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QAD Enterprise Applications
Standard & Enterprise Edition

Training Guide
Advanced Repetitive Scheduling

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

Contents

About This Course

Description

This guide provides an overview of QAD Enterprise Applications' Advanced Repetitive Scheduling for both the Enterprise Edition and Standard Edition software suites.

Course Objectives

At the end of this course you should be able to:

- Setup Advanced Repetitive
- Use Advanced Repetitive

You will learn to:

- Setup Advanced Repetitive
- Use Advanced Repetitive

Audience

- Manufacturing Planners
- Shop Floor personnel in repetitive manufacturing environment

Prerequisites

Users should be familiar with the following QAD courses.

- Initial Setup
- Manufacturing Execution

Details of which specific topics pertain to each section/chapter can be found in the introduction to the section/chapter.

Course Credit

This course is typically taught in one day.

This course is valid for 6 credit hours.

QAD Web Resources

From QAD's main site, you can access QAD's Learning or Support sites.

http://www.qad.com/

Virtual Environment Information

The hands on environment in this book should be used with the Enterprise Edition 2010 - Addons r03 environment and the workspace 10USA > 10USACO.

Chapter 1

Introduction

Introduction to QAD Advanced Repetitive Scheduling
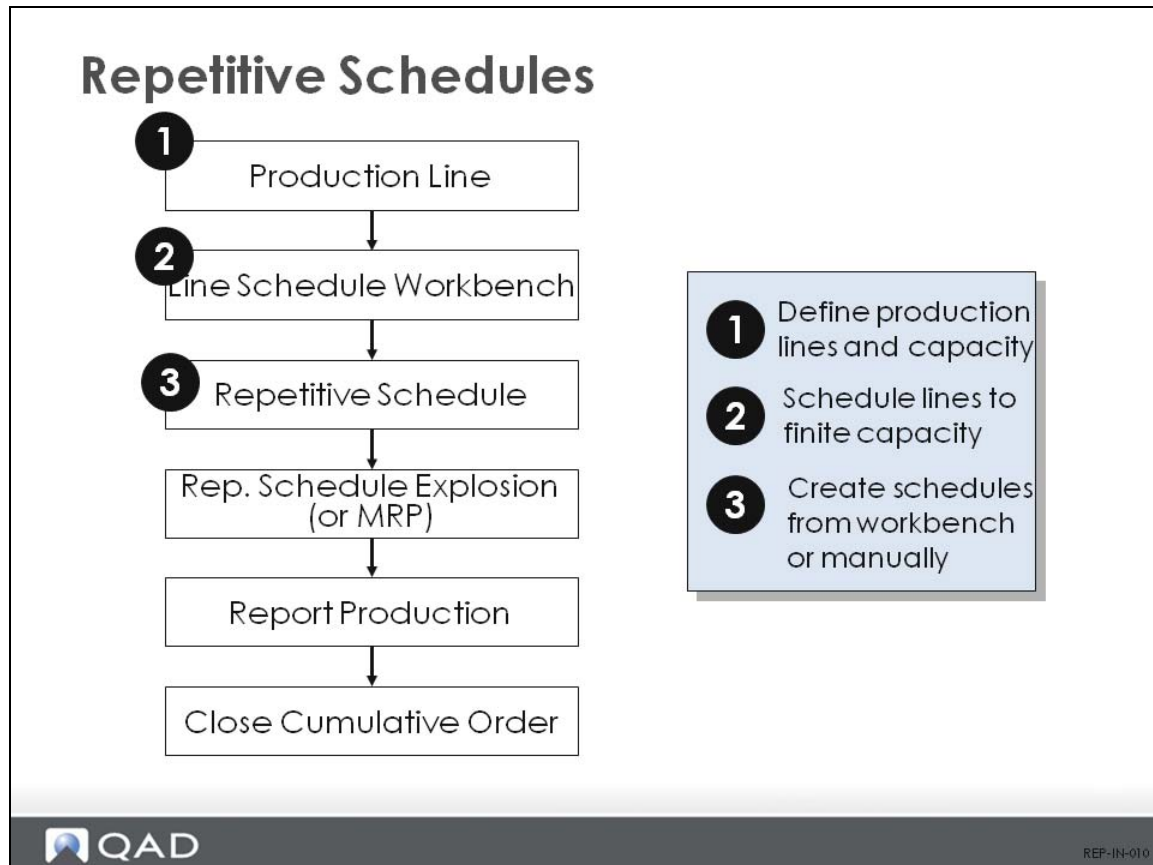
Repetitive module uses

