Work Centers, Routings, and WO Subcontracting

TRAINING GUIDE

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Contents

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About This Course

Course Description

QAD designed this course to cover the basics of preparing to implement the work centers and routing functions of MFG/PRO, as well as work order subcontracting. The course includes

- An introduction to the Work Centers and Routings module
- An overview of key business issues to consider before setting up these functions
- Setting up the work centers and routing module
- Processing subcontract operations
- Activities and exercises throughout the course
  - Students practice key concepts and processes in work centers and subcontracting operations

Students learn how to:

- Analyze some key business decisions before setting up work centers and routings
- Set up and operate work centers and routings and work order subcontracting

Who Should Attend This Course

- Implementation consultants and members of implementation teams
- Key users

Prerequisites

- *Initial MFG/PRO Setup* training course
- *Product Structures and Formulas* training course
- Basic knowledge of MFG/PRO as it is used in the business
- Working knowledge of the manufacturing industry in general

Approximate Length of Course

- This course is designed to be taught in one day

Certification Preparation

This course is one of several courses designed to assist students in preparing for QAD certification examinations. However, QAD does not guarantee anyone a passing grade as a result of having taken this course.

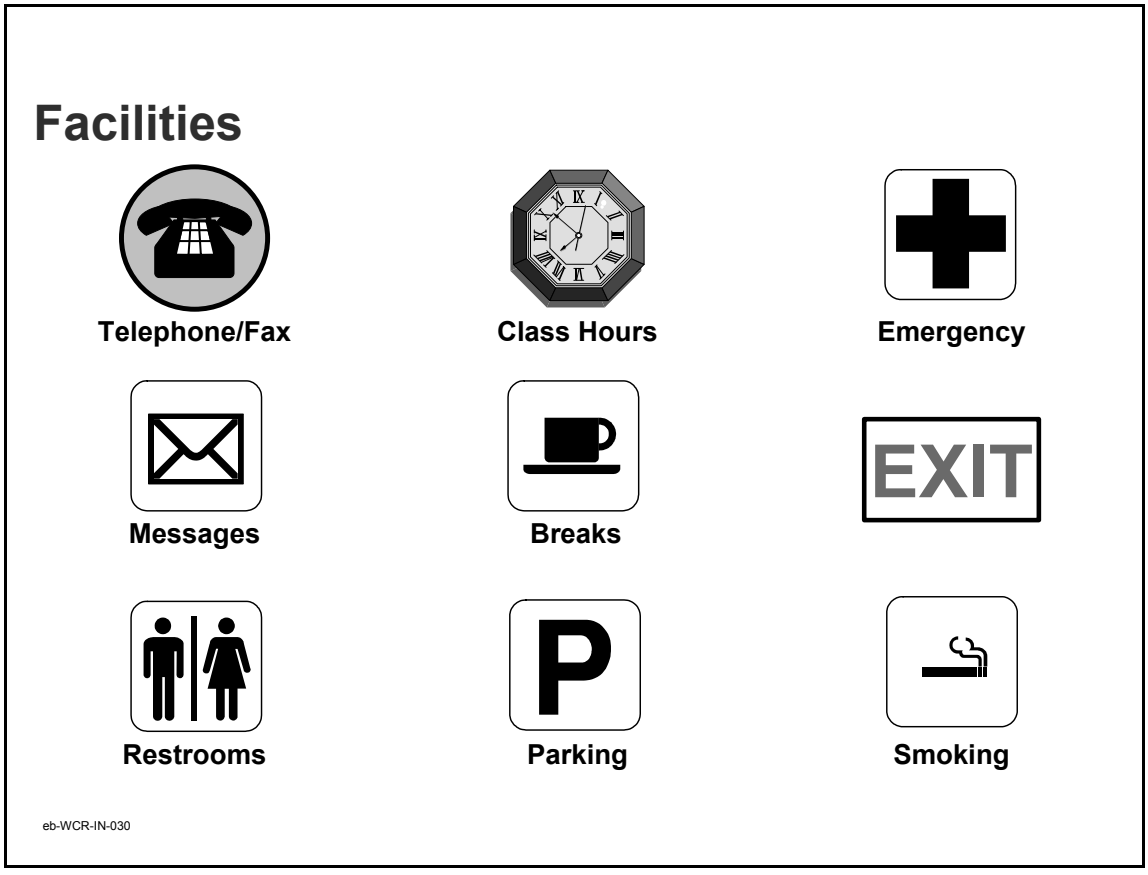
Students preparing for certification examinations should study all available materials (user guides, training guides, online help, for example) and acquire industry and field experience.

Using This Training Guide

Implementation consultants, members of implementation teams, and operators can use this guide in instructor-led classes, while knowledgeable consultants who want to learn about work centers and routing and subcontracting can use this guide for self-study.

This training guide provides a road map for instruction and learning. It contains:

- Annotated PowerPoint slides for instructors
- MFG/PRO screens annotated for instructors to demonstrate the module's functionality
- Exercises and study questions

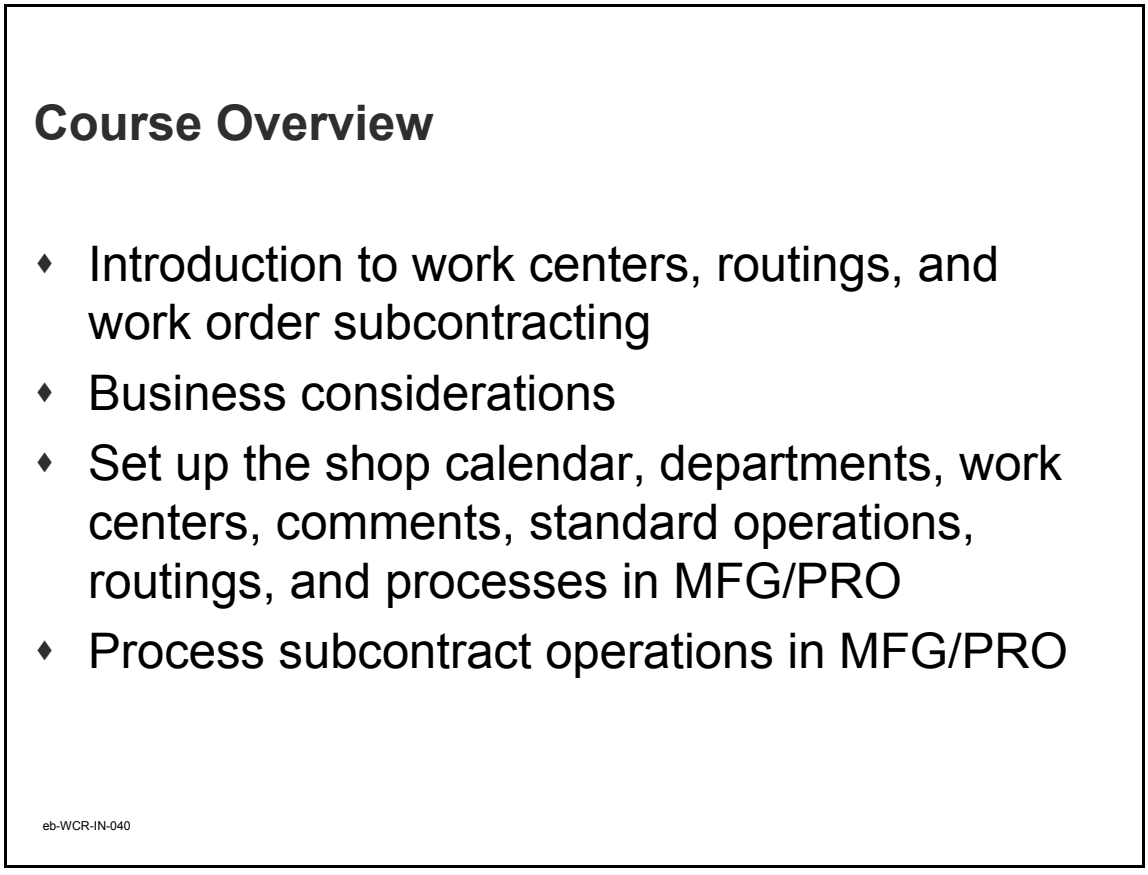


General Training Facilities Information

- Telephone or fax
- Messages
- Restrooms
- Class hours: start and finish times, and punctuality
- Breaks: frequency, approximate times
- Parking considerations; carpooling
- Emergency procedures: location of first aid, contact person for assistance
- Exit locations, building hours
- Location of approved smoking area

CHAPTER 1

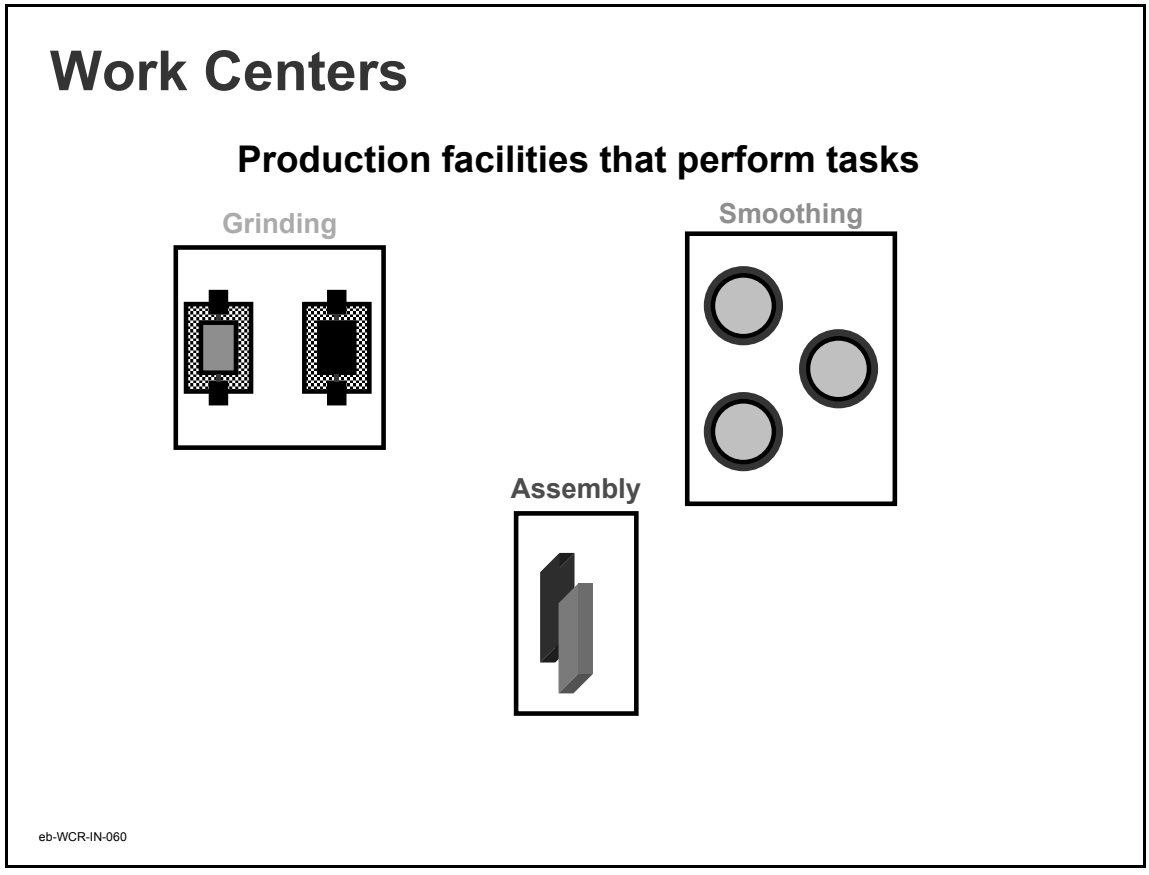
Introduction to Work Centers and Routings



Course Overview

This course covers work centers and routings and work order subcontracting.

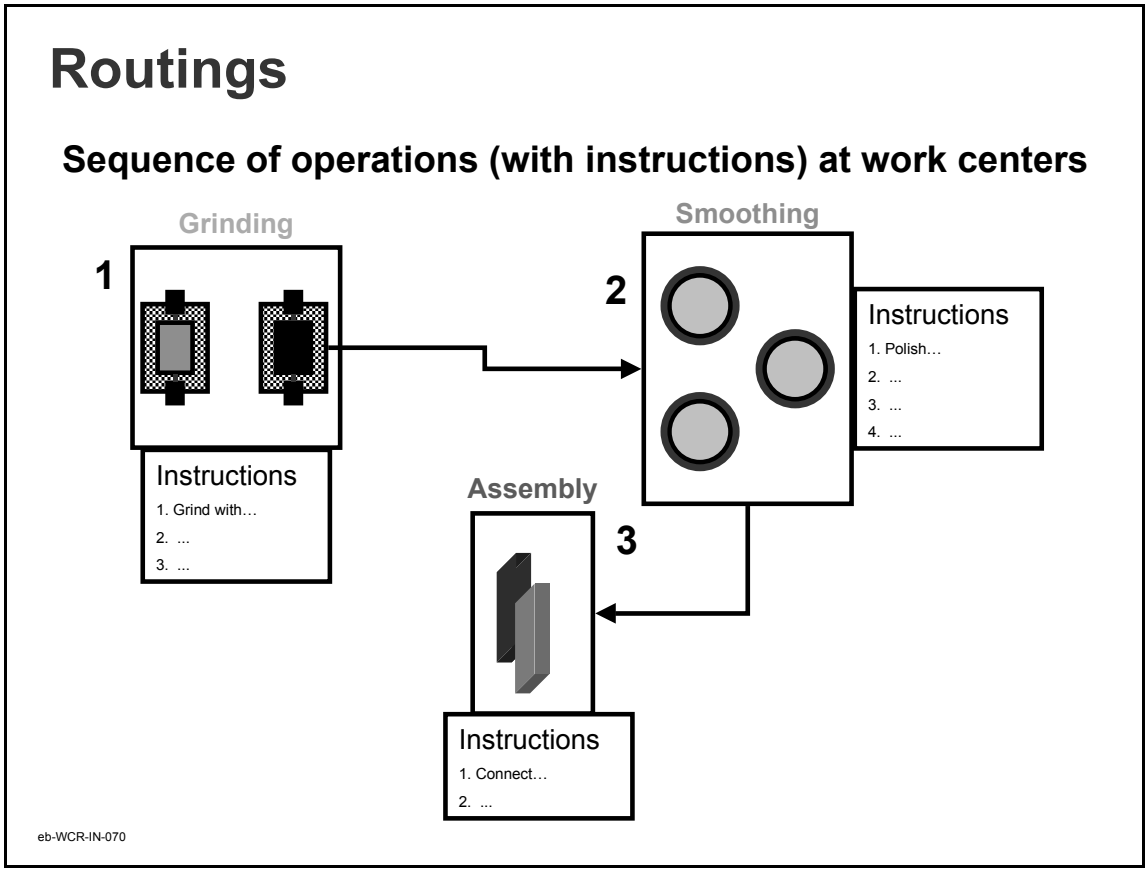
- Work centers and routings require initial entry and occasional administrative attention
- Subcontracting, although not a strict matter of work centers and routings, is treated here because it requires special operations in the routings
  - Subcontracting processing also requires knowledge of purchasing and shop floor control; this course does not cover these topics



Work Centers

A work center is a production area with one or more people or machines having identical capabilities.

- MFG/PRO uses work centers for scheduling, planning, and determining costs for GL transactions
- Work centers and operations work in conjunction with the shop calendar, which can be used to set up work center-specific schedules

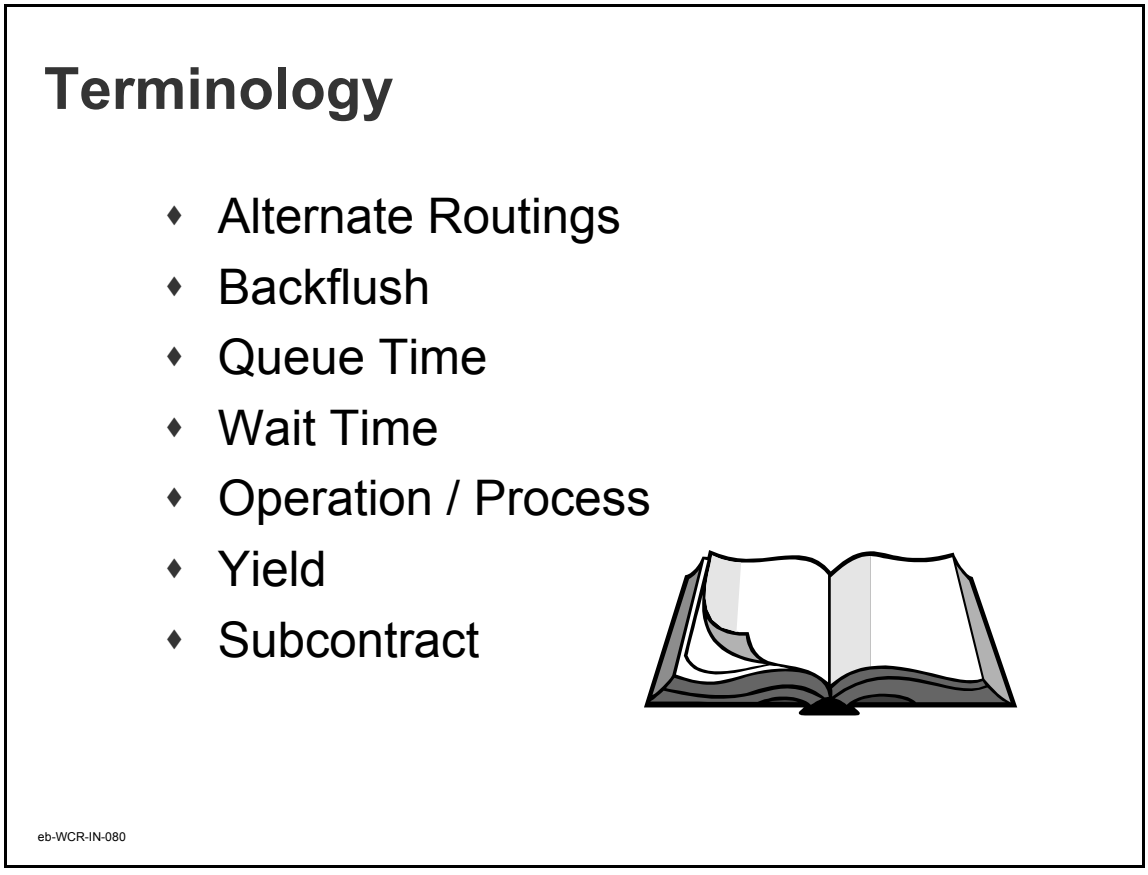


Routings

Routings list the operations required for manufacturing a product. They also indicate the work center for each operation. They can be accompanied by printed instructions entered in as master comments.

- Each routing normally consists of one or more operations
- Routing operations may not be necessary when:
  - Item lead times are very short
  - Total item costs consist mainly of material and overhead and the labor component is small
  - Capacity can be easily managed
  - The repetitive module is not used

- Each operation involves different machines, tools, skills, and tasks, such as grinding, smoothing, and assembly
- In process industries, routings are called processes



Terminology

Alternate Routing

- Alternate routing is a routing used instead of the primary routing
  - Results in an identical item

Backflush

1 Backflushing is the automatic recording of component/raw material issues based on the quantity of end items received, and the quantity per of the component from the end items bill of material. It can be used for both work order and repetitive production.

2 Backflushing calculates the quantity completed for the base process using Work Order Receipt Backflush.

The backflush quantity for the base process is used to calculate the issue (backflush) quantities for the co-products and by-products.

Queue Time

Queue time is the time a work order waits at a work center before being worked on. Increases in queue time result in direct increases to manufacturing lead time.

Wait Time

Wait time is the time a work order must wait after it has been worked on, but before it is moved to the next operation (drying, curing, cooling, for example).

Operation/Process Yield

Operation/process yield is the ratio of usable output from a process, process stage, or operation to the input quantity, usually expressed as a percentage.

Yield

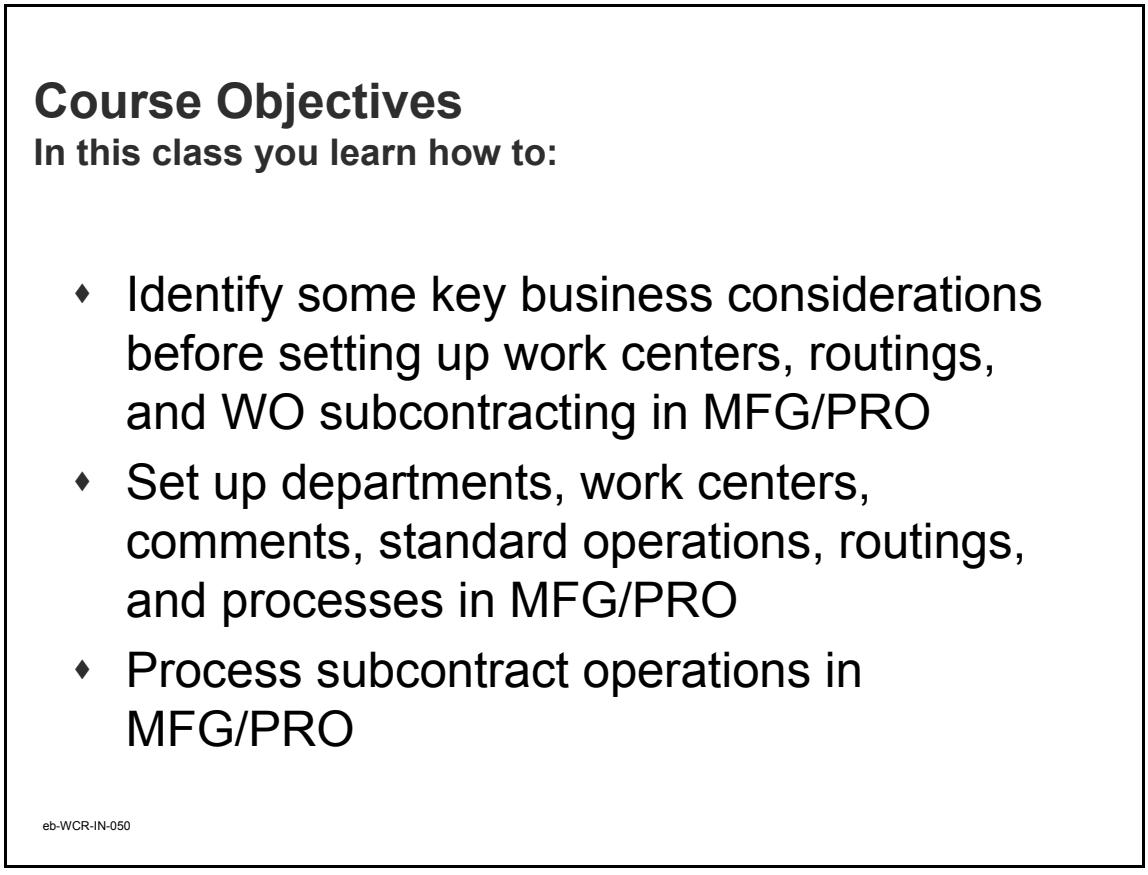
Yield is the ratio of usable output from a process to its input.

Yield %

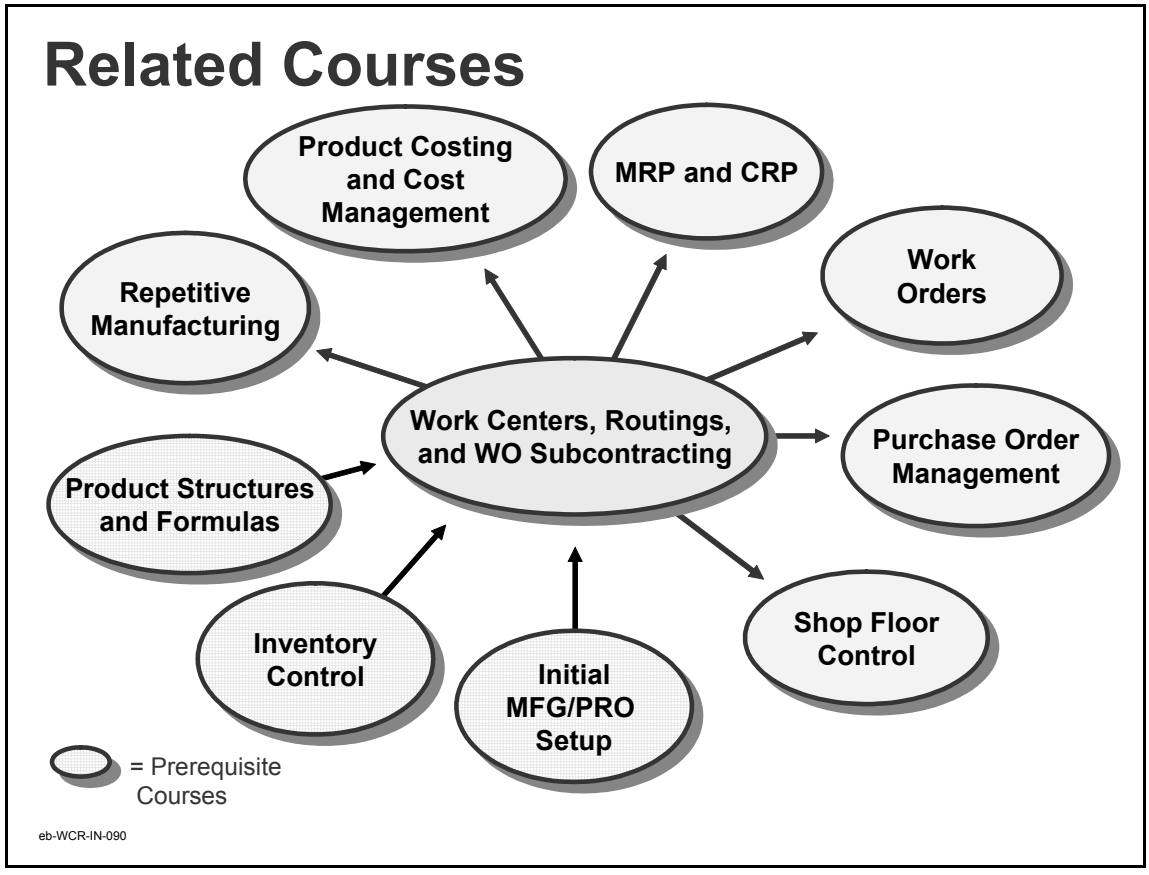
Yield percent is the percentage of acceptable quality of a manufacturing order.

Subcontract

Using outside vendors for all or some operations on a work order is called subcontracting. Subcontract costs are recorded on the routing for a product.



Course Objectives



Related Courses

Work centers and routings require that product structures and formulas be in place.

- The section in this course on subcontracting requires superficial knowledge of purchasing and receiving

Course Overview

- ✓ Introduction to work centers, routings, and WO subcontracting in MFG/PRO
- ♦ Business considerations
- ♦ Set up the shop calendar, departments, work centers, comments, standard operations, routings, and processes in MFG/PRO
- ♦ Process subcontract operations in MFG/PRO

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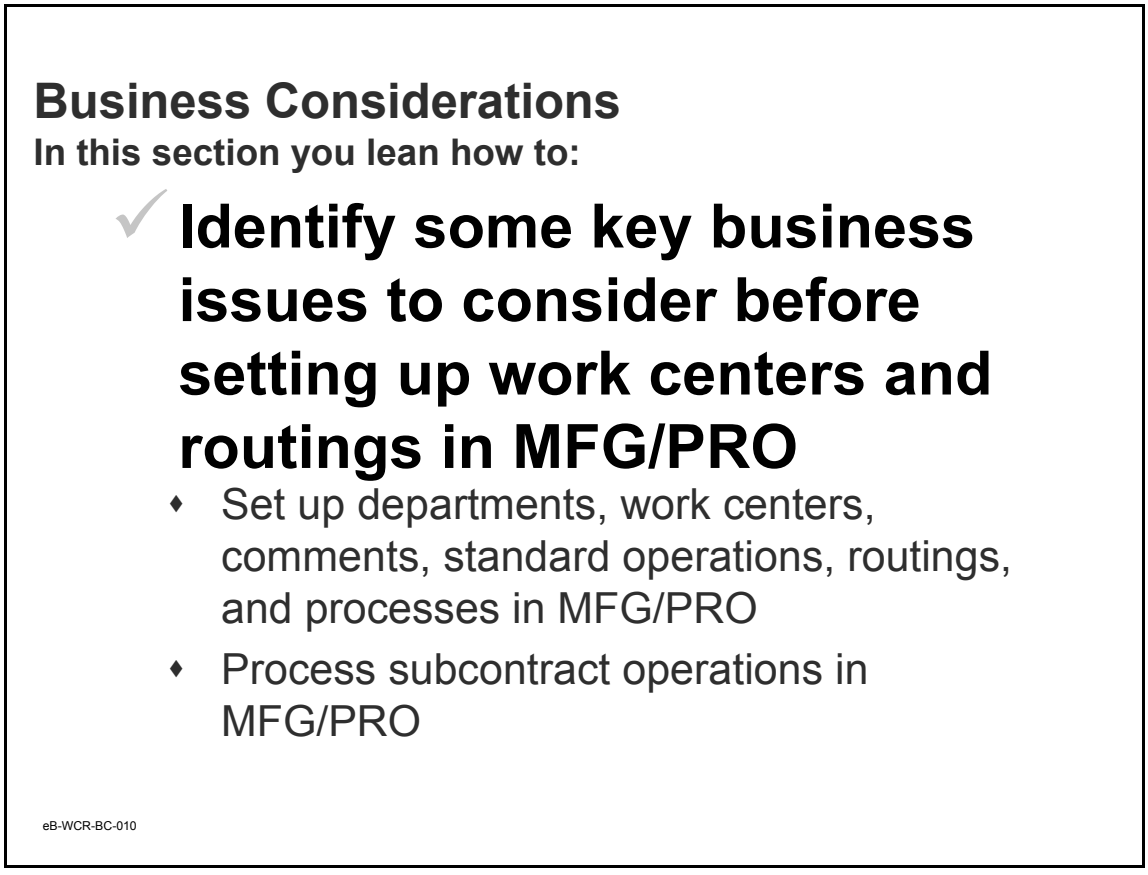
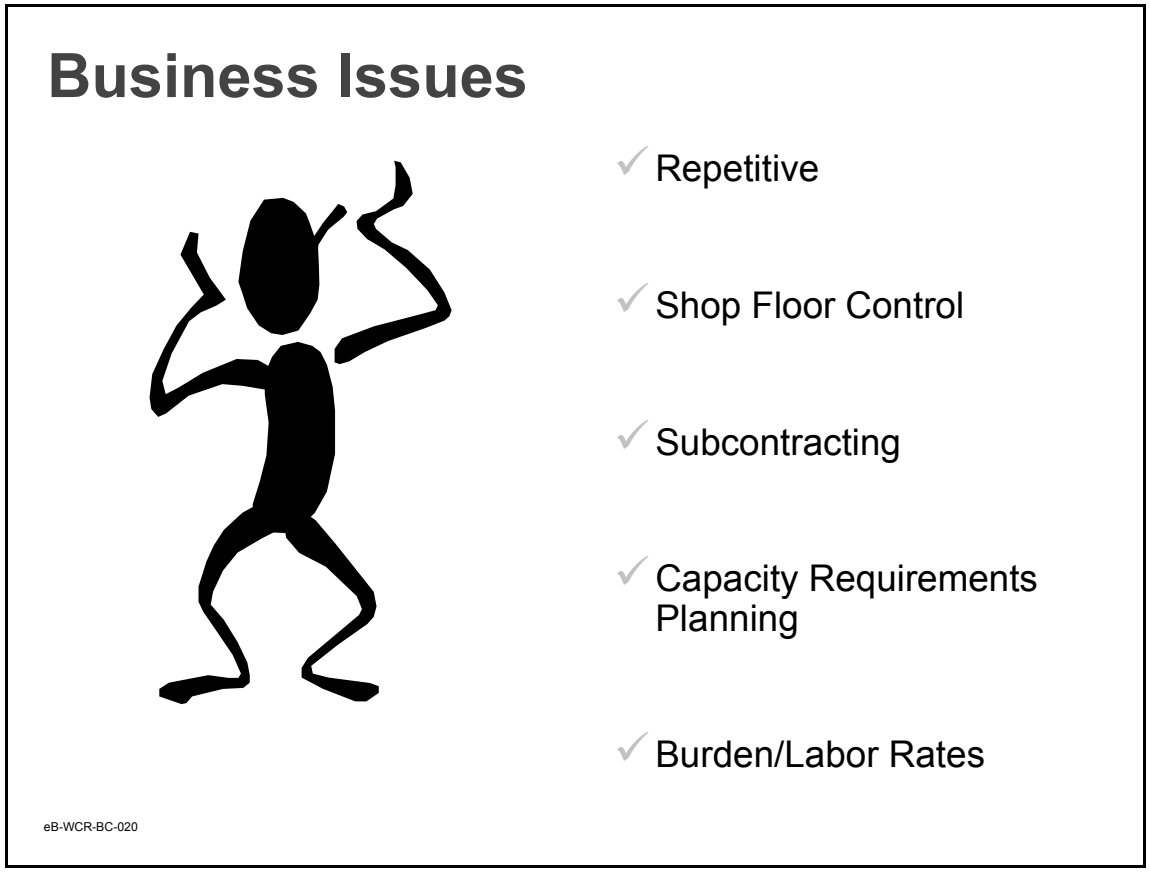
CHAPTER 2

Business Considerations



Introduction

Your company's procedures and policies can affect the way you should set up MFG/PRO. This section covers some issues you should consider before setting up your work centers and routings.



Business Issues

These are some of the business issues you should consider before beginning the implementation. We cover each one on the following pages.

Repetitive and Shop Floor Control

The repetitive and shop floor control modules in MFG/PRO require routing operations

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Repetitive and Shop Floor Control

Routings are required in repetitive and shop floor control for:

- Scheduling operations for repetitive
- Backflushing components in the repetitive module
- Obtaining operation feedback in shop floor control and repetitive

Repetitive and Shop Floor Control

The repetitive and shop floor control modules in MFG/PRO require routing operations

When may routing operations not be required?

