrap rate unique to specific bills.

Yield and scrap percentages enable you to accurately forecast the production of finished goods and the quantities of components and subassemblies necessary to produce them. Yield and scrap percentages can be used together or independently.

Scrap percentages are useful when they are predictable (e.g. a 20 percent loss is always experienced when converting a 10x10 sheet into an 8x10 sheet). When scrap is not predictable or when tighter control over scrap is desired, the production entry process can be used to control scrapped material and labor at milestone operations. To maintain inventory accuracy and track costs correctly, an item that is scrapped during a manufacturing process must be accounted for properly. For example, an item that is scrapped at the first operation will have a lower cost than one scrapped at the final operation.

Material Substitution

Inventory integrity and accuracy must be preserved for backflushed material in the event that substitute materials are consumed. During production entry, components of the parent bill “explode” automatically; however, additions, deletions and changes to components are allowed.

Lot and Serial Items

Lot and serial number features help to maintain control by allowing you to identify and record materials consumed in production. Lot and serial number control is supported at the parent level and the component level during production entry.

Multi-Level Production Entry

Multiple-level backflushing is the capability to backflush lower level subassemblies used in higher-level assemblies. If you select the option to explode sub-assemblies for a transaction, the assemblies and sub-assemblies that comprise the parent bill will be broken down into a list of basic components (i.e. a parts list). This functionality can save a significant amount of time by eliminating the need to record completion transactions for subassemblies.

Multiple Warehouses

Items located in one warehouse can be built with components from other warehouses. During the production entry process, you can override the component warehouse on each component line. This functionality offers the ability to efficiently maintain accurate inventory records in a multi-site manufacturing operation.

Disassembly Entry

Disassembly entry can be used to disassemble a manufactured item and return its component items to stock, disassemble a purchased item to salvage its component parts, and reverse a previously posted production entry. Components of the disassembled bill “explode” automatically; however, additions, deletions and modifications to the components are allowed. Component costs may also be overridden.

Bill Revisions

An unlimited number of revisions may be maintained for each bill of material. The bill revision feature allows the manufacturing of products using a bill’s current revision while a new revision is being developed. You can also maintain old revisions for service, repair, tracking or other purposes.

Copy From Feature

Existing bill information can be copied to create new bills. The copied bill may then be modified, as needed (which is commonly referred to as “same-as-except” functionality). This feature improves accuracy and saves time when you create a new bill by eliminating the need to enter every component line.

Multi-level production entry can save a significant amount of time by eliminating the need to record completion transactions for subassemblies.

Detailed engineering change history can be retained indefinitely, providing a complete history of the evolution of your products.

Engineering Change Control

The engineering change control feature provides control over the engineering change notice and product modification processes. It allows you to record a planned engineering change in advance for a bill of materials. Each engineering change has an effective date to indicate when the changes to the bill take effect. Since the bills are not actually changed (the additions are marked with a starting date and the deletions are marked with a deletion date), all bill configurations remain on file. Any bill configuration may be viewed, printed or used simply by specifying its effective date. Detailed engineering change history can be retained indefinitely, providing a complete history of the evolution of your products.

User-Defined Fields

User-Defined Fields (UDFs) increase the flexibility provided by MAS 90 and MAS 200 by allowing you to include additional information that is not provided in the standard product screens. UDFs can help a manufacturer efficiently track information needed to control and manage production activities.

String, numeric and date UDFs can be added to bill of materials header records and bill of materials line records. Examples of applying UDFs to meet the unique needs of a manufacturing environment include design engineering information (e.g. reference designators), manufacturing engineering information, production control information, and quality information (e.g. inspection and testing).

Bill of materials header UDFs can be added to the bill of materials maintenance, bill of materials inquiry, production entry, and disassembly entry screens. Bill of materials line UDFs can be added to the bill of materials maintenance and bill of materials inquiry screens.

Inventory UDFs can be linked to bill of materials header UDFs. For example, when an inventory item number is entered in bill of materials maintenance, the UDF information from the inventory item is transferred to the UDF for the bill of materials header.

Inventory UDFs can also be linked to bill of materials line UDFs for lines containing an inventory item.

UDFs can be placed on graphical forms (e.g. picking sheets and production labels) and reports using Crystal Reports.

