



QAD Enterprise Applications  
Standard and Enterprise Edition

**Training Guide**  
**Work Centers, Routings,**  
**and WO Subcontracting**

This document contains proprietary information that is protected by copyright and other intellectual property laws. No part of this document may be reproduced, translated, or modified without the prior written consent of QAD Inc. The information contained in this document is subject to change without notice.

QAD Inc. provides this material as is and makes no warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. QAD Inc. shall not be liable for errors contained herein or for incidental or consequential damages (including lost profits) in connection with the furnishing, performance, or use of this material whether based on warranty, contract, or other legal theory.

QAD and MFG/PRO are registered trademarks of QAD Inc. The QAD logo is a trademark of QAD Inc.

Designations used by other companies to distinguish their products are often claimed as trademarks. In this document, the product names appear in initial capital or all capital letters. Contact the appropriate companies for more information regarding trademarks and registration.

Copyright ©2012 by QAD Inc.

WorkCentersRoutingWOSubcontracting\_TG\_v2012.1SE\_EE.pdf/lkk/hes

**QAD Inc.**

100 Innovation Place  
Santa Barbara, California 93108  
Phone (805) 566-6000  
<http://www.qad.com>

# Contents

<b>Change Summary</b> .....	<b>vii</b>
<b>About This Course</b> .....	<b>1</b>
Course Description .....	2
Course Objectives .....	2
Audience .....	2
Prerequisites .....	2
Course Credit .....	2
Virtual Environment Information .....	2
Additional Resources .....	3
QAD Learning Center .....	3
QAD Document Library .....	3
QAD Support .....	3
<b>Chapter 1 Introduction to Work Centers and Routings</b> .....	<b>5</b>
Course Overview .....	6
Work Centers .....	7
Routings .....	8
Terminology .....	9
Course Objectives .....	10
<b>Chapter 2 Business Considerations</b> .....	<b>11</b>
Introduction to Business Considerations .....	12
Business Issues .....	13
Repetitive and Shop Floor Control .....	14
Subcontracting .....	16
Capacity Requirements Planning .....	18
Burden/Labor Rates .....	19
Machine Burden Rate .....	20
Labor Burden Rate .....	21
<b>Chapter 3 Work Center and Routing Setup and Maintenance</b> .....	<b>23</b>
Set Up Work Centers and Routings .....	24
Work Centers/Routings/Process Setup and Maintenance .....	25

Shop Calendar . . . . .	26
Calendar Maintenance . . . . .	27
Departments . . . . .	29
Department Maintenance . . . . .	31
Work Centers . . . . .	32
Work Center Maintenance . . . . .	34
Standard Operations . . . . .	37
Standard Operation Maintenance . . . . .	38
Subcontract Considerations . . . . .	39
Master Comments . . . . .	42
Master Comment Maintenance . . . . .	44
Routings . . . . .	45
Example Routing . . . . .	46
Routing Setup . . . . .	47
Routing Maintenance . . . . .	48
Types of Routings . . . . .	49
Routing Maintenance . . . . .	50
Routing Maintenance (Rate Based) . . . . .	52
Routing Copy . . . . .	53
Routing Copy . . . . .	54
Routing Update . . . . .	55
Routing Update Criteria . . . . .	57
Routing Cost Roll-Up . . . . .	58
Routing Cost Roll-Up . . . . .	60
Operation Cost Calculation . . . . .	61
Operation Cost Calculation . . . . .	62
Actual Pay Rate Maintenance . . . . .	64
Alternate Routings . . . . .	67
Alternate Routings: Procedure . . . . .	69
Alternate Routing Maintenance . . . . .	71
Work Center/Routing Standards . . . . .	72
Work Center/Routing Stds Maint . . . . .	74
Processes . . . . .	75
Process Definition . . . . .	76
Process Definition Maintenance . . . . .	77
Process Definition Copy . . . . .	79
Process/Formula Maintenance . . . . .	81
Formula/BOM Code Screen . . . . .	82
Operation Detail Screen . . . . .	84
Components Screen . . . . .	85
Exercise: Routings and Work Centers . . . . .	86

<b>Chapter 4 Work Order Subcontract Processing</b> .....	<b>89</b>
Subcontracting Requirements – Department .....	91
Department Maintenance: Subcontract .....	92
Subcontracting Requirements – Work Centers .....	93
Work Center Maintenance: Subcontract .....	94
Subcontracting Requirements – Routing .....	95
Routing Maintenance - Subcontract .....	96
Subcontract Processing: Purchase Order .....	98
Subcontract Processing: Subcontract Routing Op PO .....	99
Work Order Dispatch Report .....	100
Work Order Cost Report .....	102
Purchase Order Receipts .....	103
Exercise: Subcontract Operations .....	105
Exercise: Study Questions .....	106
Exercise: Workshop .....	107
<b>Appendix A Answers to Study Questions</b> .....	<b>109</b>
<b>Appendix B General Ledger (GL) Effects</b> .....	<b>111</b>
<b>Appendix C Work Center and Routing Reports</b> .....	<b>113</b>
<b>Appendix D QAD Product Costing</b> .....	<b>115</b>
Product Costing in QAD Enterprise Applications .....	116
<b>Index</b> .....	<b>117</b>



# Change Summary

The following table summarizes significant differences between this document and the last published version.

<b>Date/Version</b>	<b>Description</b>	<b>Reference</b>
Sept 2012/2012.1 EE and 2012 SE	Rebranded for QAD 2012.1 EE and SE	--
March 2012/2012 EE and SE	Rebranded for QAD 2012 EE and SE	--
Sept 2011/2011.1 EE and 2011 SE	Rebranded for QAD 2011.1 EE and SE	--



# **About This Course**

## Course Description

QAD designed this course to cover the basics of preparing to implement the work centers and routing functions of QAD Enterprise Applications, 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 that let students practice key concepts and processes in work centers and subcontracting operations

## Course Objectives

By the end of this course students should 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

## Audience

- Implementation consultants and members of implementation teams
- Key users

## Prerequisites

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

## Course Credit

This course is valid for 6 credit hours and is typically taught in one day.

## Virtual Environment Information

This guide applies to both the Standard Edition and the Enterprise Edition of QAD Enterprise Applications. Use the hands-on exercises in this book with the latest Enterprise Edition learning environment in the 10USA > 10USACO workspace. When prompted to log in, specify *demo* for user ID and *qad* for password.

**Note** Users of Standard Edition should complete the exercises in the EE environment; the concepts are the same in both environments and can be applied to Standard Edition. Features that only apply to Enterprise Edition are noted in the text.

## Additional Resources

If you encounter questions on QAD software that are not addressed in this book, several resources are available. The QAD corporate Web site provides product and company overviews. From the main site, you can access the QAD Learning or Support site and the QAD Document Library. Access to some portions of these sites depends on having a registered account.

<http://www.qad.com/>

### QAD Learning Center

To view available training courses, locations, and materials, use the QAD Learning Center. Choose Education under the Services tab to access this resource. In the Learning Center, you can reserve a learning environment if you want to perform self-study and follow a training guide on your own.

### QAD Document Library

To access release notes, user guides, training guides, and installation and conversion guides by product and release, visit the QAD Document Library. Choose Document Library under the Support tab. In the QAD Document Library, you can view HTML pages online, print specific pages, or download a PDF of an entire book.

To find a resource, you can use the navigation tree on the left or use a powerful cross-document search, which finds all documents with your search terms and lets you refine the search by book type, product suite or module, and date published.

### QAD Support

Support also offers an array of tools depending on your company's maintenance agreement with QAD. These include the Knowledgebase and QAD Forums, where you can post questions and search for topics of interest. To access these, choose Visit Online Support Center under the Support tab.

## 4 Training Guide — Work Centers, Routings, and WO Subcontracting

Chapter 1

# **Introduction to Work Centers and Routings**

## Course Overview

### Course Overview

- Introduction to work centers, routings, and work order subcontracting
- Business considerations
- Set up the shop calendar, departments, work centers, comments, standard operations, routings, and processes in QAD Enterprise Applications
- Process subcontract operations in QAD Enterprise Applications



eb-WCR-IN-040

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

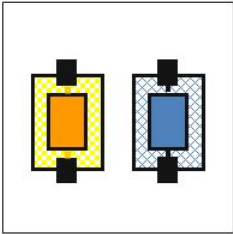
- Work centers and routings require initial entry and occasional administrative attention
- Subcontracting, although not a strict matter of work centers and routings, is treated here because it requires special operations in the routings
- Subcontracting processing also requires knowledge of purchasing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

## Work Centers

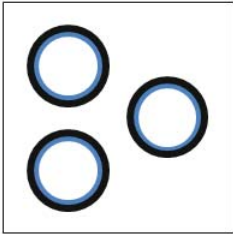
### Work Centers

Production facilities that perform tasks


**Grinding**




**Smoothing**



**Assembly**



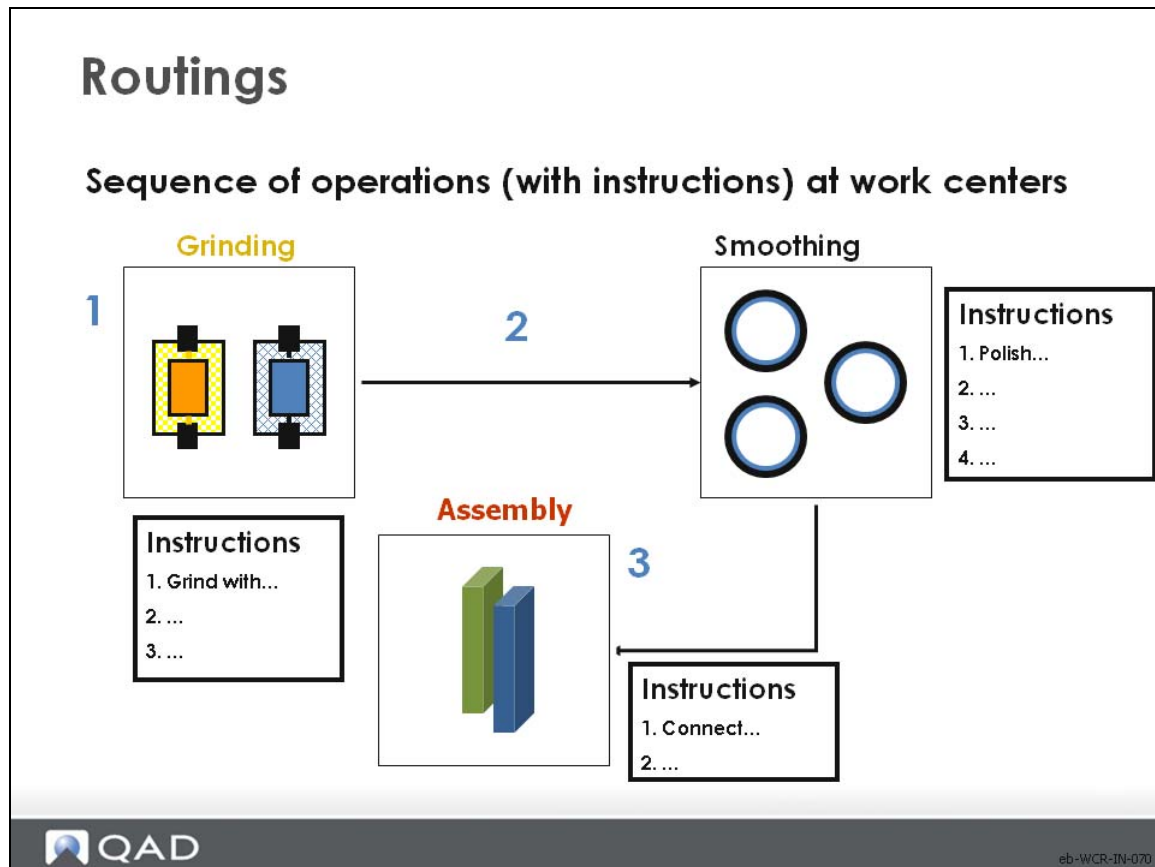
The diagram illustrates three types of work centers: Grinding, Smoothing, and Assembly. Each is represented by a square box containing a specific icon. The Grinding icon shows two rectangular blocks, one orange and one blue, with a yellow grid pattern. The Smoothing icon shows three circular rings, two blue and one black. The Assembly icon shows two rectangular blocks, one green and one blue, standing upright.

 QAD eb-WCR-IN-060

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

- QAD Enterprise Applications 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

### Terminology

- Alternate Routings
- Backflush
- Queue Time
- Wait Time
- Move Time
- Yield
- Yield Percent
- Operation / Process Yield
- Subcontract



eb-WCR-IN-080

**Alternate Routing.** A routing used instead of the primary routing that results in producing an identical end item.

**Backflush.** 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 item's bill of material. It can be used for both work order and repetitive production.

**Queue Time.** 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.** 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).