- → When control of manufacturing processes and related costs and capacities is not required or desired
- → When item lead times are very short
- → If the total item cost is mostly material and overhead and the labor component is low
- → If capacity is easily managed
- → When the repetitive module is not in use

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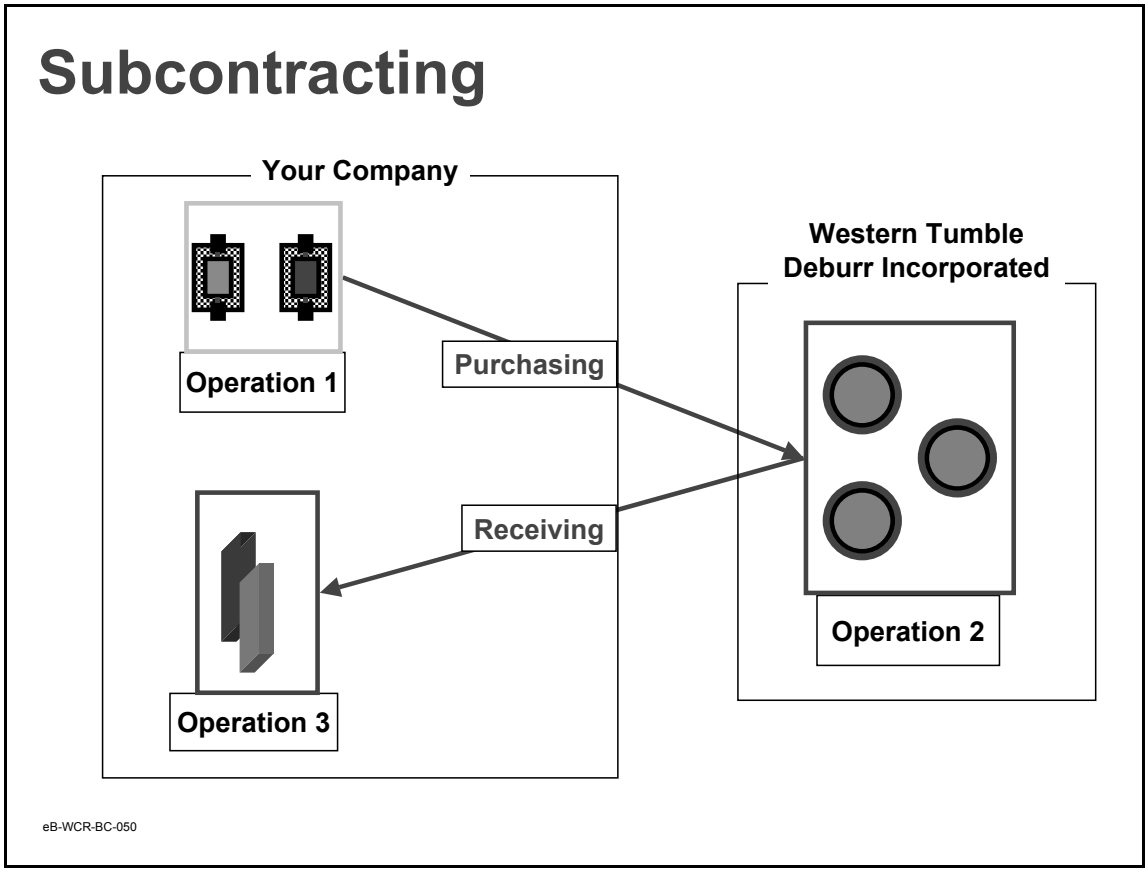
Note You cannot establish standard costs with Routing Cost Roll-Up

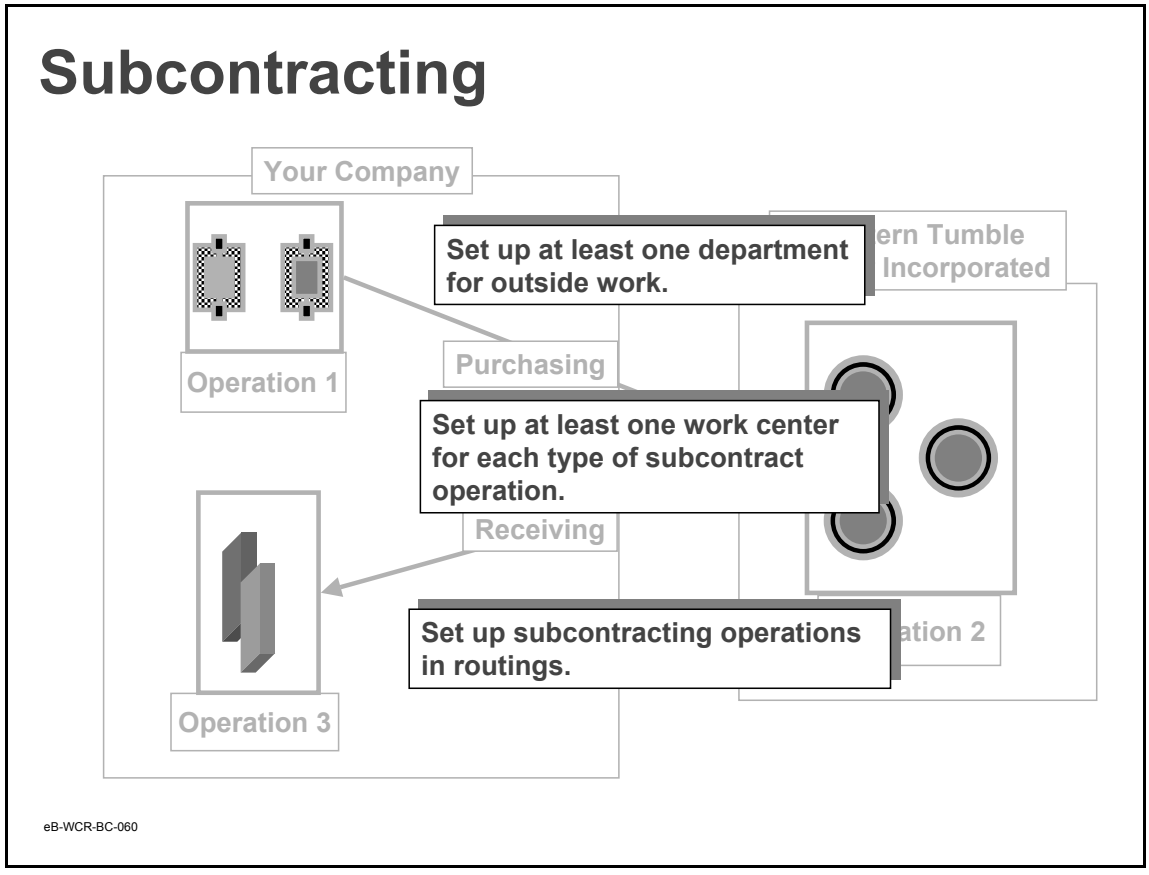


Subcontracting

Subcontracting involves the processing of your materials by an outside supplier. For example, companies send raw materials to the supplier to be manufactured or assembled and then brought back in house. The raw materials are on the books: the supplier does not own them.

This process spans modules in MFG/PRO, using purchasing, manufacturing, and shop floor control programs, as well as the repetitive functionality.

1. You set up an operation for the subcontracted work.
2. When the work moves to the subcontracted operation, you create a purchase order and refer the line item back to the operation as a line type “S”.
3. You receive the work and move it to the next operation.

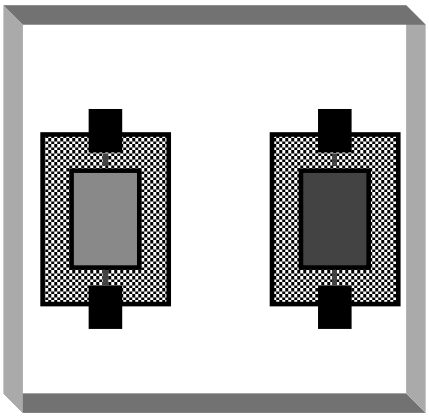


Some manufacturing systems use item numbers to account for subcontract costs. MFG/PRO uses routing operations to plan and track these costs.

See in this training guide: *Work Order Subcontract Processing* on page 111

Capacity Requirements Planning (CRP)

Work centers are the basic unit for CRP



Work center capacity equals

calendar hours available x number of machines

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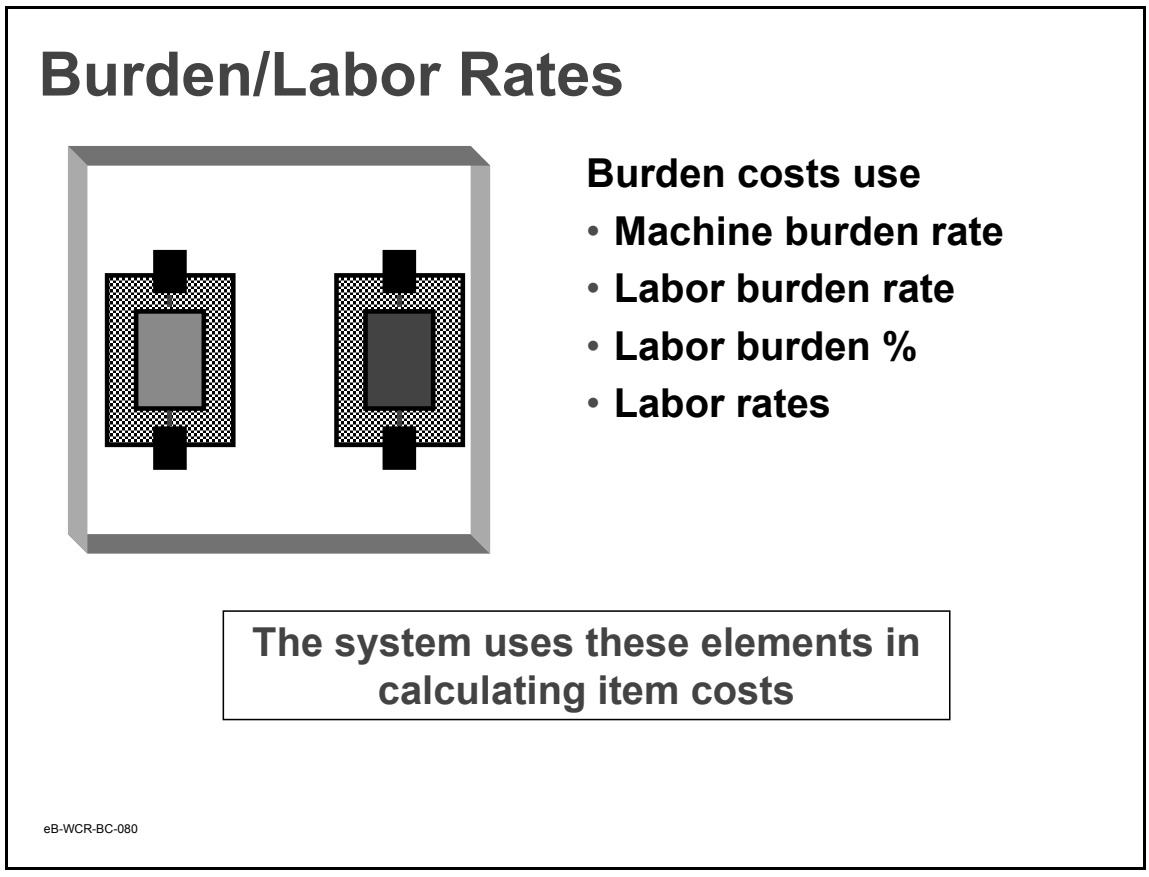
Capacity Requirements Planning

You can set up work-center-specific hour capacity in the shop calendar.

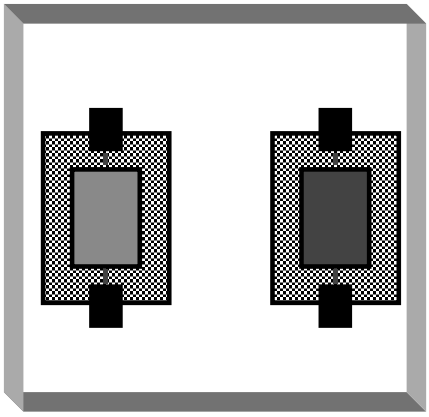


Burden/Labor Rates

Burden/labor rates are generally maintained by cost accountants. Typically, they are considered the variable portion of overhead related directly to production hours.

In contrast, overhead is considered a fixed cost and is applied to inventory at the time of work order or purchase order receipt.

Burden/Labor Rates



Burden costs use

- **Machine burden rate**
- **Labor burden rate**
- **Labor burden %**

Machine burden rate equals

(standard setup hours x number of machines + standard run hours)

x work center machine burden rate

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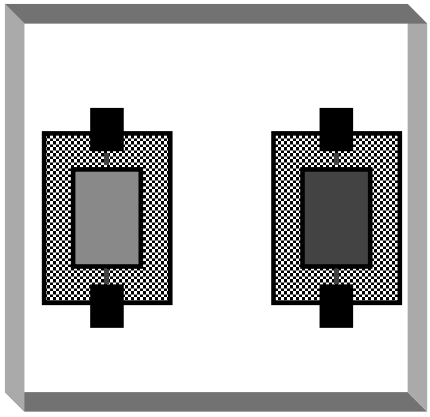
Machine Burden Rate

Burden/Labor Rates



Burden costs use

- ✓ Machine burden rate
- • **Labor burden rate**
- • **Labor burden %**

Labor burden rate equals

(standard setup hours/order quantity + standard run hours) x work center labor burden rate

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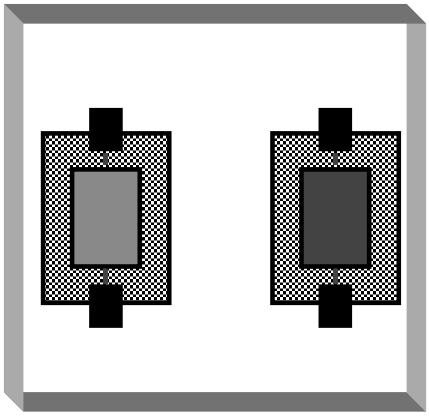
Labor Burden Rate

Burden/Labor Rates



Burden costs use

- ✓ Machine burden rate
- ✓ Labor burden rate
- ➡ • **Labor burden %**

Labor burden percent equals

(standard setup hours x work center setup rate x labor burden %)

plus

(standard run hours x work center labor rate x labor burden %)

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Labor Burden

Course Overview

- ✓ Introduction to work centers and routings
- ✓ Business considerations
- ♦ Set up departments, work centers, comments, standard operations, routings, and processes in MFG/PRO
- ♦ Process subcontract operations in MFG/PRO

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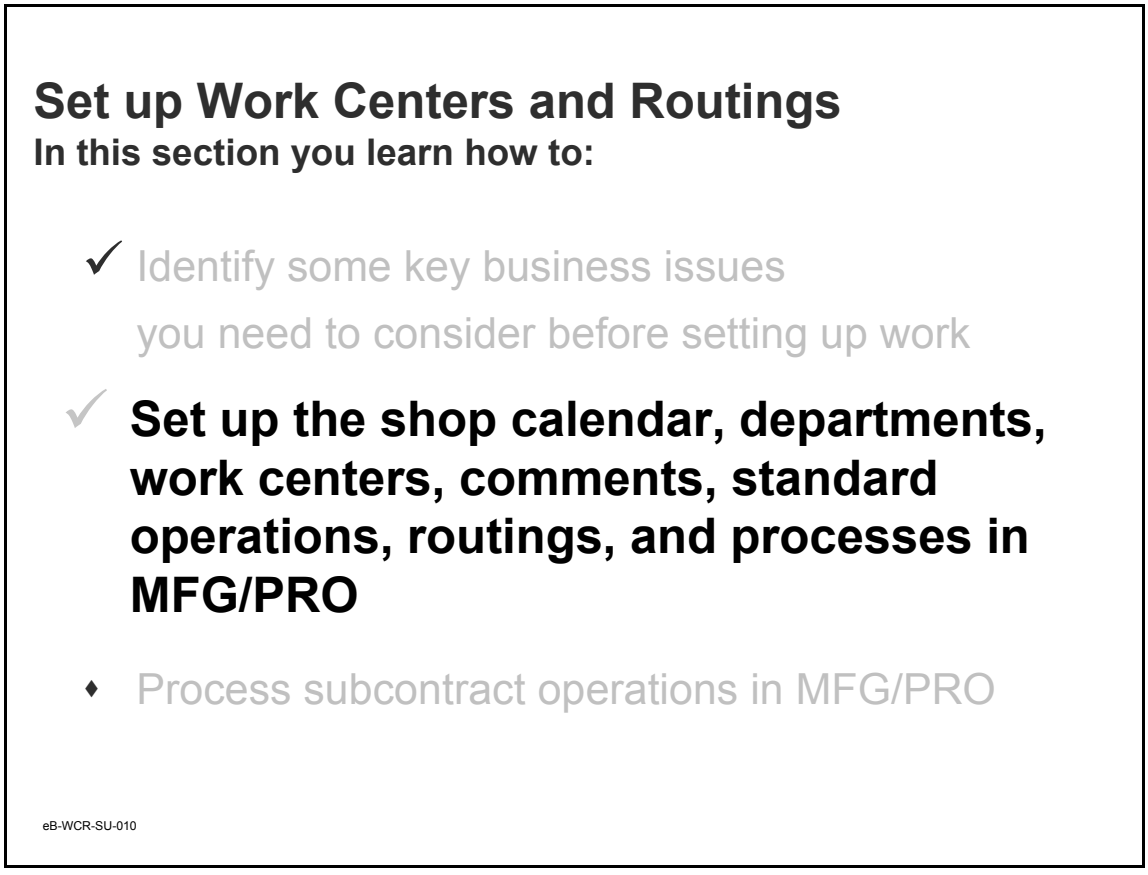
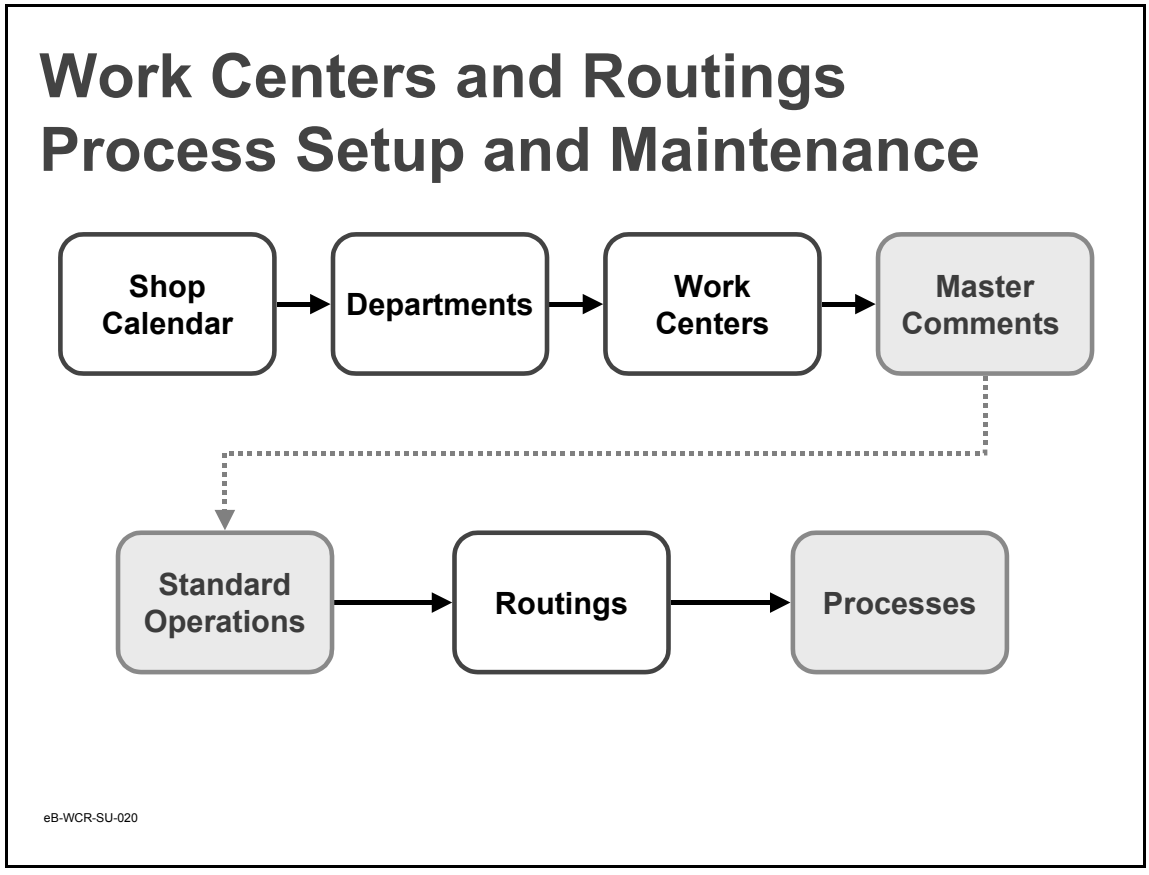
CHAPTER 3

Work Centers and Routings Setup and Maintenance



Set Up Work Centers and Routings

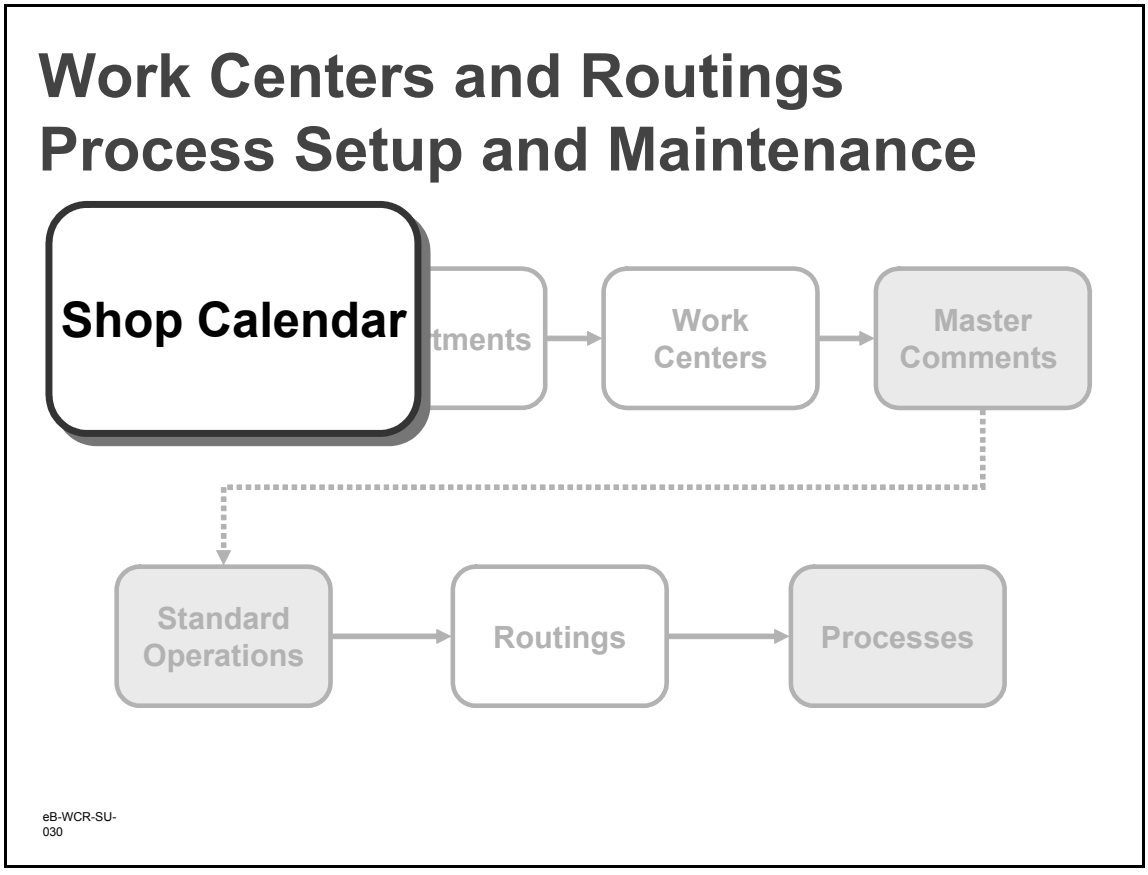


Work Centers/Routings/Process Setup and Maintenance

This illustration is the recommended initial setup sequence of for work centers, routings, and processes. It is based on information that flows from one master file to another and prerequisites that need to be accomplished before setting up a file. Reading the illustration:

Boxes with solid lines are required for set up and are covered in this course

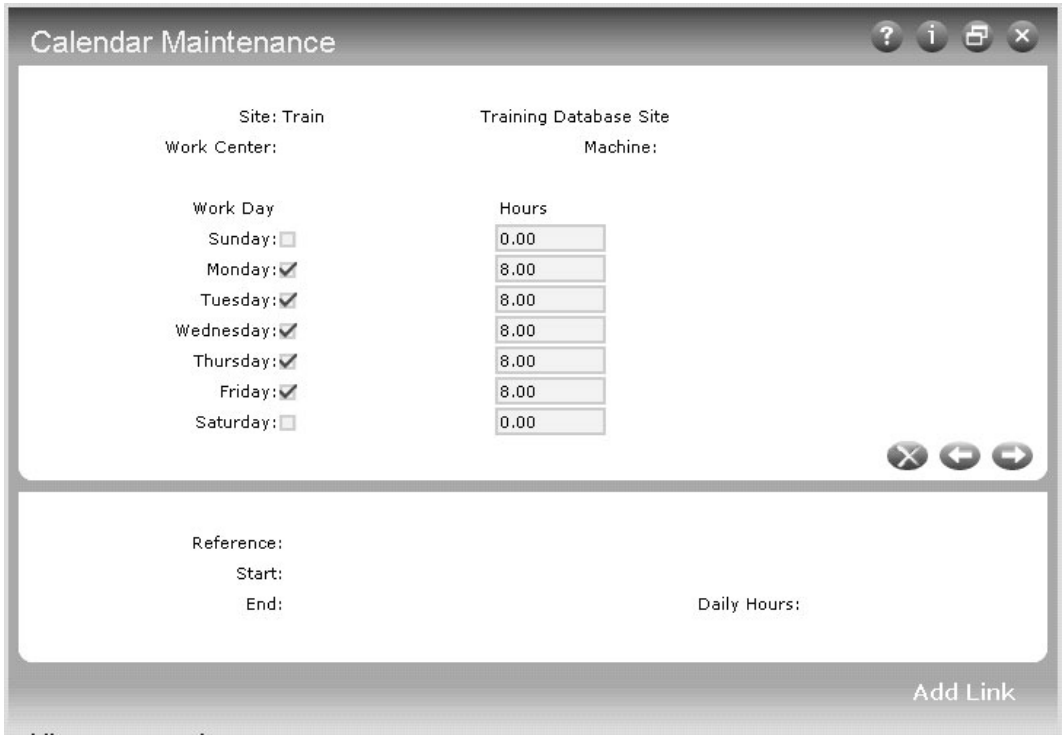
Shaded boxes reflect optional steps, but are covered in this course



Shop Calendar

The calendar sets the work week and the daily hours.

Calendar Maintenance



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Calendar Maintenance

You must define at least one calendar. Calendars set the standard work week for a site and the work centers in it. Calendars provide the basis for all manufacturing scheduling functions. You can create a calendar for the entire system, for specific sites, for work centers, and for machines in work centers.

Note Line Schedule Workbench uses the calendar defined in Shift Maintenance

Site

- The site where the calendar applies
- Leave this blank to create a system calendar
  - Any sites left blank then default to the system calendar

Work Center

- The work center where the calendar applies
- Leave this blank to default the work center to the site calendar

Machine

- The machine the calendar applies to
- Leave this blank to default the machine to the work center calendar

Work Day

- Denotes for each day whether it is a work day or not
- No = Not a work day
  - MFG/PRO schedules nothing on non-work days
- Yes = A work day. MFG/PRO can schedule events, such as:
  - Production
  - Shipments

Hours

- The total number of hours normally scheduled for all shifts to work on this day
- This should reflect actual production hours, exclusive of breaks
- This number reflects all shifts scheduled for work, which may be greater than 24 hours
- When calculating schedule due and release dates, the system only looks at scheduled work days, ignoring exceptions and holidays

Record exceptions to the normal calendar in the following three fields. These schedule:

- Overtime
- Increased shifts
- Reduced shifts
- Preventative maintenance
- Shutdowns

The number of hours specified is added or subtracted from the normal work day for each day in the range of dates specified.

Note Exceptions only record holidays if the holiday only applies to some work centers. If the holiday applies to all work centers, use Holiday Maintenance.

Reference

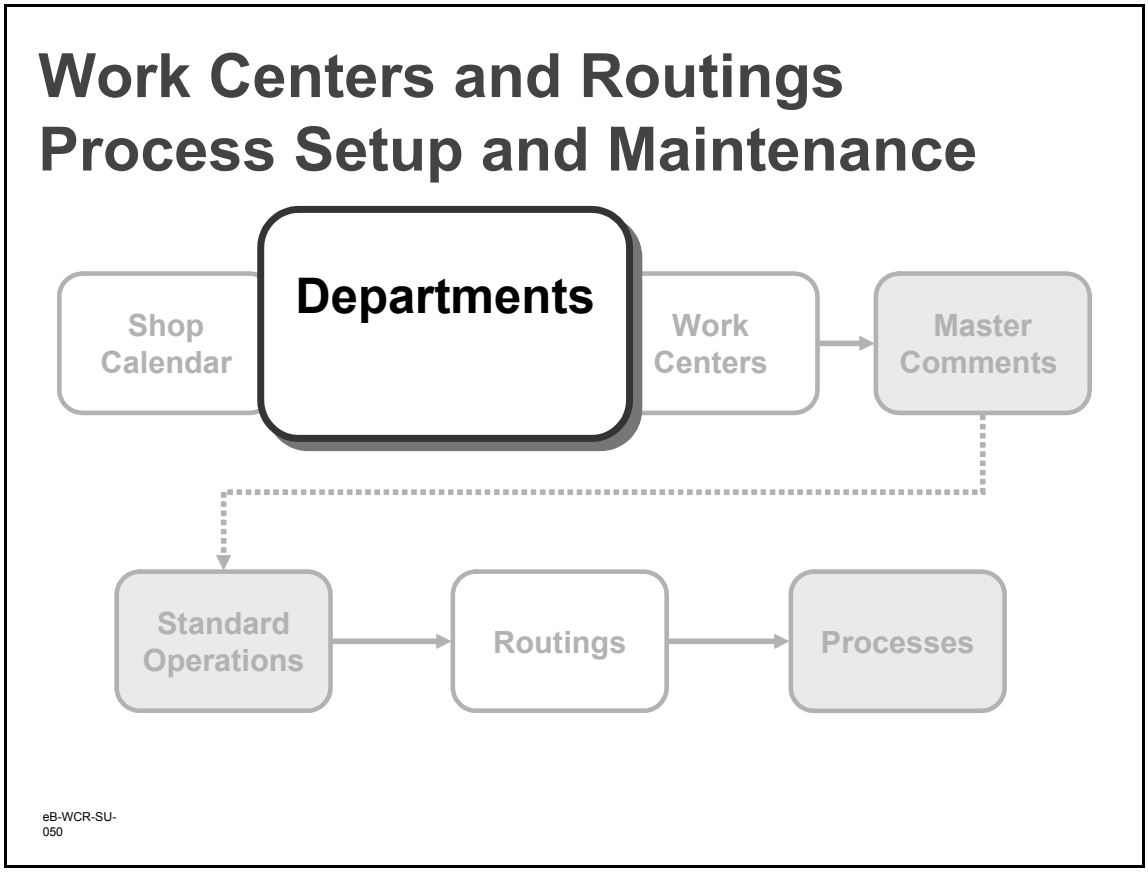
- A reference code identifying an exception to the shop calendar, usually describing the type of exception:
  - Overtime or Shutdown

Start / End

- The first day and last day this exception applies to
- The exception applies to all work days in the range of dates specified

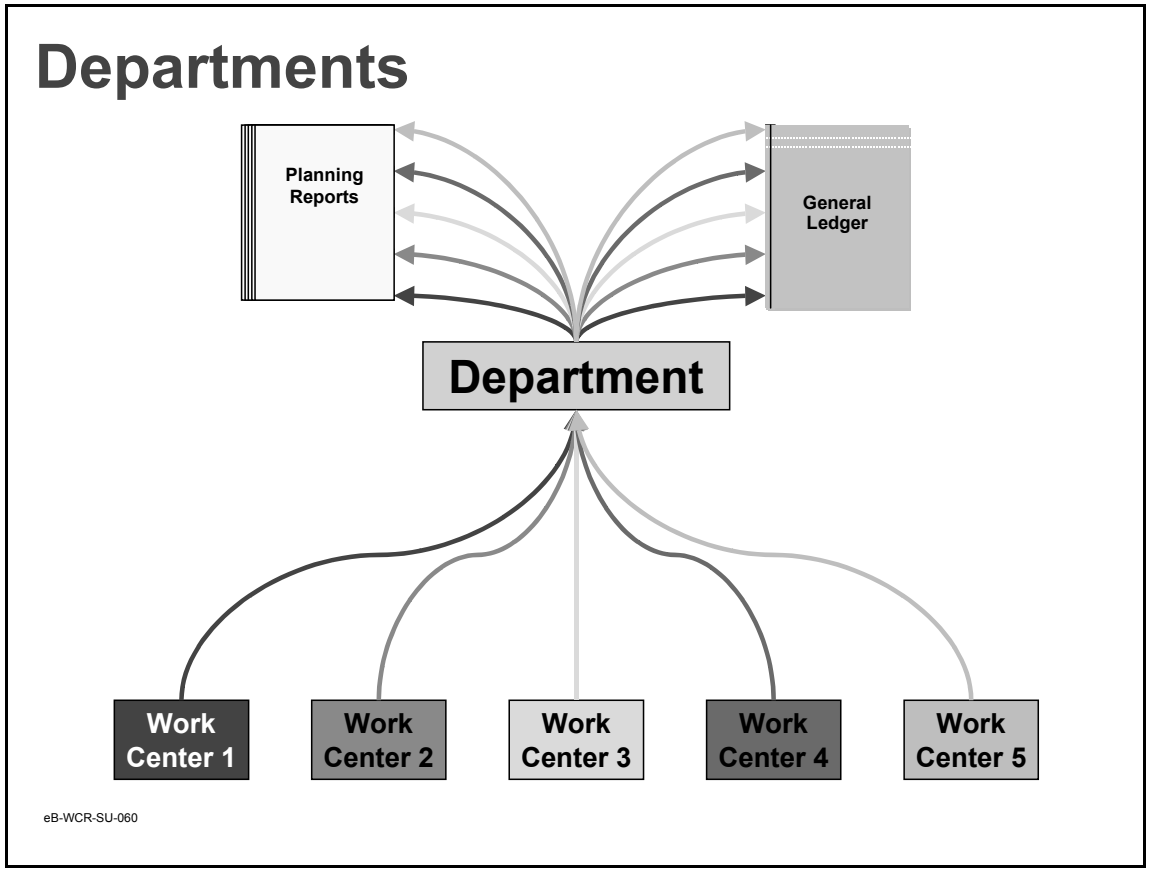
Daily Hours

- The number of hours to be added or subtracted from normal scheduled work hours for the specified range of dates
- Can be positive or negative; for a shutdown on a normal work day, enter -8



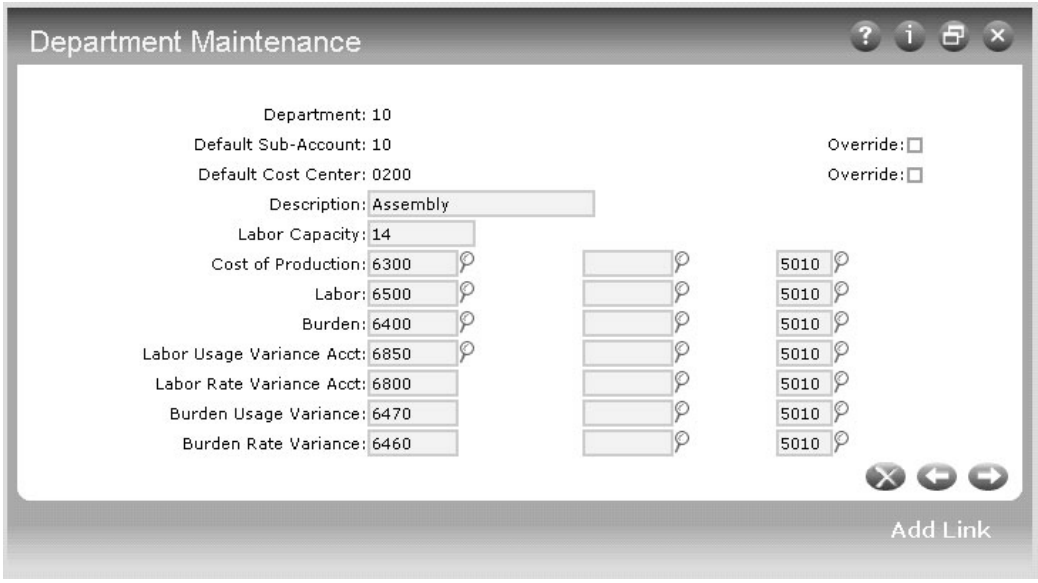
Departments

Departments group work centers for capacity requirements planning and general ledger (GL).