Bill of Materials with Bar Code Module

The Bar Code module enhances recording of completions through remote bar code data collection using handheld computers and scanners. It also allows you to automate and streamline inventory counts, receiving, and shipping. Efficiency and accuracy are dramatically improved by using the Bar Code module to minimize the amount of manual data entry required.

Bill of Materials with the MRP Module

Bill of Materials production (completion) transactions deduct component material by exploding the bill of materials based on the completed quantity. The material requirements planning (MRP) generation process can be used to coordinate the purchase of replenishment materials. The MRP module enables you to efficiently manage and maintain material flow in your manufacturing operation.

One of the most critical and time-consuming aspects of supply chain management is the process of maintaining appropriate levels of inventory on hand at all times. The MRP module helps streamline purchasing and helps eliminate production scheduling problems.

The MRP generation process looks at demand based on open sales orders, sales projections and inventory reorder points; and looks at supply based on inventory stock levels and open purchase orders. Product build times, lead times, and supply and demand functions are combined to estimate the need for an inventory item. Demand requirements are netted against inventory balances and purchase orders to recommend item purchases. MRP produces action suggestions based on an "action by" date to advise which purchase orders to place, which to change, and which to cancel.

The MRP module allows for entry of weekly or monthly projections by warehouse, or by warehouse and by customer, for each inventory item. Material requirements can be generated for specified dates over an extended planning horizon. MRP takes into account actual production quantities completed, as well as parent level yield percentages, component-level scrap percentages, and engineering change orders based on their effective dates.

The MRP module helps streamline purchasing and production scheduling.

By using forecasts and actual customer orders, MRP helps avoid material shortages, inventory surpluses and costly errors in procurement.

Manufacturers that use component materials that are difficult to control or issue are excellent candidates for the Bill of Materials solution.

The MRP module uses data from the Inventory, Sales Order, Purchase Order and Bill of Materials modules in generating and reporting material requirements. By using forecasts and actual customer orders, MRP helps a manufacturer avoid material shortages, wasteful inventory surpluses and costly errors in procurement decisions.

The “Action by Vendor Report” groups, by vendor, all actions that have been recommended by the MRP generation process. Therefore all of the necessary information is available for a “one phone call per vendor” report.

The MRP module allows you to accurately project the materials needed for production, minimizing costly delays and promoting optimum productivity of your manufacturing operation.

Manufacturing Types Appropriate for the Bill of Materials with MRP Solution

The MAS 90 and MAS 200 Bill of Materials module with MRP is an efficient solution for **Repetitive Manufacturers**, especially those with dedicated assembly lines. It is also well suited for **Process Manufacturers** with simple system requirements.

The Bill of Materials module may apply to **Discrete and Job Shop Manufacturers** with high-volume production or short production cycles.

The Bill of Materials module can be a good fit for **ATO Manufacturers** with simple system requirements, especially those that start the assembly process shortly after entering a customer order.

Excellent candidates for this solution include manufacturers that use component materials that are difficult to control because of the manufacturing process, such as plastic resin used for injection molding; inexpensive component materials; and materials that are difficult to issue, such as wire, sheet steel and liquids.

II. Bill of Materials and Work Order

The Work Order module provides the ability to issue and track work orders from release to completion. You can create work orders, develop schedules, issue material, monitor workloads and post work in process postings to the General Ledger. The Work Order module is integrated with the Sales Order, Bill of Materials, Inventory, Purchase Order and General Ledger modules.

Work Order Processing – Advanced Functionality

Advanced functionality in the Work Order module includes the following:

- 1. Integration with features in the Bill of Materials module**
- 2. Work order templates and copy from feature**
- 3. Extended step descriptions**
- 4. Operation codes**
- 5. Material and operation step substitutions**
- 6. Component where-used inquiry**
- 7. Work order memos**
- 8. Built-in sort fields**
- 9. User-defined fields**

Integration with Features in Bill of Materials Module

The tight integration between the Bill of Materials and Work Order modules helps to eliminate redundant data entry. For example, bills can be merged into work orders and work order templates.

The Engineering Change Control, Bill Revision, Phantom Bill, and Yield and Scrap features in the Bill of Materials module are fully supported in the Work Order module. When the Work Order module is added to the Bill of Materials module, a routing number can be assigned to each bill of material. Each component can then be associated with a specific step on the routing, which supports “just-in-time” material procurement arrangements.

Each component can be associated with a specific step on the routing, which supports “just-in-time” material procurement arrangements.