**Move Time.** The time required to move work from one work center/operation to the next

**Yield.** The ratio of usable output from a process to its input.

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

**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.

**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

### Course Objectives

#### In this course you learn how to:

- Identify some key business considerations before setting up work centers, routings, and WO subcontracting in QAD Enterprise Applications
- Set up departments, work centers, comments, standard operations, routings, and processes in QAD Enterprise Applications
- Process subcontract operations in QAD Enterprise Applications



eb-WCR-IN-050

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

Chapter 2

# **Business Considerations**

## Introduction to Business Considerations

### Business Considerations

In this section you learn how to:

- **Identify some key business considerations before setting up work centers, routings, and WO subcontracting in QAD Enterprise Applications**
- Set up departments, work centers, comments, standard operations, routings, and processes in QAD Enterprise Applications
- Process subcontract operations in QAD Enterprise Applications



WCR-BC-010

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

## Business Issues

### Business Issues

- Repetitive
- Shop Floor Control
- Subcontracting
- Capacity Requirements Planning
- Burden/Labor Rates



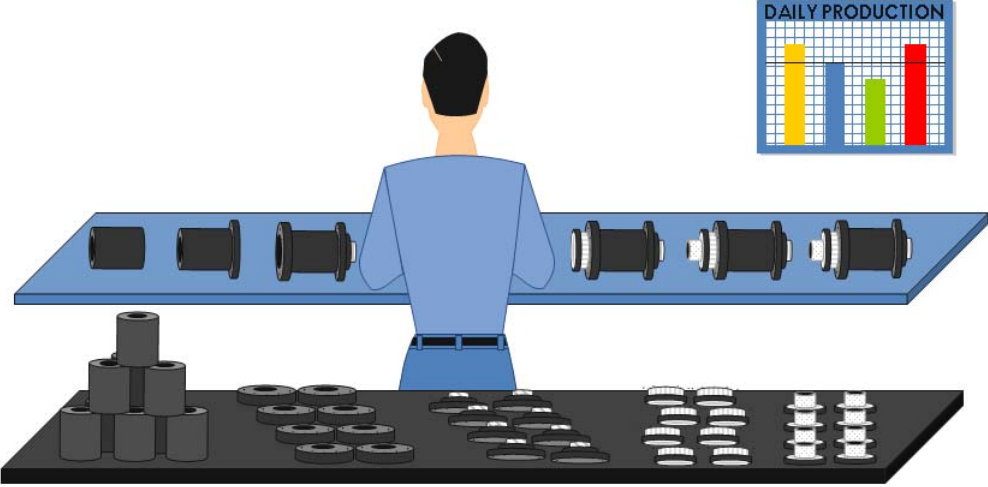
WCR-BC-020

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

### Repetitive and Shop Floor Control

The repetitive and shop floor control modules in QAD Enterprise Applications require routing operations



The illustration shows a worker from behind, standing at a production station. On a blue shelf above the worker are five black cylindrical components. Below the shelf, on a black surface, are stacks of similar components: a stack of three on the left, a stack of two in the middle, and several individual components scattered to the right. In the upper right corner of the illustration area, there is a small bar chart titled 'DAILY PRODUCTION' with four bars in yellow, blue, green, and red.

 QAD WCR-BC-030

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

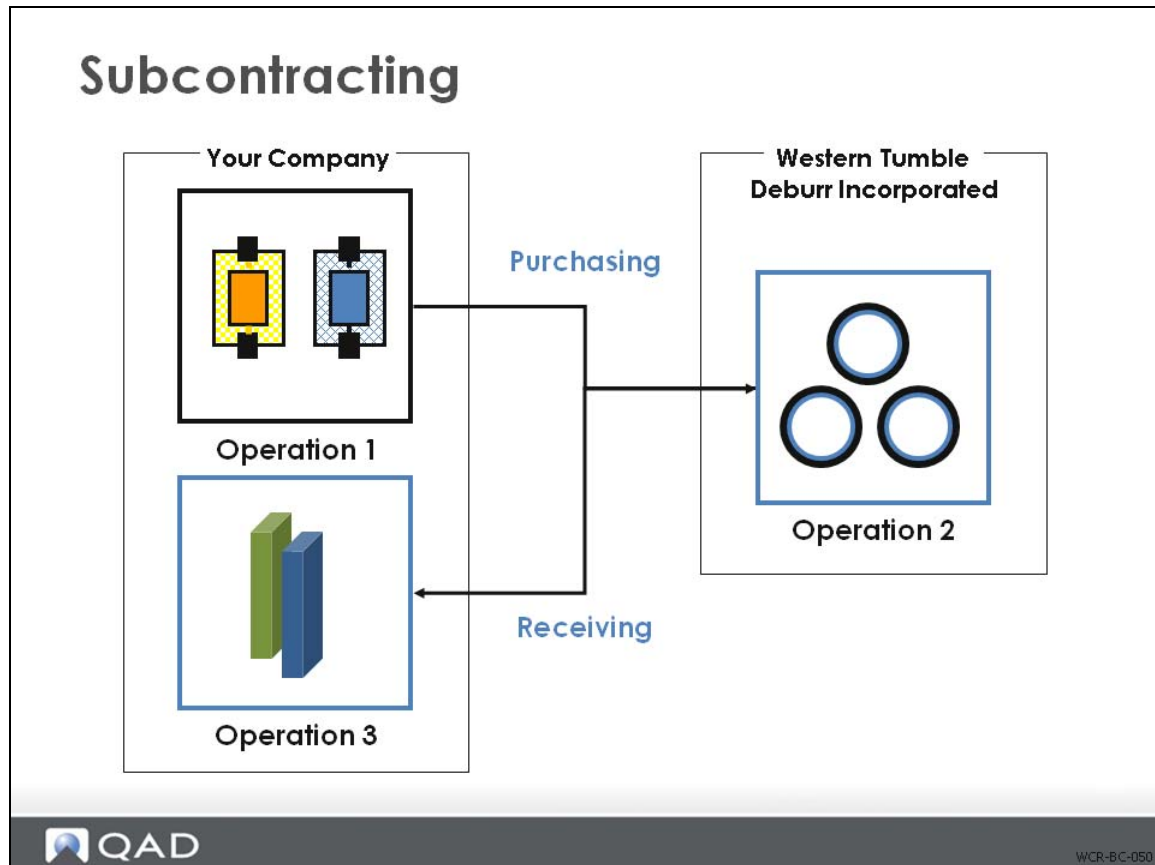
The repetitive and shop floor control modules in QAD Enterprise Applications require routing operations

### 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

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

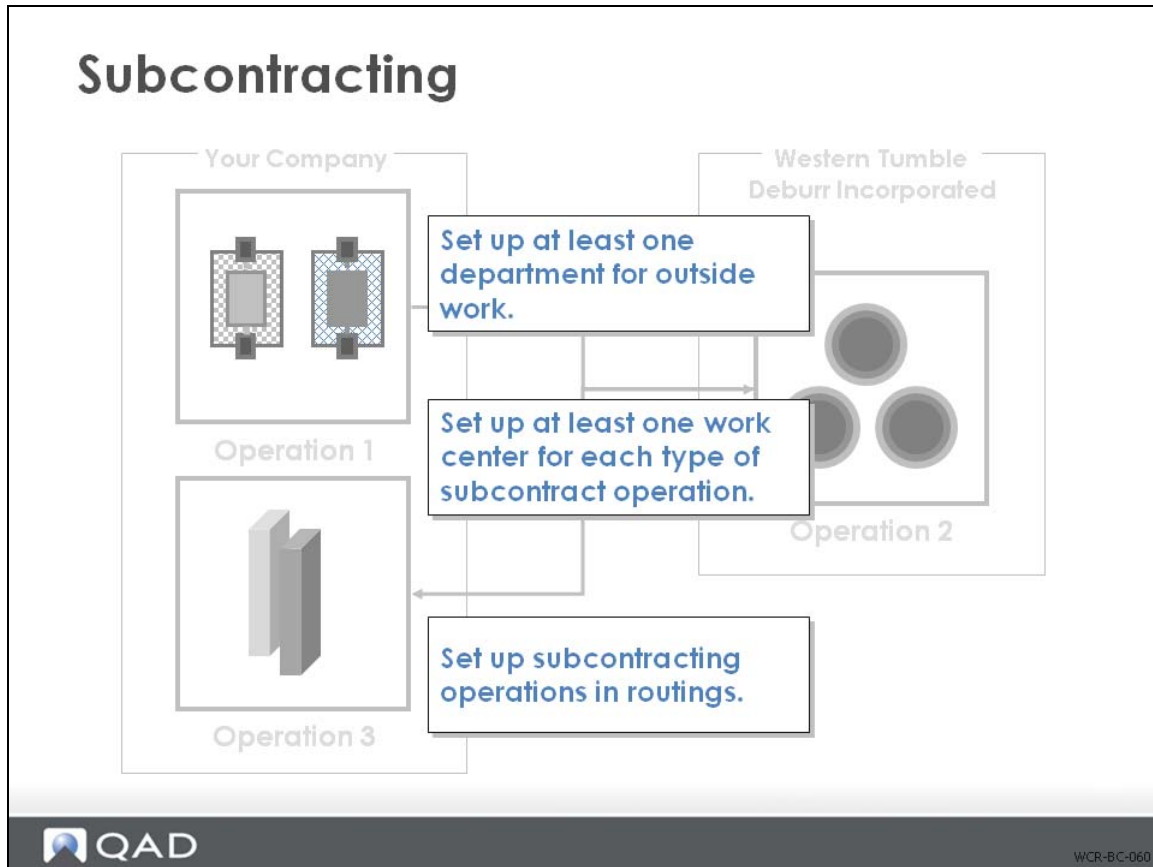
## Subcontracting



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 QAD Enterprise Applications, 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.



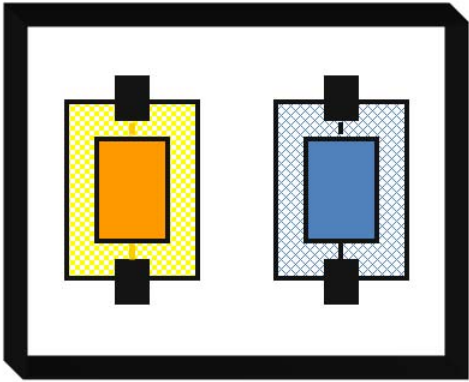
Some manufacturing systems use item numbers to account for subcontract costs. QAD Enterprise Applications uses routing operations to plan and track these costs.

See “Work Order Subcontract Processing” on page 89.


## Capacity Requirements Planning

### Capacity Requirements Planning (CRP)

**Work centers are the basic unit for CRP**



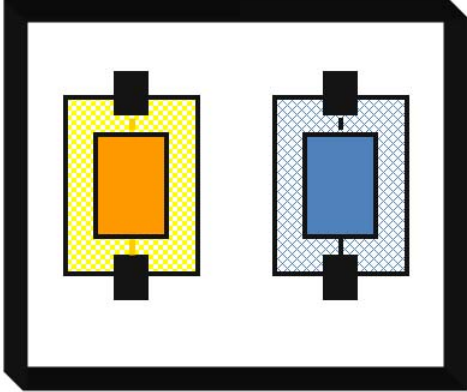
**Work center capacity equals**  
calendar hours available x number of machines

 WCR-BC-070

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


## Burden/Labor Rates

### Burden/Labor Rates



- Machine burden rate
- Labor burden rate
- Labor burden %
- Labor rates

The system uses these elements in calculating item costs

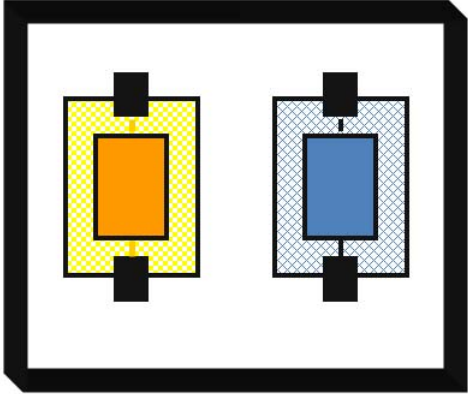
 QAD WCR-BC-080

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.