Similar to product lines, departments are used to determine the GL accounts on transactions and for summary capacity planning.

Department Maintenance



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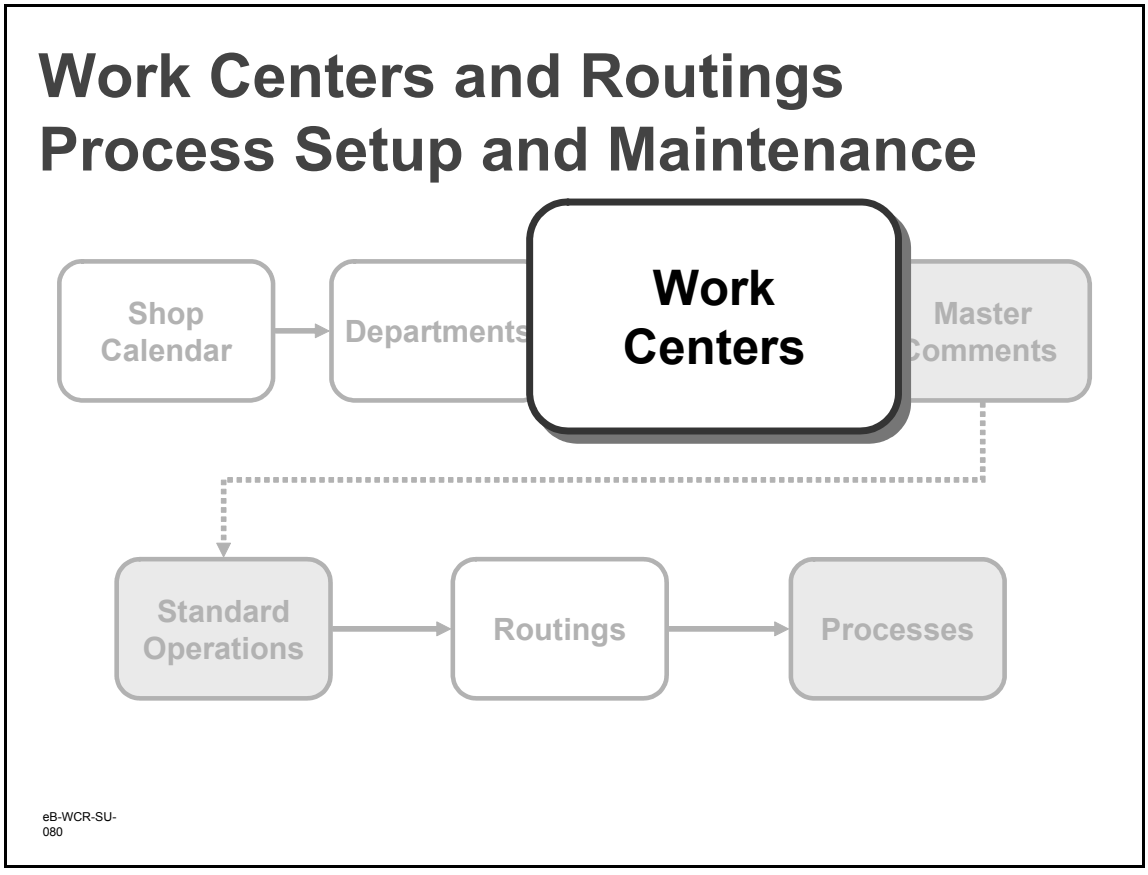
Department Maintenance

At least one department is required before entering work centers or routings.

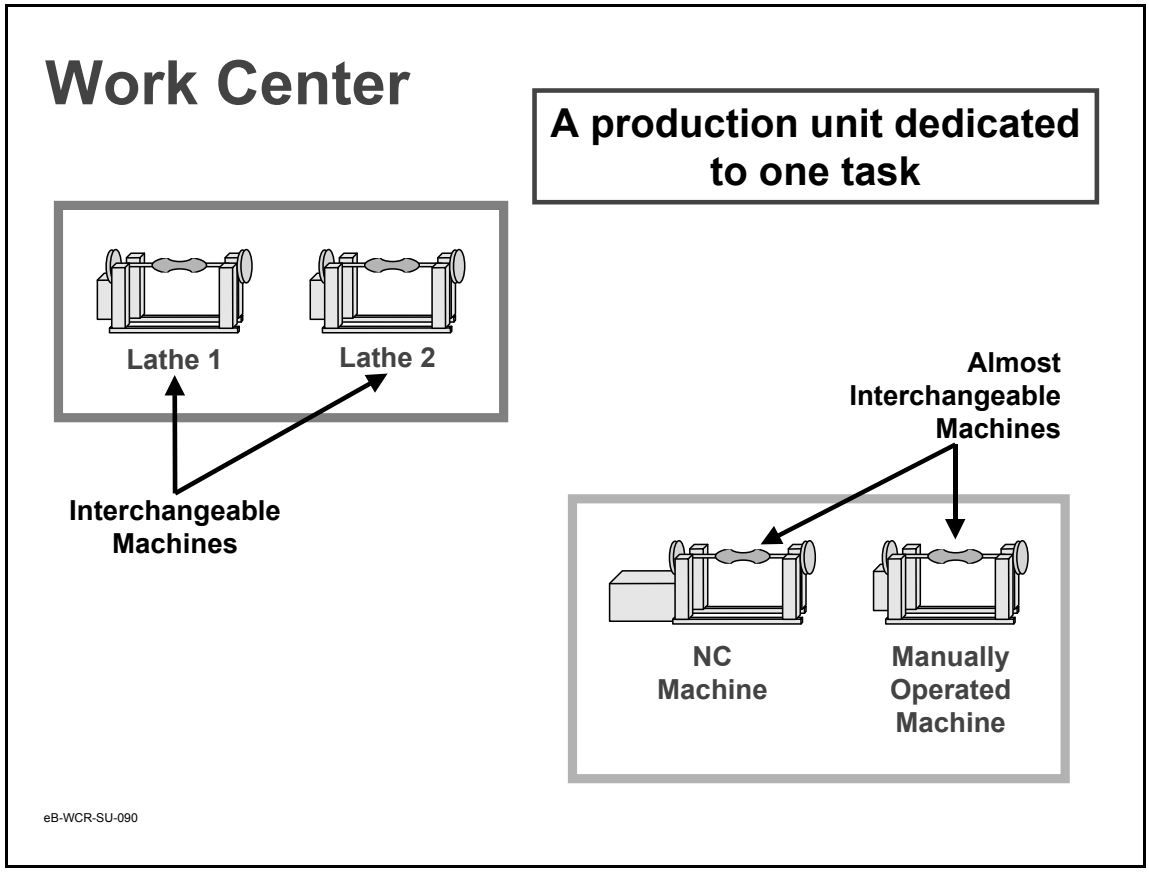
- Every work center must belong to one department
- A department is a grouping of work centers for purposes of reporting and accounting
- CRP calculates capacity and load by work center/machine and can display the summary by department
- Labor, burden, and cost of production are tracked in the GL by department
- A department should be set up to group any subcontract work centers
- Labor capacity can only be entered manually, and you should enter it – CRP uses it to determine over and under loads – and it should equal the sum of the capacities of all work centers in the department

Note The labor and burden fields are for the absorption/cost centers.



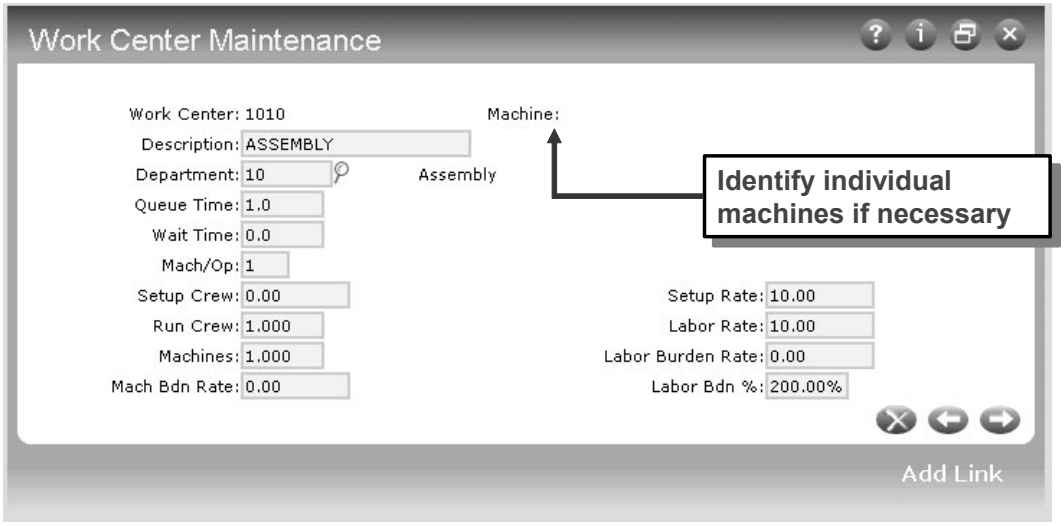
Work Centers

- A work center is a production facility that performs specified tasks
  - It identifies machines, groups of similar machines, people, or subcontract suppliers
  - In MFG/PRO, work centers link departments with operations
- Departments are a prerequisite to entering work centers



A Work Center is a production area with one or more people and machines.

Work Center Maintenance



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Work Center Maintenance

Use this function to create and modify work centers.

- For subcontracting, set up a work center for each type of subcontract operation or supplier
  - Set costs to zero
- Work center data is accessed by most manufacturing functions in MFG/PRO
  - Some static data (Description, Setup Crew, Run Crew) only prints on reports

- Work Center data controls processing in four areas:
  - Scheduling

    When a routing operation is specified at this work center, lead time fields (Operation, Queue Time, Wait Time, and Machines per Op) default to the routings
  - CRP

    Capacity for this work center is the number of machines in a work center multiplied by the number of available hours (from Calendar Maintenance)
  - Costing

    Manufacturing costs are calculated in Routing Cost Roll-Up

    Labor costs multiply the setup and run times at each operation by the setup rate and labor rate; burden costs use Mach Bdn Rate, Lbr Bdn Rate, and Lbr Bdn %; subcontract costs are taken from subcontract cost at the operation level
  - Accounting

    Each work center belongs to a department, which determines the GL accounts that track variances, labor and burden costs

Work Center

An alphanumeric code for the work center.

Machine

A code for a machine used in the work center.

- You can leave this field blank
- Specify a machine only if there is more than one machine in the work center and they cannot be used interchangeably (that is, each machine is different or dedicated to different items)
- When machine codes are specified, each routing operation has to be assigned to a particular machine
- Capacity and load can be reviewed by machine or aggregated by work center

Department

The department to which this work center is assigned.

Queue Time

The standard queue time, in decimal hours, a job normally spends waiting at this work center before it is set up and processed.

- This value displays as the default when you enter a standard operation, routing operation, or process operation for this work center
- Total manufacturing lead time includes queue, setup, run, wait, and move time
  - Lead time is used for operation scheduling and capacity requirements planning
- Queue time is independent of order quantity and can be compressed in past due situations
- When scheduling operations, the system looks at the shop calendar for the work center to determine how many hours are available for queue time in each calendar period

Wait Time

The standard wait time in decimal hours that a job normally spends waiting at this work center after processing has been completed.

- This value displays as the default whenever you enter a standard operation, routing operation, or process operation for this work center
- Uses for wait time include drying, cooling, aging, and curing
- Wait time is independent of order quantity
- An order must wait at least this long before it can go on to the next operation; wait time can't be skipped in past-due situations
- Wait time is expressed in hours and is not affected by the shop calendar

Mach/Op

The number of machines at this work center that can work at the same time to process a given operation.

- The default is 1
- This value displays as the default whenever you enter a standard operation, routing operation, or process operation for this work center
- The Mach/Op field affects scheduling of operations at this work center machine
  - During scheduling, the system uses the operation run time divided by the Mach/Op
- You can also use this field to indicate multiple operators on one machine

Setup Crew / Run Crew

The number of people normally required to set up and run this work center.

- These fields are for reference only; they appear on some selected reports and inquiries
- No scheduling or cost calculations use this data

Machines

The number of machines or people in this work center.

- The total capacity for a work center is:
  - The number of working hours times the number of machines
- If some of the machines in this work center can operate at the same time, you should enter that number in the Mach/Op field

Machine, Setup, and Labor Rates

The values in these fields enter into item cost calculations and labor feedback functions to determine and post actual costs and variances.

These rates apply to all operations carried out at this work center and may not be changed for individual operations.

Mach Bdn Rate

The burden rate per hour applicable to machine run time and setup at this work center.

- Standard machine burden cost at the operation is calculated as:

  (setup time / order quantity x routing machines per op + run time) x WC mach burden rate
- If yield is included in the standard cost, machine burden reflects the cumulative yield from all operations

Setup Rate

The average hourly rate paid to set up this work center.

- If no setup labor is reported for an operation, the system assumes that standard setup was completed and not reported; setup is posted at standard during operation close or work order accounting close
- The setup portion of standard labor cost is calculated by multiplying the standard setup time by the setup rate
  - Setup time is the time it takes to set up all machines
  - Machines/operation is not considered here
- This cost is divided by the item order quantity
- Labor burden percentage is applied to the setup cost
- Actual setup cost is calculated by multiplying the actual setup time by the setup rate for the work center

Labor Rate

The average rate paid per labor hour to run this work center.

- The run portion of standard labor cost is calculated by:
  - Multiplying the standard run time by the run rate
- Actual run cost is calculated by:
  - Multiplying the actual run time by the labor rate for the work center

Lbr Bdn Rate

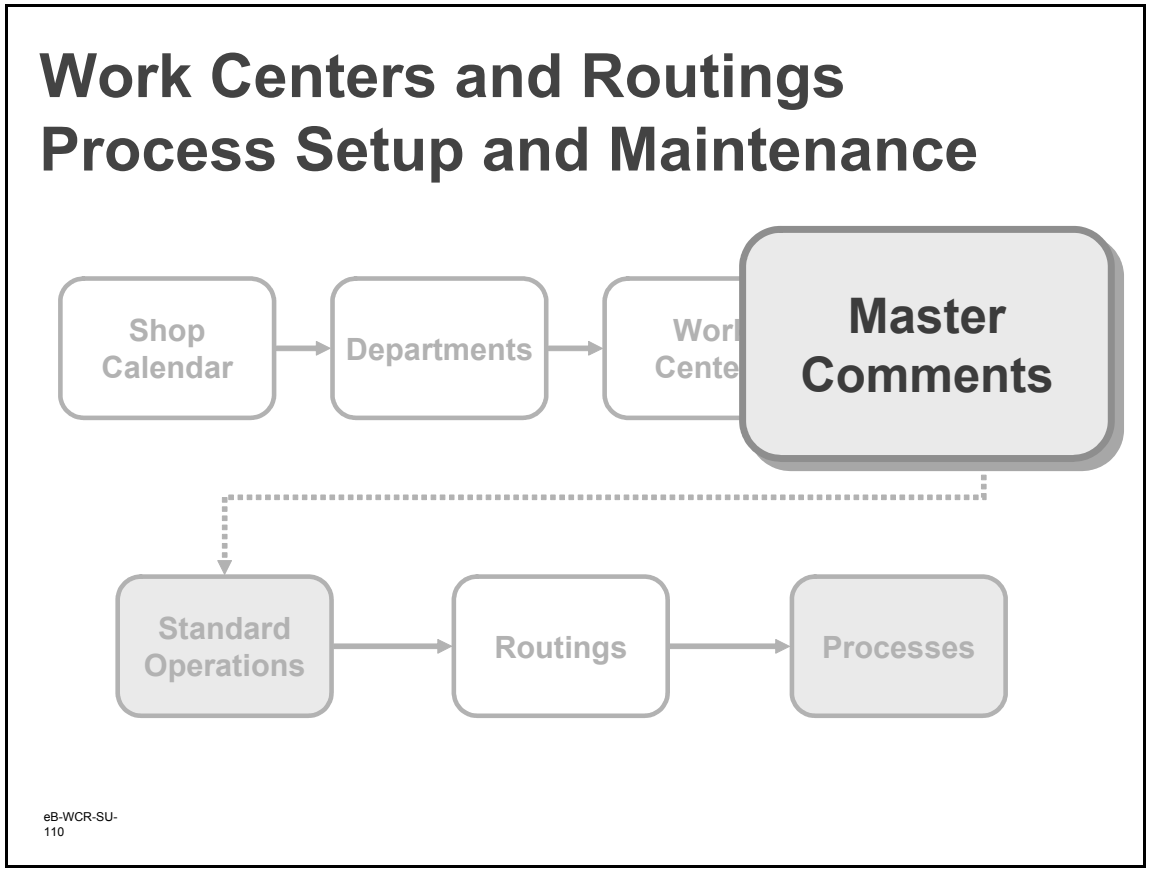
The labor burden rate per hour applicable to both setup and run time at this work center.

- The labor burden portion of standard burden cost is calculated using:
  - The labor burden rate and labor burden percentage
- The labor burden rate is multiplied by:
  - The operation setup and run times
- Actual labor burden is calculated using:
  - The actual hours reported and the burden rates and labor costs from the work center at which the operation was reported

Lbr Bdn%

The labor burden percentage applicable to the total labor cost at this work center.

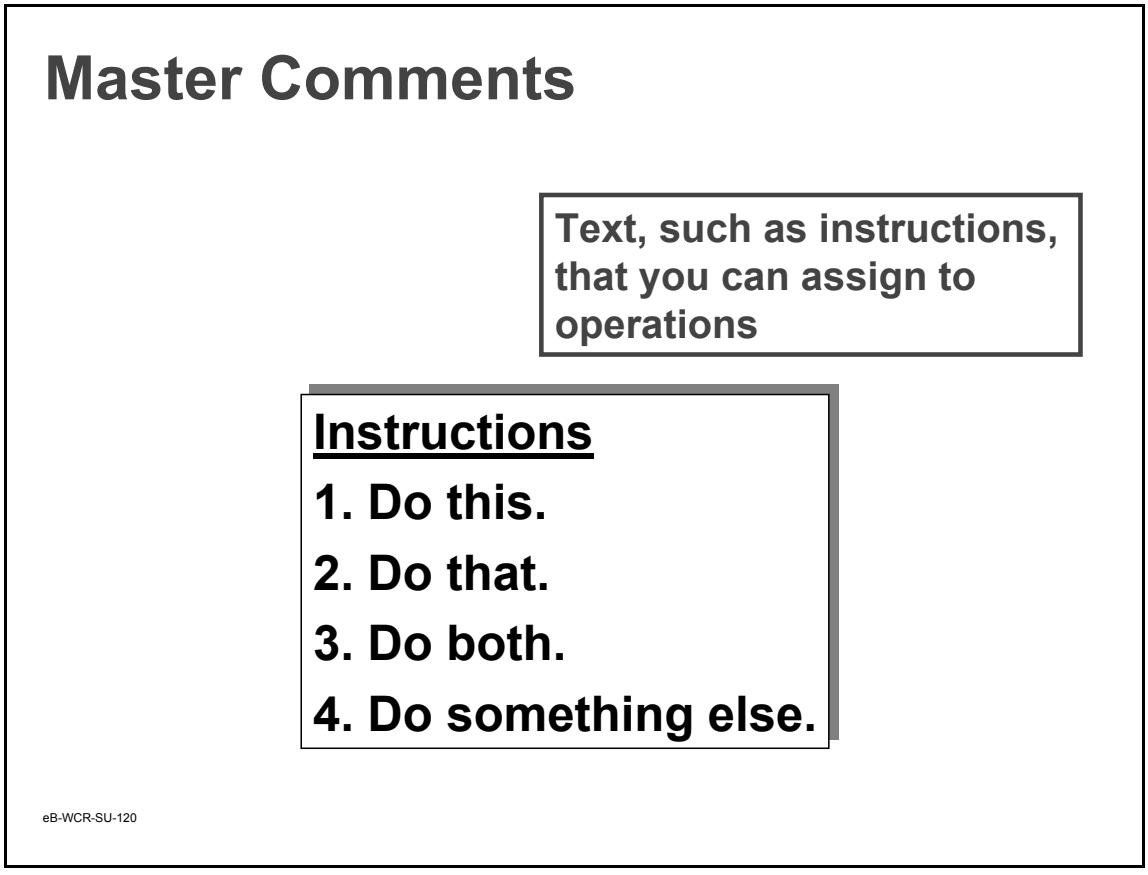
- The labor burden portion of standard burden cost is calculated using:
  - The labor burden rate and labor burden percentage
- The labor burden percentage is multiplied by:
  - The total labor cost for operation setup and run
- Actual labor burden is calculated using:
  - The actual hours reported and the burden rates and labor costs from the work center at which the operation was reported



Master Comments

You can maintain master comments as sets of templates that the routings then reference.

- These comments appear on the shop floor paperwork when the work order is released



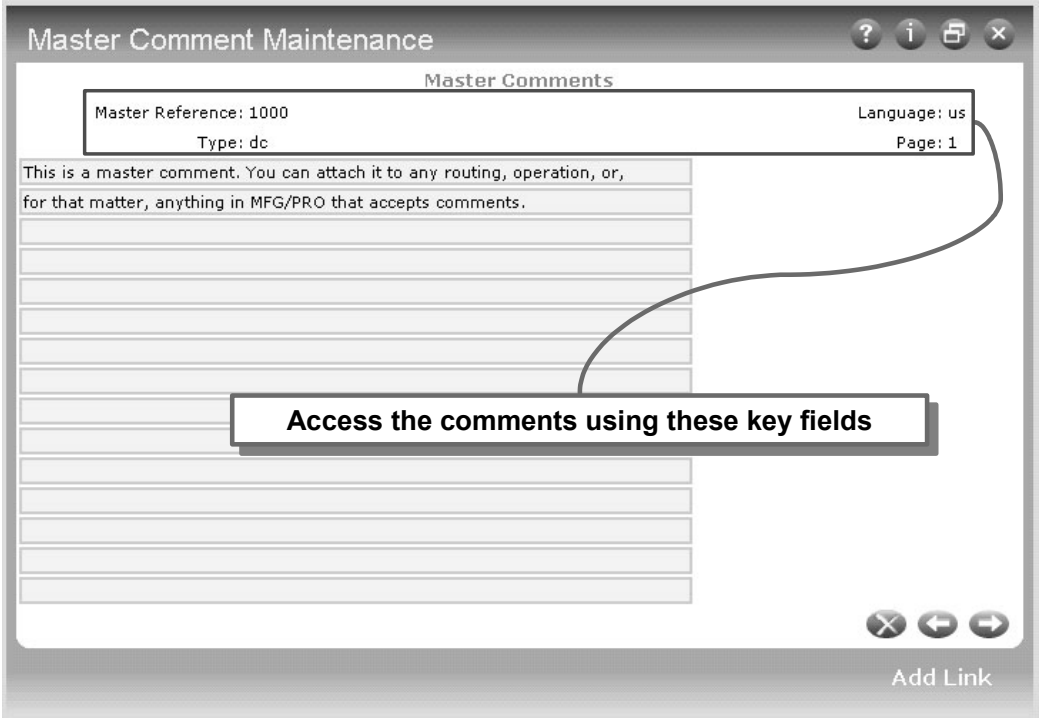
Use master comments to aid in maintaining routings when detailed instructions are needed for some or all routing steps.

Comments are useful for recording such things as:

- Processing instructions
- Tolerances
- Test specifications for an operation

Standard operation comments may be accessed and changed on each routing operation, and these may be accessed and changed on each work order.

Master Comment Maintenance



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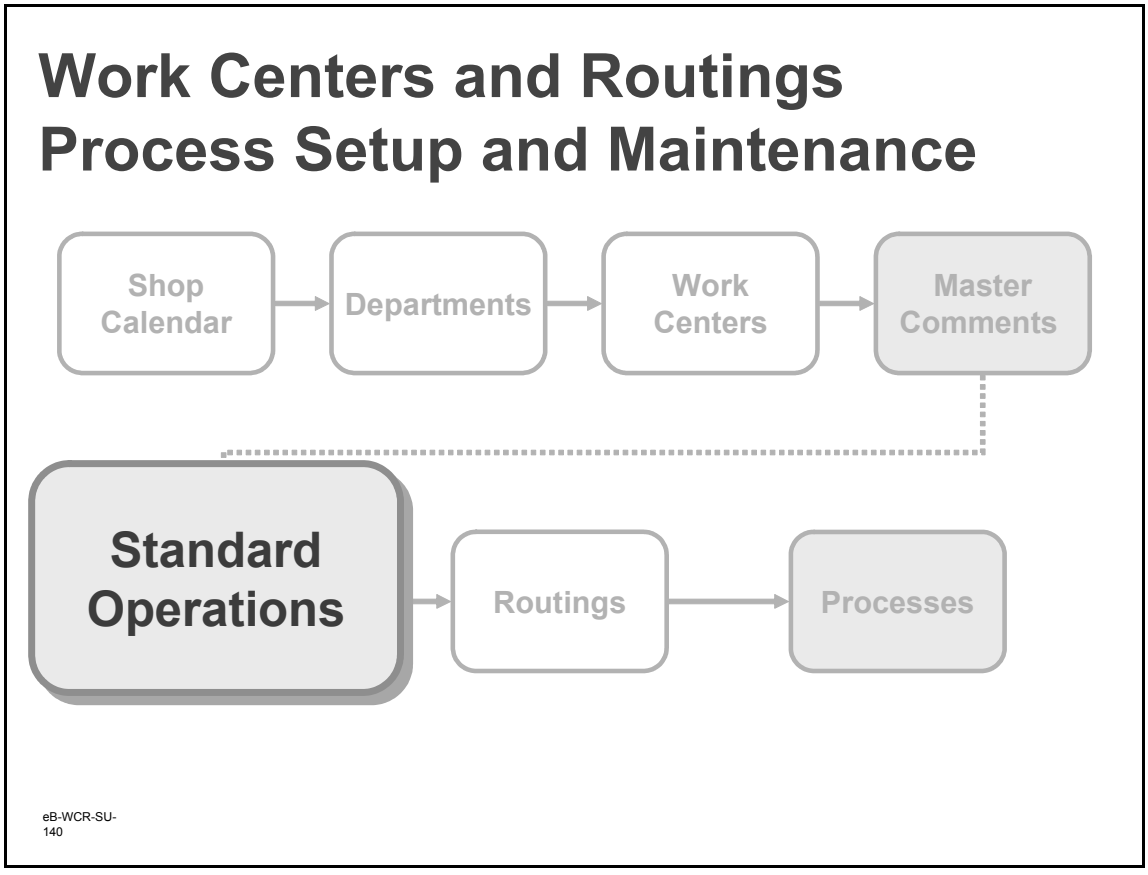
Master Comment Maintenance

- Master Comment Maintenance stores up to 99 pages of free-form text, accessible by:
  - Reference code
  - Type
  - Language
  - Page number
- Use this program to create comments and procedures for your operations

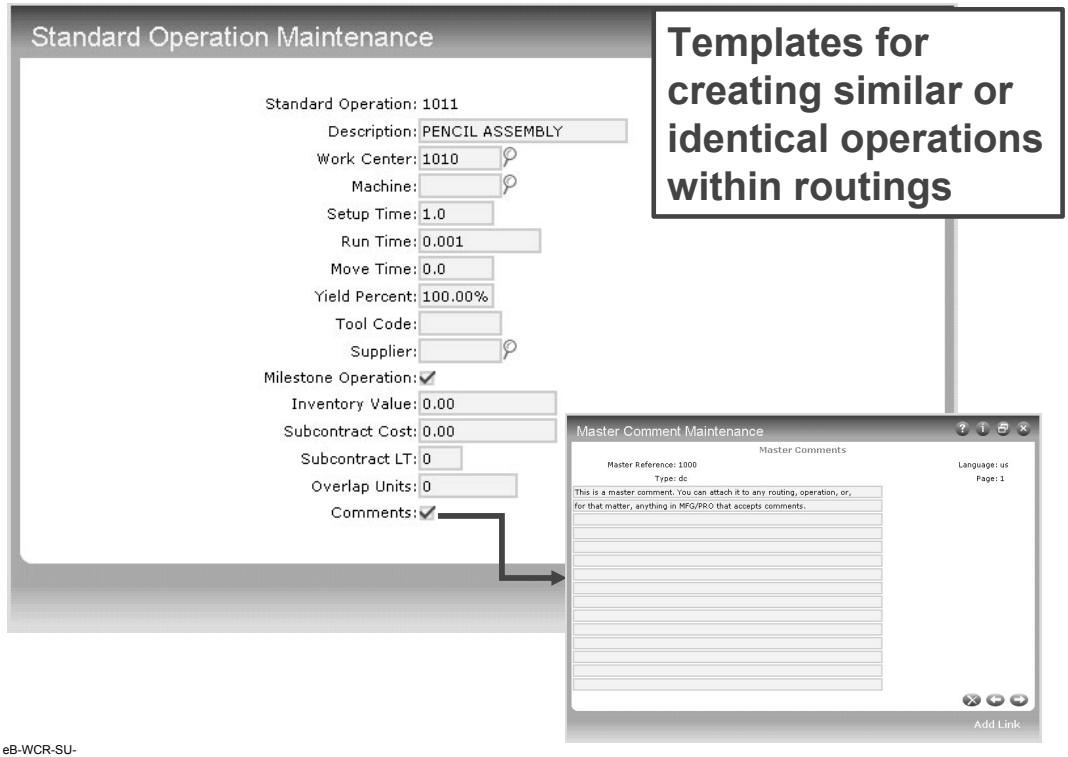


Standard Operations

Standard operations are optional.

- Often, routings share one or more operations that are essentially the same
  - An automated packaging process may be the same regardless of the color of the products packaged
- To save work when entering new routing operations, in MFG/PRO, you can create template operation steps called standard operations

Standard Operations



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Standard Operation Maintenance

A standard operation is a template for multiple similar or identical routing operations.

Be careful to create error-free templates; if not, you will be replicating errors.

- In Routing Maintenance or Work Order Routing Maintenance you can optionally specify a standard operation rather than enter it manually; this fills all the operation data with default values
- Each standard operation is defined with the setup, run, and move time (or subcontract time), yield, overlap, and instructions for carrying out this operation at its normal work center
  - This information displays as the default when a routing or process operation is added which references this standard operation code

  - It may be changed, for example, if the operation should be performed by a different work center or machine; the operation times and instructions may also need to be changed
- On a routing or work orders routing print, if there are no routing comments, standard operation comments print

Changes to standard operations do not automatically update routings previously created from those operations; use Routing Update to update selected routings.


See in this training guide: *Routing Update* on page 73

Standard Operation

This code identifies a standard operation – a process operation common to several products or applicable to different routings in different operation sequences.

Description

A description of this standard operation, usually indicating the type of operation such as “paint” or “stamp.”

The standard operation description prints on most reports beside the standard operation code.

Work Center

The work center where this standard operation is normally performed.

Machine

The machine this standard operation is normally performed on.

Subcontract Considerations

You should set up either subcontract cost and lead time, or setup, run, and move time for an operation. If you record both sets of data, then cost and lead time are overstated and operation schedules are incorrect.

You can enter a supplier code even if the operation is not normally subcontract.

Setup Time

The standard time, in decimal hours, it takes to prepare this work center to carry out this operation, independent of order quantity.

Run Time

The time, in decimal hours, it normally takes to process one unit at this operation.

Move Time

The time, in decimal hours, it normally takes to move work from this operation to the next, independent of order quantity.

- Since move time is often dependent on what the next operation is, this normally is changed on each routing or process operation
- Move time is not adjusted by the system to reflect differences in order quantity
  - It is stated in terms of the Order Quantity of the item, but may be changed manually on the work order
- In a process flow environment, move time is normally zero
- Move time applies to a physical movement of product that needs to be accounted for in the schedule
  - If product moves between buildings, time may be spent loading and unloading as well as in transit

Yield %

The normal yield percentage for this operation – the percentage of any order expected to be in usable condition after this operation.

- The default is 100%

Tool Code

A code identifying the tool normally used by this operation.

- Tool code may be left blank
- This field is for reference only and may appear on some selected reports and inquiries

Supplier

The address code of the normal (or preferred) supplier for this subcontract operation.

- This field is for reference only and may appear on some selected reports and inquiries
- A supplier code may be recorded even if the operation is not normally subcontract
  - This is useful for identifying operations which may be subcontracted
  - Do not enter a subcontract cost or lead time
- If supplier address codes are changed using Address Code Change the change is not made here but must be done manually.

Milestone Operation

Specifies whether you can report completions at this operation.

- Completions initiate a backflush for this and all previous non-milestone operations, back to but not including a previous milestone
- Milestone Operation is used only in the Repetitive module
- If this field = No, Repetitive Labor Transaction is not permitted. You can report in:
  - **a** Repetitive Setup Transaction,
  - **b** Repetitive Reject Transaction,
  - **c** Repetitive Rework Transaction, as well as in
  - **d** Repetitive Scrap Transaction which backflushes scrapped items.
- If this field = Yes, all transactions are allowed. Repetitive Labor Transaction backflushes material, labor, burden, and subcontract at standard
  - – Report setup at non-milestones to avoid backflushing setup at standard
- MFG/PRO assumes the last operation is a milestone, regardless of this field
- Milestones allow you to define meaningful reporting points in your processes and avoid reporting where it is not meaningful
  - – You may wish to report where the most labor or highest material costs are added, or where the product reaches a certain physical stage

Inventory Value

Manually entered user-defined accumulated cost through this operation.