In a repetitive manufacturing environment, the QAD Enterprise Applications Repetitive module works well when one or more of the following is true.

- Manufacturing lead times are relatively short and batches do not overlap.
- All work in process is complete by the end of each day or shift.
- Work-in-process (WIP) costs are either insignificant or fairly constant.

- The routing does not include subcontract operations.

These characteristics are typical of many food and chemical process that are batch oriented.

Advanced Repetitive module uses

QAD Enterprise Applications' Advanced Repetitive module supports manufacturing environments where the following apply.

- Manufacturing lead times are relatively long.
- Continuous processing is in use; lines may be dedicated to one item for days, weeks, or months.
- WIP costs are variable or high.

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- Subcontracting operations are used in a Release Management/JIT environment.
- Batches can overlap and visibility of and control over WIP are necessary.

These characteristics are typical of many discreet production processes where work in process is left on the line at the end of the day/shift and continued at the next shift.

The Advanced Repetitive module offers rich functionality. However, it is somewhat more complex and requires more hands-on control. Therefore, a thorough understanding of the functionality of this module is necessary for successful implementation. This course covers all aspects of advanced repetitive manufacturing, and includes hands-on exercises to illustrate the concepts.

Enabling the Advanced Repetitive Module in it's control file disables the Repetitive Module. As the Advanced Repetitive module will manage all repetitive operations. An enterprise with both types of process in a single domain should select the Advanced Repetitive module

Repetitive Schedules vs. Advanced Repetitive Schedules

Repetitive Scheduling

Repetitive Schedule → 18.22.2.1 Schedule Maintenance

Rep. Schedule Explosion → 18.22.2.4 Schedule Explosion

Report Production →
18.22.13 Backflush Transaction
18.22.14 Run Labor Transaction
18.22.15 Setup Labor Transaction
18.22.16 Reject Transaction
18.22.17 Rework Transaction
18.22.18 Scrap Transaction
18.22.19 Move Transaction
18.22.20 Down Time Transaction
18.22.21 Wip Adjust Transaction
18.22.22 Non-productive Labor Feedback