## Machine Burden Rate

### Burden/Labor Rates




**Burden costs use**

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

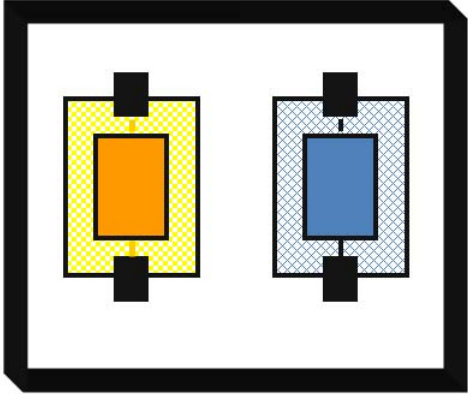
**Machine burden rate equals**

(standard setup hours  $\times$  number of machines + standard run hours)  
 $\times$  work center machine burden rate

 QAD WCR-BC-090

## Labor Burden Rate

### Burden/Labor Rates




**Burden costs use**

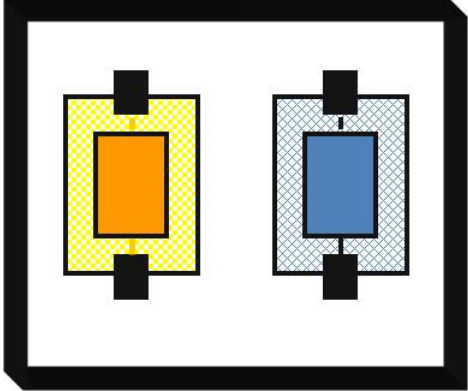
- ✓ Machine burden rate
- Labor burden rate
- Labor burden %

**Labor burden rate equals**

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

 QAD WCR-BC-100

## 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 %)

+

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

 QAD WCR-BC-110

**Note** If a Labor Burden Rate is also entered, it is added to Total Burden.

Chapter 3

# **Work Center and Routing Setup and Maintenance**

## Set Up Work Centers and Routings

### Set up Work Centers and Routings

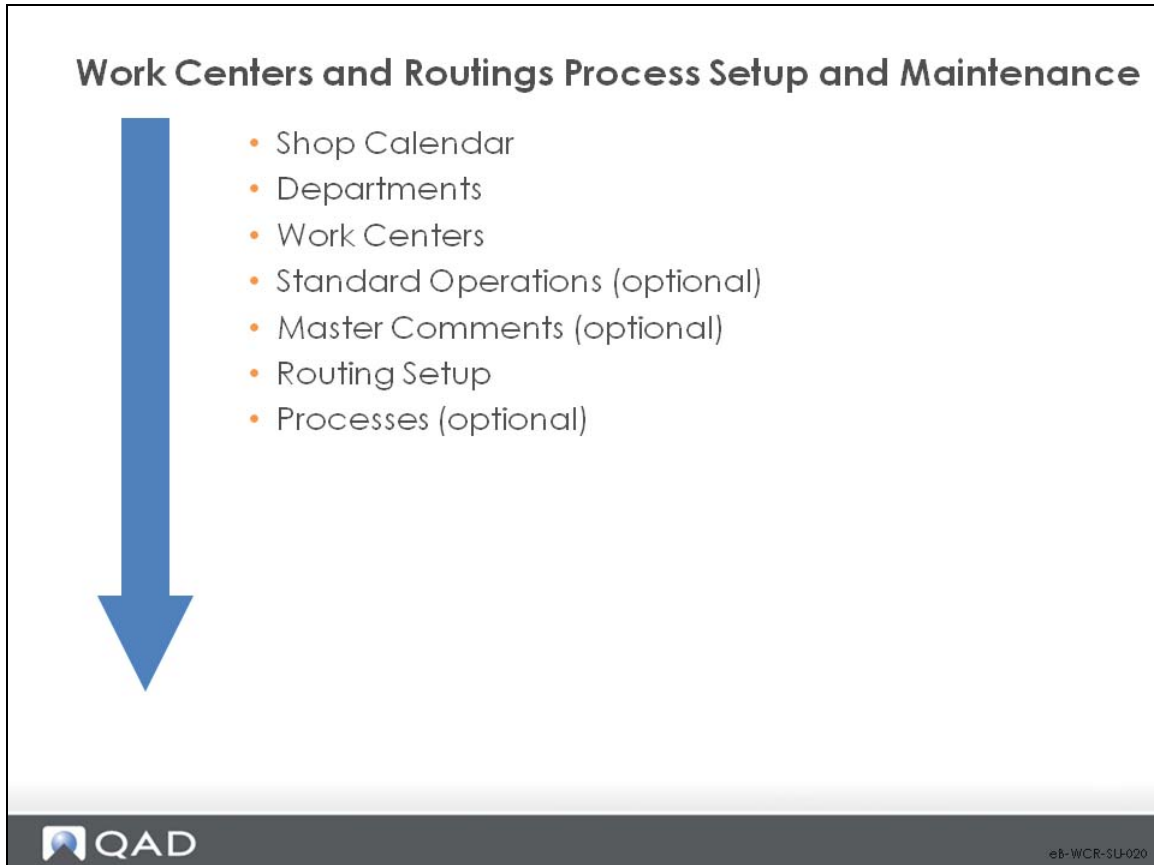
#### In this section you learn how to:

- ✓ Identify some key business considerations before setting up work centers, routings, and WO subcontracting in QAD Enterprise Applications
- **Set up departments, work centers, comments, standard operations, routings, and processes in QAD Enterprise Applications**
- Process subcontract operations in QAD Enterprise Applications



e8-WCR-SU-010


## Work Centers/Routings/Process Setup and Maintenance




This work flow sequence is the recommended initial setup sequence of for work centers, routings, and processes. It is based on information that flows from one type of data to another and prerequisites that need to be accomplished. Optional steps are noted as such.

## Shop Calendar

**Work Centers and Routings Process Setup and Maintenance**



- **Shop Calendar**
- Departments
- Work Centers
- Standard Operations (optional)
- Master Comments (optional)
- Routing Setup
- Processes (optional)

 QAD e8-WCR-SU-030

The calendar sets the work week and the daily hours.

## Calendar Maintenance

Calendar Maintenance

Go To Actions Copy Print Preview

Site: 10-100 Work Center:

Site: 10-100 Ultrasound Mfg Site

Work Center: Machine:

Work Day	Hours
Sunday: <input type="checkbox"/>	0.00
Monday: <input checked="" type="checkbox"/>	8.00
Tuesday: <input checked="" type="checkbox"/>	8.00
Wednesday: <input checked="" type="checkbox"/>	8.00
Thursday: <input checked="" type="checkbox"/>	8.00
Friday: <input checked="" type="checkbox"/>	8.00
Saturday: <input type="checkbox"/>	0.00

Reference:

Start:

End: Daily Hours:

QAD e8-WCR-SU-040

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; the system schedules nothing on non-work days

Yes: A work day. The system can schedule events, such as production and 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 can 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 such as 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

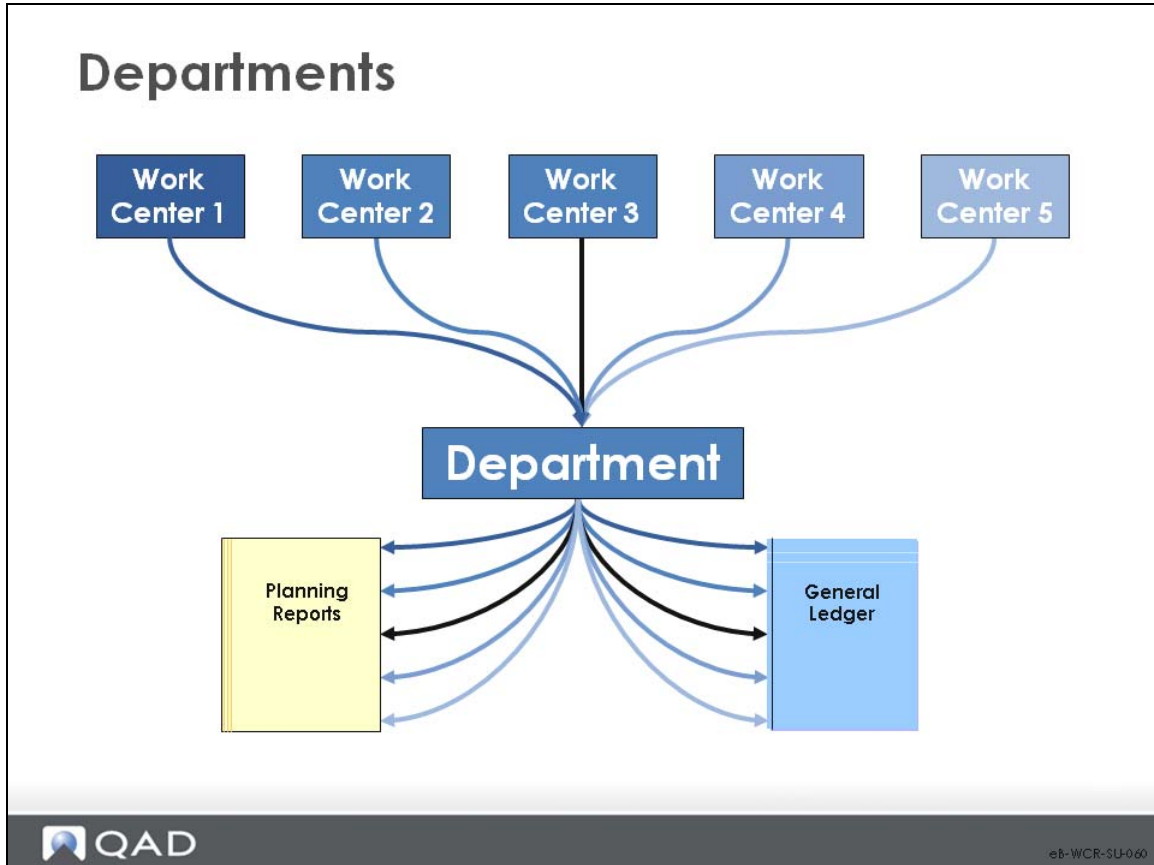
*Daily Hours.* The number of hours to be added or subtracted from normal scheduled work hours for the specified range of dates. This can be positive or negative; for a shutdown on a normal work day, enter -8

## Departments

### Work Centers and Routings Process Setup and Maintenance



- ✓ Shop Calendar
- **Departments**
- Work Centers
- Standard Operations (optional)
- Master Comments (optional)
- Routing Setup
- Processes (optional)



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

# Department Maintenance

Department Maintenance x
Go To Actions Copy Print Preview Attach

Department: 0400 Default Sub-Account:

Department: 0400

Default Sub-Account: Override:

Default Cost Center: Override:

Description:

Labor Capacity:

Cost of Production:	<input type="text" value="5770"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Labor:	<input type="text" value="5120"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Burden:	<input type="text" value="5220"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Labor Usage Variance Acct:	<input type="text" value="5140"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Labor Rate Variance Acct:	<input type="text" value="5150"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Burden Usage Variance:	<input type="text" value="5240"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>
Burden Rate Variance:	<input type="text" value="5250"/>	<input type="button" value="⚙"/>	Mech	<input type="button" value="⚙"/>	<input type="button" value="⚙"/>

e8-WCR-3U-070


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/load by work center/machine, can display 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 should be entered - CRP uses it to determine over/under loads - it should equal the sum of the capacities of all work centers in the department, assuming the labor is transferable between work centers within the department


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

## Work Centers

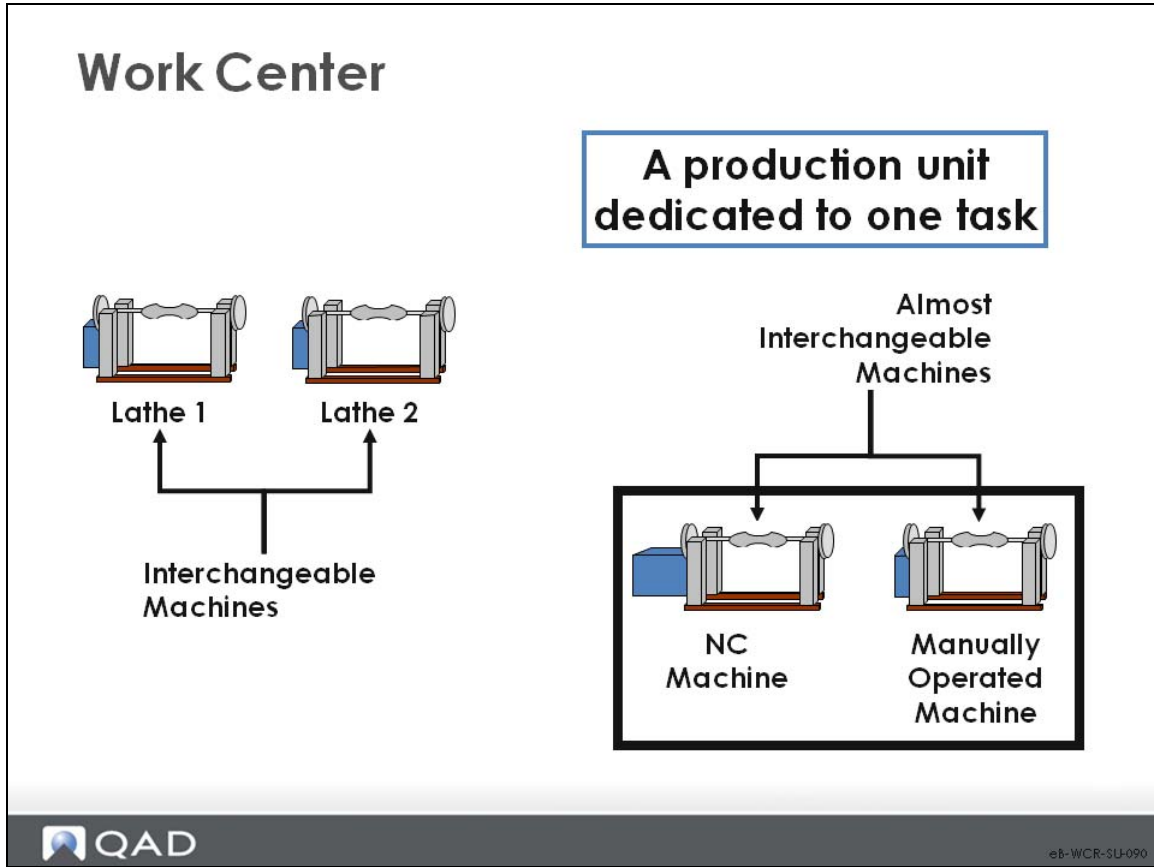
### Work Centers and Routings Process Setup and Maintenance



- ✓ Shop Calendar
- ✓ Departments
- **Work Centers**
- Standard Operations (optional)
- Master Comments (optional)
- Routing Setup
- Processes (optional)

e8-WCR-SU-080

- A work center is a production facility that performs specified tasks
  - It identifies machines, groups of similar machines, people, or subcontract suppliers
  - In QAD Enterprise Applications, 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 centers can be very specific as shown here with lathes. Or they can be very general as with manual assembly where one work center with several people can be capable of many different tasks.