- Only used by the Repetitive WIP Cost Report
- Inventory Value might be used for “plugged” operation costs where these costs are set internally or negotiated with a customer, or for any cost you want to track in WIP, such as union costs, miscellaneous supplies, and so forth

Subcontract Cost

The average cost per unit normally charged by subcontractors to perform this operation.

- It can be changed, based on the item and order quantity
- Cost calculations determine item costs using subcontract cost

Subcontract LT

The average number of calendar days it normally takes a subcontractor to perform this operation.

- This value becomes the default when a routing or process operation is added which references this standard operation code
  - It can be changed, based on the item and order quantity
- Subcontract lead time is part of the calculation for the manufacturing lead time generated by Routing Cost Roll-Up
- Subcontract lead time influences scheduling for work order operations
- When scheduling work order operations, the system treats the subcontract lead time as the calendar days needed between the operation due date and the start date
  - For example, if subcontract lead time is two and the due date is the tenth of a month, the start date would be the seventh because the two days between (the eighth and the ninth) are needed for the subcontract LT

Overlap Units

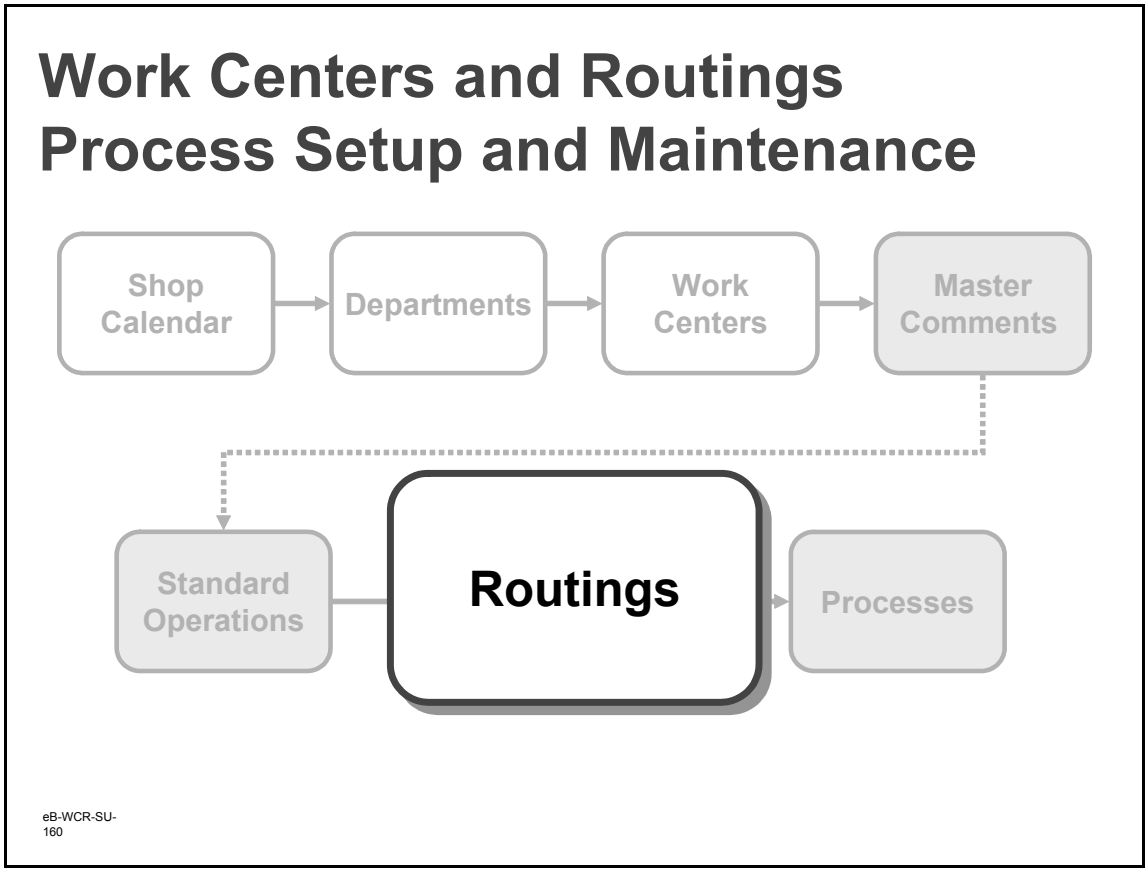
The number of units that must be completed at this operation before work can begin at the next operation.

- Operation overlap is considered by scheduling algorithms, usually with the effect of reducing overall manufacturing lead time: if the overlap quantity is 10, the system schedules only enough time to setup, run, wait, and move 10 items before starting the next operation
  - If the processing time at the next operation is longer than at the first, overall lead time is reduced
- If overlap is not used, you should set the overlap quantity to zero
- In a process flow industry, overlap quantity is normally 1

Comments

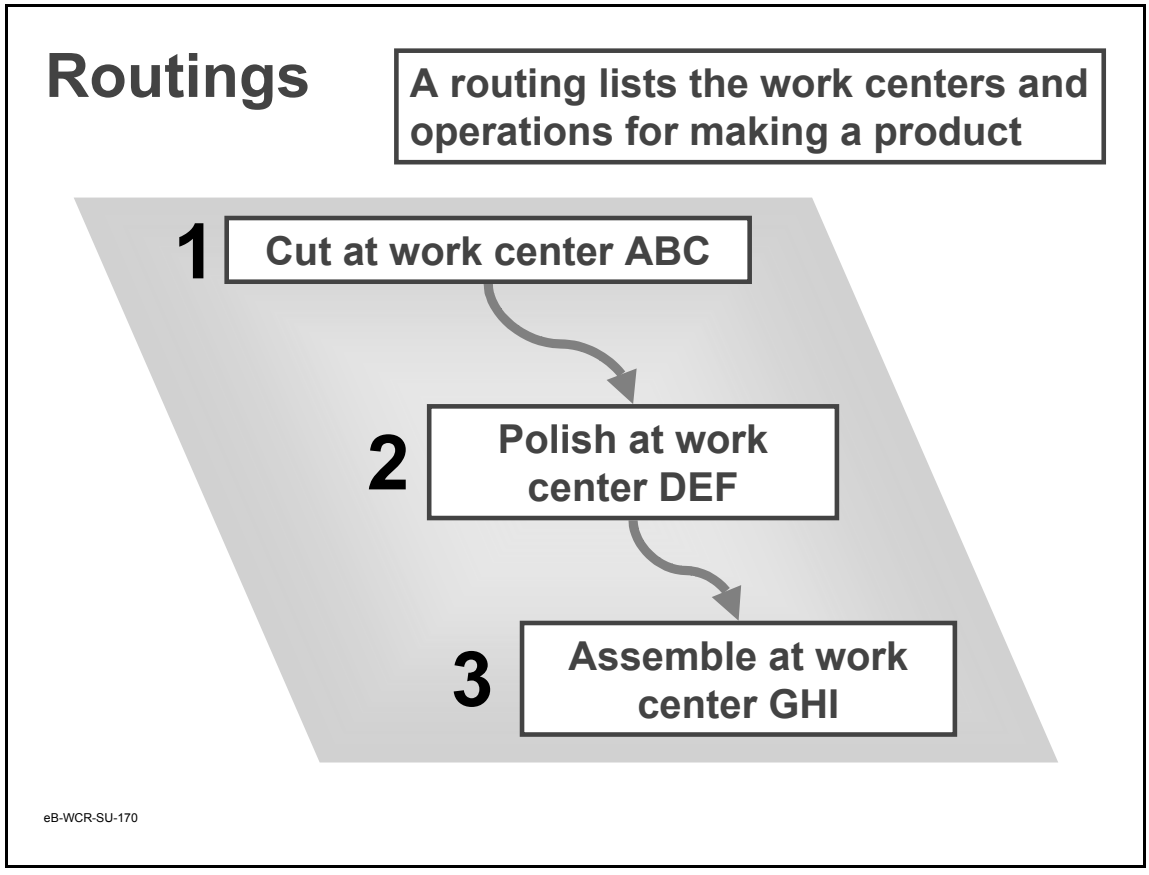
Set this field to Yes to open the comments frame and attach comments to this standard operation.

- If you want to “freeze” current comments on specific work order routing operations, you can open the comment frame in Work Order Routing Maintenance
  - Changes to Master Comment Maintenance do not override the comments on existing work orders where you have frozen the comments
  - Once you have frozen the comments, you must delete them in Work Order Routing Maintenance if you want to access updated comments from another source, such as Master Comment Maintenance



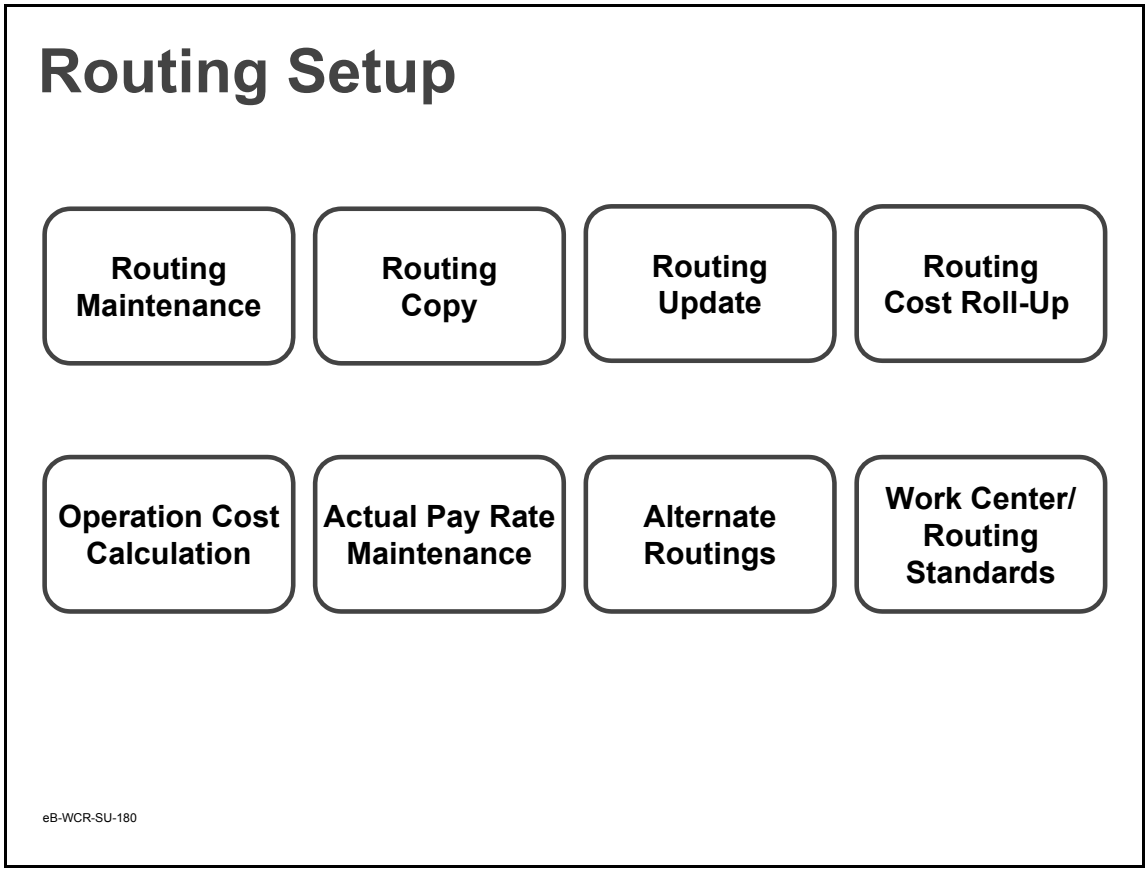
Routings

Routings define the set of operations required to manufacture a product, with the work centers, machines used, the sequence of operations, the tools, the standard hours, and set up and run times.



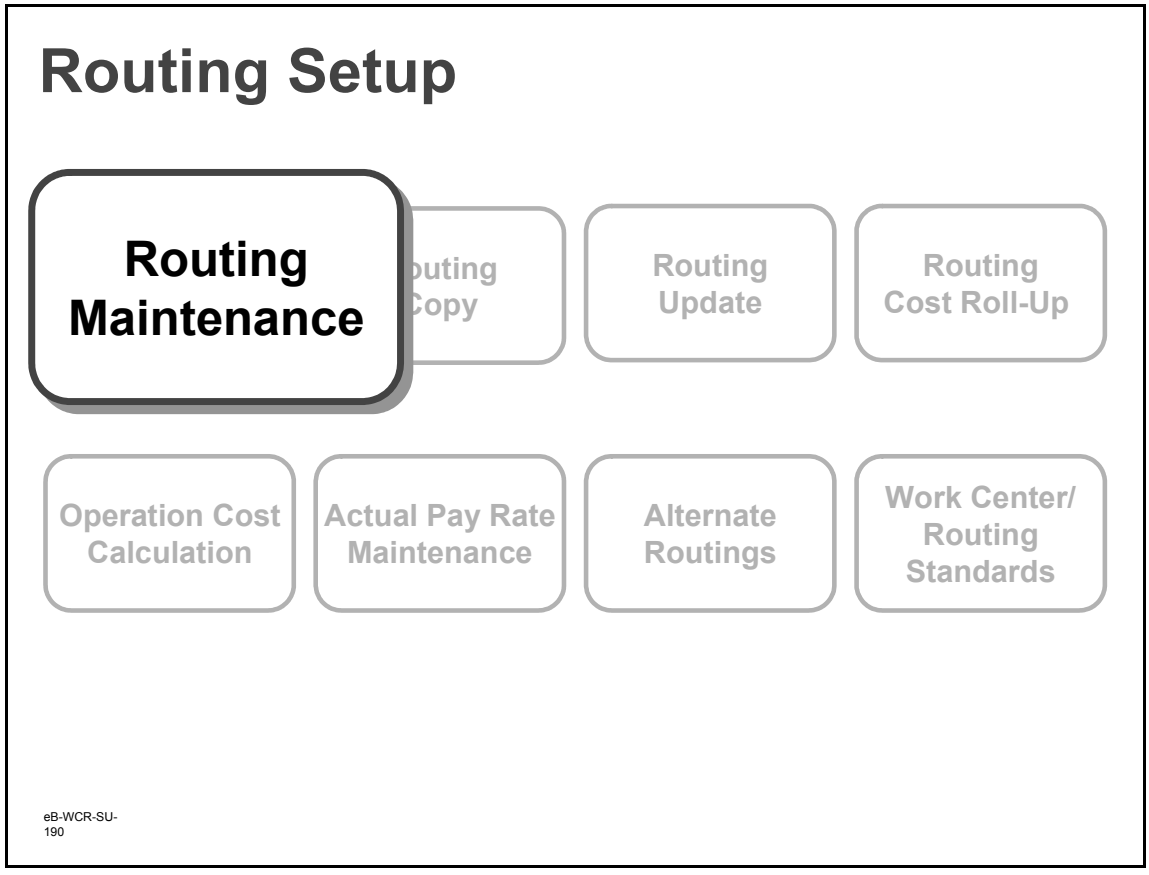
Example Routing

The operations in the routing can be custom made or can be standard operations.

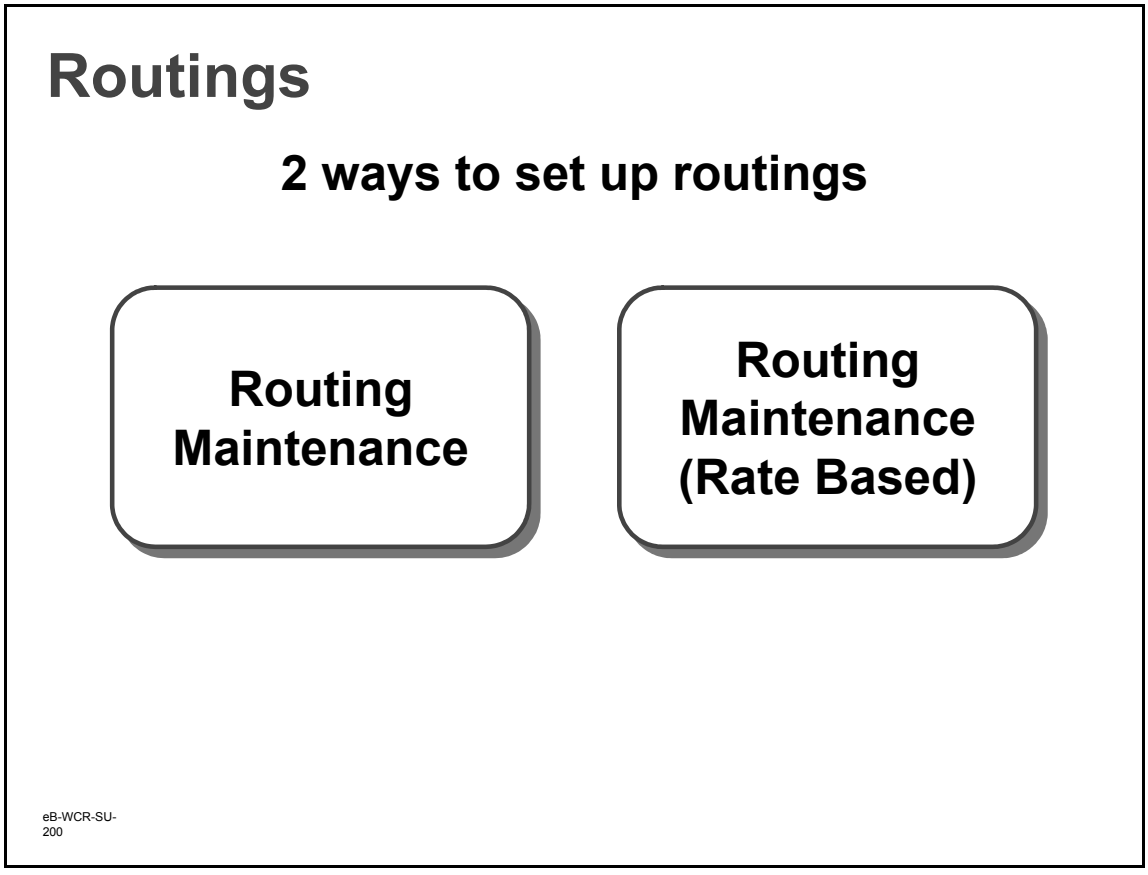


Routing Setup

Routings are important and complex elements in MFG/PRO; the diagram shows the programs for their development and maintenance.



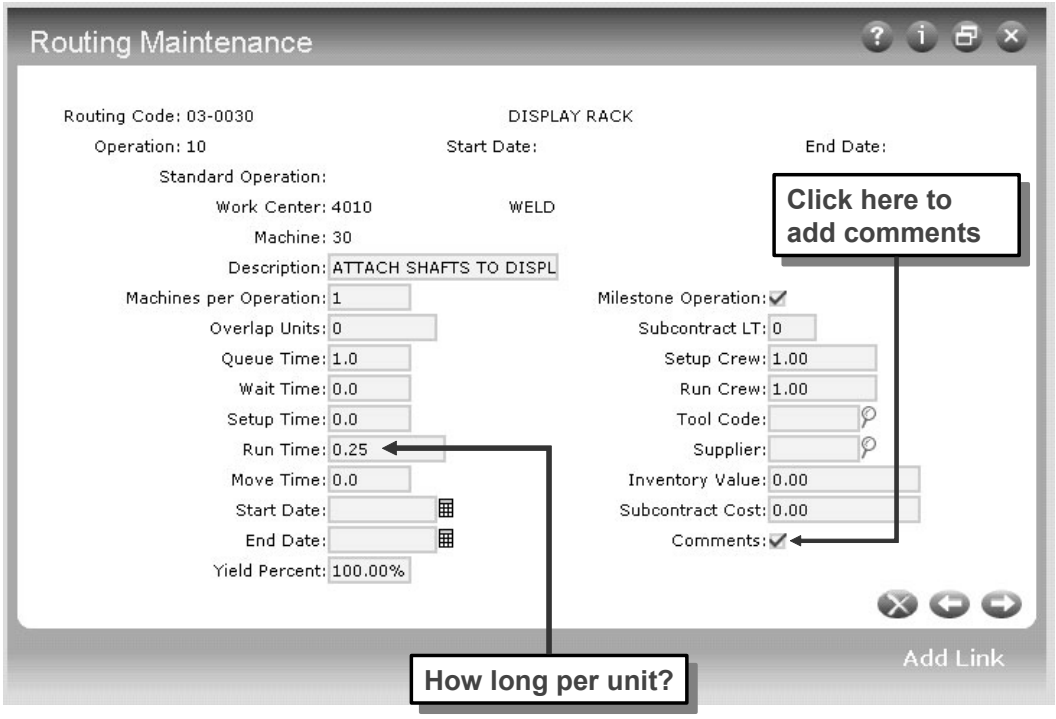
Routing Maintenance



Types of Routings

- You have two ways to set up routings:
  - Routing Maintenance requests the time to produce one item
  - Routing Maintenance (Rate Based) requests how many items per hour

Routing Maintenance



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Routing Maintenance

Each routing or process consists of one or more operations.

Fields

Most of the fields contain default values from the work center or from standard operations. Here we cover only those fields unique to this screen.

Routing Code

This code usually matches the item number of the manufactured item, but it can be different for alternate routings or for similar routings or processes at different sites.

  - When it is different, you attach the routing code to its product in Item Planning Maintenance or Item-Site Planning Maintenance

Operation

Operation numbers identify steps within a specific routing code.

- Each routing or process includes a series of sequential steps
- Routing operations are accessed whenever a work order is created and printed
  - Operation information may be changed on any work order
  - To report labor, you must enter an operation number
- At least one operation is required to process repetitive labor feedback
- If you delete an operation from a routing, you must also close any outstanding cumulative orders using the routing in the repetitive module
  - This prevents reporting labor against the operation
- Operations should be numbered by 10's or 100's, so you can add new steps without renumbering existing operations
  - If you have operations 10, 20, and 30 and need to add another operation after operation 20, it can be entered as operation 25, for example

In a repetitive environment, this operation number is referenced in the product structure to show that the item is backflushed from that operation.

Start Date / End Date

Routing steps can be defined as effective over a period of time. Starting and ending effective dates define that period. You enter the start date at the top of the screen and the end date at the bottom. These dates are inclusive and may not overlap.

- You can leave either or both fields blank
- Using effective dates enables you to phase in engineering changes and maintain history on-line
- Nonblank start and end dates determines when to include and when to exclude this step on the routing
- Functions that reference the routing always use the routing steps in effect on the current date
- Most reports and inquiries may be selected for a specific effective date
- To switch one step for another, add the new step and give it a start date in the future, then specify the end effective date for the existing step to the day before the new one is to take effect

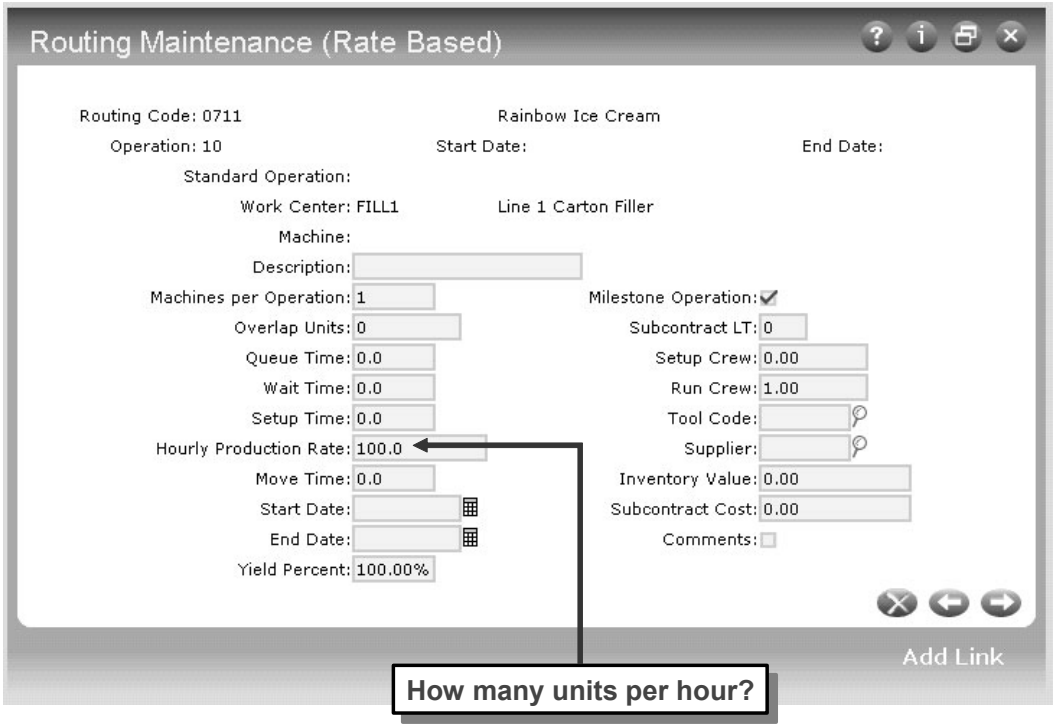
Standard Operation

- You can enter a standard operation here when you create the routing, but after that time the field is protected and you cannot modify it

Run Time

This is the time required to manufacture one unit. Routing Maintenance (Rate Based) requests how many units can be produced per hour.

Routing Maintenance (Rate Based)



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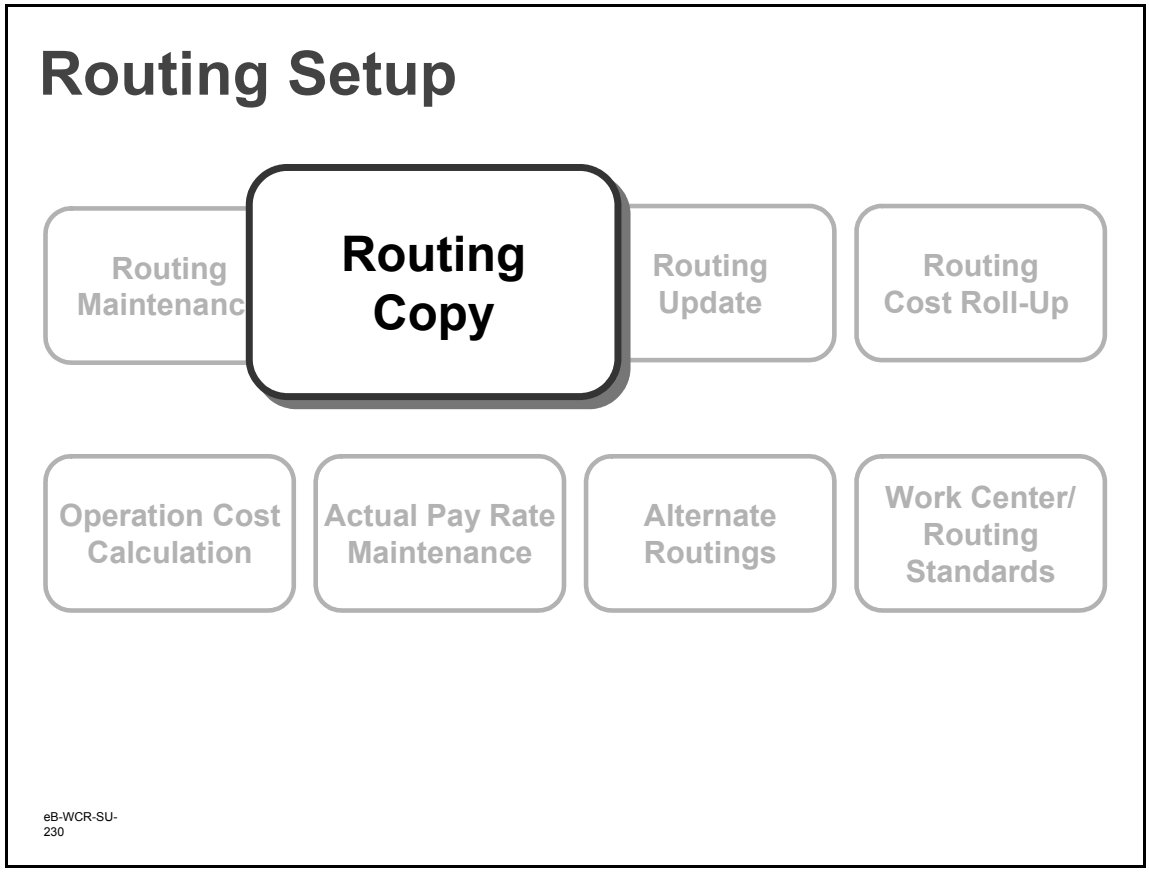
Routing Maintenance (Rate Based)

Use this program to create routings with run time expressed in units per hour.

- This is the only difference between the two programs

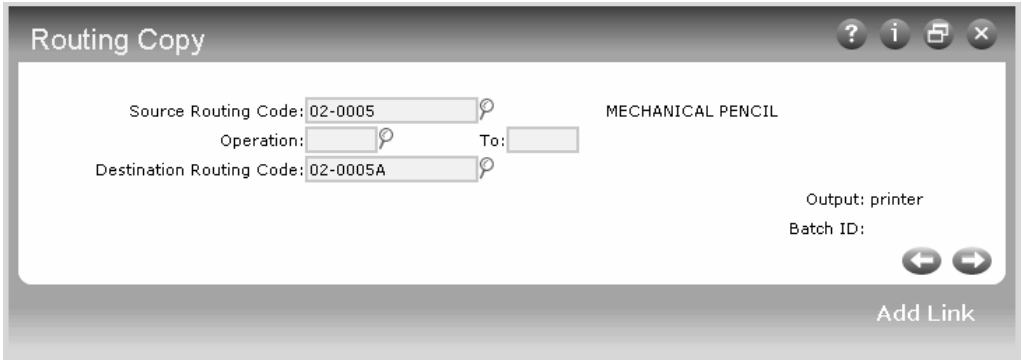


Routing Copy

With this program you can create a new routing by copying another one.

- This is useful when items share similar operations or when creating alternates

Routing Copy



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Routing Copy

Source Routing Code

The routing you wish to copy.

Operation / To

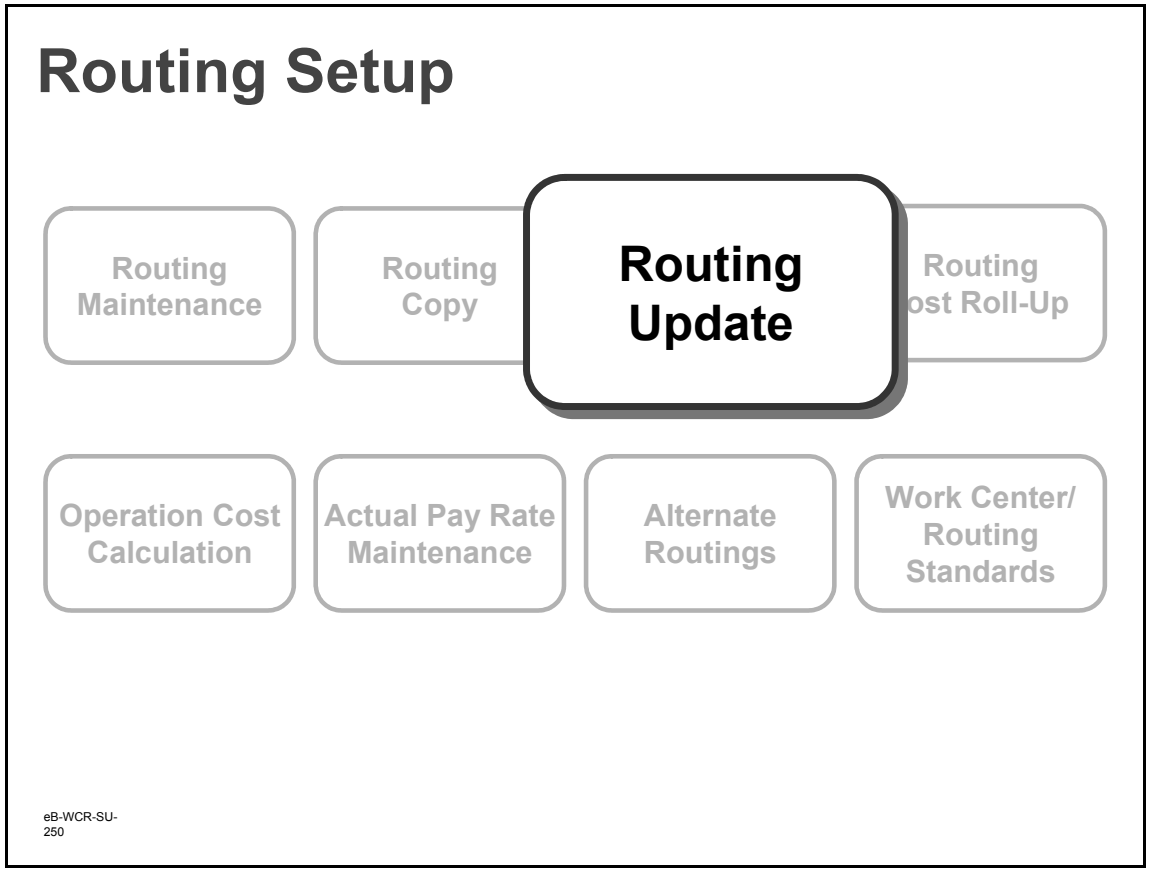
You can specify a range of operations or leave these fields blank to copy all operations.

Destination Routing Code

The routing or process code you are creating.

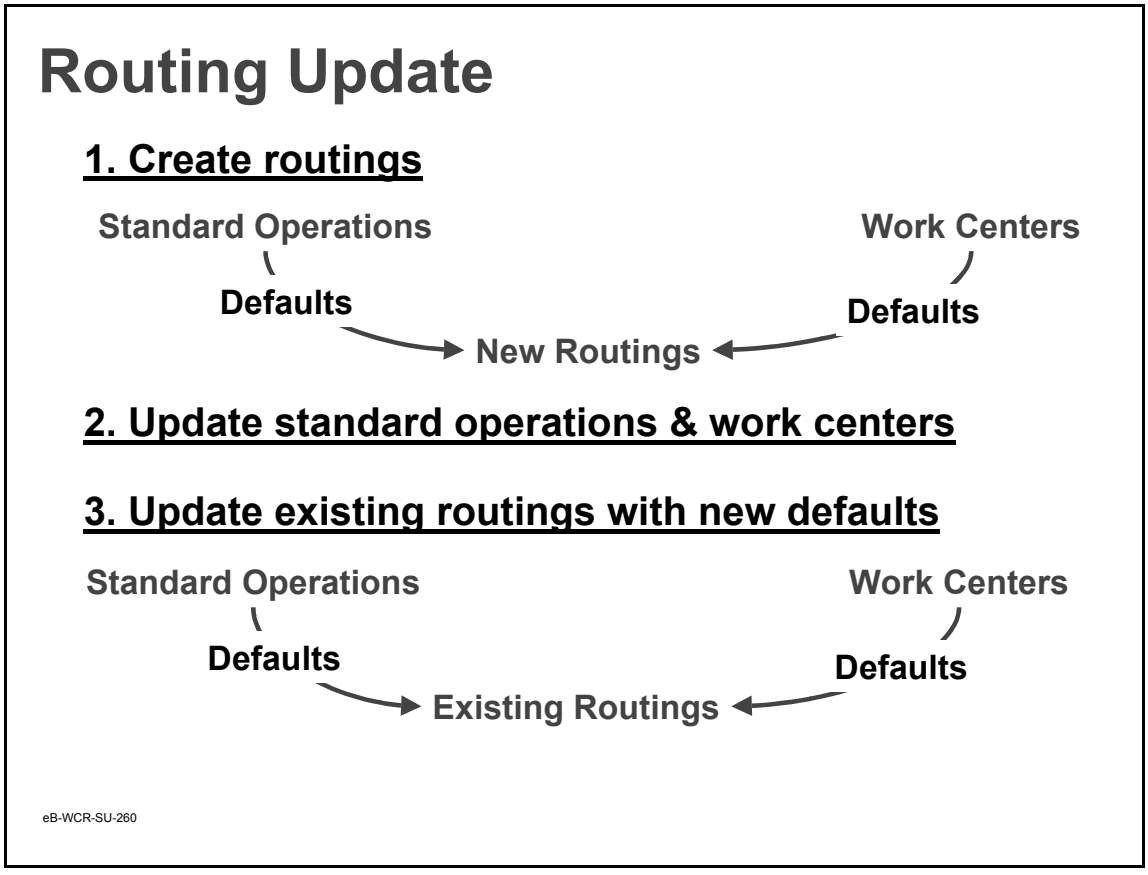
- The destination routing or process does not have to be a valid item number

Note This feature should be password-protected.