Close Cumulative Order → 18.22.10 Cumulative Order Close

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Chapter 2

Repetitive Production

Repetitive Production Overview
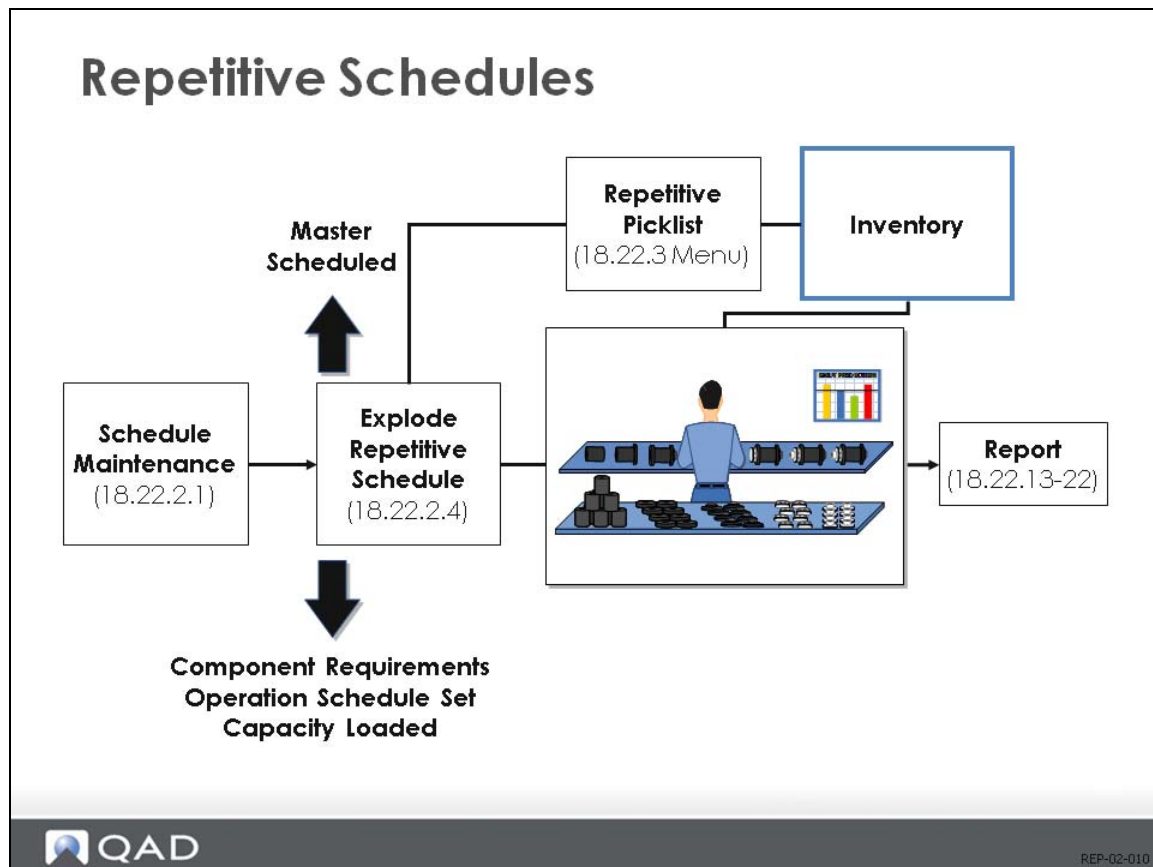
Advanced Repetitive Scheduling enables companies using a dedicated process for a group or family of items to manage labor, material, and costs by defining what should happen and then reporting what actually did happen.

Repetitive manufacturing is executed with schedules rather than work orders. Schedules require fewer steps and less paperwork to execute.

QAD Enterprise Applications' Advanced Repetitive scheduling enables you to:

• Build to a repetitive schedule.

• Run a production line without finite schedules.

• Run a production line with repetitive schedules forward scheduled to capacity limits.

• Report production and let MRP adjust inventory plans.