Work Order Templates and Copy From Feature

A template is a basic work order form, including the material and routing definitions required to complete one finished product, from which standard work orders can be created. Work order templates can improve the efficiency and accuracy of creating new work orders.

Information may be copied from an existing work order using the Copy From feature. This feature saves time when you create a new work order by minimizing data entry and allowing modification as needed.

Extended Step Descriptions

Up to 5,000 characters of extended description may be entered for each step of a routing or work order. Step descriptions may be printed on the work order traveler and operation tickets to provide extensive specifications and detailed instructions to manufacturing personnel.

Operation Codes

Operation codes identify production operations performed at each work center. Operation code maintenance allows each operation code to be defined, standard cost rates for the operation to be entered, overhead calculation rates to be defined, and general ledger accounts for posting to be assigned. This provides complete flexibility in determining how costs and overhead are calculated for a specific operation at a specific work center.

Material and Operation Step Substitutions

When transactions are entered against a work order, unplanned operations or operations performed at a different work center may be recorded.

Component Where-Used Inquiry

A work order component where-used inquiry is available to review where components are being used in work orders. This inquiry screen is ideal for assessing the impact of a material component vendor quality or delivery problem.

Work Order Memos

Work order memos can be used for information pertinent to a work order (for example, recaps of correspondence or specific instructions regarding the handling of operations, material, and steps). Each memo includes a memo code, subject

The Component Where-used Inquiry screen is ideal for assessing the impact of a material component vendor quality or delivery problem.

description, memo date and reminder date, as well as a text box for the memo detail.

Work order memos may be created and maintained from the work order entry screens. An unlimited number of memos for each firm planned, released, template and closed work order can be maintained. Work order memos can be accessed during entry of transactions and the work order inquiry screens. They can also be printed based on the work order number, memo code, memo date and reminder date.

Built-In Sort Fields

Four built-in sort fields are available for each work order. These fields may be defined to contain either a date or string of up to 10 alphanumeric characters. These fields can be used to categorize work orders by type, manufactured product groups, or to associate related work orders on a project basis. These sort fields can be used during work order lookups, as well as select and sort criteria on work order reports.

User-Defined Fields

User-Defined Fields (UDFs) increase the flexibility provided by MAS 90 and MAS 200 by allowing you to include additional information that is not provided in the standard product screens. UDFs can help a manufacturer efficiently track information needed to control and manage production activities.

String, numeric and date UDFs can be added to bill of materials header records, bill of materials line records, work center records, operation code records, routing header records, routing line records and work order header records. Examples of applying UDFs to meet the unique needs of a manufacturing environment include design engineering information manufacturing (e.g. reference designators), engineering information, production control information and quality information (e.g. inspection and testing).

UDFs can be placed on graphical forms (work order travelers, picking sheets, operation tickets and work order labels) and reports using Crystal Reports.

Bill of Materials and Work Order with MRP module

The MRP module is not needed for manufacturers that can use a reorder point method for inventory replenishment. The

UDFs increase the flexibility provided by MAS 90 and MAS 200 by allowing inclusion of information not provided in the standard product screens.

The MRP module allows you to minimize costs by keeping inventory at a minimum without disrupting your manufacturing and shipping schedules.

The MRP module allows for entry of weekly or monthly projections by warehouse, or by warehouse and by customer for each inventory item.

reorder point method is most applicable when demand for inventory is relatively smooth, uniform and continuous. Most manufacturers do not enjoy that set of circumstances. Therefore, the MRP module should always be considered when evaluating the MAS 90 and MAS 200 Bill of Materials and Work Order modules.

The MRP module is especially relevant to manufacturers with several levels in their bill of materials. When the demand for an item can be calculated through its dependence on another item, MRP can significantly increase the productivity of purchasing and manufacturing planning personnel.

One of the most critical and time-consuming aspects of supply chain management is the process of maintaining appropriate levels of inventory on hand at all times. The MRP module helps streamline purchasing and production scheduling activities, and eliminate purchasing and production scheduling problems. The MRP module allows you to minimize costs by keeping inventory at a minimum level, without disrupting your manufacturing and shipping schedules.

The MRP generation process determines demand based on work order component requirements, open sales orders, sales projections, and inventory reorder points; and looks at supply based on inventory stock levels, existing work orders and open purchase orders. Product build times, lead times, and supply and demand functions are combined to estimate the need for an inventory item. Demand requirements are netted against inventory balances, work orders and purchase orders to recommend production and purchases. MRP produces action suggestions based on an "action by" date to advise which purchase orders to place, which to change, and which to cancel.