Routing Update

This update can help you maintain existing routings when standards change; it updates all or a range of routing and work center data.

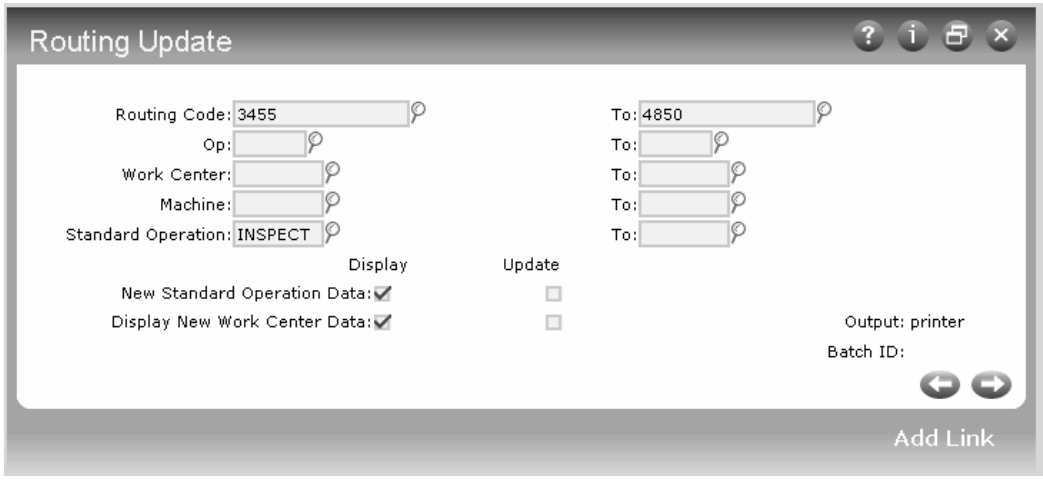


This program updates existing routings with any new default data from standard operations and work centers.

- Run it only if standard operations or work center standards change

Note This update overrides any changes made to routings that use the default information. This feature should be password-protected.

Routing Update



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Routing Update Criteria

Routing Code / Op / Work Center / Machine / Standard Operation

Use these selection criteria to limit the routings to update.

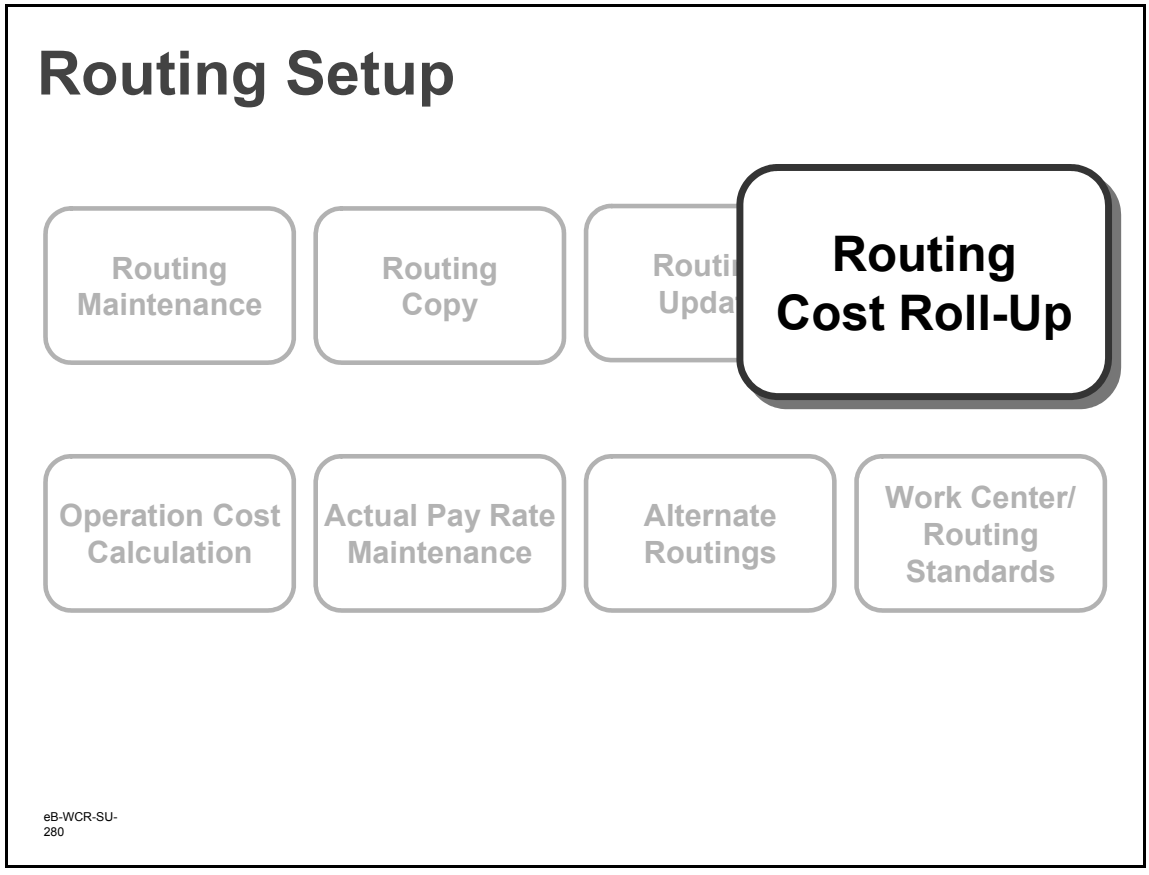
- The program produces a report
- By specifying No to update, you can produce a report without updating; use this to verify what you are doing, then update

Display / Update

New Standard Operation Data / New Work Center Data

Use these fields to control the function.

- The report produced by this function compares the operation information to the standards and prints an asterisk whenever they don't match
- Set Display to Yes to include the information on the report
- To review only, set Display = Yes and Update = No
  - After going over the report, you can set Update to Yes and rerun to make the changes take effect



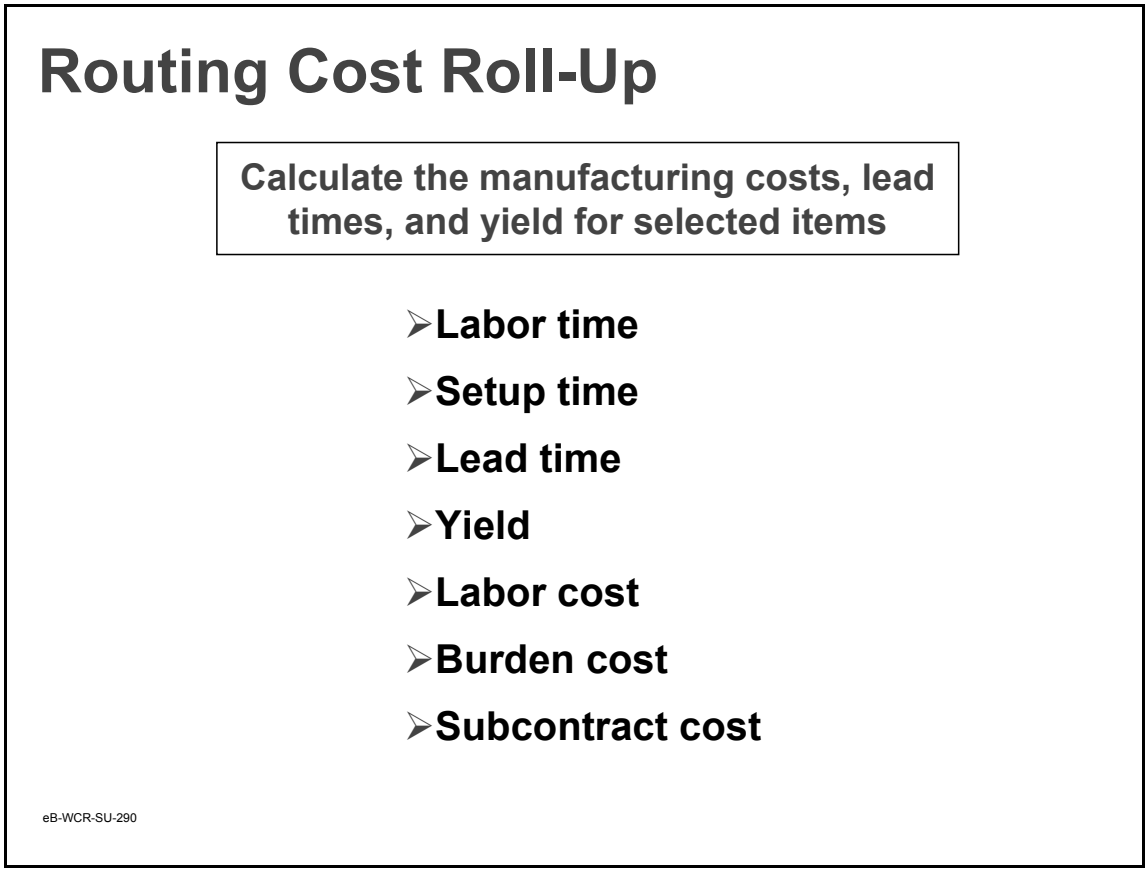
Routing Cost Roll-Up

Each routing or process describes the steps required to make this item, including where performed (Work Center), how long (Queue Time, Setup Time, Run Time, Wait Time, and Move Time), and the expected Yield% at each operation.

- Cost roll-ups use this information to calculate the manufacturing costs, lead times, and total yield for the item

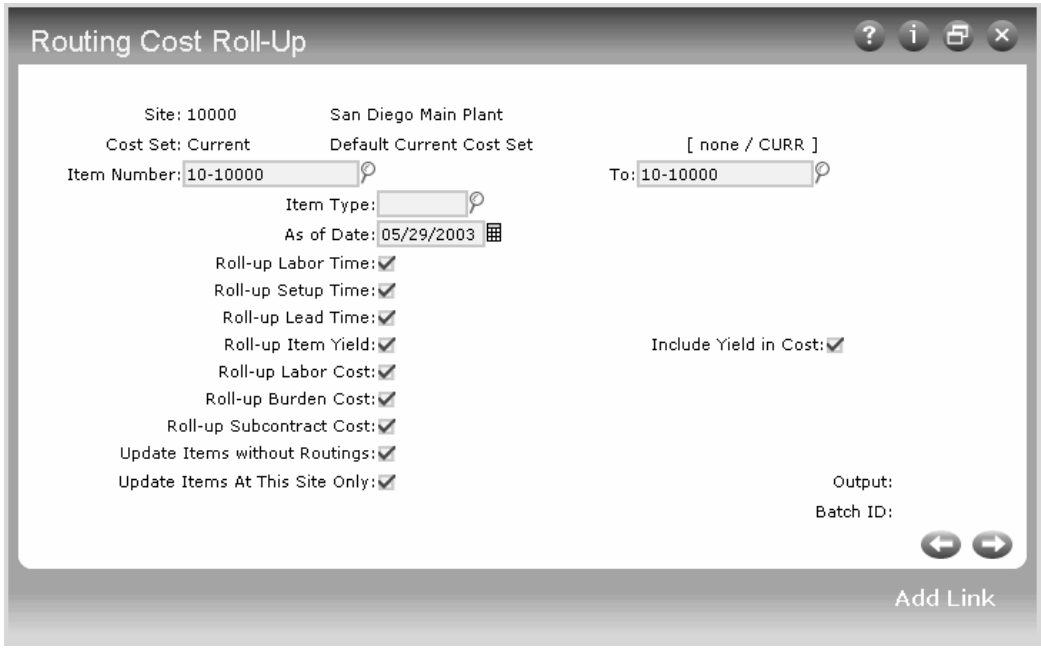
Note Normally this function uses the current or simulated cost set.

Discussed in the following Training Guide: MFG/PRO Product Costing and Cost Management



These are the elements used in calculating costs, yields, and lead times.

Routing Cost Roll-Up



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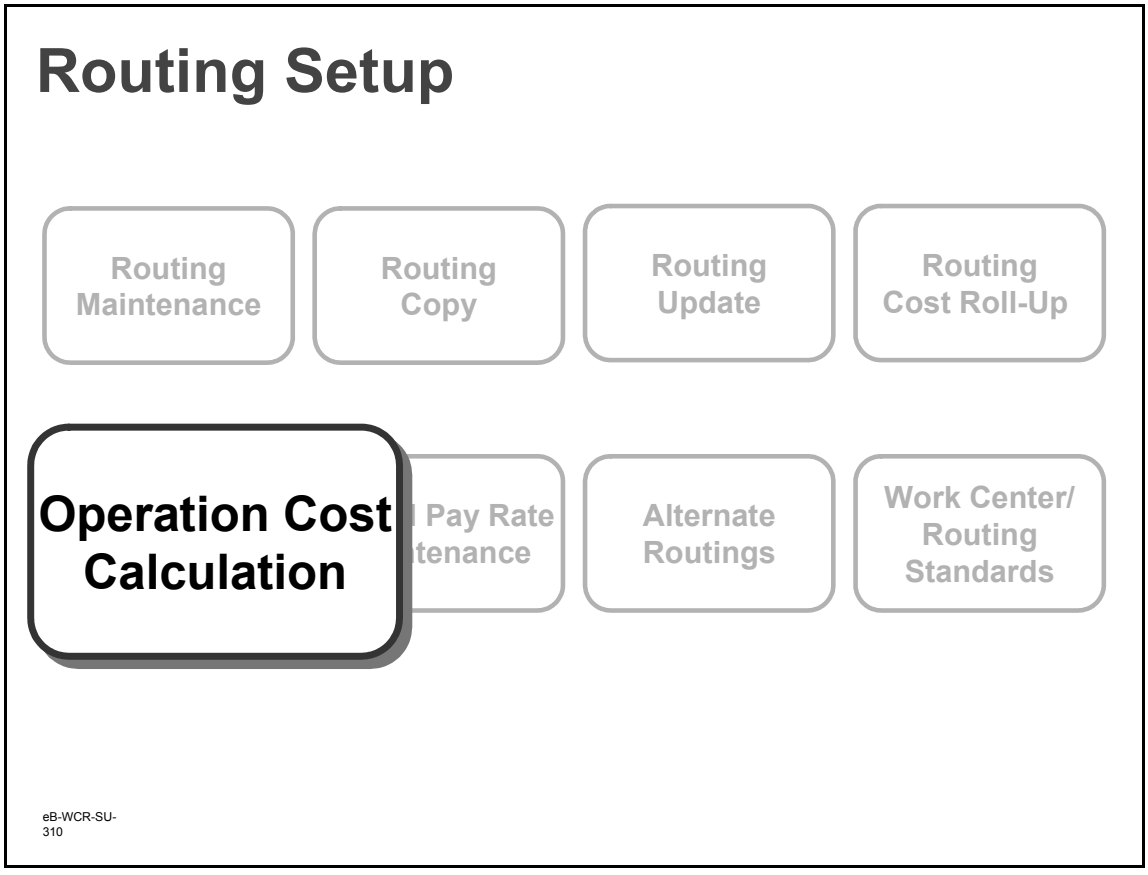
Routing Cost Roll-Up

This function calculates this-level costs. Be aware that this may take some time to process.

Note You should always run this function before Product Structure Cost Roll-Up when establishing standard costs.



Operation Cost Calculation

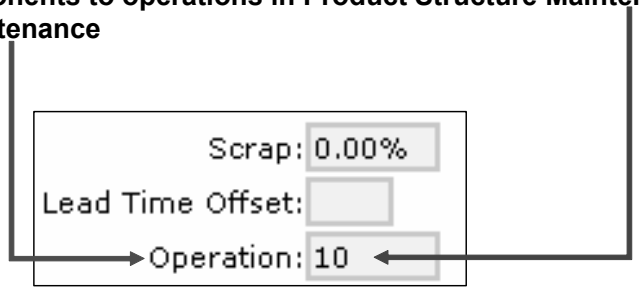
Operation Cost Calculation does a combined routing and product structure roll-up, creating a separate operation cost file broken down by cost categories–material, labor, burden, and subcontract–and totaled by operation and routing code.

- This calculation does not have a direct GL effect

Operation Cost Calculation

A combined routing and product structure roll-up, with a breakdown by cost categories (material, labor, burden, subcontract) and totaled by operation and routing code

Assign components to operations in Product Structure Maintenance or Formula Maintenance



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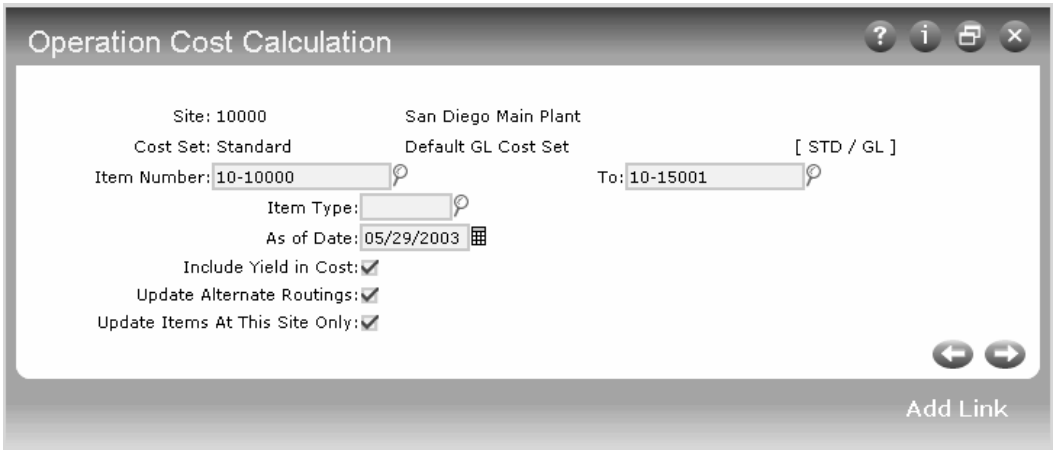
Operation Cost Calculation



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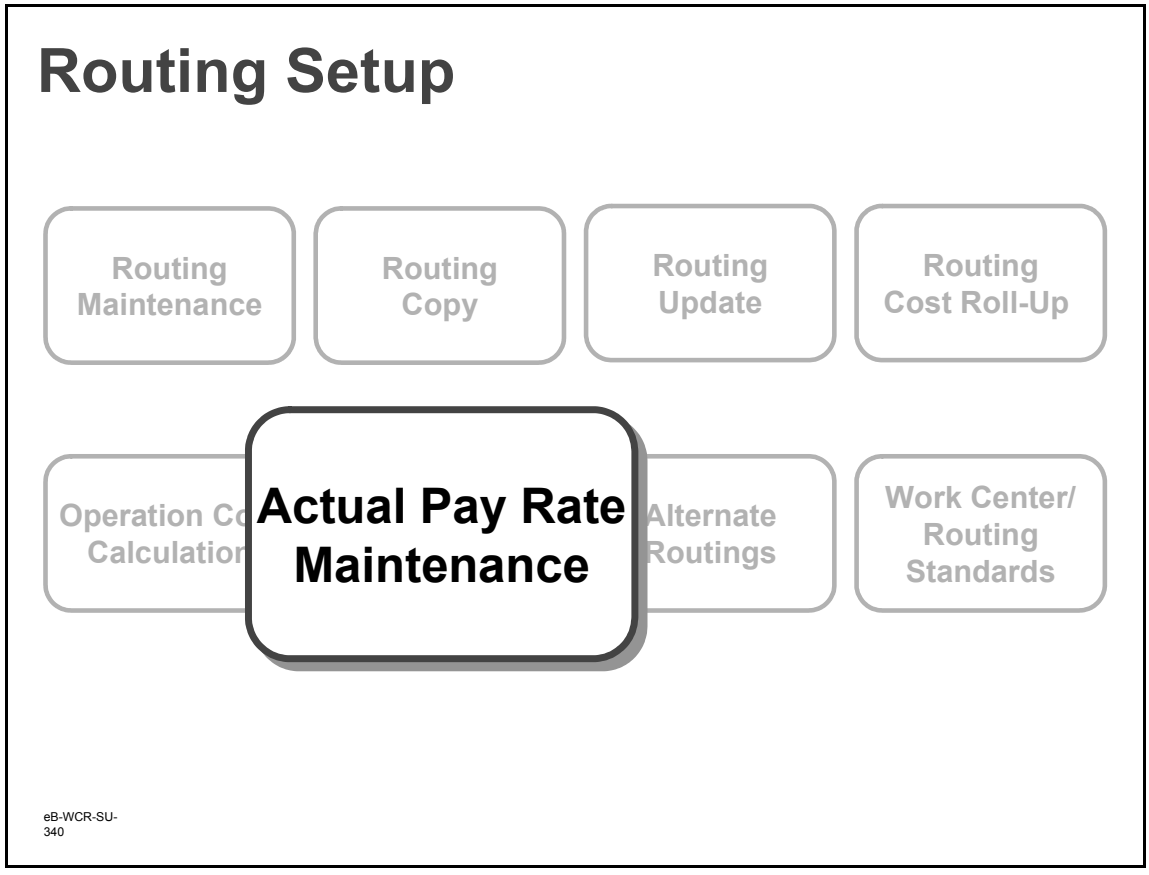
Operation Cost Calculation

- This calculation does not affect item costs
- Operation Cost Calculation relies on accurate item costs, routings and bills
- The resulting operation costs are used by:
  - Repetitive Scrap Transaction to value scrapped items
  - Repetitive WIP Cost Report to value WIP



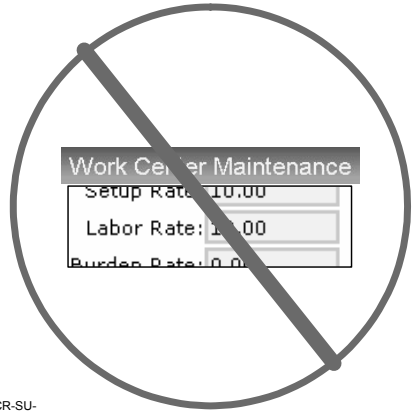
Actual Pay Rate Maintenance

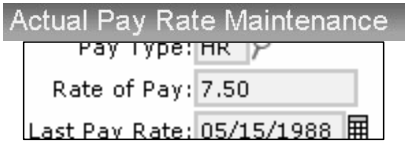
- You can, optionally, enter pay rates in this program for use in work cost calculations
- You can also use it to calculate labor rate variance

Actual Pay Rate Maintenance

Use this program to enter employee pay rates

This way, when you report labor against a work order or repetitive schedule, the program uses the employee's actual rate rather than the standard rate from the work center





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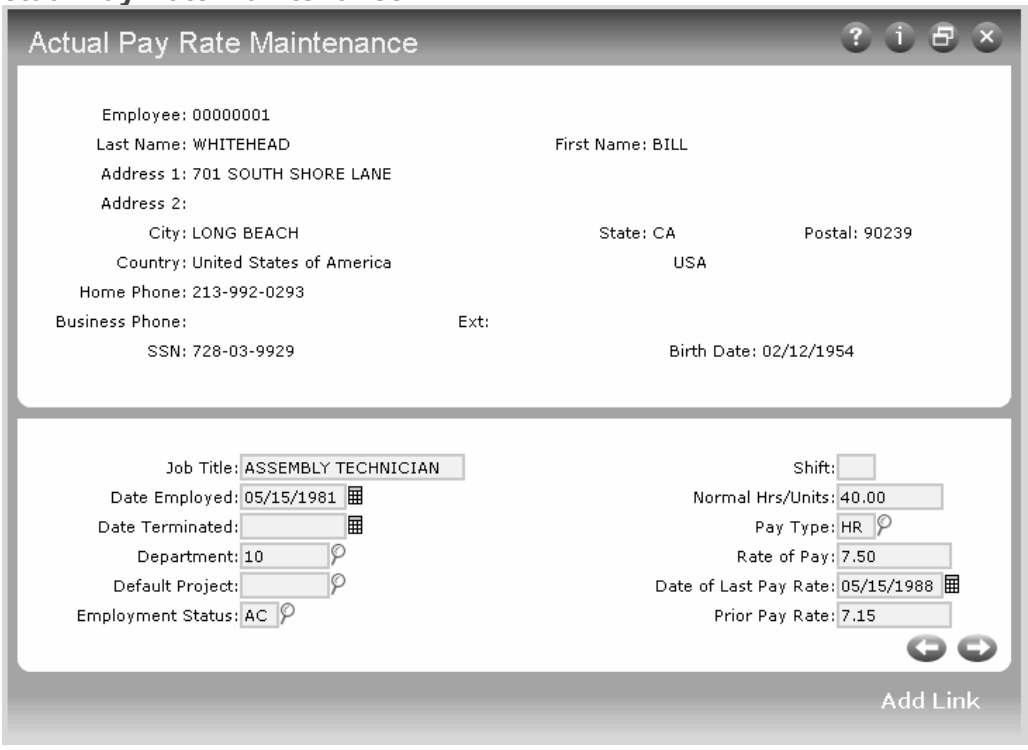
Actual Pay Rate Maintenance



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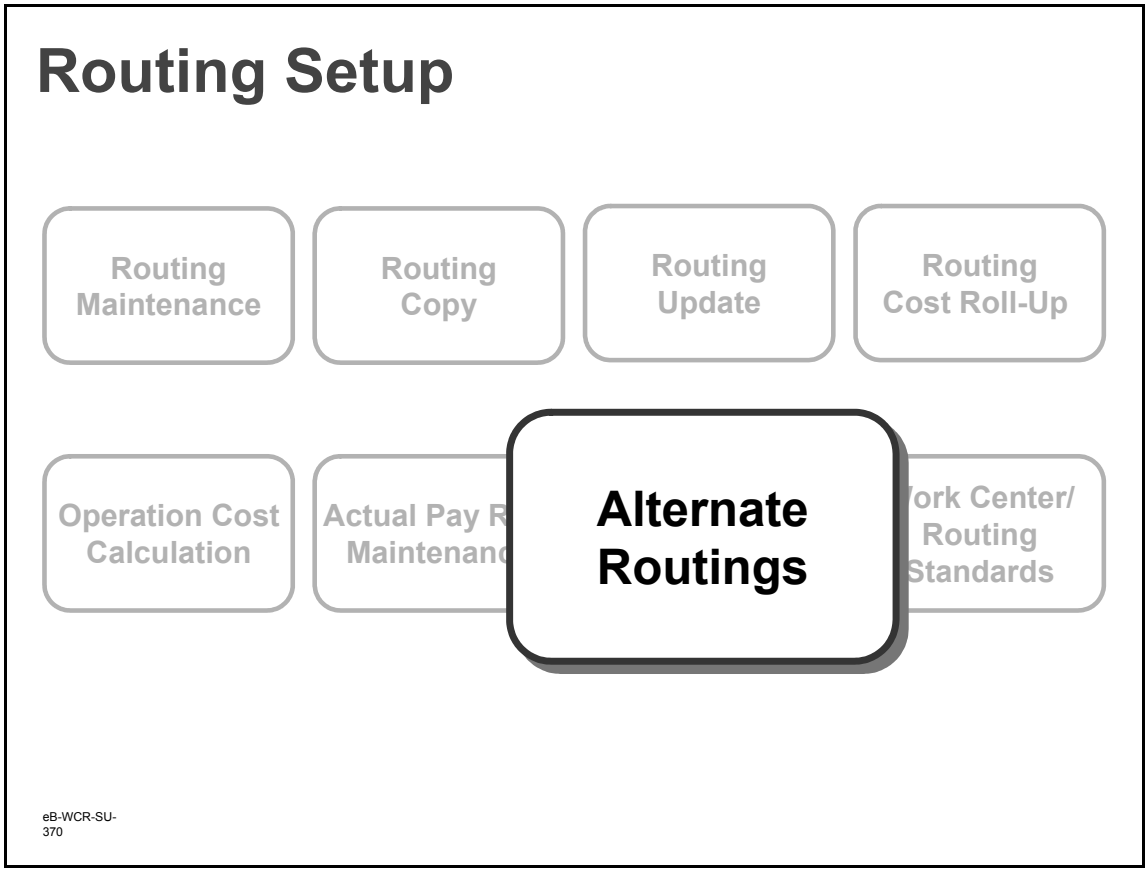
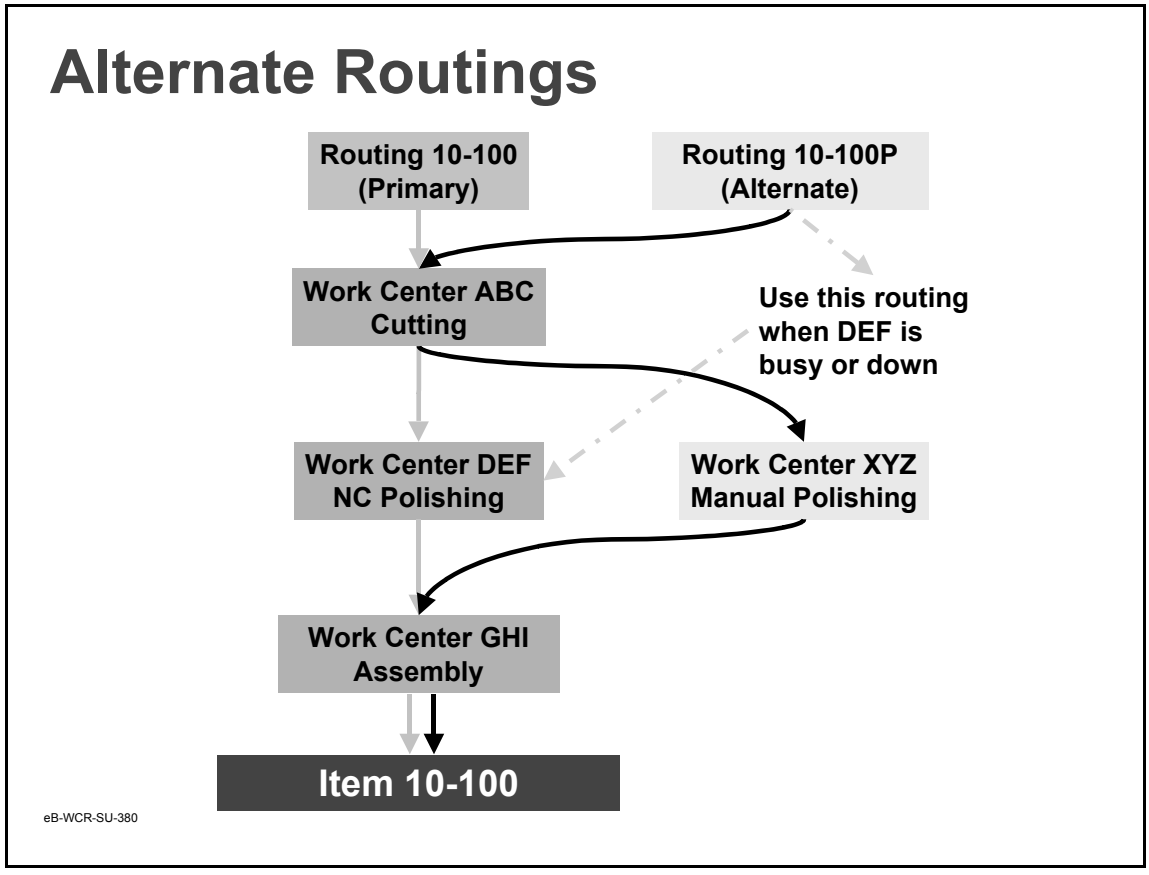
Actual Pay Rate Maintenance

The rates you enter here are used by labor reporting programs such as Labor Feedback by Work Order and Repetitive Labor Transaction to calculate variances.



Alternate Routings

One item can be made different ways, using different operations, work centers, machines, and perhaps different components. Each of these is called an alternate.



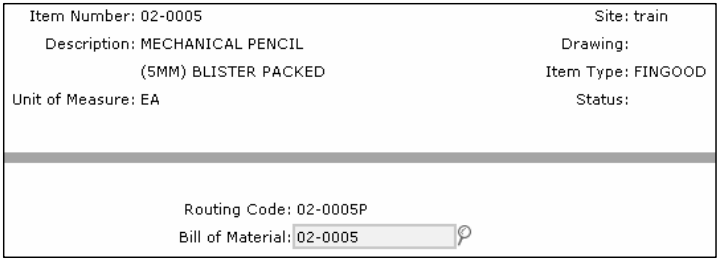
Typical uses of alternate routings are to back up production when a work center goes down or is too busy to handle the volume.

Alternate Routings

1 **Create the alternate in Routing Maintenance then...**

Routing 10-100P (Alternate)

2 **Assign items to it in Alternate Routing Maintenance**



3 **Use Work Order Maintenance or the Shop Floor Control module to assign the alternate to a specific work order**

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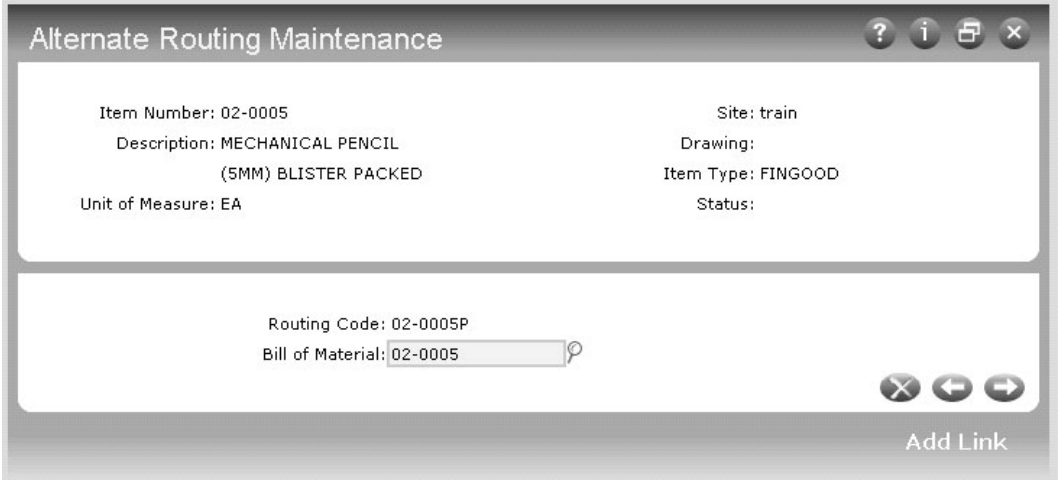
Alternate Routings: Procedure

Often, routings are named the same as the items they produce.