## Work Center Maintenance

### Work Center Maintenance

Work Center Maintenance x  
 Go To Actions Copy Print Preview Attach  
 Work Center: 1000 (1) Machine:

Work Center: 1000 Machine:


Description: General Assembly

Department: 0400 Assembly

Queue Time: 0.25  
 Wait Time: 0.25  
 Mach/Op: 1

Setup Crew: 1.00      Setup Rate: 5.00  
 Run Crew: 1.000      Labor Rate: 4.50  
 Machines: 1.000      Labor Burden Rate: 0.02  
 Mach Bdn Rate: 0.05      Labor Bdn %: 0.01%

Identify individual machines if necessary


e8-WCR-SU-100

Use this function to create and modify work centers.

- For subcontracting, set up a work center for each type of subcontract operation or supplier. Where possible it will work best if the subcontract work center has the same code as the supplier. Set subcontract work center rate costs to zero. Subcontract costs are managed as purchase cost and are indicated on the subcontract operation in the route.
- Work center data is accessed by most manufacturing functions in QAD Enterprise Applications. 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.

The following describe key fields in this program.

*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 cannot 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:

$(\text{setup time} / \text{order quantity} \times \text{routing machines per op} + \text{run time}) \times \text{WC mach burden rate}$

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:

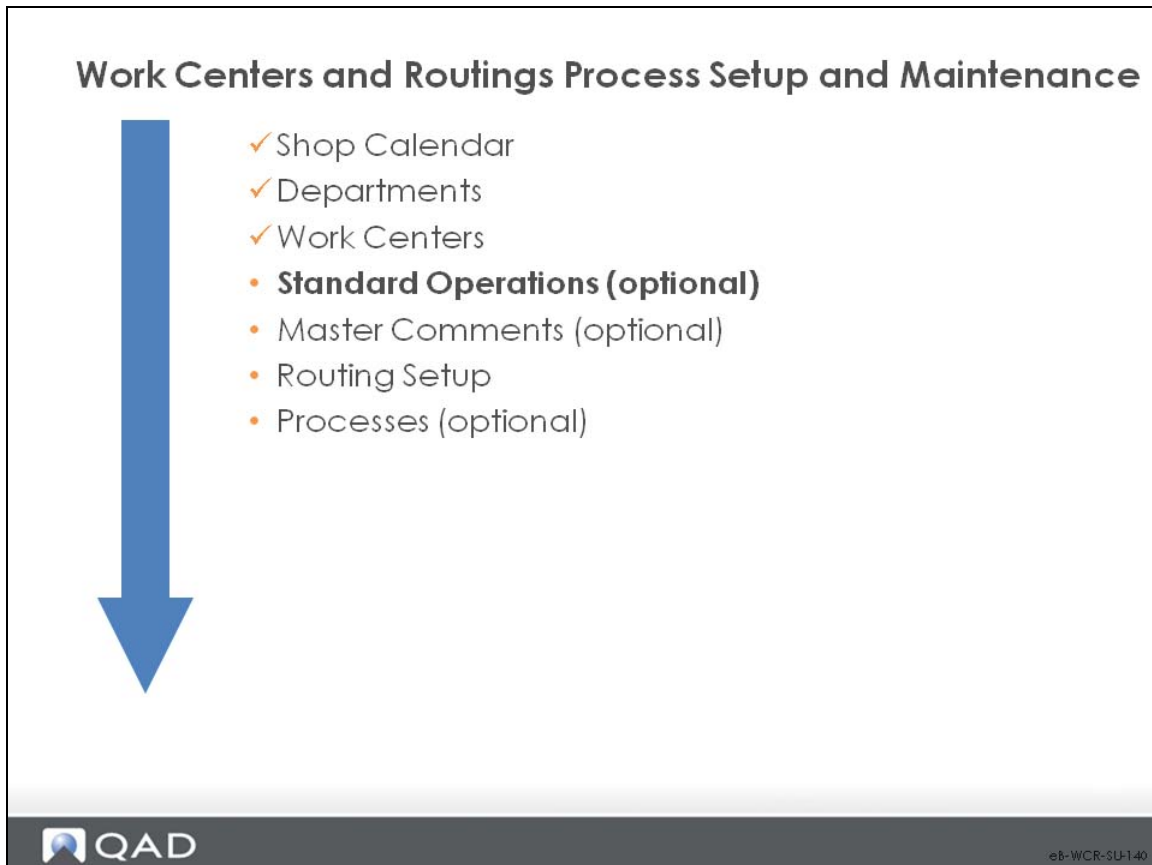
- The labor burden rate and labor burden percentage
- The labor burden rate is multiplied by the operation setup and run times
- Actual labor burden is calculated using the actual hours reported and the burden rates and labor costs from the work center where the operation was reported

*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 where the operation was reported

## Standard Operations



Standard operations are optional.

- Often, routings share one or more operations that are essentially the same
  - An automated packaging process can be the same regardless of the color of the products packaged
  - Various heat treating or oven cycles are also examples of standard operations.
- To save work when entering new routing operations, in QAD Enterprise Applications, you can create template operation steps called standard operations

## Standard Operation Maintenance

# 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 that references this standard operation code
  - It can 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

**Note** If you use standard operations as templates to save data entry and then modify them, they are no longer “standard operations.” In the previous example Heat Treat cycle 1000 should always be the same.

- 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 “Routing Update” on page 55.

**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 can 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 can be left blank. This field is for reference only and can 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 can appear on some selected reports and inquiries

A supplier code can be recorded even if the operation is not normally subcontract. This is useful for identifying operations that can 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 is No, Repetitive Labor Transaction is not permitted. You can report in:

- Repetitive Setup Transaction,
- Repetitive Reject Transaction,
- Repetitive Rework Transaction, as well as in
- Repetitive Scrap Transaction, which backflushes scrapped items

If this field is 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.

The system assumes the last operation is a milestone, regardless of this field.

Milestones let you define meaningful reporting points in your processes and avoid reporting where it is not meaningful. For example, you may want 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 that 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 and 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 set up, 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

## Master Comments

### Work Centers and Routings Process Setup and Maintenance



- ✓ Shop Calendar
- ✓ Departments
- ✓ Work Centers
- ✓ Standard Operations (optional)
- **Master Comments (optional)**
- Routing Setup
- Processes (optional)

 e8-WCR-SU-110

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.

## Master Comments

Text, such as instructions, that you can assign to operations

### Instructions:

1. Do this.
2. Do that.
3. Do both.
4. Do something else.



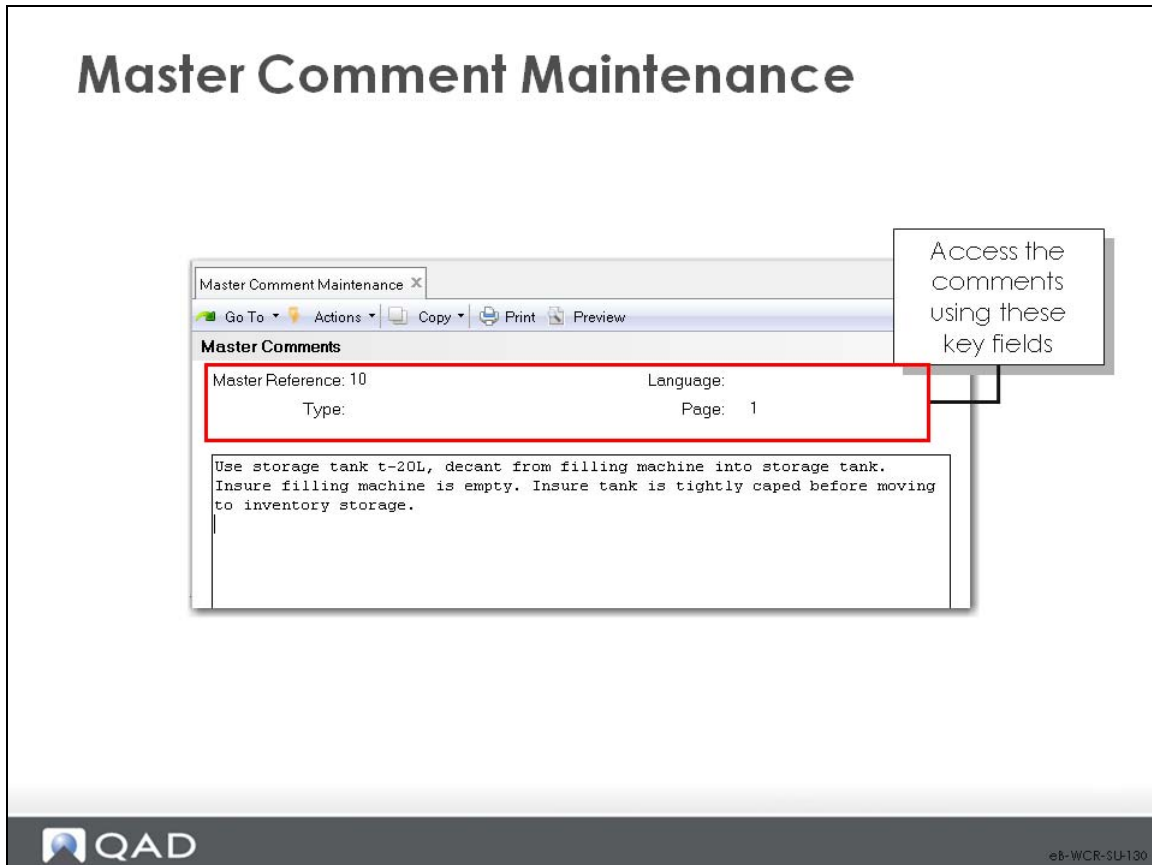
e8-WCR-SU-120

Comments are useful for recording such things as:

- Processing instructions
- Tolerances
- Test specifications for an operation

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

## 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


**Note** This function can be called from within Routing Maintenance by operation.

## Routings

**Work Centers and Routings Process Setup and Maintenance**

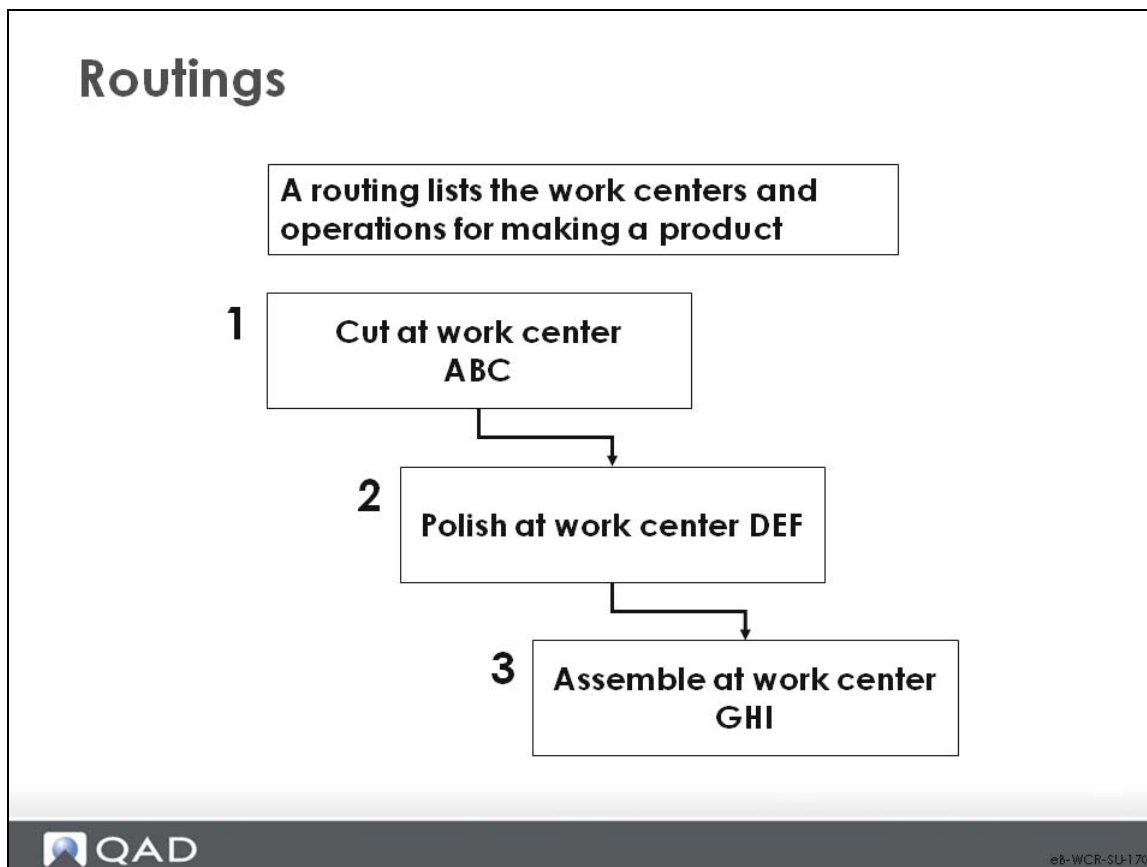


- ✓ Shop Calendar
- ✓ Departments
- ✓ Work Centers
- ✓ Standard Operations (optional)
- ✓ Master Comments (optional)
- **Routing Setup**
- Processes (optional)

 QAD e8-WCR-SU-1.60

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

### Routing Setup

- Routing Maintenance
- Routing Copy
- Routing Update
- Routing Cost Roll-Up
- Operation Cost Calculation
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards



e8-WCR-SU-180

Routings are important and complex elements in QAD Enterprise Applications; the diagram shows the programs for their development and maintenance.

## Routing Maintenance

### Routing Setup

- **Routing Maintenance**
- Routing Copy
- Routing Update
- Routing Cost Roll-Up
- Operation Cost Calculation
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards

## Types of Routings

### Routings

#### 2 ways to set up routings

- Routing Maintenance
- Routing Maintenance (Rate Based)



e8-WCR-SU-200

- 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

The screenshot shows the 'Routing Maintenance' window with the following fields and values:

- Routing Code: 01020
- Operation: 60
- Machine: 1000
- Description: Assemble components
- Machines per Operation: 1
- Setup Time: 0.0
- Run Time: 0.0
- Move Time: 0.0
- Yield Percent: 100.00%
- Milestone Operation: (dropdown menu)
- Subcontract LT: 0
- Setup Crew: 1.00
- Run Crew: 1.00
- Subcontract Cost: 0.00
- Comments: (text area)

Callouts in the image:

- 'How long per unit?' points to the Run Time field.
- 'Check here to add comments' points to the Comments field.

Each routing or process consists of one or more operations.

### Field Definitions

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 can 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 10s or 100s, 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 cannot overlap.

You can leave either or both fields blank

Using effective dates enables you to phase in engineering changes and maintain history online.

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 can 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)

# Routing Maintenance (Rate Based)

Routing Maintenance (Rate Ba... X)
Go To Actions Copy Print Preview Attach

Routing Code: 01020      Standard Operation:      Standard Operation:

Routing Code: 01020      Implantable Ultrasound

Operation: 60      Start Date:      End Date:

Standard Operation:

Work Center: 1000      General Assembly

Machine:

Description: Assemble components

Machines per Operation: 1      Milestone Operation:

Overlap Units: 0      Subcontract LT: 0

Queue Time: 0.25      Setup Crew: 1.00

Wait Time: 0.25      Run Crew: 1.00

Setup Time: 0.0

Hourly Production Rate: 10.0

Move Time: 0.0

Start Date:      Tool Code:

End Date:      Supplier:

Yield Percent: 100.00%      Inventory Value: 0.00

Subcontract Cost: 0.00

Comments:

How many units per hour?


e6-WCR-SU-220

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

### Routing Setup

- ✓ Routing Maintenance
- **Routing Copy**
- Routing Update
- Routing Cost Roll-Up
- Operation Cost Calculation
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards

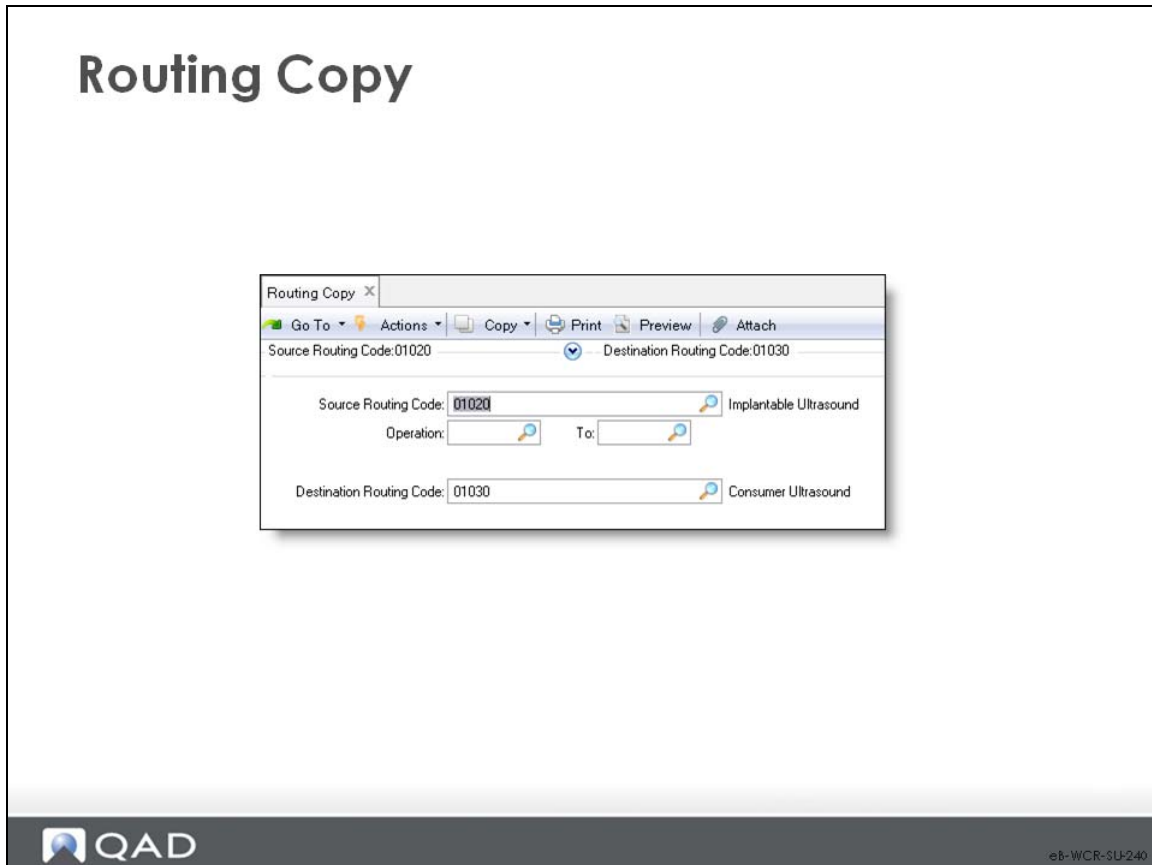


e8-WCR-SU-230

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



*Source Routing Code.* The routing you want 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

### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- **Routing Update**
- Routing Cost Roll-Up
- Operation Cost Calculation
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards



e8-WCR-SU-250

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.
- For example: the standard time and temperature for a heat treat cycle are changed by engineer order. The standard operation heat treat cycle is used by hundreds of items. Update the Standard Operation record then run this Update transaction. All routes using this standard operation are updated to the new time and temperatures.

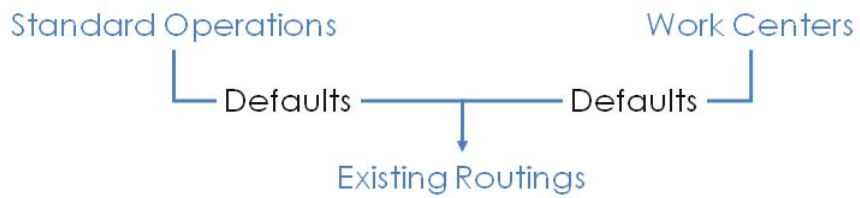
## Routing Update

### 1. Create routings



### 2. Update standard operations & work centers

### 3. Update existing routings with new defaults



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

## Routing Update Criteria

# Routing Update

e8-WCR-3U-270

*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 do not match.

Set Display to Yes to include the information on the report. To review only, set Display to Yes and Update to No. After going over the report, you can set Update to Yes and rerun to make the changes take effect.

## Routing Cost Roll-Up

### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- ✓ Routing Update
- **Routing Cost Roll-Up**
- Operation Cost Calculation
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards



e8-WCR-SU-280

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 *Training Guide: Product Costing and Cost Management*.

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

## Routing Cost Roll-Up

Calculate the manufacturing costs, lead times, and yield for selected items

- Labor Time
- Setup Time
- Lead Time
- Yield
- Labor cost
- Burden cost
- Subcontract cost

## Routing Cost Roll-Up

### Routing Cost Roll-Up

Routing Cost Roll-Up x
Go To Actions Copy Print Preview Attach

Site: 10-100 Cost Set: Current Item Number:

Site: 10-100 Ultrasound Mfg Site [ AVG / CURR ]

Cost Set: Current Default Current Cost Set

Item Number:  To:

Item Type:

As of Date: 10/21/2010

Roll-up Labor Time:

Roll-up Setup Time:

Roll-up Lead Time:

Roll-up Item Yield:  Include Yield in Cost:

Roll-up Labor Cost:


Roll-up Burden Cost:

Roll-up Subcontract Cost:

Update Items without Routings:

Update Items At This Site Only:

Output:  
Batch ID:


e8-WCR-SU-300

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

### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- ✓ Routing Update
- ✓ Routing Cost Roll-Up
- **Operation Cost Calculation**
- Actual Pay Rate Maintenance
- Alternate Routings
- Work Center/Routing Standards



e8-WCR-SU-310

Operation Cost Calculation does a combined routing and product structure roll-up, creating a separate operation cost 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

### 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 (shown)

Scrap:	0.00%
Lead Time Offset:	
Operation:	10

## Operation Cost Calculation

Operation Cost Calculation

Go To Actions Copy Print Preview Attach

Site: 10-100 Cost Set: Standard Item Number

Site: 10-100 Ultrasound Mfg Site

Cost Set: Standard Default GL Cost Set [ STD / GL ]

Item Number: 01011 To: 01013

Item Type: [ ]

As of Date: 10/21/2010

Include Yield in Cost:

Update Alternate Routings:

Update Items At This Site Only:



e8-WCR-SU-330

- 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

### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- ✓ Routing Update
- ✓ Routing Cost Roll-Up
- ✓ Operation Cost Calculation
- **Actual Pay Rate Maintenance**
- Alternate Routings
- Work Center/Routing Standards



e8-WCR-SU-340

- 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

## Work Center Maintenance

Sett. Rate:	25.00
Labor Rate:	15.00
Labor Burden Rate:	5.00
Labor Bdn %:	25.00%

## Actual Pay Rate Maintenance

Pay Type:	HR
Rate of Pay:	24.50
Prior Pay Rate:	20.25

## Actual Pay Rate Maintenance

The screenshot shows a web browser window titled "Actual Pay Rate Maintenance". The browser's address bar contains "Employee:10-EMP01". The page content includes the following fields:

- Employee: 10-EMP01
- Name: Alex Erikson
- Job Title: Engineer
- Department: 0100
- Pay Type: HR (dropdown menu)
- Rate of Pay: 24.50 (text input)
- Prior Pay Rate: 20.25 (text input)
- Shift: 1 (text input)
- Normal Hrs/Units: 8.00 (text input)
- Date of Last Pay Rate: (dropdown menu)



e8-WCR-SU-366

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

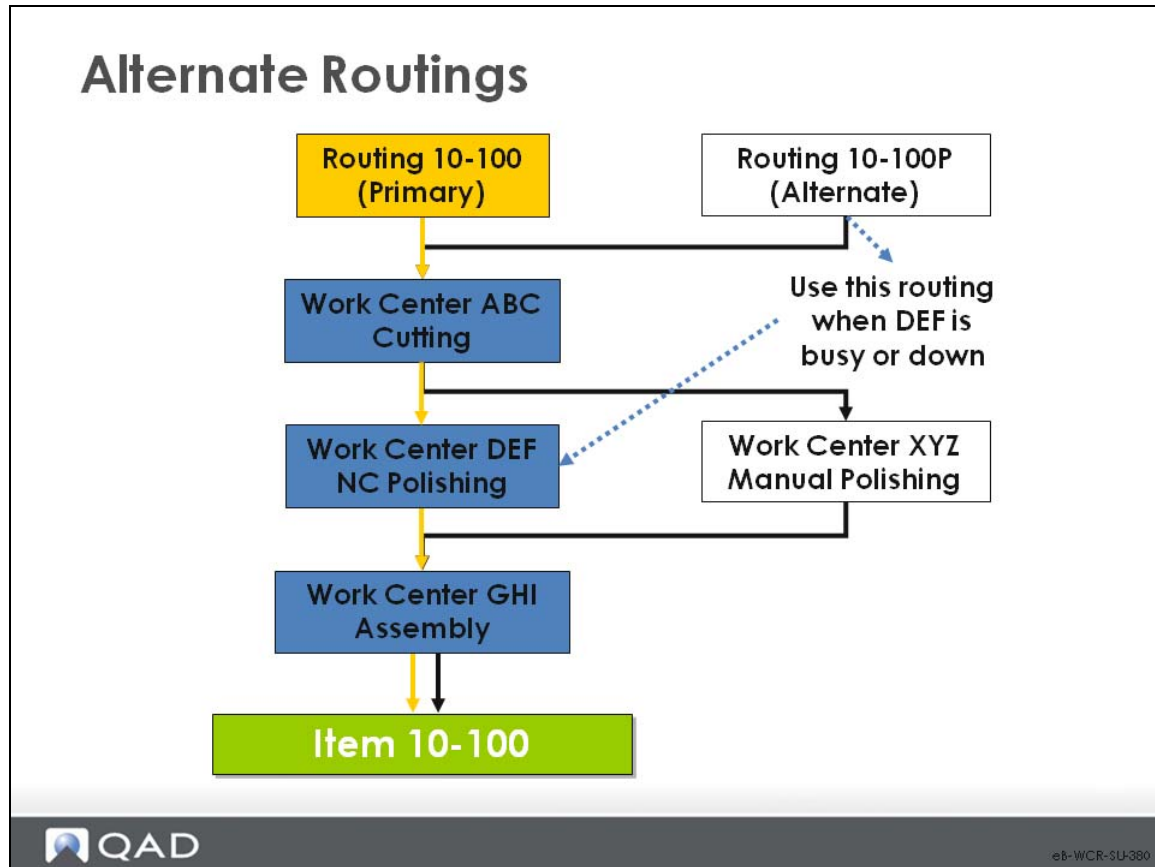
### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- ✓ Routing Update
- ✓ Routing Cost Roll-Up
- ✓ Operation Cost Calculation
- ✓ Actual Pay Rate Maintenance
- **Alternate Routings**
- Work Center/Routing Standards



e8-WCR-SU-370

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



One of the more common uses of an alternate route is in the case of an alternate product structure. Often the use of alternate components or materials will require the use of alternate operations. Other uses include alternate work centers and or machines that may require more time, or the use of subcontract operations deal with capacity issues.

An alternate route can also be used as a set of default operations. For example in cutting slacks of a specific size the route does not care what color the material is or often what type of material is being cut.

## Alternate Routings: Procedure

# Alternate Routings

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

**Routing 1500-10-A1**  
(Alternate)

Routing Maintenance X

Go To Actions Copy Print Preview Attach

Routing Code: 1500-10-A1 Standard Operation: Standard Operation:

Routing Code: 1500-10-A1

Operation: 10 Start Date: End Date:

Standard Operation:

Work Center: 1000 General Assembly

Machine:

Description:

Machines per Operation: 1 Milestone Operation:

Overlap Units: 0 Subcontract LT: 0

Queue Time: 0.25 Setup Crew: 1.00

Wait Time: 0.25 Run Crew: 1.00

Setup Time: 0.0 Tool Code:

Run Time: 0.0 Supplier:

Move Time: 0.0 Inventory Value: 0.00

Start Date: End Date:

Yield Percent: 100.00% Subcontract Cost: 0.00

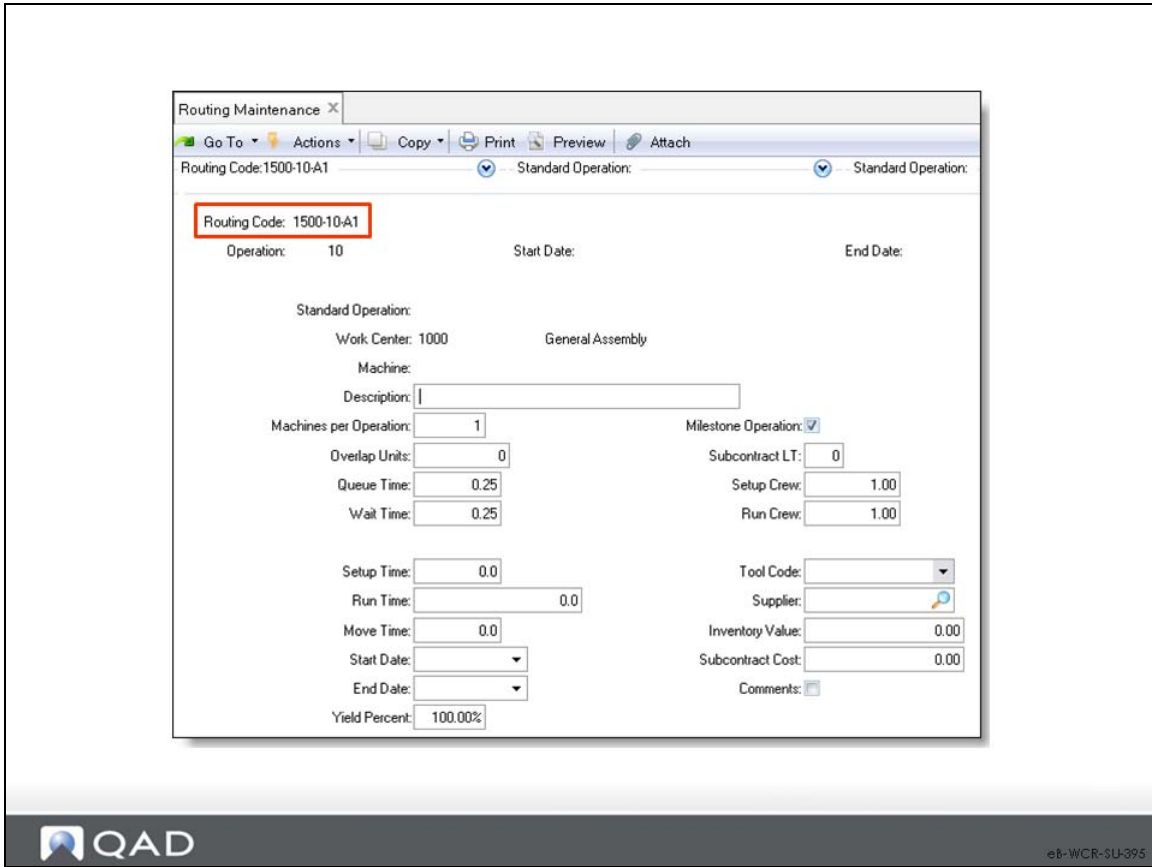
Comments:



e8-WCR-SU-390

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. An alternate route can also be assigned as a default for an item in Item Planning Maintenance or Item Site Planning Maintenance.



Discussed in *Training Guide: Shop Floor Control*.

## Alternate Routing Maintenance

# Alternate Routing Maintenance

## 2 Assign items to it in Alternate Routing Maintenance (Field data shown for example only)

The screenshot shows a web-based form titled "Alternate Routing Maintenance". At the top, there is a search bar with "Item Number: 01010 (2)" and "Site: 10-100". Below this, the form displays the following details:

Item Number: 01010	Site: 10-100
Description: Medical Ultrasound	Drawing: F-10000-A23
Unit of Measure: EA	Item Type: FINGOOD
	Status: ACTIVE

At the bottom of the form, there are two input fields: "Routing Code: 1500-10-A1" and "Bill of Material: 1500-10-A1". Both fields are highlighted with a red box.

## 3 Use Item or Item-Site Planning Data, to assign alternate or use Work Order Maintenance or the Shop Floor Control module to assign the alternate to a specific work order



e8-WCR-3U-400

In this function, you assign items to the alternate routings created in Routing Maintenance or 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 cannot 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 can be associated with more than one site.

**Routing Code.** Identifies a routing or process that can be used as an alternate method for producing this item/product. Only predefined alternate routings or processes can 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) that 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

### Routing Setup

- ✓ Routing Maintenance
- ✓ Routing Copy
- ✓ Routing Update
- ✓ Routing Cost Roll-Up
- ✓ Operation Cost Calculation
- ✓ Actual Pay Rate Maintenance
- ✓ Alternate Routings
- **Work Center/Routing Standards**



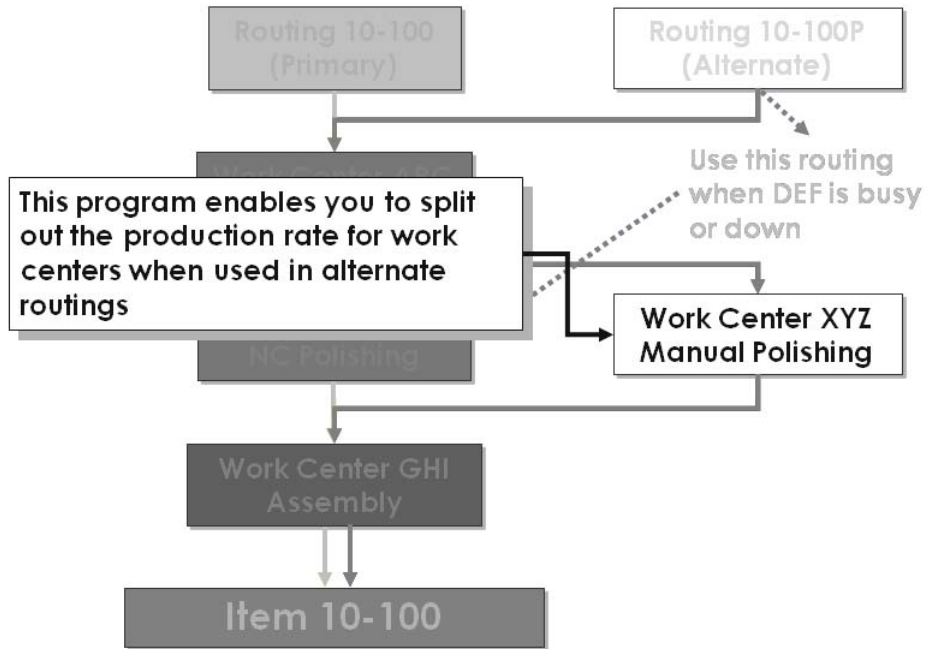
e8-WCR-SU-410

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 / Routing Stds Maintenance



## Work Center/Routing Stds Maint

### Work Center/Routing Stds Maint

e8-WCR-3U-430

Standard rates can be reviewed when determining which work center to use. Later, after production reporting, efficiency reports use the standard production 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.

**Note** 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.


*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

**Work Centers and Routings Process Setup and Maintenance**



- ✓ Shop Calendar
- ✓ Departments
- ✓ Work Centers
- ✓ Standard Operations (optional)
- ✓ Master Comments (optional)
- ✓ Routing Setup
- **Processes (optional)**

 QAD e8-WCR-SU-440

- 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 can be done in either batch or continuous mode

## Process Definition

### Process Setup and Maintenance

- **Process Definition**
- Process Definition Copy
- Process/Formula Maintenance



e8-WCR-SU-450

You set up processes as you do routings.

## Process Definition Maintenance

**Process Definition Maintenance**

Routing Code: 70004    Lubricant

Operation: 10    Batch Quantity: 1,000.0 L

Start Date:    End Date:

Standard Operation:

Work Center: 3010    Reactor 5,000 L

Machine: 5000

Description: Clean/Purge Reactor

Machines per Operation: 1    Milestone Operation:

Overlap Units: 0    Subcontract LT: 0

Queue Time: 0.25    Setup Crew: 1.00

Wait Time: 0.25    Run Crew: 1.00

Setup Time: 0.0    Yield Percent: 100.00%

Run Time/Batch Qty: 0.2    Tool Code:

Move Time: 0.0    Supplier:

Start Date:     Subcontract Cost: 0.00

End Date:     Comments:

Unique fields

Set up in Formula Code Maintenance or Batch Quantity Change

QAD e8-WCR-3U-460

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

**Run Time/Batch Qty.** 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.

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** QAD Enterprise Applications 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 Setup and Maintenance

- ✓ Process Definition
- **Process Definition Copy**
- Process/Formula Maintenance



e8-WCR-SU-470

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

Process Definition Copy

Go To Actions Copy Print Preview

Source Routing Code: 2400:00      Lube Formula  
Operation: 10      To: 30      Batch Qty: 20,000.0

Destination Routing Code: 2400:20

Output: PAGE 1000  
Batch ID:



e8-WCR-SU-480

*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 Setup and Maintenance

- ✓ Process Definition
- ✓ Process Definition Copy
- **Process/Formula Maintenance**



e8-WCR-SU-420

Process/Formula Maintenance allows you to enter formula, batch, and process information by operation. It is common in the process industry to have process sheets that define both the steps of the process and the materials that are used at each step in a single document. This function allows you to do the same thing.