The MRP module allows for entry of monthly projections by warehouse, or by warehouse and by customer for each inventory item. Material requirements can be generated for specified dates over an extended planning horizon. MRP takes into account actual production quantities completed as well as parent level yield percentages, component level scrap percentages, and engineering change orders based on their effective dates.

The MRP module uses data from the Inventory, Sales Order, Purchase Order, Bill of Materials, and Work Order modules in generating and reporting material requirements and

recommended actions. The process of calculating requirements will explode through the bill of material for many levels, until it arrives at the purchase level for every part needed in the manufacture of a finished product.

Advanced functionality in the MRP module includes the following:

- Warehouse Groups
- Advanced Arrival Allowance
- Auto Generate Work Orders

Warehouse Groups

Warehouse groups allow the user to define one or more groups that are used to consolidate supply, demand, MRP calculations and recommendations for material. Each warehouse group can include one or more warehouses. Warehouse groups can also be established which cause MRP to recommend the transfer of inventory from a manufacturing site to a distribution site.

Advanced Arrival Allowance

To reduce the volume of “push-out” recommendations, the user can enter a number of days in the advanced arrival allowance field. MRP will not make “push-out” recommendations if the required date is within the number of days specified.

Automatically Generate Work Orders

MRP can create, modify or delete unreleased work orders for items that have a procurement type of make. MRP can calculate build times based on work order routings. A time-saving option is also provided for production planners to explode quantity change and reschedule recommendations to subassemblies and components.

Manufacturing Types Appropriate for this Solution

The MAS 90 and MAS 200 Bill of Materials and Work Order with MRP solution is used by a variety of manufacturers. There are certain types of manufacturing operations which it is more easily applied. This solution is most applicable to **Discrete (make-to-stock) Manufacturers**.

In a discrete environment, products are typically made on a repeating basis and consist of many component items. The bill

The MRP module provides a time saving option for production planners.

of materials and work order solution reduces the amount of data entry required.

The MAS 90 and MAS 200 Bill of Materials and Work Order with MRP solution can apply to **ATO Manufacturers** with basic manufacturing system requirements. The MAS 90 and MAS 200 Bill of Materials and Work Order solution will not fit **ATO Manufacturers** that require a sophisticated product configurator.

The MAS 90 and MAS 200 Bill of Materials and Work Order with MRP solution can apply to **ETO Manufacturers** with basic manufacturing system requirements. This manufacturing solution will not fit **ETO Manufacturers** that require sophisticated project management or contract accounting with built-in functionality for tracking progress billings and change orders.

The MAS 90 and MAS 200 Bill of Materials and Work Order with MRP solution can apply to **Process Manufacturers** with basic manufacturing system requirements. MAS 90 and MAS 200 may not be a good fit for **Process Manufacturers** who need full support for by-products and co-products.

III. JOB♦OPS

The JOB♦OPS solution is seamlessly integrated with the MAS 90 and MAS 200 suite of modules and takes a different approach to data collection and job management than the other manufacturing solutions.

JOB♦OPS work orders (called work tickets to differentiate them from the Work Order module) are all generated directly from within the Sales Order module and is strictly a *demand-driven* manufacturing and project costing system. It combines components of Work Order (routing, material requirements, labor tracking) and Job Cost (budgeting, contract billing, revenue recognition) into a single module. With the addition of the rules-based product configurator, graphical scheduling, and real-time shop floor data collection components, MAS 90 and MAS 200 with JOB♦OPS can easily handle the requirements of companies that make, install, and service their products based on customer specifications.

JOB♦OPS can easily handle the requirements of companies that make, install and service their own products.

JOB♦OPS – Advanced Functionality

Advanced functionality in the JOB♦OPS modules include the following:

1. Integration with features in Bill of Materials module
2. Integration with MRP
3. Work ticket templates
4. Work ticket steps
5. Work ticket status
6. Extended step descriptions
7. Create from history, templates, configurator or open jobs
8. Parts imports from ASCII Files, templates or bills of material
9. Activity codes
10. Bar code shop floor entry
11. Real-time labor and material issues
12. Payroll integration and overtime allocation
13. Graphical drag and drop scheduling
14. Finite and infinite capacity planning models
15. User-defined fields
16. Comprehensive purchase order integration, warranty tracking and service orders
17. Time and material jobs
18. Contract billing with retention support
19. Multiple-format work ticket forms (travelers)
20. Date-sensitive WIP reconciliation

Integration with Bill of Materials

JOB♦OPS has several points of integration with the Bill of Materials module including:

Work ticket templates can have individual steps associated with a different bill of materials. When a work ticket is being created from a template, the current bill's list of materials is automatically exploded, including phantom blow-through, into the current job.