Alternate routings have a name that does not match any item. You assign items to the routing in Alternate Routing Maintenance, then actually use them in Work Order Maintenance or Shop Floor Control to override the item's usual routing with the alternate.

Discussed in the following Training Guide: Shop Floor Control

Alternate Routing Maintenance



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Alternate Routing Maintenance

In this function, you assign items to the alternate routings created in Routing Maintenanceor Process Definition Maintenance.

- MRP and manufacturing orders always use the standard Routing Code and BOM/Formula associated with the item in Item Planning Maintenance or Item-Site Planning Maintenance as do the costing functions
  - You can manually override the Routing Code and BOM/Formula on any work order to specify the use of any approved alternate
  - If an alternate routing is chosen, the appropriate product structure or process is automatically attached

Item Number

The item number this alternate routing or process relates to.

- The item code may not be a base process (an item with a Co-Product/By-Product structure)

Site

The site that uses this alternate routing or process.

- The same alternates may be associated with more than one site

Routing Code

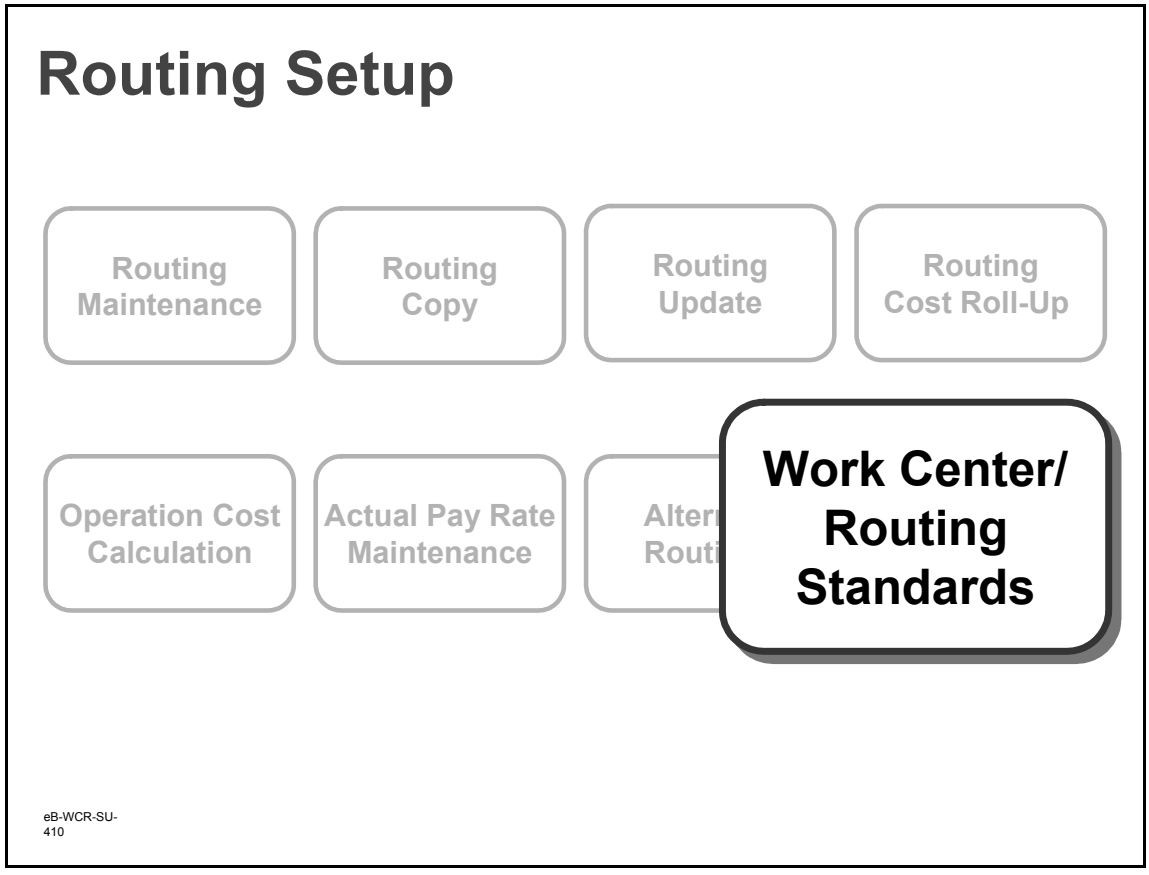
A code identifying the routing or process which may be used as an alternate method for producing this item/product.

- Only predefined alternate routings or processes may be referenced on manufacturing orders for this item at this site

Bill of Material

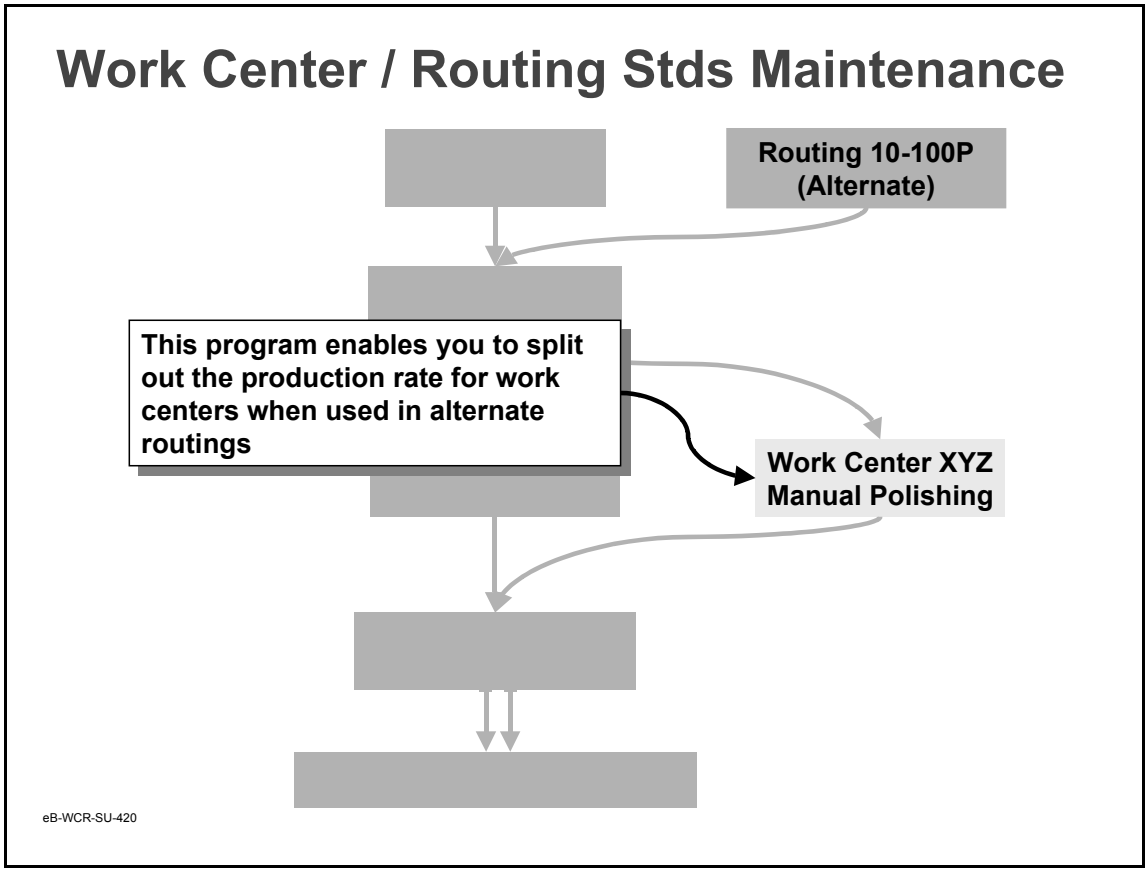
A code identifying the product structure or formula (bill of material) which is used when this alternate routing is used to produce this product.

- When this alternate routing is selected for use on a manufacturing order, the system automatically selects this alternate bill
- If this field is left blank, the default is the standard bill associated with the item



Work Center/Routing Standards

- Routings and process definitions identify the work center where each operation is normally performed, but the work can be done at several work centers
  - Work Center/Routing Stds Maint enables you to establish different production rates for the various alternates and items manufactured in them
  - This cross reference is used for repetitive module efficiency reports only



Work Center/Routings Stds Maint

eB-WCR-SU-430

Work Center/Routing Stds Maint

Standard rates can be reviewed when determining which Work Center to use. Later, after production reporting, efficiency reports use the Std Prod Rate defined for the Work Center where the work was actually done rather than the standard rate for the Work Center identified on the routing.

- Standard production rates are used only in Repetitive 18, not Shop Floor Control 17

Work Center / Machine

The alternate work center and machine for this routing code and operation.

- The work center code and the machine code together identify a work center – a basic production unit used in manufacturing planning and control

- Work centers identify individual machines, groups of similar machines, or subcontract suppliers

Routing Code

The routing code this standard run rate applies to.

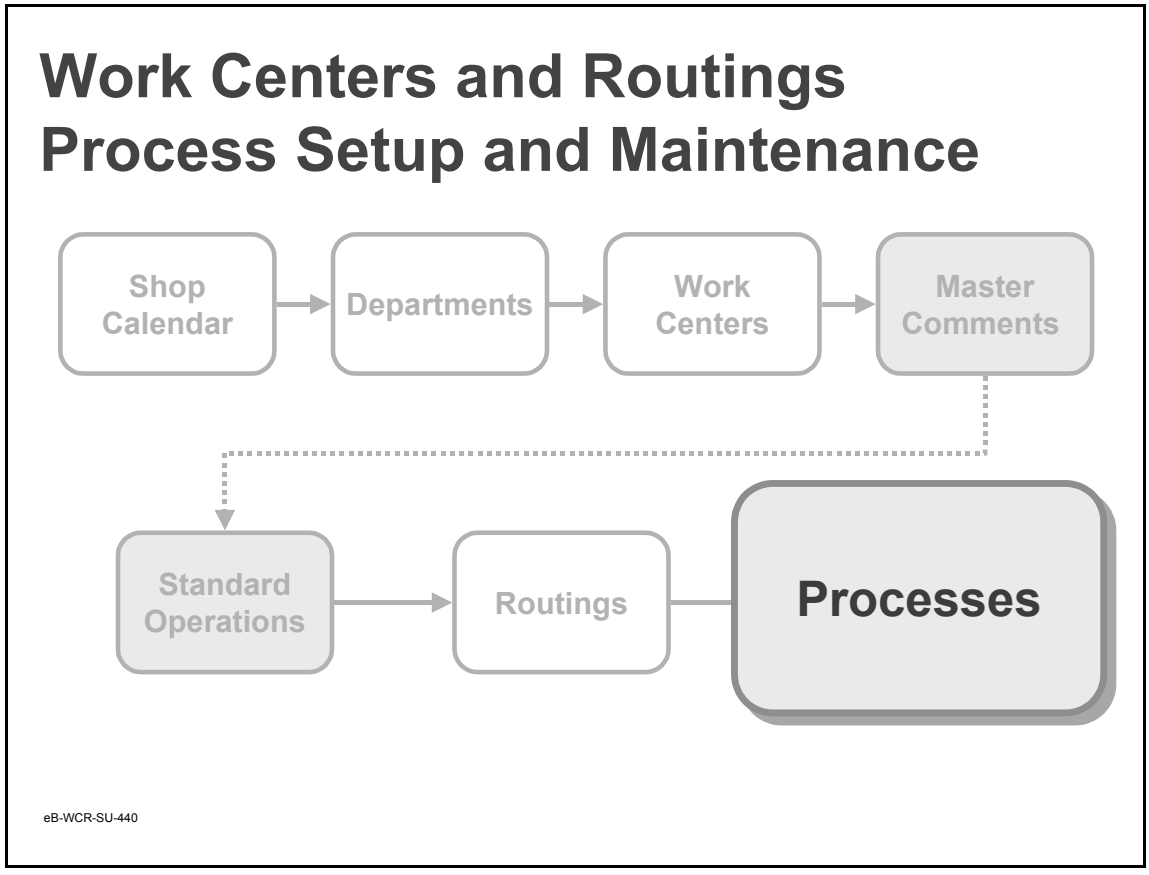
Op

The operation number this standard run rate applies to. Each operation step is uniquely identified by a routing code and operation number.

Std Prod Rate

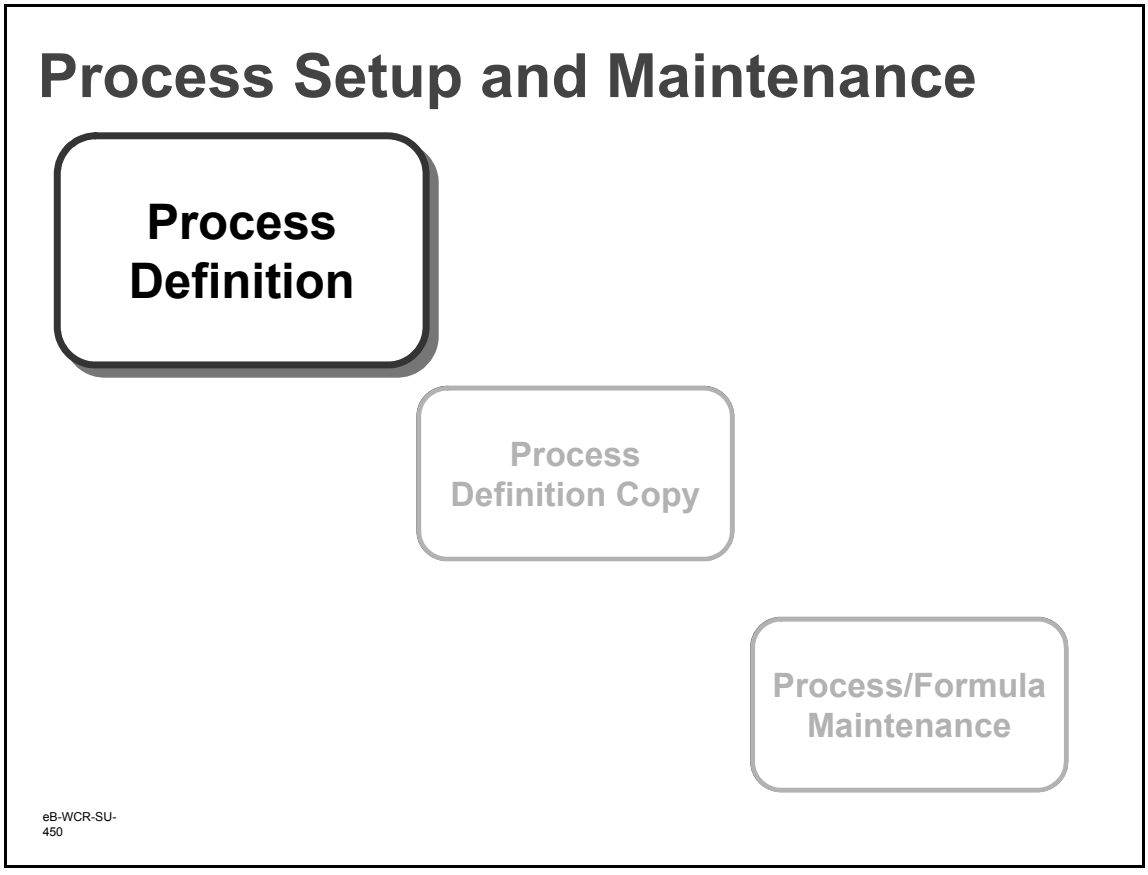
The standard production rate for this routing operation when it is processed on this work center and machine.

- Production rate is expressed as the number of units per hour that can be processed (excluding setup time)
  - The unit is the item/product unit of measure



Processes

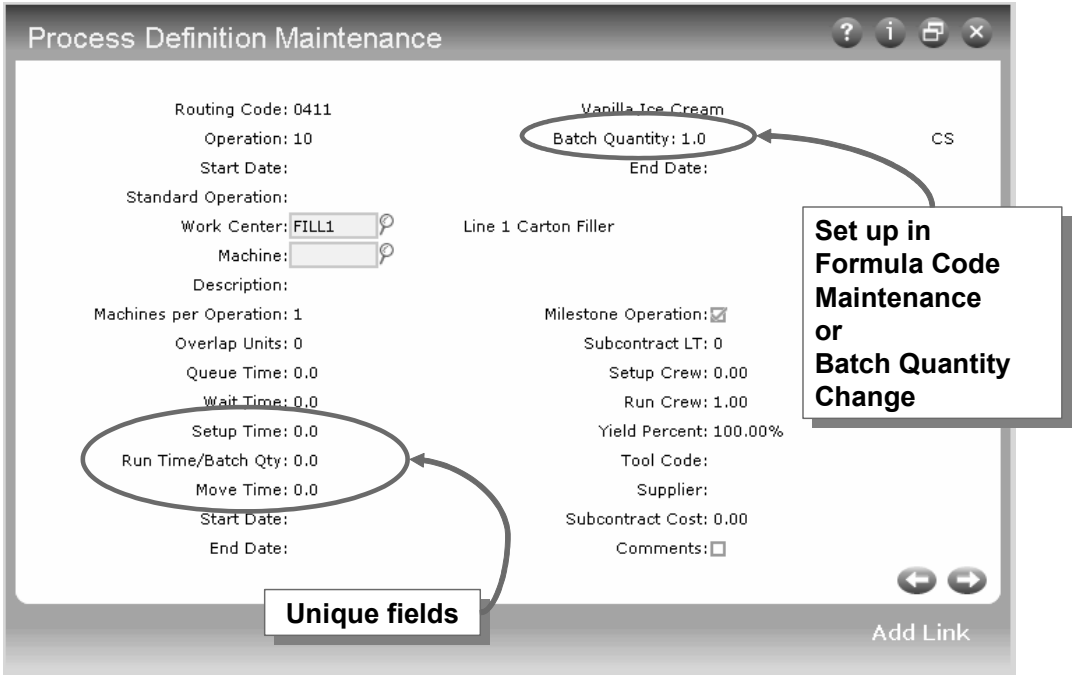
- A process is, like a routing, a systematic sequence of steps producing a specified result
- Processes add value by mixing, separating, forming, and/or using chemical reactions; they may be done in either batch or continuous mode



Process Definition

You set up processes as you do routings.

Process Definition Maintenance



eB-WCR-SU-460

Process Definition Maintenance

The fields in this screen correspond to those in Routing Maintenance.

Run Time/Batch Qty

The time it normally takes to process one batch at this operation.

- Run time is stated in decimal hours
- Run times are used to calculate item/product cost and lead time, and by planning to schedule operations
- Process operation run times are always entered in terms of the batch quantity for the item/product

  - Make sure you set this first using Batch Quantity Change because the system uses this to calculate the run time per unit and stores this value along with the batch quantity
- When the Batch Quantity Change function is run, runtime per batch is automatically recalculated based on the new batch quantity and the new batch quantity is recorded
- Before setting up the process, you can use Formula Code Maintenance to define batch quantity, but afterwards, you must use Batch Quantity Change

Setup Time

- The standard time, in decimal hours, it takes to prepare this work center to carry out this operation, independent of quantity

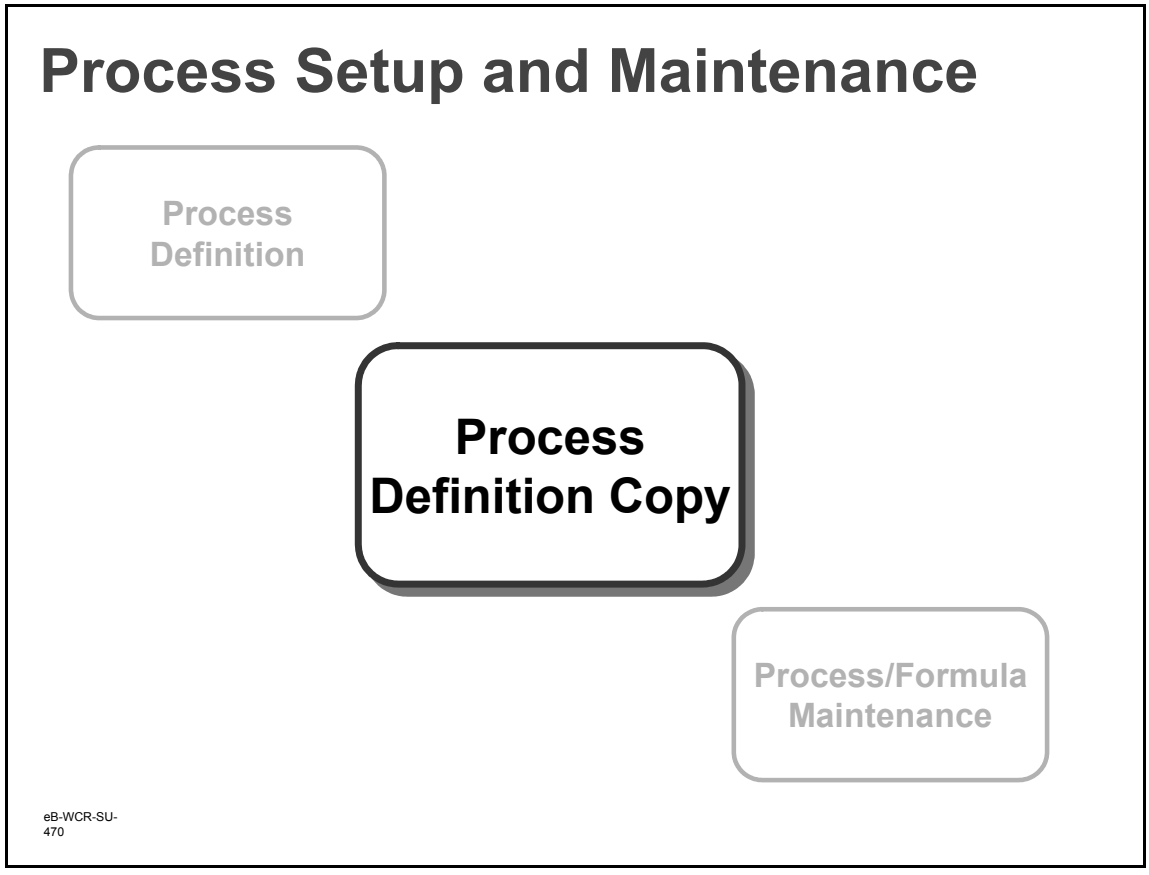
Run Time/Batch Quantity

- The time, in decimal hours, it normally takes to process one batch at this operation
- Run times are used to calculate item/product cost and lead time, and by planning to schedule operations

Note MFG/PRO treats setup time as fixed and run time as variable.

In process industries, the reverse may be true, as in heating a product to a specified temperature; the heating time can vary depending on quantity, but the dwell time remains the same.

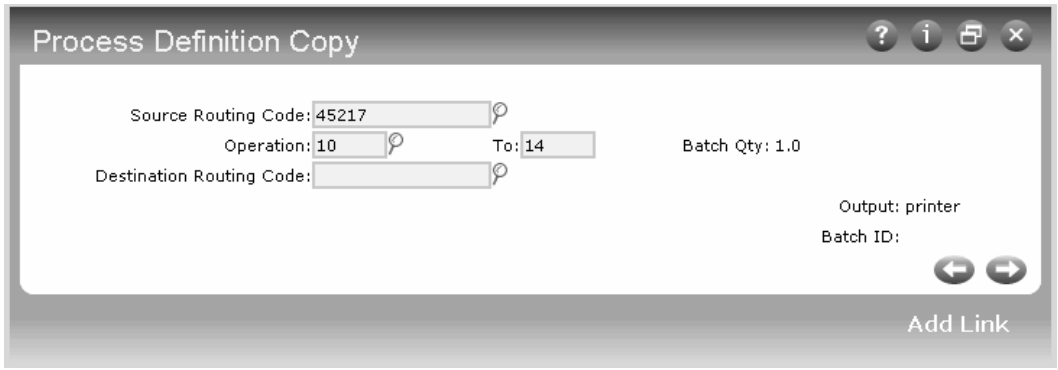
In this case, you can create one operation with a setup time of zero and the run time set to gallons times the time required for heating, and a second operation with setup time set to equal the dwell time, and run time set to zero.



Process Definition Copy

Process Definition Copy creates a new process definition by copying another one–useful when items share similar operations or when creating alternates.

Process Definition Copy



eB-WCR-SU-480

Process Definition Copy

Source Routing Code

The routing code from which operations are to be copied.

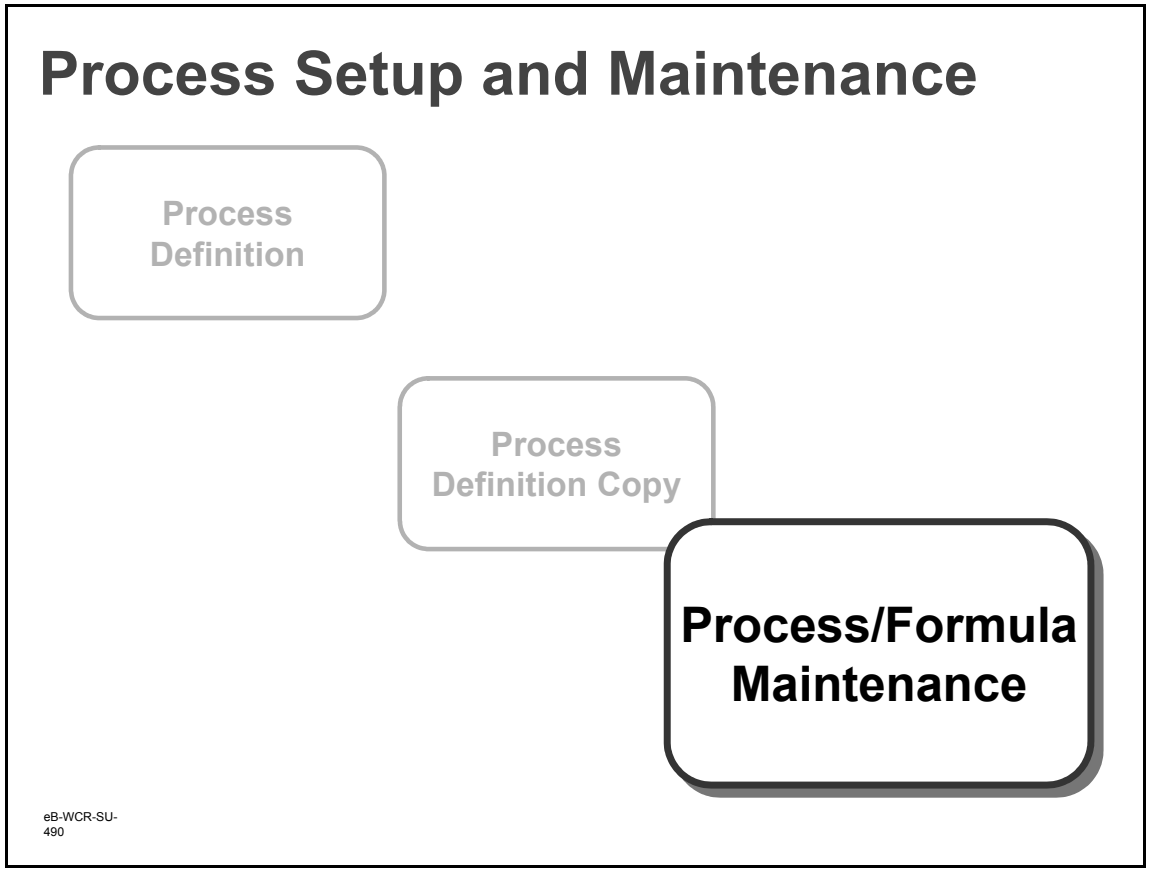
Operation / To

Select a range of operations to copy.

- Leaving these fields blank copies all operations

Destination Routing Code

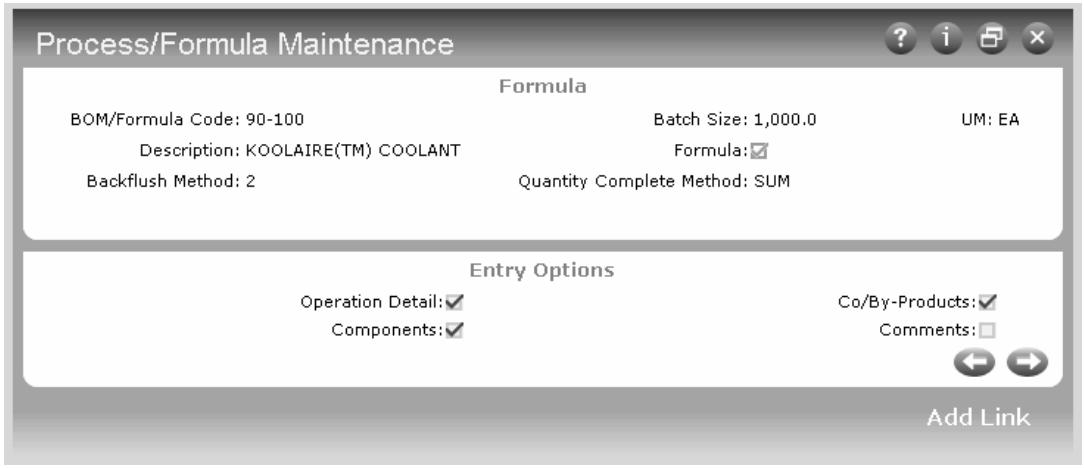
The routing code into which selected operations are copied.



Process/Formula Maintenance

Process/Formula Maintenance allows you to enter formula, batch, and process information by operation.

Process/Formula Maintenance: Screen 1 of 3 – Formula/BOM Code



eB-WCR-SU-500

Formula/BOM Code Screen

BOM/Formula Code / Description

Enter the code and description.

Formula

Indicates whether this is a formula or a product structure.

- Yes - This is a formula
  - Normally only BOM codes flagged as formulas are listed on Formula reports and inquiries
- No - This is a product structure, normally used in Product Structure functions or as a base process for Co-Products/By-Products

Backflush Method

Provides the calculation basis to backflush components of the base process based on the received quantities of the Co-Products/By-Products.

- Value can be 1 or 2
- Backflush Method 1: The backflush (base process) quantity is calculated from the receipt quantities processed for all of the Co-Products/By-Products

  This method calculates the backflush quantity based on the following:

  – Quantities received for each of the Co-Products/By-Products

  – Unit-of-measure conversion factors to convert Co-Product/By-Product quantities into base process units

  Use method 1 when the quantity for a batch is directly related to the sum of its output

  For example, for a process that sorts fruit into different sizes and grades, the batch quantity can be calculated from the total amount of fruit processed for all sizes and grades

  This method is generally appropriate when there is greater variability in the output percentages for the various products
- Backflush Method 2: The default backflush quantity is the order quantity for the base process work order

  You can change the backflush quantity to reflect the actual quantity processed for a batch

  Use method 2 when the batch quantity is closely related to the expected output of a particular co-product

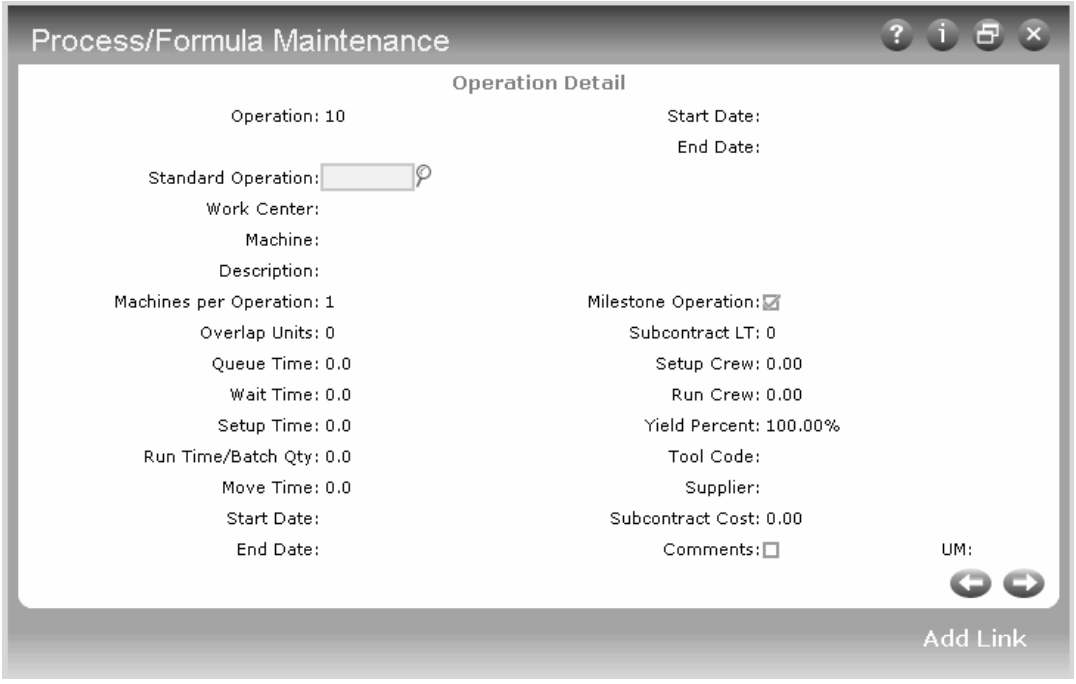
  – For example, for a process that makes ice cream, the batch quantity can be calculated from the amount of ice cream processed

    Any by-products, such as waste water, would not be necessary for the calculation of the batch quantity

Operation Detail / Components / Co/By Products / Comments

You determine which screens to display by entering *yes* or *no*.