Repetitive Production
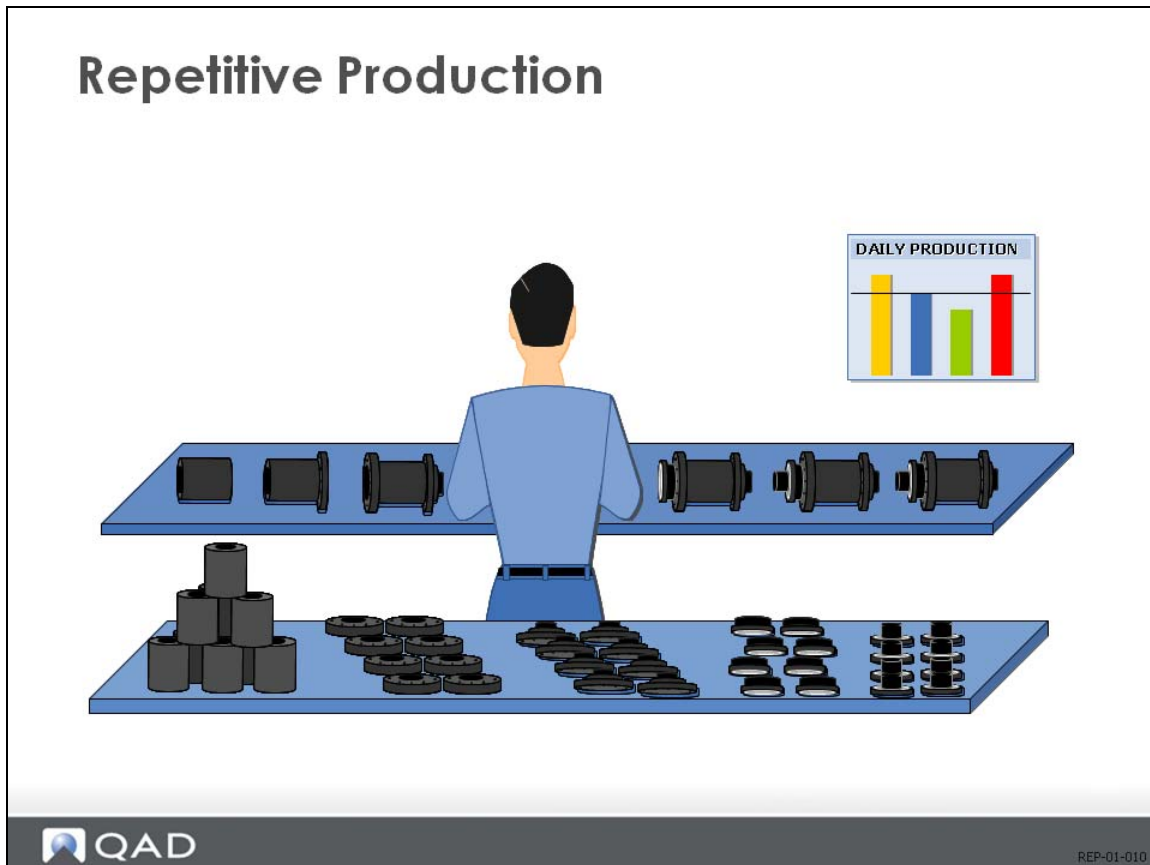
Repetitive Defined

Repetitive manufacturing is the production of individual items, using the same process for all items. In this kind of manufacturing the process has been brought under a high degree of control. There is little variation, and therefore, little need for paperwork for each item produced. Production is managed instead by creating a schedule of production, and then measuring actual production against what the schedule requires.

Manage by Variance

If you are managing a repetitive operation, you need to keep track of the amount of:

- labor put into the items
- material used

Because you understand your processes, you know how much labor and material ought to be put in, and you know how fast the items should be created. So you manage by comparing the amount of each item actually put in with the amount that ought to be put in.

Create Schedules-Report Actuals

To collect the required information, the manager or master scheduler must create reasonable production schedules for each item. Then each person working accurately reports what was actually completed and what was lost in wasted time or in work on items that were broken or not used (scrap). Periodically, the schedules and the reports of actuals must be summed up and compared.

Note   If you are using a single operation routing, you can use a kanban signal instead of creating a schedule.

Less Reporting

Relative to other manufacturing environments, repetitive manufacturing is remarkable for its absence of reporting. Each individual operation, and each individual issue of material does not need to be kept track of.