Configured items can contain parts lists that are bills of materials. When the Configurator creates the work ticket, the associated materials list is generated to the work ticket.

If a parent item has options, these options are taken into account during the work ticket creation and the correct list of materials is generated.

The parts import feature allows direct importation of parts from an active bill of materials.

Integration with MRP

Since the materials lists in JOB♦OPS work tickets are actually sales order detail lines, the demand against inventory is recorded automatically and taken into account within MRP. Additionally, when capacity-based scheduling is used, the required dates of the materials will match up with the production dates of their associated production step. Work ticket parent items in JOB♦OPS are handled within the MRP report as both demand and supply, clearly showing the user what material demands within the Sales Order module are parts of jobs.

Work Ticket Templates

A template is a basic work ticket form, including material, routing, and production instructions from which work tickets can be created. When the template code is the same as the parent item number, the work ticket creation process will automatically prompt the operator to create the work ticket from the template. Scaled and non-scaled steps and parts are available to handle setup and runtime.

Extended Step Descriptions

Each step within a work ticket may have very detailed instructions, which may then be printed on the work ticket form. If the Configurator module is utilized, these instructions can be automatically built based on the specific options the user selects during the configuration process.

Creation from History, Templates, Configurator or Open Jobs

To provide maximum flexibility, work tickets can be generated from a variety of sources. The Configurator is the most comprehensive method, but work tickets can also be generated from option bills, templates or previously established jobs in

either the open or historical job files. The budgets, routing, instructions, and material requirements are all copied in.

Parts Imports from ASCII files, Templates, or Bills of Material

Material requirements are a major component of production for most manufacturers. **JOB♦OPS** allows parts to be imported directly into any step of the work ticket from a current bill of materials, a step on a template or from an ASCII file (such as can be generated from a CAD/CAM system).

Activity Codes

Activity codes are used for costing categorizations in work tickets. When the Scheduling module is used, they become the planned resources (work centers, employees, activities, etc.). Different sets of activities may be established for tracking different kinds of activities. Examples include any resource, such as labor operation categories or machines or departments. Activity codes contain capacity information for scheduling, standard costing and burden rates for budgeting, with the ability to automatically generate labor charges for service or installation work.

Bar Code Shop Floor Entry

Time Tracker, the shop floor data entry module, is designed to be a data capture facility directly from the production floor. This module includes the ability to act like a time clock, logging workers in and out for payroll time in addition to using bar codes to log in and out of work tickets. Current status, quantities completed and bar-coded material issues can all be captured from this single point of entry.

Real-Time Labor and Material Issues

One of the advantages of **JOB♦OPS** is the ability to record material issues and labor entries in real-time. Work tickets are updated upon completion of entry, and end-of-day audit reports are provided with updates to the general ledger. Material issues may be done as manual, backflushed or automatic issues, including the ability to consume lot and serial numbers in either date or number order along with the ability to force fulfillment from a single lot.

JOB♦OPS allows parts to be imported directly into any step of the work ticket from a current bill of materials, a step on a template, or from an ASCII file.

One of the advantages of **JOB♦OPS** is the ability to record materials issues and labor entries in real time.

JOB♦OPS allows for distinctive information capture for different types of jobs.

Payroll Integration and Overtime Allocation

The Time Tracker module has the ability to automatically assign overtime based on setup parameters and by prorating it over the week or directly applying only to the work tickets worked on after regular hours. Salaried employee time can be allocated in a variety of methods as well. MAS 90 and MAS 200's Payroll data entry may then be generated directly from the JOB♦OPS labor entry files.

Finite and Infinite Capacity Planning Models

Planning resources can be critical to customer satisfaction and meeting delivery expectations. The Scheduling module of JOB♦OPS allows setup of company and activity calendars and can plan in either finite or infinite modes. Forward and reverse scheduling are also supported.