## Formula/BOM Code Screen

### Process/Formula Maintenance

Process/Formula Maintenance
Go To Actions Copy Print Preview Attach


BOM/Formula Code: 70004

Formula

BOM/Formula Code: 70004	Batch Size: 1,000.0	UM: L
Description: Lubricant	Formula: <input checked="" type="checkbox"/>	
Backflush Method: 1	Quantity Complete Method: SUM	

Entry Options

Operation Detail: <input checked="" type="checkbox"/>	Co/By-Products: <input checked="" type="checkbox"/>
Components: <input checked="" type="checkbox"/>	Comments: <input type="checkbox"/>


e8-WCR-SU-500

**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.

## Operation Detail Screen

# Process/Formula Maintenance

Process/Formula Maintenance
Go To
Actions
Copy
Print
Preview
Attach

BOM/Formula Code: 70004
Work Center: 3010
Machine: 5000

Operation Detail

Operation:	10	Start Date:	
		End Date:	
Standard Operation:			
Work Center:	3010	Reactor 5,000 L	
Machine:	5000		
Description: Clean/Purge Reactor			
Machines per Operation:	1	Milestone Operation:	<input checked="" type="checkbox"/>
Overlap Units:	0	Subcontract LT:	0
Queue Time:	0.25	Setup Crew:	1.00
Wait Time:	0.25	Run Crew:	1.00
Setup Time:	0.0	Yield Percent:	100.00%
Run Time/Batch Qty:	0.2	Tool Code:	
Move Time:	0.0	Supplier:	
Start Date:		Subcontract Cost:	0.00
End Date:		Comments:	<input type="checkbox"/> UM:

e8-WCR-SU-510

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

## Components Screen

### Process/Formula Maintenance

Process/Formula Maintenance
Go To Actions Copy Print Preview Attach

BOM/Formula Code: 70004
Component Item: 03040 (2)
Process:

Components

Component Item: 03040		Lubricant 4 liter Tub	
Rev:			
Reference:			
Effective Date:	To:	Scrap: 0.00%	
Quantity per Batch:	16,000.0 EA	Lead Time Offset:	
Quantity Type: B		Operation:	10
Batch Percent:	0.0	Sequence Number:	
Structure Type:		Forecast Percent:	100.00%
Start Effective:		Option Group:	
End Effective:		Process:	
Remarks:			

e8-WCR-SU-520

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

Discussed in *Training Guide: Product Structures and Formulas*

## Exercise: Routings and Work Centers

### Create Routings

- 1 Use Work Center Maintenance (14.5) to create two machines in the work center 0410. Enter the following information.

Field	Machine 1 Data	Machine 2 Data
Work Center	0410	0410
Machine	1000	1100
Description	Forge Oven	Forge Press
Department	0410	0410
Queue Time	0	0
Wait Time	0	0
Mach/Op	1	1
Setup Crew	0	0
Run Crew	1	1
Machines	1	1
Mach Bdn Rate	100	100
Setup Rate	25.00	25.00
Labor Rate	25.00	25.00
Lbr Bdn Rate	0.00	0.00
Lbr Bdn%	200	200

- 2 Most companies have some operations that vary little from product to product. For example, QMI has established a heat treat cycle that can be used for most drop forged parts. Use Standard Operation Maintenance (14.9) to enter the following standard operation data and leave the other fields as they are.

Field	Data
Standard Operation	1000
Description	Heat treat cycle 1 450c
Work Center	0410
Machine	1000
Run Time	0.005

Field	Data
Standard Operation	1001
Description	Forge sheet steel
Work Center	0410
Machine	1100
Setup Time	0.25
Run Time	0.017

- 3 Use Routing Maintenance (14.13.1) to create a routing for item 62250.

Field	Data
Routing Code	62250
Operation	10
Standard Operation	1000
Queue Time	0.75
Wait Time	2.5

**Note** In this example the queue time is the time for the oven to come up to temp. The wait time is the actual oven cycle time.

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

Comments could be used here to add additional detail about the heat treat process. Check the comments box and when the window opens add the following comment:

“When the heat treat cycle is complete; ensure the forge press is available and setup with the correct die. Using tongs, move the billet to the forge press as quickly as possible.”

- 4 Add a second operation for routing 62250.

Field	Data
Routing Code	62250
Operation	20
Standard Operation	1001

- 5 Use Routing Inquiry (14.13.3) to review the resulting operations for item 62250.
- 6 Use Calendar Maintenance (36.2.5) to set up a calendar for site 10-200, work center 0410 and Machine 1000, forge oven. This machine is available 24 hours a day Monday through Friday.

### Define Alternate Routings

- 1 Use Routing Copy (14.13.6) to create an alternate route for item 02200. Copy the route for 02200 to destination code 02200-A1.
- 2 Use Routing Maintenance (14.13.1) to modify routing 02200-A1.
  - a Delete operation 15.
  - b Change the work center for operation 30 from Product Test (1050) to Electrical Test (1040).
- 3 Use Alternate Routing Maintenance (14.15.1) to link item 02200 to Routing Code 02200-A1.
- 4 Use Routing Inquiry (14.13.3) to review the new alternate routing.
- 5 Use Alternate Routing Browse (14.15.2) to see the alternate routing for item 02200.



Chapter 4

# **Work Order Subcontract Processing**

## Process Subcontract Operations

### In this section you learn how to:

- ✓ Identify some key business considerations before setting up work centers, routings, and WO subcontracting in QAD Enterprise Applications
- ✓ Set up departments, work centers, comments, standard operations, routings, and processes in QAD Enterprise Applications
- **Process subcontract operations in QAD Enterprise Applications**



eB-WCR-PR-010

This lesson covers subcontract setup and processing with work orders. Advanced Repetitive Schedules offer significant additional functionality for subcontract operations. Advanced Repetitive subcontract operations are covered in the Advanced Repetitive course.

**Note** The department and work center setup for subcontract operations covered here also applies to the advanced repetitive functionality.

## Subcontracting Requirements – Department

### Subcontracting Requirements

- **Department for outside operations**
- Work centers for outside operations
- Subcontract routing operations



eB-WCR-PR-000

- 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: Subcontract

### Department Maintenance: Subcontracting Requirements

Department Maintenance X

Go To Actions Copy Print Preview Attach

Department: 3090 Default Sub-Account:

Department: 3090

Default Sub-Account: Override:

Default Cost Center: Override:

Description:

Labor Capacity:

Cost of Production:	<input style="width: 80px;" type="text" value="5770"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value=""/>
Labor:	<input style="width: 80px;" type="text" value="5120"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>
Burden:	<input style="width: 80px;" type="text" value="5220"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>
Labor Usage Variance Acct:	<input style="width: 80px;" type="text" value="5140"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>
Labor Rate Variance Acct:	<input style="width: 80px;" type="text" value="5150"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>
Burden Usage Variance:	<input style="width: 80px;" type="text" value="5240"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>
Burden Rate Variance:	<input style="width: 80px;" type="text" value="5250"/>	<input style="width: 80px;" type="text" value="Mech"/>	<input style="width: 80px;" type="text" value="mfg"/>

eB-WCR-FR-030

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

### Subcontracting Requirements

- ✓ Department for outside operations
- **Work centers for outside operations**
- Subcontract routing operations


## Work Center Maintenance: Subcontract

# Work Center Maintenance:

## Subcontracting Requirements

Work Center Maintenance x
 Go To Actions Copy Print Preview Attach

Work Center: 2130 Machine:  
 Description:   
 Department:  Stamping  
 Queue Time:   
 Wait Time:   
 Mach/Op:   
 Setup Crew:  Setup Rate:   
 Run Crew:  Labor Rate:   
 Machines:  Labor Burden Rate:   
Mach Bdn Rate:  Labor Bdn %:


e6-WCR-FR-050

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. It will be most convenient if there is one work center for each subcontract vendor and the work center code is equal to the supplier code. In the example shown here the supplier code is SU100 and the Work Center code is SU100.

## Subcontracting Requirements – Routing

### Subcontracting Requirements

- ✓ Department for outside operations
- ✓ Work centers for outside operations
- **Subcontract routing operations**



eB-WCR-PR-060

Certain fields in routing operations deal specifically with subcontract requirements.

## Routing Maintenance - Subcontract

### Routing Maintenance

#### Subcontracting Requirements

Routing Maintenance X  
 Go To Actions Copy Print Preview Attach  
 Routing Code: 02001 Work Center: 2130 Machine:

Routing Code: 02001 Automotive Connector  
 Operation: 40 Start Date: End Date:

Standard Operation:  
 Work Center: 2130 Stamping 1

Machines:  
 Description: Stamping  
 Machines per Operation: 1 Milestone Operation:

Overlap Units: 0  
 Queue Time: 0.25  
 Wait Time: 0.25

Setup Time: 0.0  
 Run Time: 0.0 0.0  
 Move Time: 0.0  
 Start Date: End Date:  
 Yield Percent: 100.00%

Subcontract fields


Subcontract LT: 3

Setup Crew: 1.00  
Run Crew: 1.00

Tool Code:   
Supplier: 10300

Inventory Value: 0.00  
Subcontract Cost: 2.50

Comments:


e6-WCR-FR-070

Enter subcontract cost and lead time for subcontract operations. These values are the default when a routing or process operation is added that 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.

This second frame appears for entry of subcontracting information.

## Routing Maintenance

### Subcontracting Requirements (continued)

Routing Maintenance X

Go To Actions Copy Print Preview Attach

Routing Code: 02001 Work Center: 2130 Machine:

Routing Code: 02001 Automotive Connector

Operation: 40 Start Date: End Date:

Standard Operation:

Work Center: 2130 Stamping 1

Machine:

Description: Stamping

Machines per Operation: 1 Milestone Operation:

Overlap Units: 0 Subcontract LT: 3

Queue Time: 0.25 Setup Crew: 1.00

Wait Time: 0.25 Run Crew: 1.00

Setup Time: 0.0 Tool Code:

Run Time: 0.0 Supplier: 10-300

WIP Item: 52050 Move Next Operation:  0.00

Auto Labor Report:  2.50



eB-WCR-PR-080

**WIP Item.** Specify an item number to represent Work-In-Process (WIP) material for subcontract shipments. For example, you might create a WIP item “Hot Stamp” to accommodate a large range of items that are sent outside for processing. This gives you accountability and costing for items currently at the supplier’s place of business.

The WIP item must be a valid item number defined in the Item Master.

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.

**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.

**Yes:** Backflush Transaction automatically reports the standard number of run hours for the quantity processed entered for this operation as well as any prior non-milestone operations where this field is set to Yes. This is reported in addition to any labor hours entered in the transaction.

**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: Purchase Order

**Purchase Order Maintenance**

Purchase Order: P01008    Supplier: 10-300    Site: 10-100

Ln    Site    Req    Item Number    Qty Ordered    UM    Unit Cost    Disc%

1	10-100		52050	100.0	EA	2.50	0.00
---	--------	--	-------	-------	----	------	------

Line Details

Qty Received: 0.0    Due Date: 10/21/2010    CRT Int: 0.00

Qty to Rel: 0.0    Pur Acct: 6610    Mech    ADM

Single Lot:     Performance Date:    Project:    Type: S

Location: 020    Need Date:    Taxable:    Inspect Req:    Cmnts:

Item Revision:    Sales/Job:    UM Conversion: 1.0000

Status:    Fixed Price:     Stock UM Quantity: 100.0    EA

Supplier Item:    Manufacturer:    Description: Stamped Connector    Update Avg/Last Cost:     Extended Net Cost: 250.00

- Set up a purchase order line, type S, to cover the subcontracted service.

Work Order: [Search Icon]

ID: [Text Input]

Operation: 40 [Search Icon]

Subcontract Type: [Search Icon]

Lot/Serial: [Text Input]

- If you know the work order number you can enter it in the pop-up window on the PO line.