QAD Enterprise Application in Repetitive Environments
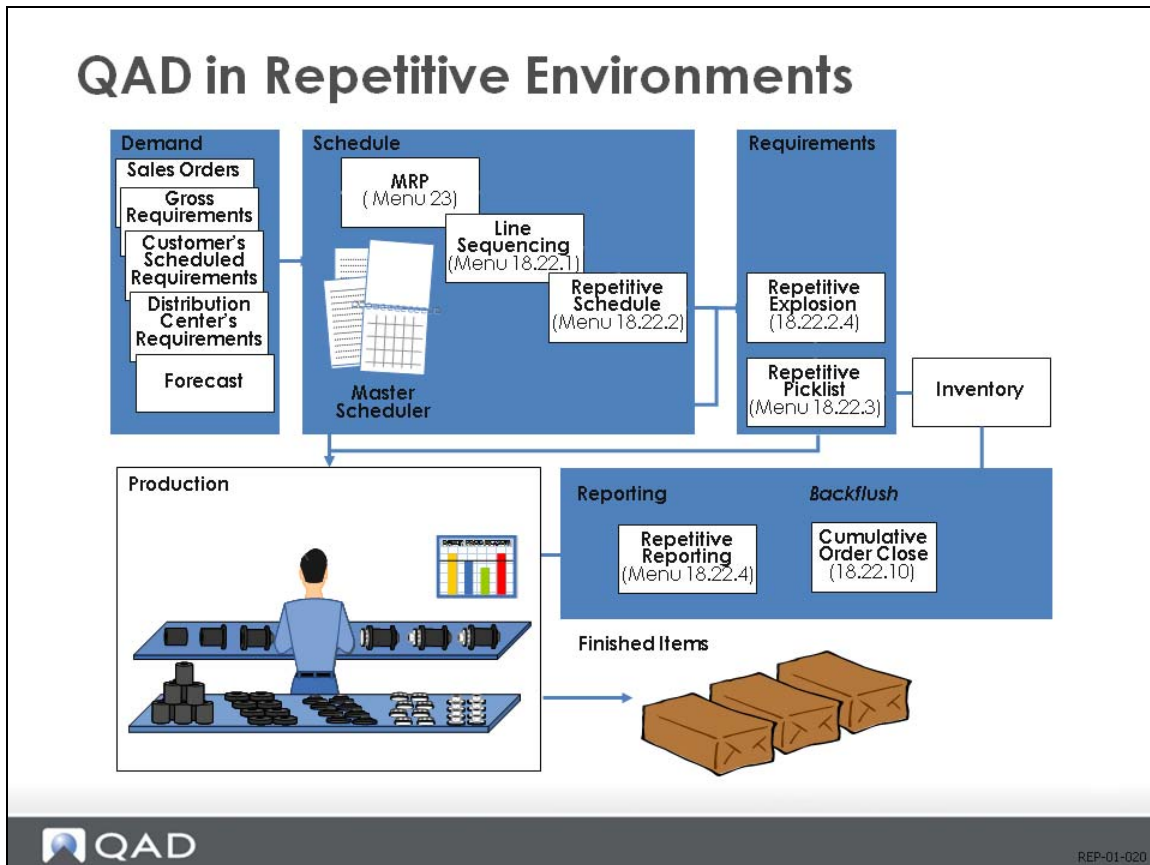
Supports Most Rep Environments

QAD Enterprise Applications' Advanced Repetitive module supports the reporting and management requirements of most repetitive environments.

Scheduling/Reporting

In a repetitive environment, you normally need two things from a computer system: the ability to create schedules and the ability to report on what happened. The schedules set requirements at each operation, and you can determine at which operation you want to report production counts. Labor reporting is optional.

Manual or via Line Sequencing

In QAD Enterprise Applications, you can do the scheduling manually, or use the line sequencing functionality. Line sequencing enables you to import QAD planned orders into a simulated schedule, and then modify the schedule based on the actual capacity of a production line.

Explosion, Picklist

Once you establish a schedule, you must explode it. Exploding a schedule determines what will be done at each operation and when. It also determines what material will be required at each operation. In environments where inventory is stored on the line, the repetitive picklist enables you to determine when to replenish the line's work centers.

Activity Reporting

Nine transaction types

As work is performed, labor and movement of WIP units are reported. QAD Enterprise Applications' repetitive functions enable you to report these activities using various types of transactions, including downtime, scrap, rework, move, and rejects. There are nine transaction types and several purchase order functions for subcontract activities.