Graphical Drag-and-Drop Scheduling

An intuitive graphical representation is available with color coding to indicate which jobs are currently scheduled on time and which will be late. Resources can be reallocated between departments and a specific work ticket step can be rescheduled to be worked on by a different resource. Drill down into the job detail to check or change status or review labor detail is also available.

User-Defined Information

In addition to MAS 90 and MAS 200's Custom Office user-defined fields within the Sales Order module, JOB♦OPS provides five separate user-defined information (UDI) fields per work ticket class. This allows for distinctive information to be captured for different types of jobs. This includes the ability to establish a validation code file from which only valid values may be selected.

Comprehensive Purchase Order Integration

Purchase orders may be generated for materials or outside processing charges from within the work ticket. When the items are received, they are automatically issued to the work ticket at the received cost. Invoice variances are also posted to the work ticket to ensure complete and accurate costing. Additionally, purchase order entry allows for linking entered lines directly to open work tickets.

Warranty Tracking and Service Orders

Serialized items (both parent items and components) may have standard warranty information established. During the completion of the work ticket these items will be automatically generated to JOB♦OPS Warranty/Serial Tracking system. If service is required against the item at a later point in time, a work ticket can be generated and *linked* directly to the item being repaired. The item's history then shows all work tickets that have been generated for that item with inquiry drill downs to the invoice history and work ticket for additional information.

Time and Material Jobs

JOB♦OPS has the ability to create chargeable items within the work ticket for materials, up-charges or detailed labor billing. Time Tracker can be used separately or in conjunction with the Timekeeper module to capture labor against a job, detailed descriptions, and whether the service is billable or not. Customer-specific rates are available by activity code and the customer invoice can be generated in detail or summarized by date and/or employee.

Contract Billing with Retention Support

Various invoice presentations are available with the ability to generate retention amounts during invoicing. The work ticket can also capture change order amounts and the invoice can present a contract recap to use in preparing AIA billing forms.

Multiple-Format Work Ticket Forms (Travelers)

Each work ticket class can have a separate format for the work ticket form (traveler). For example, manufacturing can have a traditional traveler complete with bar codes at each step for labor and materials collection, while service work tickets can produce a service order form.

Date-Sensitive WIP Reconciliation

Work in process (WIP) is supported with detailed transactions for labor, materials, and direct costs from Accounts Payable invoices. The JOB♦OPS Work-In-Process Reconciliation Report provides the ability to calculate work in process as of a specified date, including a date in the past.

Work in process is supported with detailed transactions for labor, materials and direct costs from invoices.

The intuitive and thoughtful design of MAS 90 and MAS 200 helps promote a smoother, more rapid implementation.

Product Configurator

The Configurator module is a fully rules-based engine that will walk the operator through a wizard-style interface, complete with prompts, validation constraints, and graphical depictions. The rules enforce only valid combinations of entries, and common configurations may be stored for future use. Items can also be reconfigured with the original selections preloaded.

The Configurator will generate a work ticket complete with labor budget, instruction text, a fully qualified description of the configured item, routing and parts list.

For advanced requirements, the Configurator has code scripts available to handle very complex calculations including geometric and dimensional functions in addition to logic.

Conclusion

The MAS 90 and MAS 200 manufacturing modules offer powerful features and capabilities for a variety of manufacturing companies. In addition to manufacturing functionality, MAS 90 and MAS 200 offer tight integration with the powerful suite of MAS 90 and MAS 200 accounting and distribution modules. The integration of manufacturing, distribution and accounting into one comprehensive system helps a manufacturer reduce redundant data entry, improve accuracy, and increase communication throughout the organization.

Unlike most other manufacturing software packages, the fully integrated MAS 90 and MAS 200 solutions include complete, double-entry accounting systems that are efficient and easy to use. The intuitive and thoughtful design of MAS 90 and MAS 200 helps promote a smoother and more rapid implementation.

MAS 90 and MAS 200 reliably meet the needs of a variety of small and medium sized manufacturing businesses by providing a fully integrated, easy-to-use solution at an affordable cost.

Glossary of Manufacturing Terms and Concepts

Backflushing

Backflushing is the automated issuing of component material used in an assembly or subassembly by exploding the bill of material by the production reporting count of units completed. The explosion process uses yield and scrap allowances if recorded on the bill of material. Backflushing can be performed at an interim operation, where a subassembly is produced, or at the completion of the production process.