Process/Formula Maintenance: Screen 2 of 3 – Operation Detail



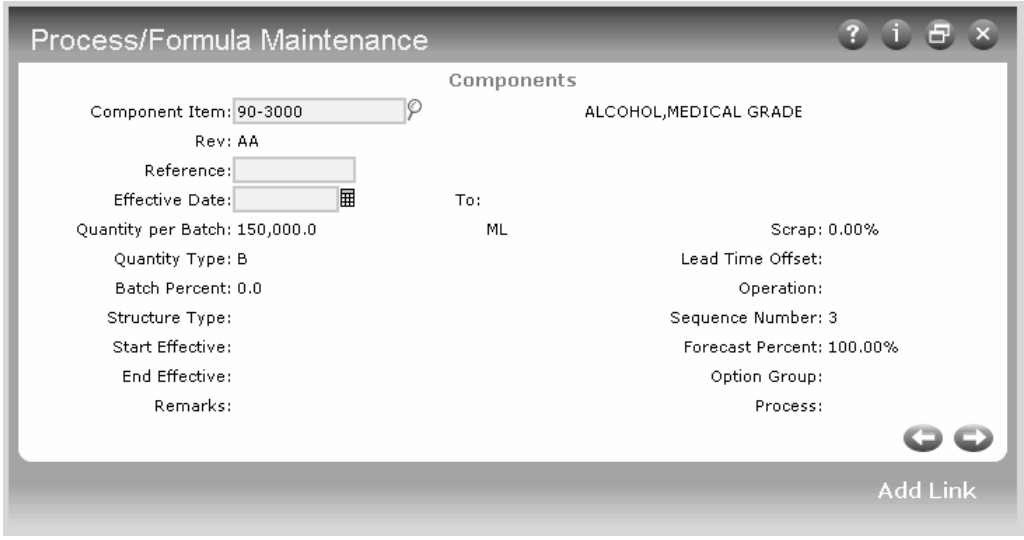
eB-WCR-SU-510

Operation Detail Screen

- The Process Operation Detail records information about the operations associated with the formula's process definition; it is the same as Process Definition Maintenance

See in this training guide: *Process Definition Maintenance* on page 97

Process/Formula Maintenance: Screen 3 of 3 – Components



eB-WCR-SU-520

Components Screen

- The Formula Components screen records information about the components used at each operation; it is the same as Formula Maintenance .

Discussed in the following Training Guide: Product Structures and Formulas

Setup and Maintenance Exercises

eB-WCR-SU-530

Important The data used in these exercises may not be the same as the data shown in the screen captures in this lesson.

Exercise: Routings and Work Centers

Description: In this exercise, you define work centers and routing steps for assembling pens.

1. Use Department Browse/Inquiry to review the departments. The pen assembly will be assigned to department 10.
2. Using Work Center Maintenance, create a work center for a new assembly area in the factory. Enter the following information:

Work Center:	1060
Machine:	<blank>
Description:	Pen Assembly Area
Department	10
Queue Time:	.5
Wait Time:	0
Mach/Op:	1
Setup Crew:	0
Run Crew:	1
Machines:	1
Mach Bdn Rate:	0
Setup Rate:	10.00
Labor Rate:	10.00
Lbr Bdn Rate:	0.00
Lbr Bdn%:	200

3 Most companies have core operations that vary little from product to product. For example, the same assembly operation is performed on all of Quality Pencil's pen products. You can set up a standard operation for pen assembly. Enter the standard operation data listed below:

Standard Operation:	1014
Description:	PEN ASSEMBLY
Work Center:	1060
Machine:	<blank>
Setup Time:	.5
Run Time:	.005

(Leave the other fields as they are.)

Use Standard Operation Maintenance

4 The pen routing has only one operation, assembly. Enter this step using the standard operation you defined. Use Routing Maintenance.

Routing Code:	04-0009
Operation:	10
Standard Operation:	1014

Notice that you don't have to enter any of the other information. All of the data fields were completed from the standard operation you referenced.

Comments can be used here to identify how the pen is actually assembled. Set the Comments field (at the bottom) to Yes, and press Go. Enter your comments (press Go to skip the header fields).

For example, you could enter:

> Insert the filled ink cartridge into the barrel, attach the clip end, and then put the cap on the end.

When you are done with comments, press Go, then End since no additional pages are needed.

5 Packaging pens uses exactly the same steps as packaging pencils. Use Routing Copy to copy the routing code from the pencil (02-0005) to the pen (02-0009). To copy all of the steps, leave the operation fields blank. Send output to your terminal.

6 Using Routing Browse/Inquiry, review the resulting operation for the packaged pen (02-0009).

Course Overview

- ✓ Introduction to work centers and routings
- ✓ Business considerations
- ✓ Set up the shop calendar, departments, work centers, comments, standard operations, routings, and processes in MFG/PRO
- ♦ Process subcontract operations in MFG/PRO

eB-WCR-SU-540

CHAPTER 4

Work Order Subcontract Processing

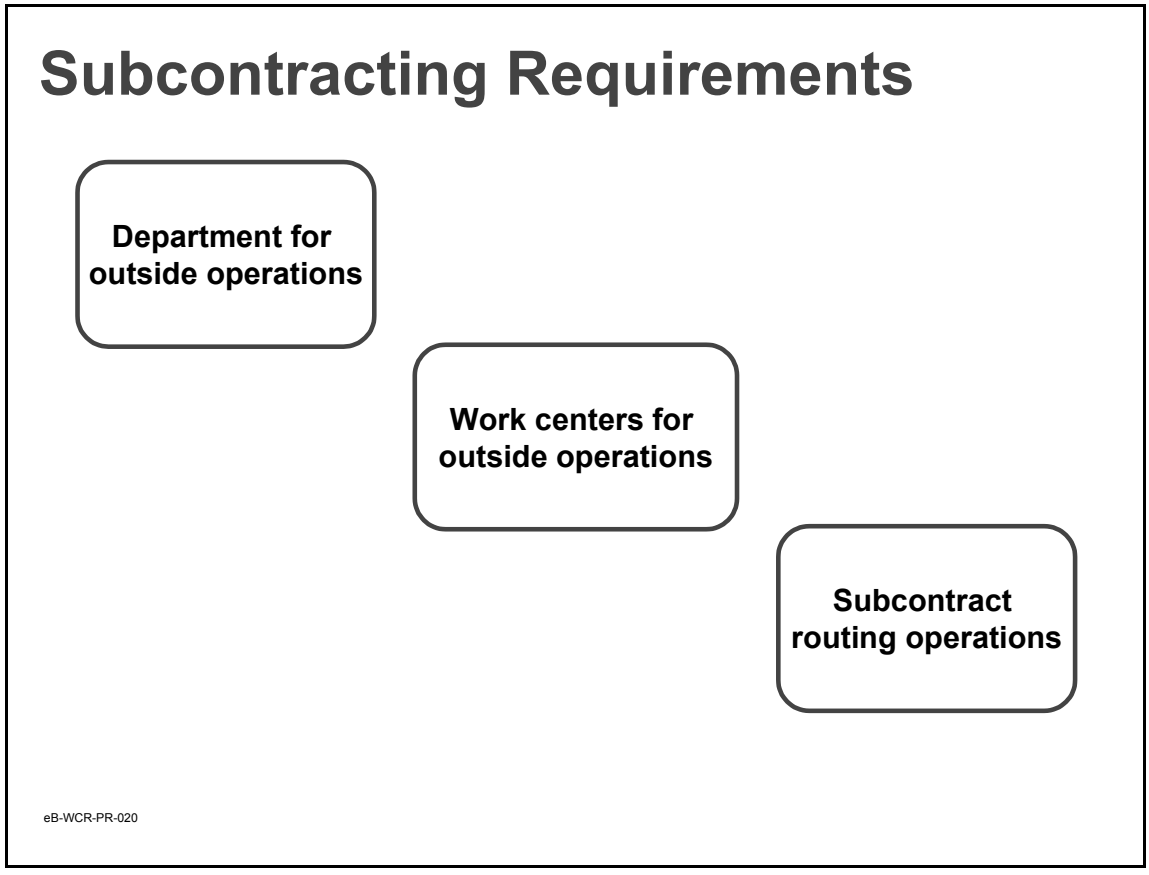
Process Subcontract Operations

In this section you learn how to:

- ✓ Identify some key business issues you need to consider before setting up work centers and routings in MFG/PRO
- ✓ Set up the shop calendar, departments, work centers, comments, standard operations, routings, and processes in MFG/PRO
- ✓ **Process subcontract operations in MFG/PRO**

eB-WCR-PR-010

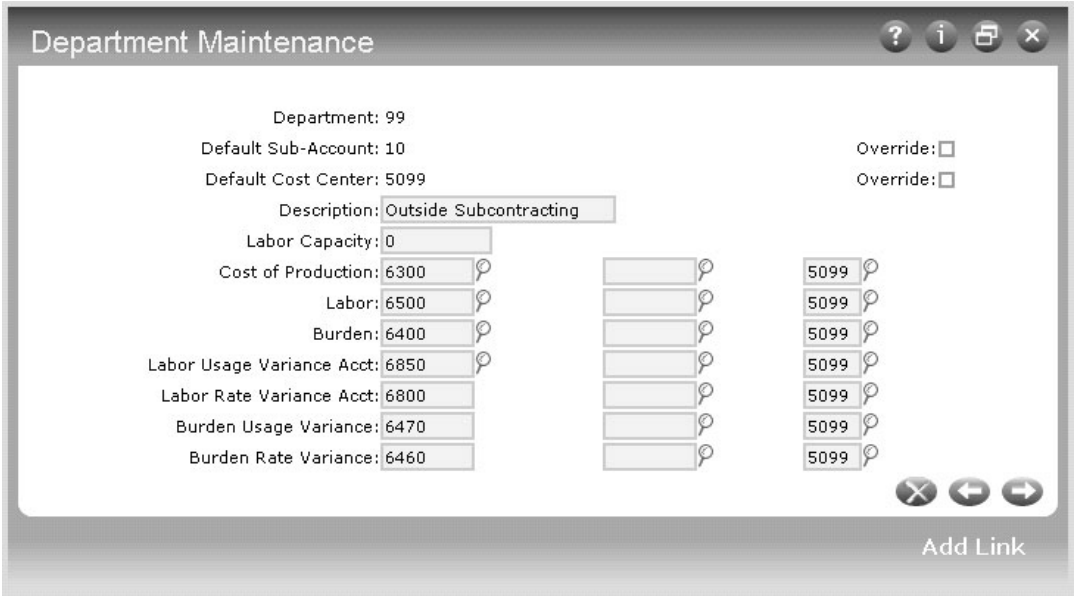
This lesson covers subcontract setup and processing with work orders.



Subcontracting Requirements – Department

- Subcontract processing requires work in both manufacturing and purchasing
- In this subsection, you look at the control information to enter in the manufacturing module

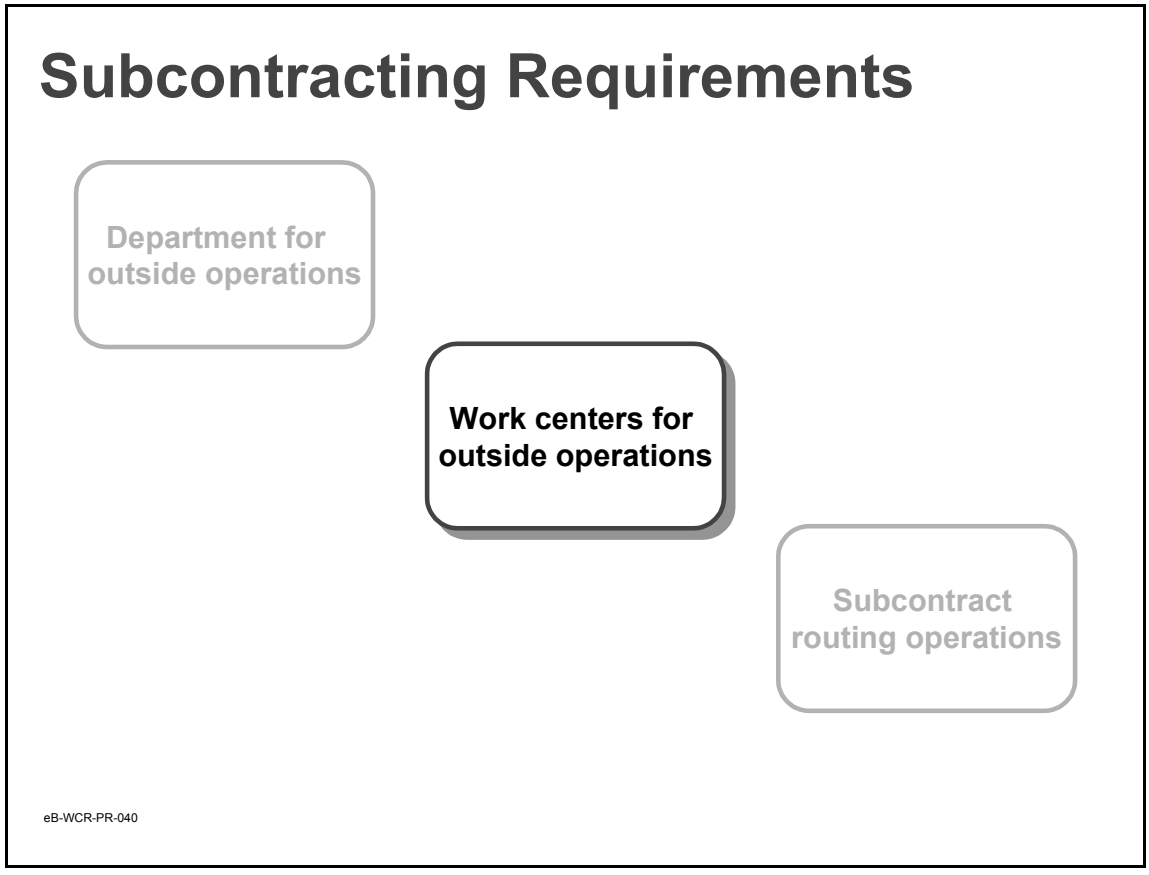
Department Maintenance: Subcontracting Requirements



eB-WCR-PR-030

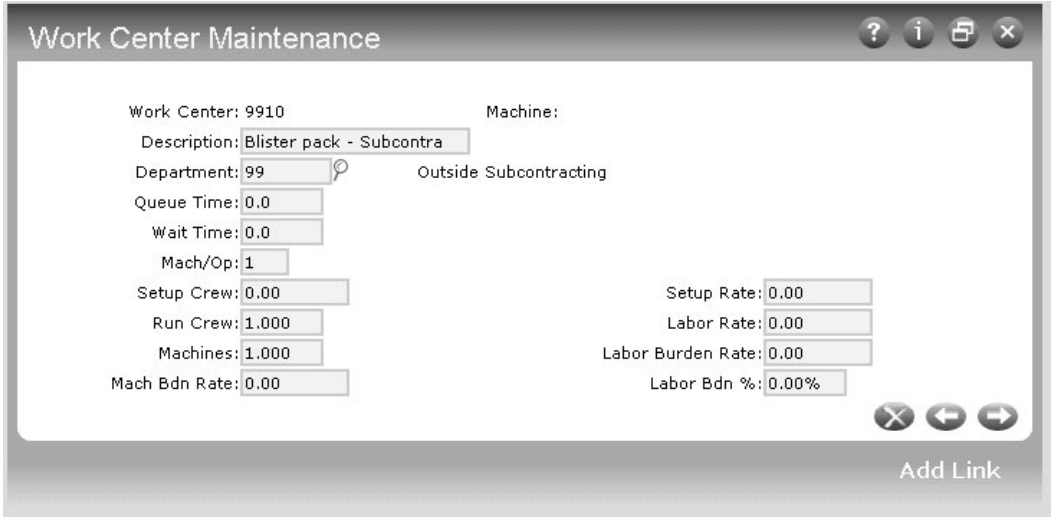
Department Maintenance

- You must create at least one department before entering any work centers or routings
  - You should set up a department to group subcontract work centers
  - This department record has no accounting effect



Subcontracting Requirements – Work Centers

Work Center Maintenance: Subcontracting Requirements

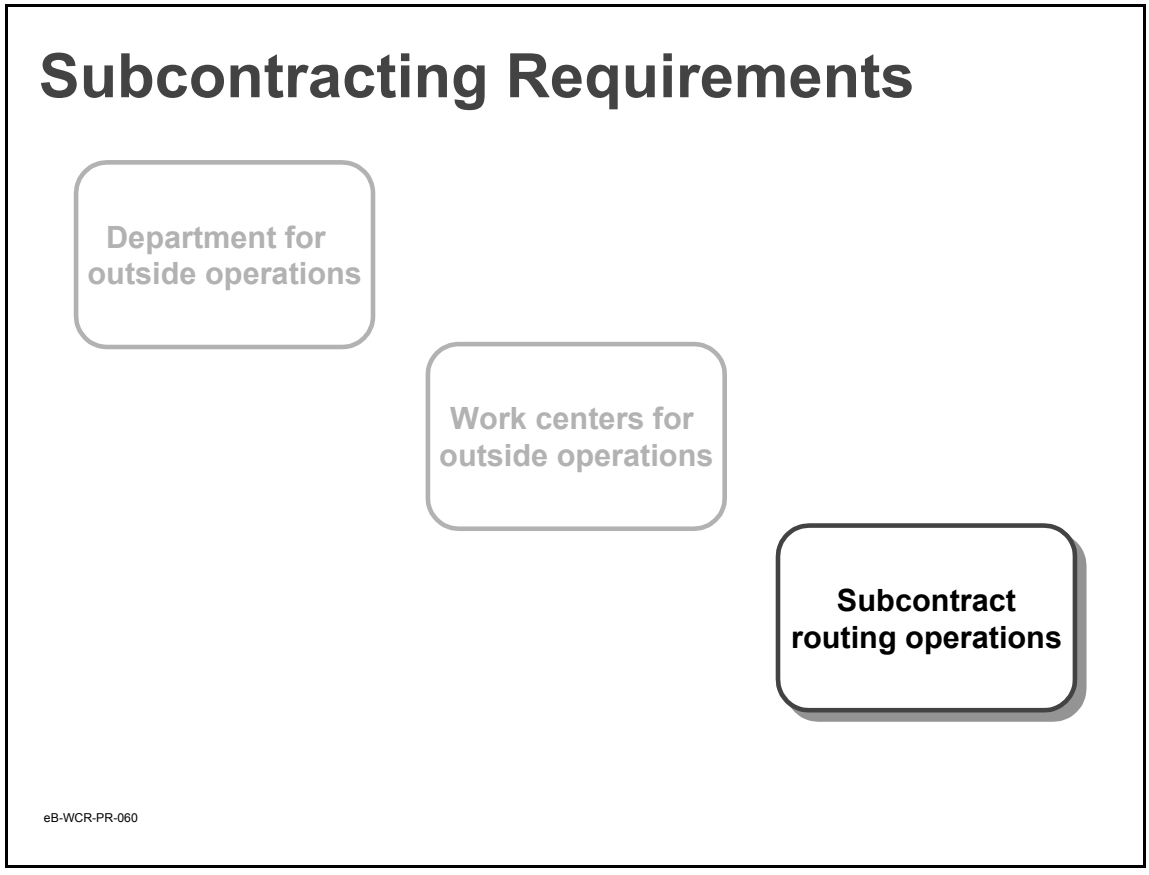


eB-WCR-PR-050

Work Center Maintenance

A work center is a production area with one or more people or machines having identical capabilities.

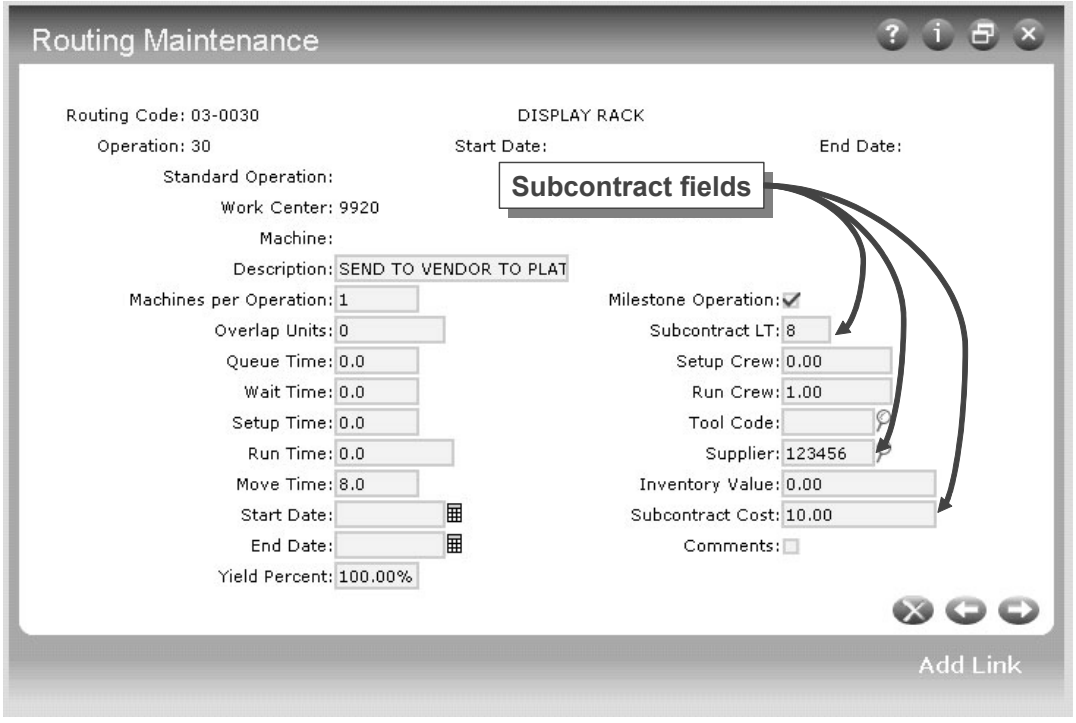
For subcontracting, set up a work center for each type of subcontract operation or supplier, leaving costs at zero.



Subcontracting Requirements – Routing

Certain fields in routing operations deal specifically with subcontract requirements.

Routing Maintenance: Subcontracting Requirements (1 of 2)



eB-WCR-PR-070

Routing Maintenance

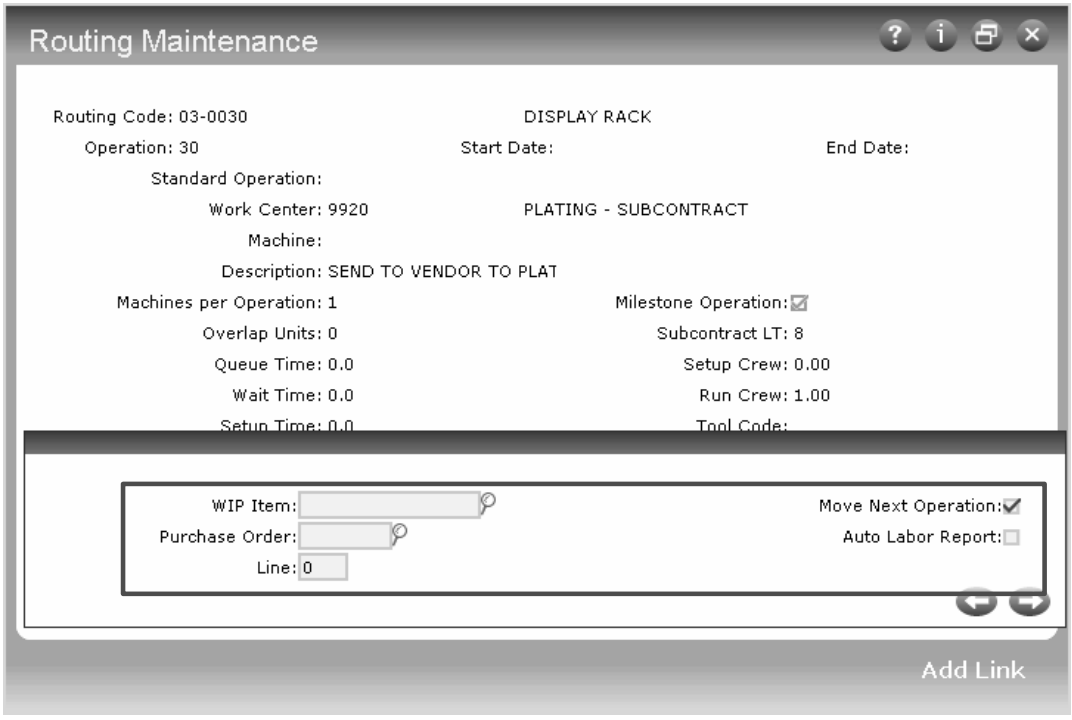
- Enter subcontract cost and lead time for subcontract operations
  - These values are the default when a routing or process operation is added which references this standard operation code
- Subcontract lead time is part of the calculation for the manufacturing lead time of an item (performed in Routing Cost Roll-Up), and influences scheduling for work order operations
- Subcontract cost is the average cost per unit normally charged by subcontractors to perform this operation
  - Cost calculations determine item costs using subcontract cost
- The Supplier field is informational only; you can enter a supplier code even if the operation is not normally subcontracted. This code appears on the work order routing document

You should enter either:

- Subcontract cost and lead time, or
- Setup, run, and move time

Warning If you enter both sets of data, cost and lead time are overstated and operation schedules are incorrect.

Routing Maintenance: Subcontracting Requirements (2 of 2)



eB-WCR-PR-

This second frame appears for entry of subcontracting information.

WIP Item

- An item number to represent Work-In-Process (WIP) material for subcontract shipments
- This gives you accountability and costing for items currently at the supplier's place of business
  - This must be a valid item number from the master file
- This field is used by Sub Shipper Print in Advanced Repetitive Subcontract processing
- The item number entered here is used to get a description and unit weight from Item Master Maintenance, used for printing in the subcontract shipper

Purchase Order

- The number of a scheduled purchase order used to purchase outside subcontract processing services

- Use this field for subcontract routing operations only
- This field is used by Schedule Update from MRP to accumulate operation demand data in order to generate supplier schedules for subcontract service suppliers
- You can use this for discrete work order processing as well as repetitive processing

Line

- The line number of the scheduled purchase order detail record which is used to purchase outside subcontract processing services

Move Next Op

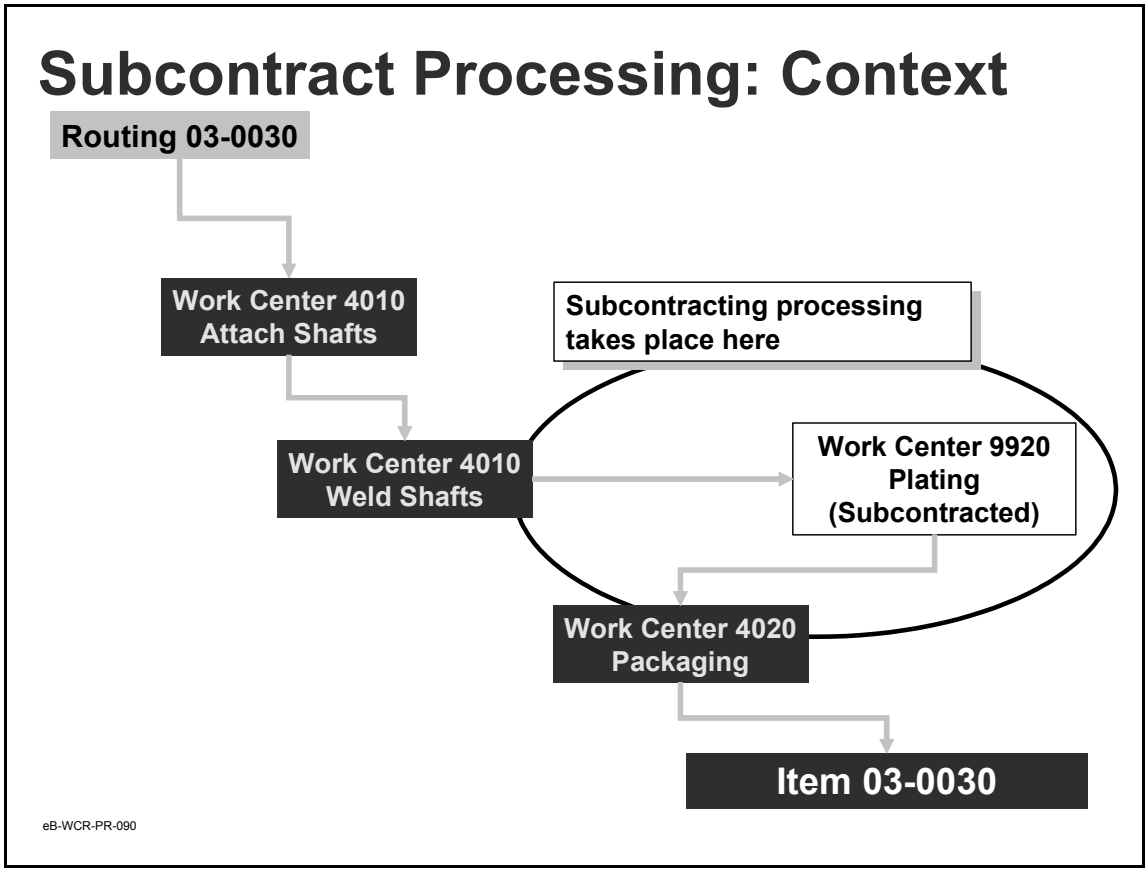
- This field is used as the default for the field of the same name in Advanced Repetitive in both Backflush Transaction and Move Transaction

Auto Labor Report

- Controls whether run labor reporting is generated automatically by Backflush Transaction
- If this field = Yes, the Backflush Transaction automatically reports the standard number of run hours for the Quantity Processed entered for this operation as well as any prior nonmilestone operations where this field is set to Yes
  - This is reported in addition to any labor hours entered in the transaction
- If this field = No, labor hours do not report automatically.

  In this case, you should report labor explicitly in either Backflush Transaction or Run Labor Transaction.

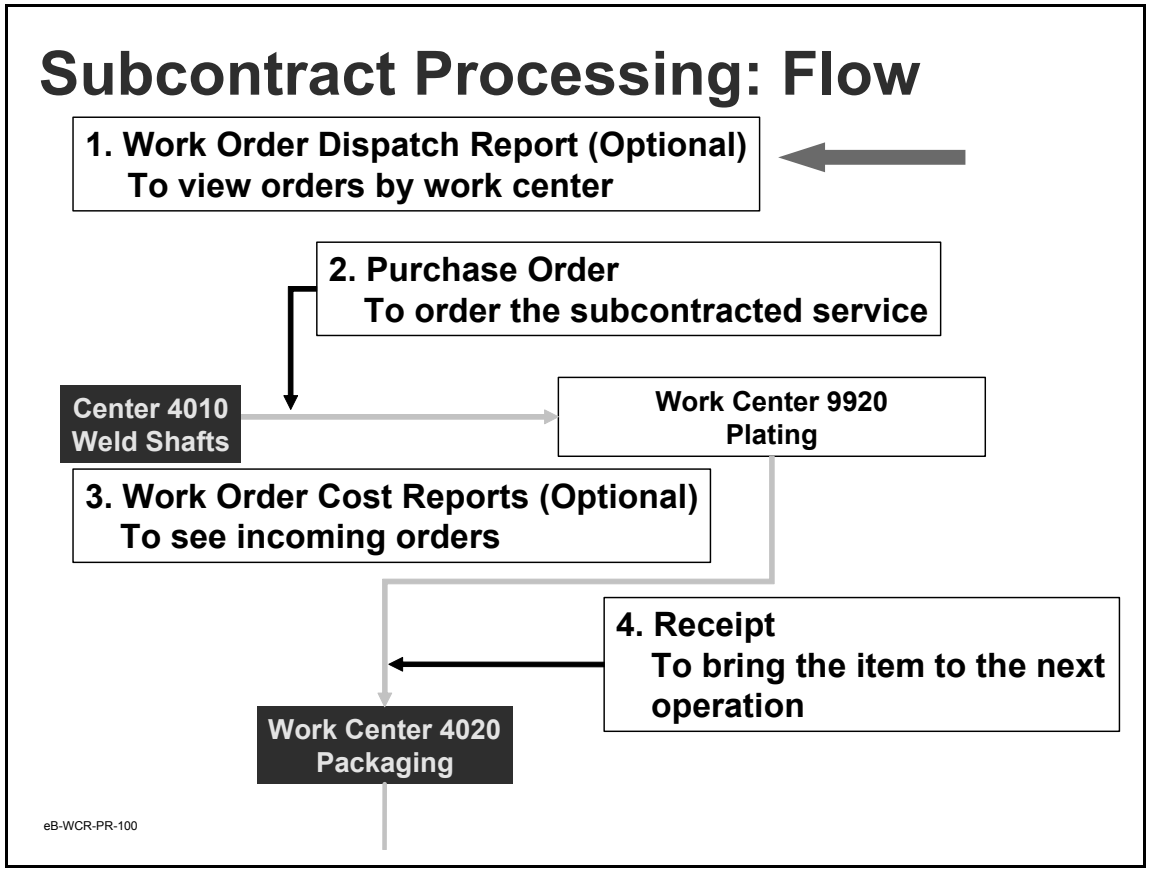
  In both cases, you must report all setup labor using Setup Labor Transaction.



Subcontract Processing: Context

- Processing specific to subcontracting begins after you move the work to the subcontract operation
  - You can do this through shop floor control

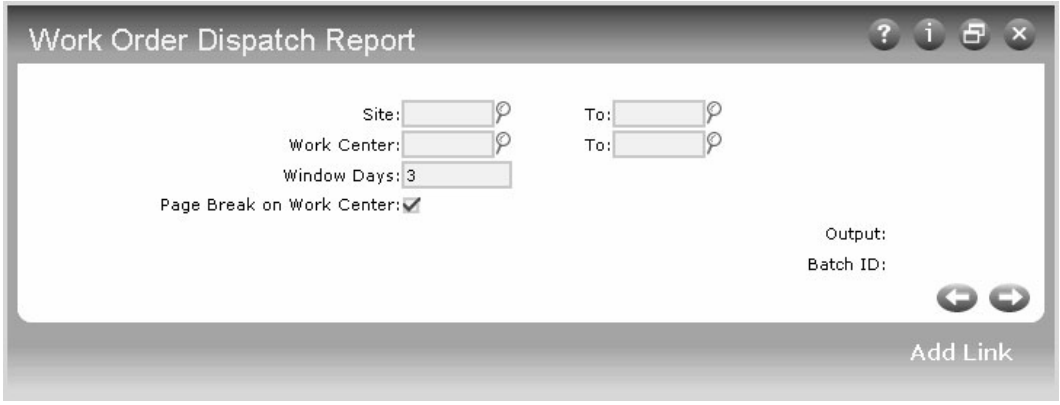
Discussed in the following Training Guide: Shop Floor Control

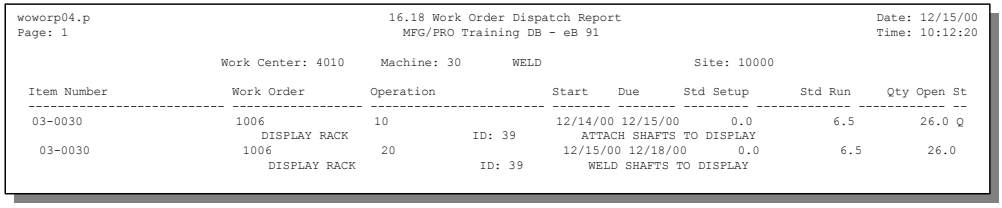


Subcontract Processing: Flow

The diagram shows the steps in processing subcontracted operations.