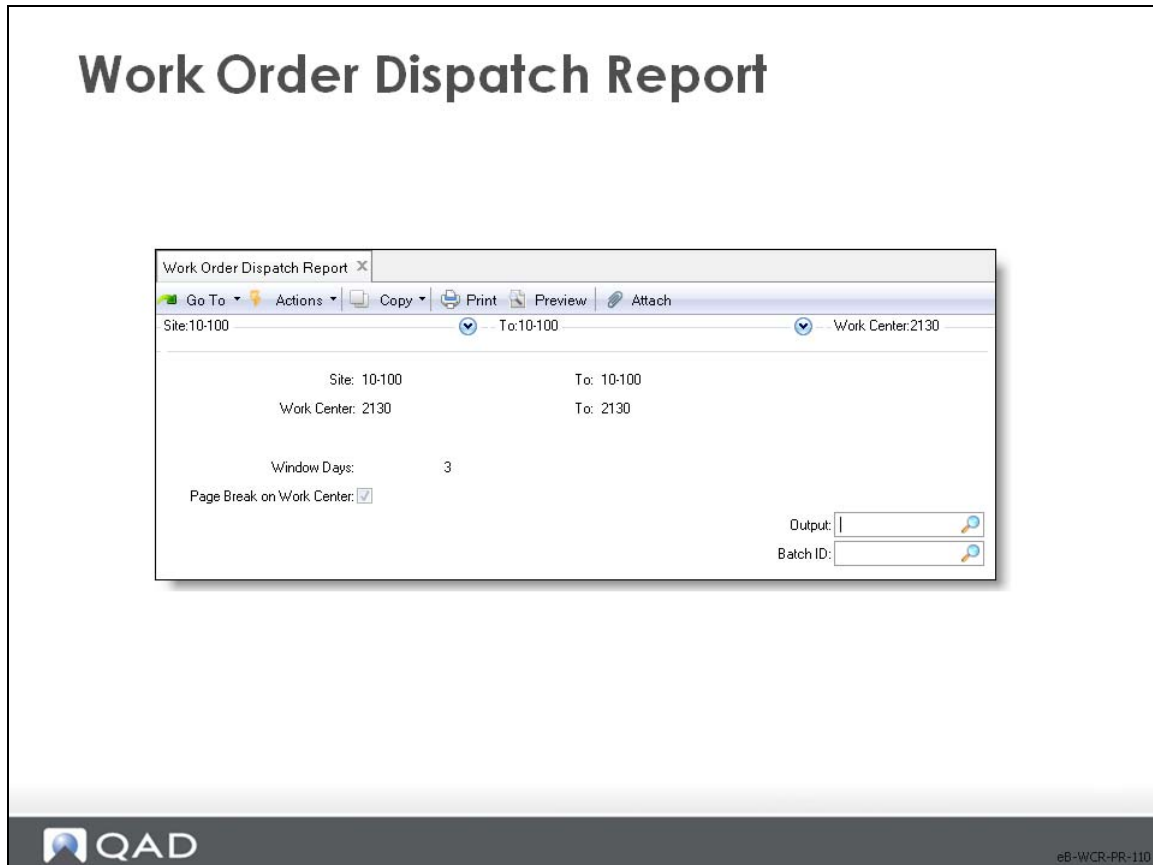
Subcontract Processing: Subcontract Routing Op PO

## Subcontract Process: Subcontract Routing Op PO

Supplier	Order	Line
10-300	PO1008	1

Use Subcontract Routing Op PO to link the subcontract routing operation to the subcontract line item on the purchase order.

## Work Order Dispatch Report



By selecting appropriate work centers, that is the work centers you have set up for your suppliers who do subcontract your work. You can print a report on subcontracting operations.

The Work Order Dispatch Report prints in work center sequence and shows all work orders with operations in the selected work centers, between the report date and the window days. In the example shown here the report will list work order operations that call for work center 2130 between today and 3 days from now.

### Subcontract Shop Floor Control

Use shop floor control transactions to report the operation before the subcontract operation as complete and select Move Next Operation. This moves the WIP to the subcontract work center.

Use Purchase Order Receipts to receive the items back into WIP at the next operations. In the case where the subcontract operation is the last operation, the units can be received into an inventory location. It is common to have an inspection operation be the first operation after the subcontract operation to verify that all shipped units have been received and all are correct. Use the Work Order WIP Cost Report to track WIP cost of subcontract operations.

# Work Order WIP Cost Report

Work Order WIP Cost Report

Go To Actions Copy Print Preview Attach

Item: 52050 Account: To:

Account: To:

Sub-Account: To:

Cost Center: To:

Project: To:

Work Order: To:

ID: To:

Item Number: 52050 To: 52050

Site: To:

Sales/Job: To:

Supplier: To:

## Work Order Cost Report

Work Order Cost Report

Go To Actions Copy Print Preview

Work Order: [ ] To: [ ]  
ID: [ ] To: [ ]  
Site: [ ] To: [ ]  
Item Number: [ ] To: [ ]  
Due Date: [ ] To: [ ]

Sales/Job: [ ]  
Supplier: [ ]  
Status: [ ]

Material: [Detail] [ ]  
Labor: [Detail] [ ]  
Burden: [Detail] [ ]  
Subcontract: [Detail] [ ]

Page Break on Work Order: [ ] Output:  
Batch ID:

QAD e6-WCR-FR-150

Use the Work Order Cost Report to see total work order cost including the cost of subcontract operations

You can print this and other reports by supplier code

## Purchase Order Receipts

# Purchase Order Receipts (1 of 2)

Purchase Order Receipts x

Go To Actions Copy Print Preview

Order: P01008 Supplier: 10-300 Status: Effective: 10/21/2010

Packing Slip:

Receiver:  QMI -USA Division

Move to Next Operation:

Receive All:

Comments:

Ship Date:



## Exercise: Subcontract Operations

Marketing has decided to add a Hot Stamp Logo to the Motor Mounting Plate Assembly (52200). San German Tube and Wire has agreed to this operation.

- 1 Use Department Maintenance (14.1) to verify that department 6050 has been set up for subcontract work.
- 2 Use Work Center Maintenance (14.5) to set up work center 2275 for the subcontract hot stamp work. Leave all of the rate fields blank, assign the work center to department 6050.
- 3 Use Item Master Maintenance (1.4.1) to add a new item.

Field	Data
Item Number	Hot Stamp
Prod Line	20
Item Type	COMP
Status	ACTIVE
Purchase/Manufacture	P

- 4 Use Routing Maintenance (14.13.1) to add operation 20, Hot Stamp, to routing 52200.
- 5 Use Purchase Order Maintenance (5.7) to create a purchase order for supplier 10SUBCT with one Hot Stamp in the order line, and make sure the Ln Format S/M field is set to "Single."

Field	Data
Supplier	10SUBCT
Ship-To	10-200
<b>Line</b>	
Item Number	Hot Stamp
Qty	1
Type	S

- 6 Use Subcontract Routing/Op PO Maintenance (5.11) to link the subcontract routing operation to the subcontract line item on the purchase order, effective today.



## 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?



Appendix A

# **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**

<b>Function</b>	<b>Notes</b>	<b>DR / CR</b>	<b>Account</b>	<b>Defaults From</b>
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**

<b>Report</b>	<b>Function / Purpose</b>
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

Appendix D

# **QAD Product Costing**

## Product Costing in QAD Enterprise Applications

This appendix provides a brief outline; for details refer to *Training Guide: Product Costing*.

In the standard core product, product costs are kept in two cost sets: the current cost set and the GL (standard) cost set. Additional cost sets can be defined using functionality in the Cost Management module.

All transactions are posted to the GL using the GL cost set data. In a standard cost environment, the GL cost set is kept fixed for a defined period of time, usually the GL fiscal year. The GL standards are then reset on a regular schedule, usually the fiscal year. The GL cost set can be defined as an Average Cost using functionality in the Cost Management module.

The current cost set can be updated automatically by the system using either the last cost (for purchase orders and work orders) or an average cost. Optionally, you can choose to not have the system update current costs.

In a standard cost environment, differences between the GL cost and the current cost are reported as variances, usually on a fiscal month basis. In an average cost environment costs are re-averaged as they occur and variances are not reported.

The standard core product maintains product costs in five cost categories in each of the two cost sets. These five categories are: Material, Labor, Burden, Overhead, and Sub-Contract. Additional user-defined cost elements can be defined as subsets of these cost categories using functionality in the Cost Management module.

- Material costs are manually entered and are usually the purchase costs of raw materials and components.
- Labor costs can be system calculated using rates defined in the work center records and times defined in the routing records.
- Burden is variable overhead and Overhead is fixed overhead. Burden can be system calculated using rates defined in the work center records. Overhead is manually entered in the item cost record.
- Sub-contract costs are entered manually and are treated as purchase costs.

The cost roll-up process begins with the Routing Cost Roll-Up, and proceeds with the Product Structure Cost Roll-Up. A common procedure is to do all cost setup and rollup work in the current cost set until costs are verified as correct. Costs can then be copied to the GL cost set. Either cost set can be frozen to prevent unintentional cost changes and to improve system response in new item cost rollups.

Product costs can be modified at each site and can be viewed on numerous inquires and reports.

# Index

## A

Actual Pay Rate Maintenance 64  
Address Code Change 39  
advanced repetitive  
    backflush transaction 97  
    move transaction 97  
    run labor transaction 97  
    setup labor transaction 97  
    subcontract processing 97  
Alternate Routing Maintenance 69  
alternate routing maintenance 71  
alternate routings 67  
    procedure 69  
answers 109

## B

Backflush Transaction 97  
Batch Quantity Change 77  
burden/labor rates 19  
business issues 11, 13  
    burden/labor rates 19  
    capacity requirements planning 18  
    repetitive 14  
    shop floor control 14  
    subcontracting 16

## C

Calendar Maintenance 27, 34  
capacity requirements planning 18  
course description 2  
course overview 6  
CRP 18

## D

Department Browse 114  
Department Maintenance 92  
Department Report 114  
departments 29

## E

exercises  
    answers 109  
    routings and work centers 86

## F

Formula Code Maintenance 77  
Formula Maintenance 85

## H

Holiday Maintenance 28

## I

Introduction to Product Structures and Formulas 115  
Inventory Account Maintenance 112  
Item Planning Maintenance 50, 71  
Item Routing Cost Report 114  
Item-Site Planning Maintenance 50, 71

## L

Labor Feedback by Work Order 66  
Line Schedule Workbench 27

## M

Master Comment Maintenance 41, 44  
master comments 42  
Move Transaction 97

## O

Operation Cost Browse 114  
Operation Cost Calculation 62, 114  
operation cost calculation 61  
Operation Cost Report 114  
operations  
    standard 37

## P

prerequisites 2  
pre-setup business issues  
    burden/labor rates 19  
process definition 76  
Process Definition Copy 79  
Process Definition Maintenance 71, 77, 84  
Process/Formula Maintenance 81  
    Components screen 85  
    Formula/BOM Code screen 82  
    Operation Detail screen 84  
processes 75  
Product Structure Cost Roll-Up 60  
Purchase Order Receipts 103

## R

Repetitive 74  
repetitive 14  
Repetitive Labor Transaction 40, 66  
Repetitive Reject Transaction 40  
Repetitive Rework Transaction 40  
Repetitive Scrap Transaction 40, 63  
Repetitive Setup Transaction 40  
Repetitive WIP Cost Report 40  
reports 113  
Routing Copy 54

- routing copy 53
- Routing Cost Report 114
- Routing Cost Roll-Up 15, 34, 40, 58, 60, 96, 112, 114
- Routing Inquiry 114
- Routing Maintenance 49, 50, 71, 77, 96
- routing maintenance 38, 48
- Routing Maintenance (Rate Based) 49, 51, 52
- Routing Report 114
- routing setup 47
- routing standards 72
- Routing Update 38
- routing update 55
- routings 45
  - alternate 67
  - introduction 5, 8
  - setup and maintenance 23
  - terminology 9
  - types 49
- Run Labor Transaction 97

## S

- setup
  - routing 47
- setup and maintenance
  - process 25
  - routings 25
  - work centers 25
- Setup Labor Transaction 97
- Shift Maintenance 27
- shop calendar 26
- Shop Floor Control 69, 74
- shop floor control 14
- Standard Operation Browse 114
- Standard Operation Maintenance 38

- Standard Operation Report 114
- standard operations 37
- standards
  - routing 72
  - work centers 72
- Sub Shipper Print 97
- subcontract processing 89
  - context 98
  - flow 99
- subcontracting 16
  - requirements
    - department 91
    - routing 95
    - work centers 93

## W

- Work Center Browse 114
- Work Center Maintenance 34, 94
- Work Center Report 114
- work center standards 72
- Work Center/Routing Stds Maint 72, 74
- Work Centers 32
- work centers
  - introduction 5, 7
  - setup and maintenance 23
  - terminology 9
- work centers and routings
  - GL effects 111
- Work Order Cost Report 102
- Work Order Dispatch Report 100
- Work Order Maintenance 69
- Work Order Routing Maintenance 38, 40
- Work Order WIP Cost Report 102