MAS 90 and MAS 200 support single level and multi-level backflushing. Multi-level backflushing eliminates the need to perform multiple production entries for items containing a multi-level bill of materials. Multiple batches can be entered, printed, and posted independently without affecting other batches.

MAS 90 and MAS 200 support single level and multi-level backflushing.

Bill of Materials

The Bill of Materials (BOM) is a list of the components (subassemblies, parts, and raw materials) required to produce a parent assembly. The key to understanding the bill of materials is the concept known as parent/component relationship. Components are the objects that are assembled together to make a parent. Each component can, in turn, be a parent.

It is typically used to build and test products, cost products, purchase products, determine product lead times, schedule production, issue inventory, and determine inventory needs. The BOM needs to accurately reflect the subassemblies, parts, and raw material used to make a product. BOMs are typically developed by engineers and costed by accountants. BOMs are used throughout a manufacturing organization: accounting, engineering, manufacturing, materials management, purchasing, quality control, and service.

MAS 90 and MAS 200 support up to 99 levels in a bill of material.

Both MAS 90 and MAS 200 have powerful delete, renumber and merge utilities for inventory item numbers.

Every manufacturer has a bill of materials. Process manufacturers may call them recipes, ingredients, or formulas; others may refer to them as parts lists or packaging specifications. These terms mean the same thing, the items or raw materials that go into producing a product.

MAS 90 and MAS 200 support up to 99 levels in a bill of materials. Data elements that can be entered for a component include, but are not limited to: component part number, find number (on parent engineering drawing), step number (on parent routing), scrap percentage, and quantity of the component needed to build one of the parent items. If the component is an assembly with its own bill of materials, a bill revision level can also be specified.

Engineering Change Notice (ECN)

Engineering changes are made to improve quality, increase production efficiency, reduce cost, or enhance a product. An engineering change notice is a document issued by an engineering department to advise all concerned parties (purchasing, planning, manufacturing, accounting, etc.) that a change has been, or will be made, to an assembly. An effective date is used to activate engineering change orders. The effective date is the date on which a component is to be added or removed from a bill.

MAS 90 and MAS 200 provide 800 characters of data to provide a complete description of the engineering change. Engineering change history information can be retained indefinitely. An engineering change history report is available to provide a list of all engineering changes on file. The report can be sorted by change number, bill number or effective date.

Inventory Item Master

The item master contains all parts used by the manufacturer. It includes the item cost, lead-time, part description, and unit of measure. It is used to identify parts and products. The parts in the item master are used to build the bill of materials for a product or subassembly. Data contained in the item master may also be used to purchase, price, stock, receive and ship. Item numbers must be unique and identify one, and only one, specific object.

MAS 90 and MAS 200 inventory item master data fields include fields for weight, volume, standard unit of measure,

purchase unit of measure, sales unit of measure, default warehouse, inventory cycle count code, buyer code, planner code, and four sort fields. MAS 90 and MAS 200 allow an unlimited number of vendors with vendor specific lead times to be set up for each inventory item. An unlimited number of alias part numbers can also be set up for each item. An item image file (.bmp, .jpg or .gif) can be added for each inventory item.

Both MAS 90 and MAS 200 have a very powerful delete, renumber, and merge utility for item numbers. For example, if an item is renumbered with this utility, all instances of the old item number will be replaced with the new item number throughout the entire MAS 90 and MAS 200 database (including sales order, purchase order, bill of materials, and work order files).

An option exists to track additions, deletions, and changes to the inventory item master in summary or detail.

Lead Time

Lead-time is the amount of time between the recognition of the need for an order and the receipt of the goods from a supplier. MAS 90 and MAS 200 allow entry of vendor specific lead times for each inventory item. Last lead-time is tracked for each vendor-inventory item.

MAS 90 and MAS 200 allow entry of planned manufacturing cycle time by item.

Manufacturing Cycle Time

Manufacturing cycle time is typically measured in days. It represents the time an item is in production. To measure, start the stopwatch when an item is released into production and stop when it is finished (final product packaging, if any is complete). The longer an item resides in production the more cost it accumulates (labor, machining, storage, theft, damage, other overhead and the time value of money). Usually, the shorter the cycle time, the less inventory in Work in Process. Manufacturers can decrease work in process, decrease product lead-time offered to customers and increase production by reducing manufacturing cycle times. MAS 90 and MAS 200 allow entry of planned manufacturing cycle time by item.