Work Order Dispatch Report



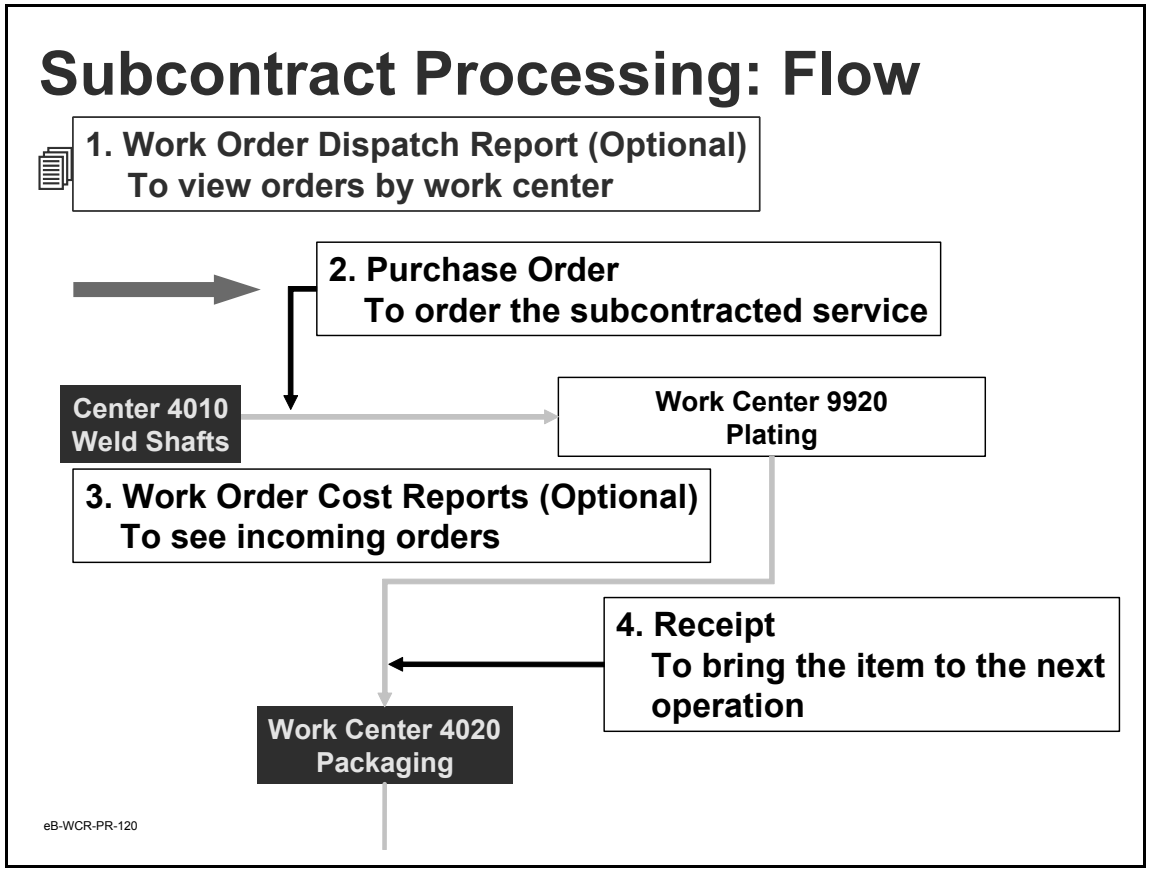


```
woworp04.p                              16.18 Work Order Dispatch Report                              Date: 12/15/00
Page: 1                                   MFG/PRO Training DB - eB 91                                 Time: 10:12:20

                        Work Center: 4010     Machine: 30       WELD                    Site: 10000

 Item Number                Work Order         Operation               Start    Due      Std Setup      Std Run     Qty Open St
 -------------------------- ------------------ ------------------------ -------- -------- --------- ------------ ------------ --
 03-0030                     1006               10                       12/14/00 12/15/00       0.0          6.5         26.0 Q
                                DISPLAY RACK                  ID: 39         ATTACH SHAFTS TO DISPLAY
  03-0030                    1006               20                       12/15/00 12/18/00       0.0          6.5         26.0
                                DISPLAY RACK                  ID: 39         WELD SHAFTS TO DISPLAY
```

eB-WCR-PR-110

Work Order Dispatch Report

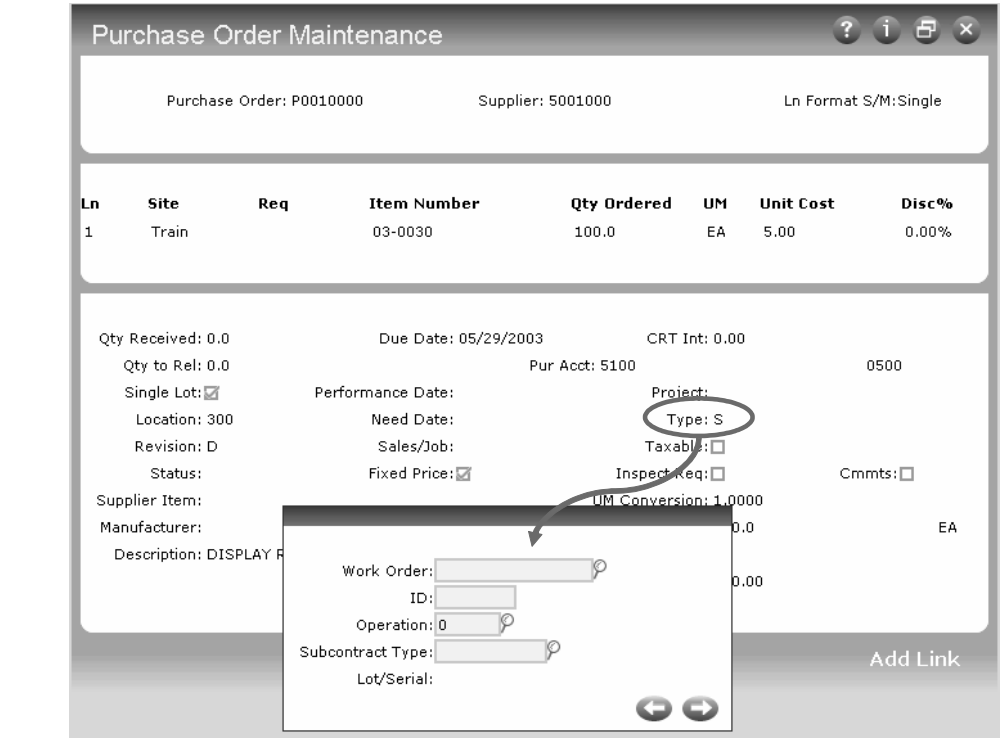
By selecting appropriate work centers, you can print a report on subcontracting operations.



Purchase Order

You create the subcontract order in purchasing by creating an order for the manufactured item, with a type “S” line item.

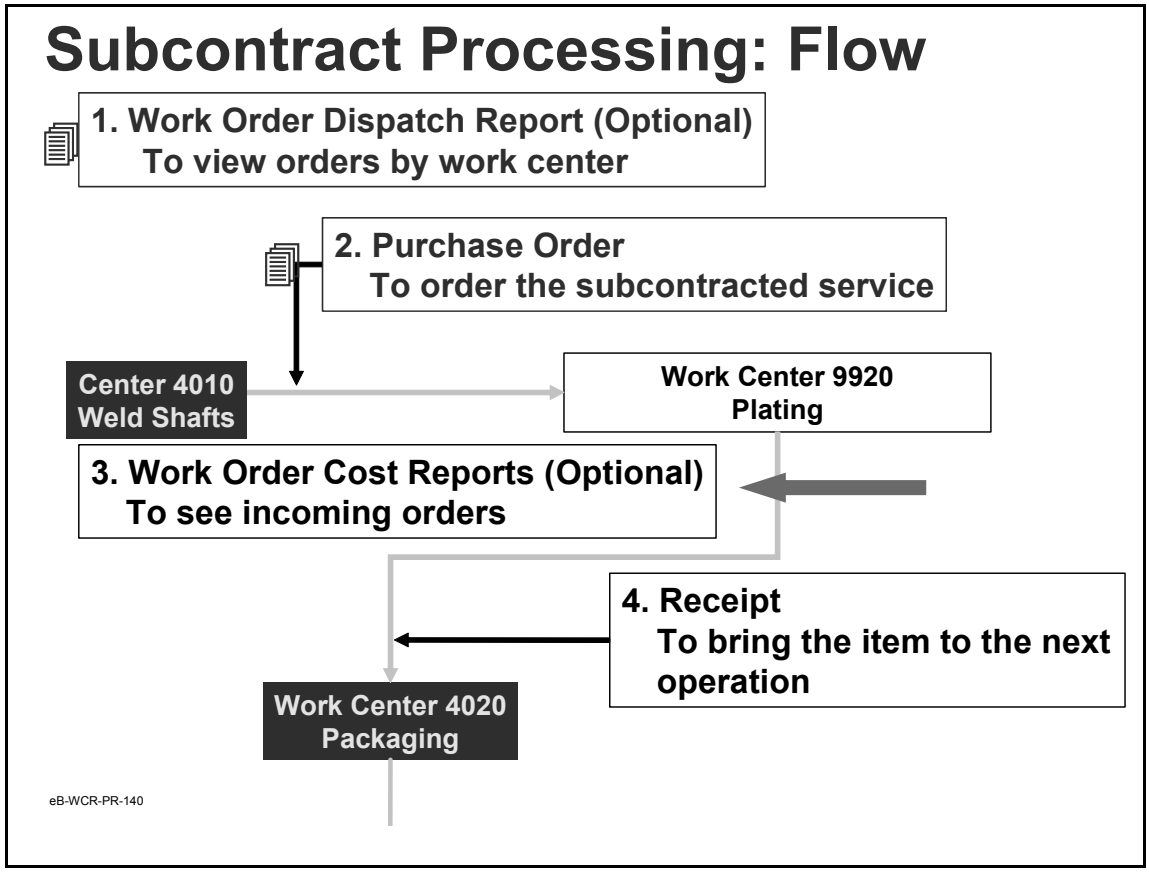
Purchase Order Maintenance



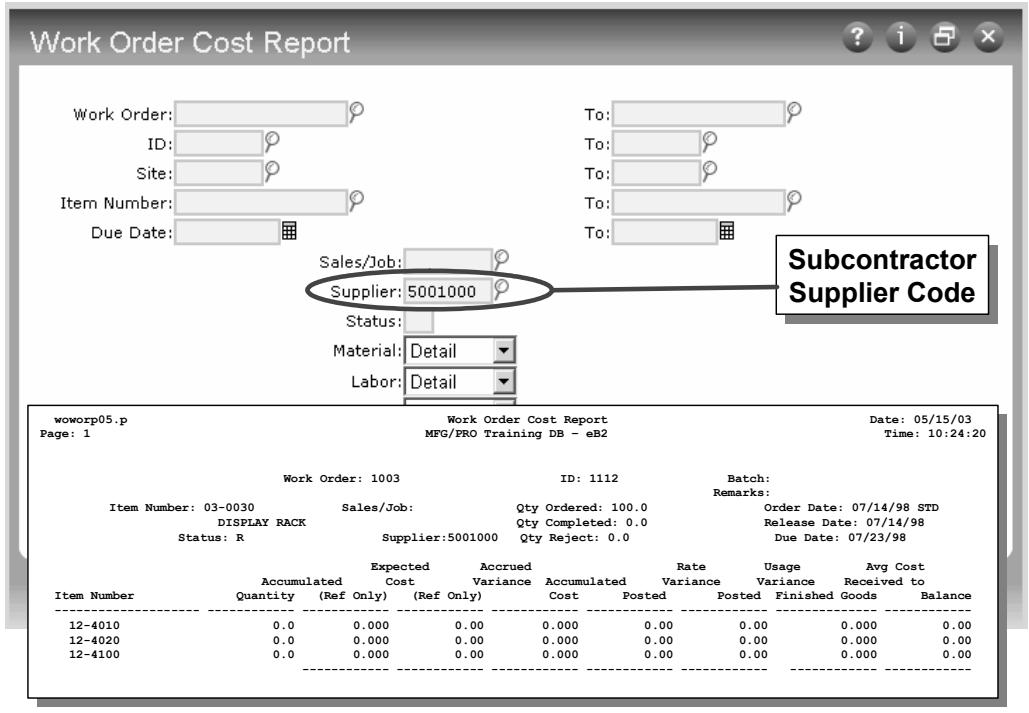
eB-WCR-PR-130

Purchase Order Maintenance

- Create the subcontract transaction as a type “S” line item
- The pop-up window appears, requesting the work order number and ID, as well as the operation number



Work Order Cost Report

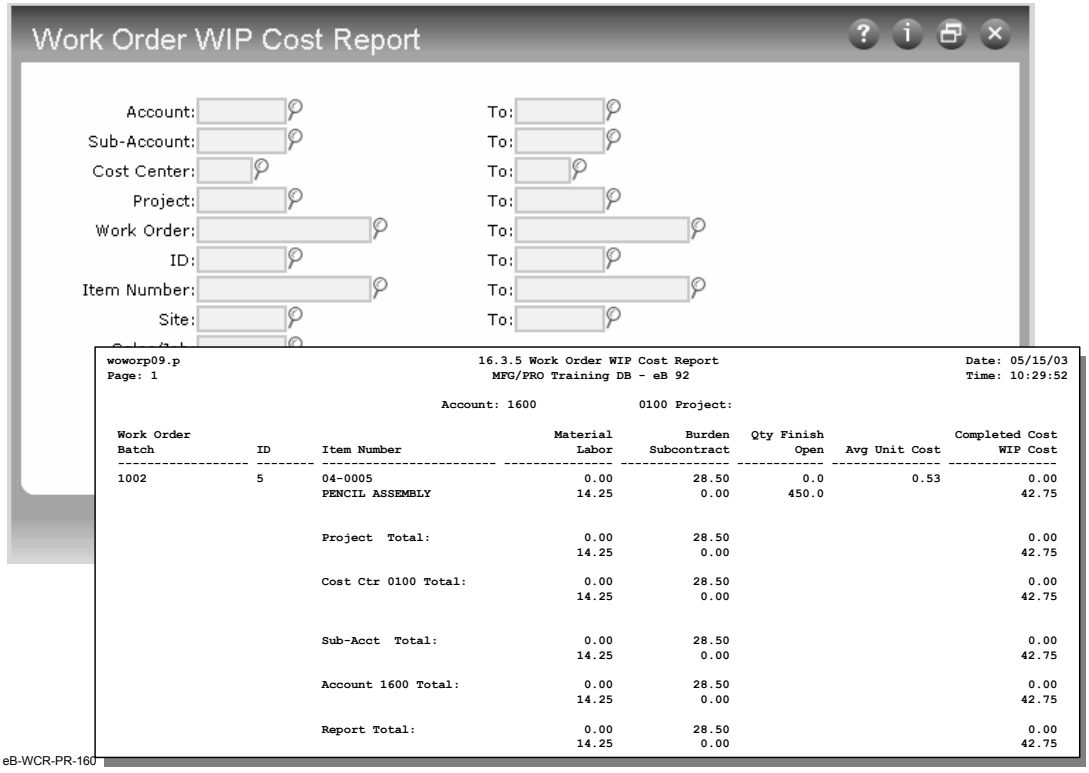


eB-WCR-PR-150

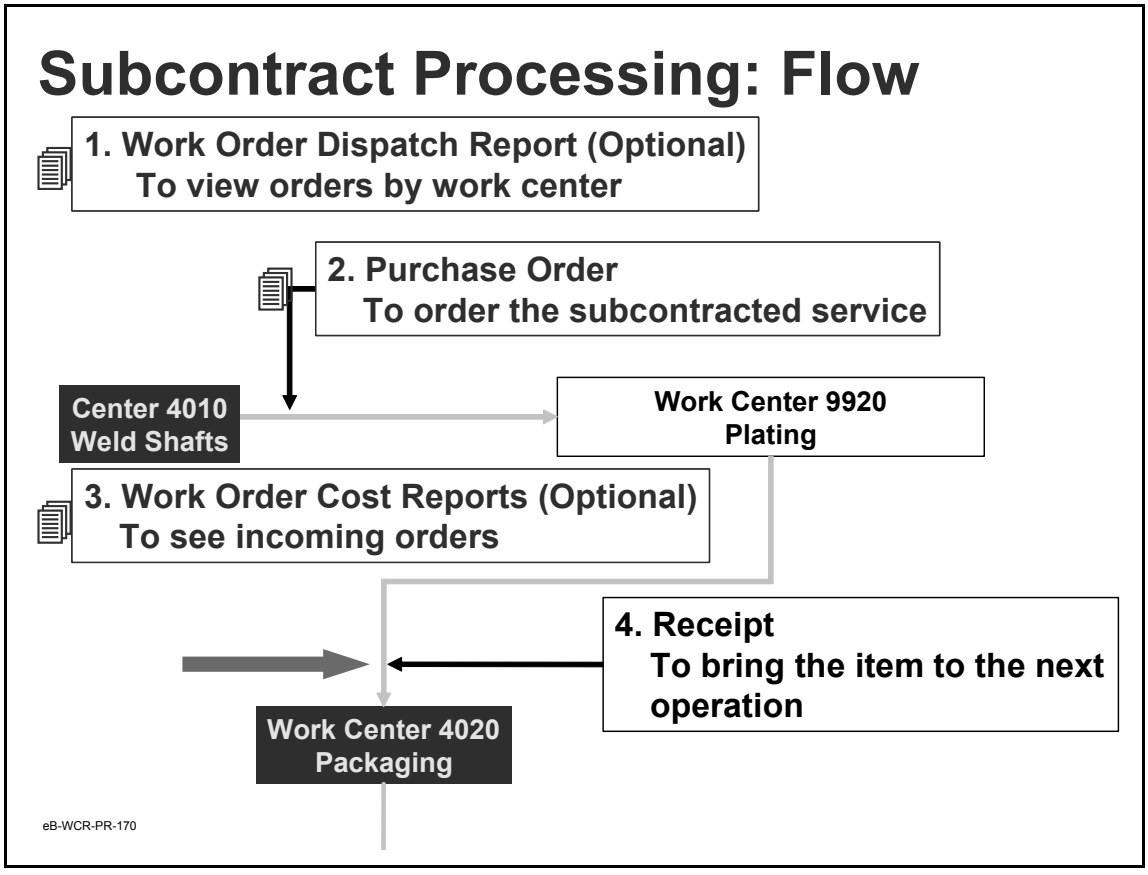
Work Order Cost Report

You can print this and other reports by supplier code.

Work Order WIP Cost Report



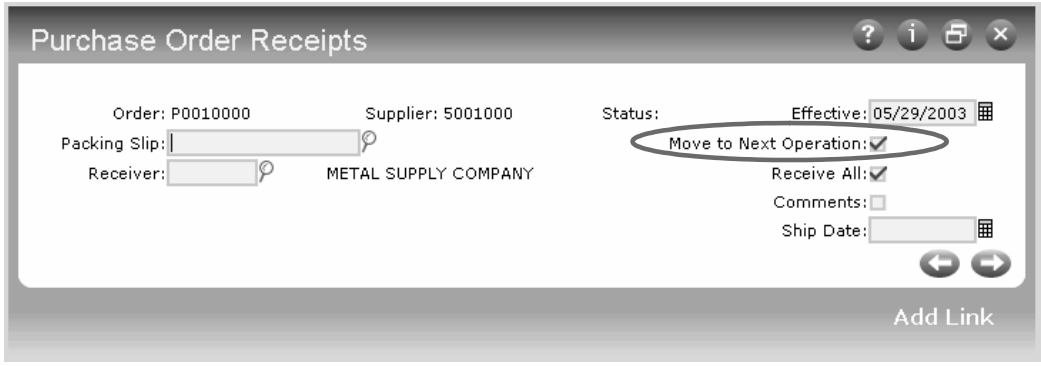
Work Order WIP Cost Report



Receipts

You receive the subcontract goods and can then move them to the next operation.

Purchase Order Receipts (1 of 2)

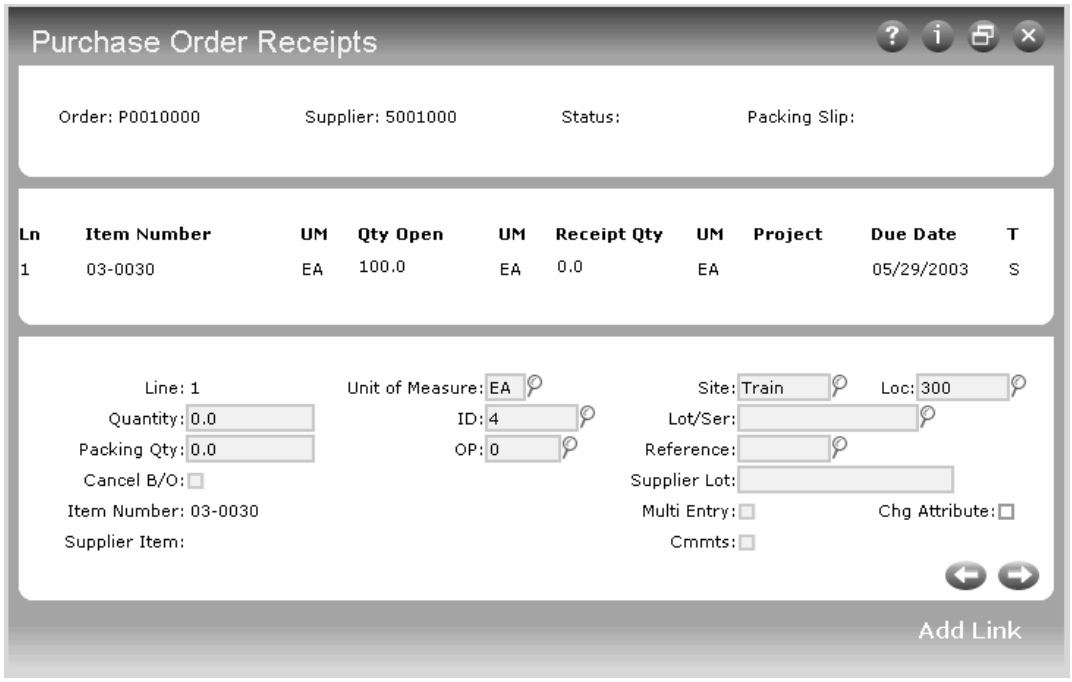


eB-WCR-PR-180

Purchase Order Receipts

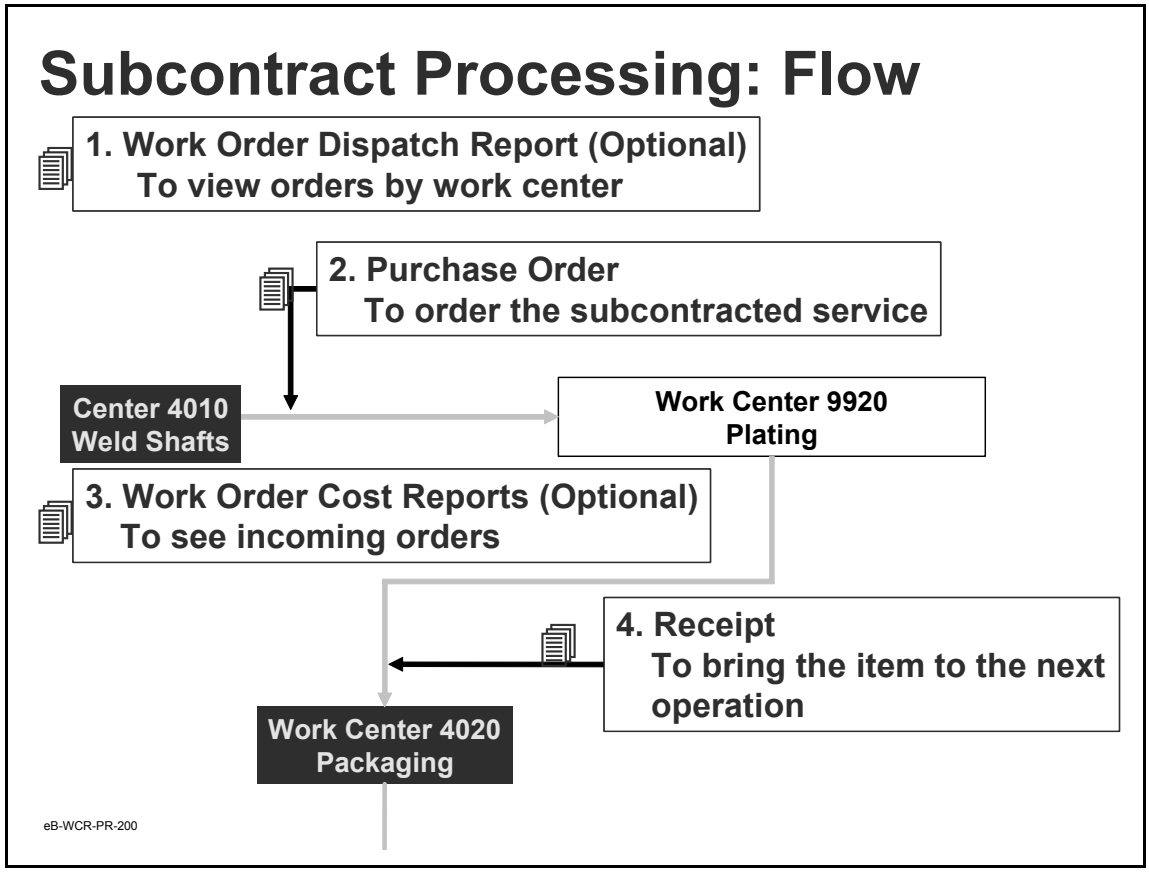
- You receive subcontract items into WIP
- The receipt updates the quantity completed at the designated WO operation and sets the operation status to C
- You can specify to Move to Next Operation to set the status of the next operation to [Q]ueue so it will appear on the dispatch list

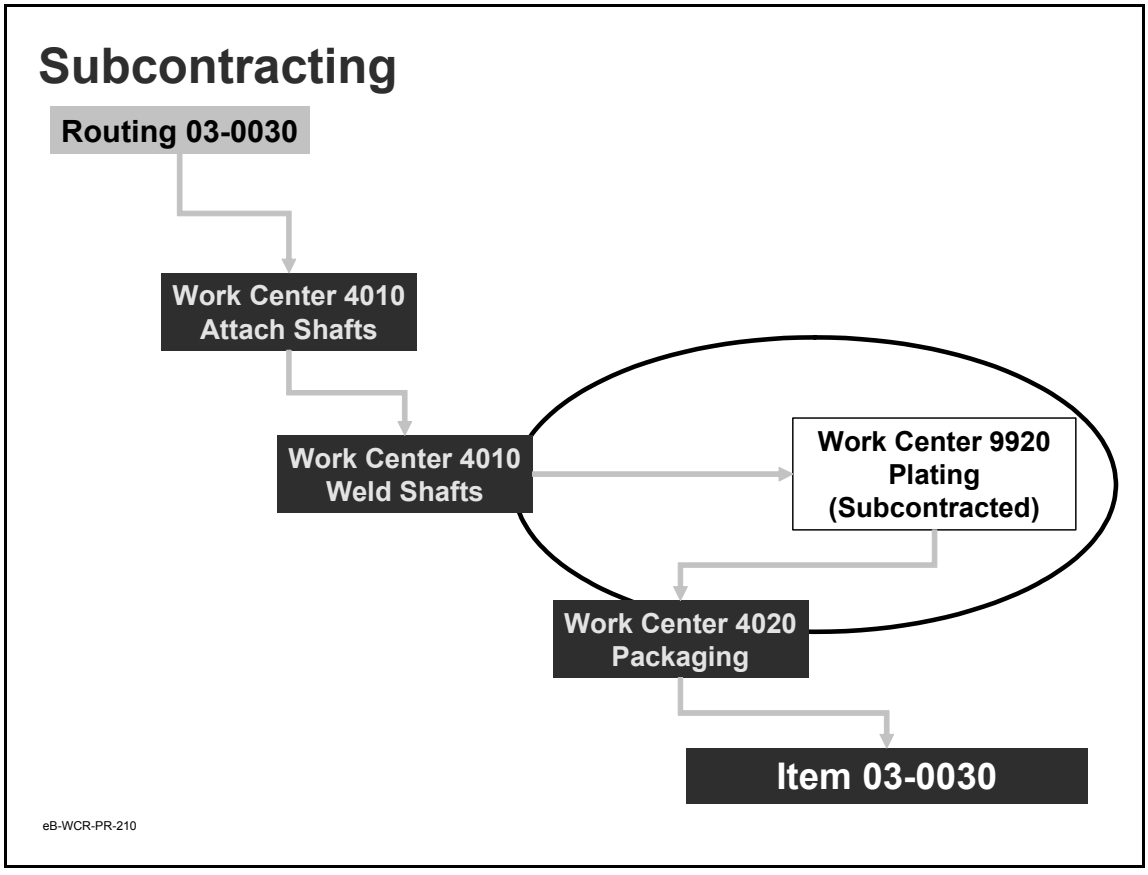
Purchase Order Receipts (2 of 2)



eB-WCR-PR-190

If the operation has been completed (status “C”) before the purchase order receipt, then the cost of the subcontract operation does not go to WIP, but remains in cost of production.





Processing Exercises

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Important The data used in this exercise may not be the same as the data shown in the screens in this lesson.

Exercise: Subcontract Operations

Description: Your company manufactures mechanical pencils. Normally, you blister wrap them on site, but lately the demand has been outstripping your capacity, so you need to set up an alternate routing for subcontracting this operation. First you create a new work center for the subcontracted work, then you create an alternate routing by copying an existing one, then modifying the alternate

to create a subcontracted operation.

1 Using Work Center Maintenance, create the new work center.

Work Center:	9910
Machine:	<blank>
Description:	Blister Pack-Subcontract
Department:	99
Queue Time:	0.0
Wait Time:	0.0
Mach/Op:	1
Setup Crew:	0.00
Run Crew:	0
Machines:	0
Mach Bdn Rate:	0.0
Setup Rate:	0.0
Labor Rate:	0.0
Lbr Bdn Rate:	0.0
Lbr Bdn %:	0.0

2 Use Routing Copy to create the new routing by copying 02-0005.

Source Routing Code:	02-0005
Operation:	<blank>
To:	<blank>
Destination Routing Code:	02-0005A

3 Assign item 02-0005 to the new routing.

Item Number:	02-0005
Site:	train
Routing Code:	02-0005A
Bill of Material:	02-0005

Use Alternate Routing Maintenance.

4 Using Routing Maintenance, modify operation 10 for subcontracting.

Routing Code:	02-0005A
Operation:	10
Start Date:	<blank>
Work Center:	9910
Description:	Blister Pack/Sub
Machine per Op:	<blank>
Overlap Units:	0
Queue Time:	0
Wait Time:	0
Milestone Operation:	yes
Subcontract LT:	4
Setup Crew:	0
Run Crew:	0
Setup Time:	0
Run Time:	0
Move Time:	0
Start Date:	<blank>
End Date:	<blank>
Yield%:	100.00%
Tool Code:	<blank>
Supplier:	5011000
Inventory Value:	0.00
Subcontract Cost:	.12
Comments:	no

Warning This operation was originally based on a standard operation. What will happen if you run Routing Update? How could you control or even prevent this?

Exercise: Study Questions

1 What are the primary uses of departments in MFG/PRO? (List two.)

2 How might you set up departments and work centers in your company (or any company you know well)? What things would you consider?

3 When you set up a work center, the number you enter in Mach/Op should not be less than the number of machines entered in Machines.

True False

4 Wait time is the amount of time that completed work spends at a work center before it moves on to the next work center. Think about your company and where this may apply. List three situations where you would use wait time.

5 When a standard operation changes, the system automatically transfers the changes to all the routings that reference that standard operation.

True False

Refer to *Answers to Study Questions* on page 144 for answers to these study questions.

Exercise: Workshop

Your company has just opened a new production area to make beer. The owner's son (Harvey Ripple) has developed a revolutionary new brewing technique–a process where it takes only one day to brew and bottle the beer and then the aging process takes place in the bottle. (Of course, he

expects to make millions on this, since it tastes just as good as beer brewed in the traditional way. They have decided to name the beer after Harvey, naming it HRipple Beer.)

The production line consists of two machines, one for mixing and the other for bottling. The basic ingredients are water, barley, and hops. All ingredients are piped into the mixing machine directly and stirred together for 15 minutes. A significant part of the process is the addition of the secret ingredient, which is added to the mixture after it sits for one hour.

Immediately after adding the secret ingredient, the mixture is bottled. The bottling machine can fill 120 bottles each hour, and the bottles are packaged 12 per case. Cases must be stored in a dark place for three full days before they can be shipped. This step is vital. Anyone who drinks the brew before it has aged three days will get very sick.

Initially, there are only two people working this production line (Harvey and his assistant). They will only work one four-hour shift per day. It takes 20 minutes to clean the mixing machine each day prior to starting a new lot of production.

1 Add the department and the two work centers used by this bottling process.

2 Establish the four-hour per day capacity. Where did you have to go to do this?

3 Set up an item record and process for beer. How did you indicate the three-day aging period?

4 What function allows you to enter the bottling time as units per hour?

Course Overview

- ✓ Identify some key business issues you need to consider before setting up work centers and routings in MFG/PRO
- ✓ Set up the shop calendar, departments, work centers, comments, standard operations, routings, and processes in MFG/PRO
- ✓ Process subcontract operations in MFG/PRO

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APPENDIX A

Answers to Study Questions

Answers to Study Questions

1 The primary uses of departments are:

- Accounting
  - GL account defaults are established by department.
- Capacity requirements planning
  - Labor capacity of associated work centers.

2 There is no one correct answer. You need to look at how your company reports capacity and production costs.

3 False. Mach/Op should be less than or equal to the number of machines in the work center.

4 The key here is that wait time cannot be compressed. Usually, wait time is specified for mandatory processes like cooling, drying, or curing.

5 False. You must run Routing Update to do this.

APPENDIX B

General Ledger (GL) Effects

Function	Notes	DR / CR	Account	Defaults From
Routing Cost Roll-Up using standard cost set		DR	Inventory	Inventory Account Maintenance*
		CR	Cost Revaluation	Inventory Account Maintenance*

*The GL account defaults from the inventory item/site account if one is set up; otherwise, from the product line.

APPENDIX C

Work Center and Routing Reports

Work Centers / Routings Menu

Report	Function / Purpose
Department Browse	This browse displays department information.
Department Report	This report lists department information.
Work Center Browse	This browse displays work center information.
Work Center Report	This report lists work center information.
Standard Operation Browse	This browse displays standard operation information.
Standard Operation Report	This report lists standard operations.
Routing Inquiry	This inquiry displays routings.
Routing Report	This report lists routings.
Routing Cost Report	This report lists routing costs as calculated by the Routing Cost Roll-Up
Item Routing Cost Report	This report lists item costs based on the routing cost roll-up.
Operation Cost Browse	This browse displays operation cost information based on Operation Cost Calculation
Operation Cost Report	This report lists operation cost information based on Operation cost Calculation

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Training Guide: Work Centers, Routings, and WO Subcontracting

Item number: 70-2860A

How would you rate the quality of this training guide?

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