Material Requirements Planning (MRP)

MRP is defined in the APICS dictionary as a set of techniques that uses bill of material, inventory data, and the master

The MRP module will synchronize production and purchasing plans with sales forecasts and existing customer orders.

production schedule to calculate requirements for materials. MRP makes recommendations to release replenishment orders for material, and since it is time-phased, it also makes recommendations to reschedule open orders when appropriate.

The MAS 90 and MAS 200 MRP module uses sales forecasts, sales orders, bills of materials, inventory data, work orders, and purchase orders to calculate requirements for materials. Based on demand from sales forecasts, sales orders, and inventory carrying levels, MRP makes recommendations to release purchase orders and work orders for materials and assemblies. It also makes recommendations to reschedule or cancel open purchase orders and work orders when needed. In other words, MRP will synchronize production and purchasing plans with the sales forecasts and existing customer orders.

By using data from all modules, MRP can help improve communication and ensure everyone works together and uses data from one database. An effective implementation of MRP will improve on-time shipping performance, and support manufacturing and purchasing effectiveness, while maintaining an appropriate level of inventory.

In MAS 90 and MAS 200, time-phased MRP is accomplished by exploding the bill of material, adjusting quantities on hand or on order for inventory, and offsetting the net requirements by the appropriate lead times.

Product Configurators

Product configurators are system modules that allow a person to custom configure a product (i.e. computer, bicycle, etc.) This ability is made possible by pre-programmed rules and constraints that govern the choices of feasible options. The configurator populates the attributes of the newly configured item, tests for conflicts, and generates the appropriate bill of materials, routing, and price based on rules and calculations. The JOB♦OPS Configurator contains this functionality.

For simpler requirements, the MAS 90 and MAS 200 Bill of Materials module offers an Option Bills feature. Using this feature, a single bill may have up to nine option categories defined that allow it to accommodate various configurations of a finished product. Each option category may be defined as required or not required. Within each category, over 1,000 options may be defined. Components to be added or removed

from the base bill can be specified for each option. Option interactions may be defined to allow for adding or subtracting components for specified combinations of options.

Revision Level

The revision level is the change level of an item. A modification to an item that does not change the form, fit or function of a product is normally controlled by a revision level. MAS 90 and MAS 200 allow for an unlimited number of revisions to be tracked for each bill of material.

Routing

The routing is a sequence of how products are built and the flow from one work center to another. It defines the process used to construct the product. It is also used to determine the planned utilization of specific work centers. It is developed by engineers and costed by accountants. The routing needs to accurately reflect the actual process used to build a product.

MAS 90 and MAS 200 Work Order supports up to 9,999 steps on a routing. Data elements that can be entered for a routing step include, but are not limited to: step (sequence) number, work center (the machine or work area where work is to be performed), operation code, ignore queue time, overlap percentage, step description, standard run type, standard hours per operation (or standard operations per hour or standard hours per lot), parent item type, factor and required tooling.

Routing steps are automatically merged to a work order when the routing is assigned in work order entry. Routing steps for phantom bills are merged into the work order as sub-steps. Merged routing information may be customized during work order entry. Any changes that are made can optionally be saved to the routing file directly from the work order entry screen. Routing information can be printed on the work order traveler.

Work Order

Work Orders determine the amount of product to be made, when it is to be made, and serve as a communication to track actual production. The work order describes the steps taken to transform components into a completed assembly or

MAS 90 and MAS 200 allow unlimited revisions to be tracked for each bill of materials.

The work order entry process in MAS 90 and MAS 200 brings together the material plans from the BOM with the manufacturing plans defined in the routing.

subassembly. The work order is also known as a shop order, job ticket or manufacturing order.

It is used to “release” production and provides a method for recording production. The work order incorporates the bill of material and routing for a product or subassembly.

The work order entry process in MAS 90 and MAS 200 brings together the material plans from the bill of materials with the manufacturing plans defined in the routing. You may modify or delete merged materials and routing operation steps as well as enter new materials and operations in the work order before the work order is released.

When a firm planned work order is entered in MAS 90 and MAS 200, you commit the necessary materials from inventory and schedule the time required from the work centers. Planned time and cost information is calculated for comparison against actual.

Work order travelers, picking sheets, work center dispatch sheets and operation tickets may be printed to facilitate the manufacturing process. Routing and material information can be printed on the work order traveler.

Supplemental Resources

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