Updating

The repetitive schedule is updated when units move to stock. Operation schedules are updated at completion of the operation. As the transactions are entered, a cumulative order is updated for costing or measuring variances.

Key Concepts
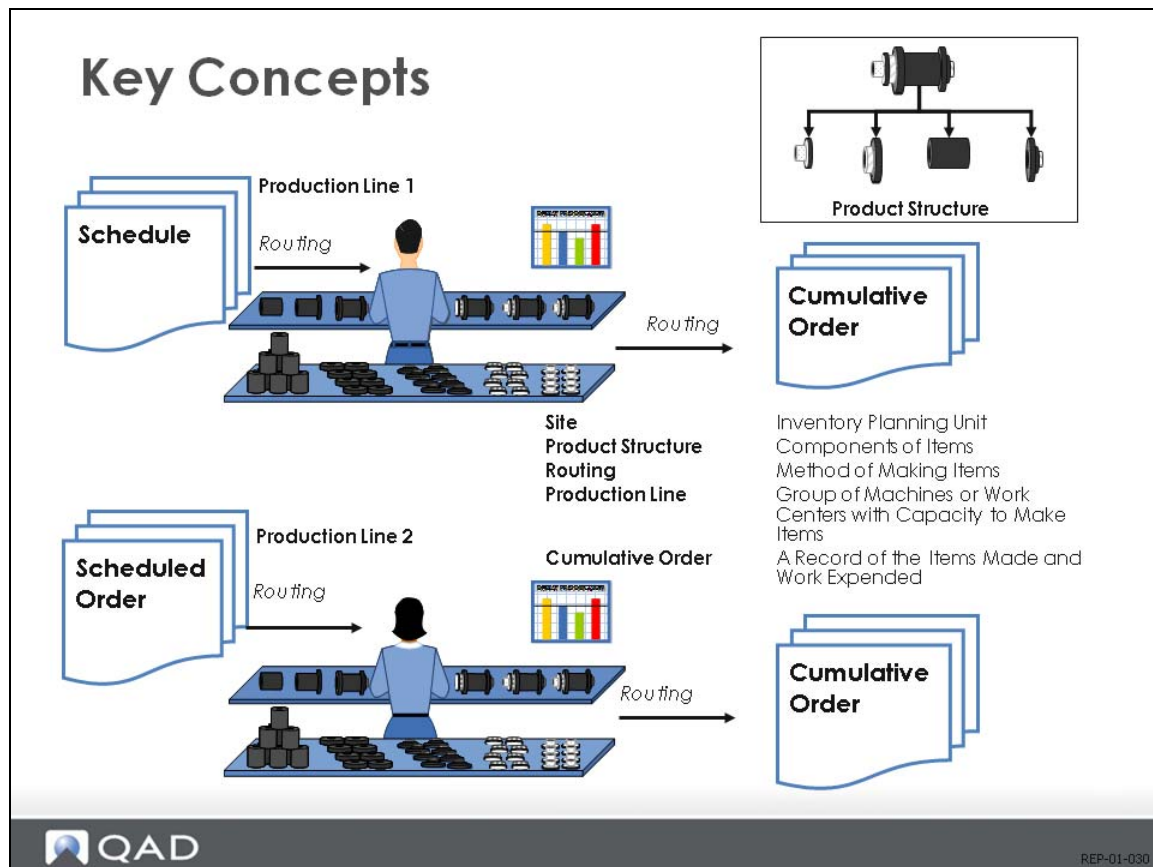
Scheduled, Cumulative Orders

QAD Enterprise Applications has two basic management functions in a repetitive environment: to set a schedule, and to record what happens. In QAD terms, both the schedule and the record are orders. The schedule is a scheduled order, the record is a cumulative order. Internally, the scheduled order is a special type of work order, and the cumulative order is a type of tally sheet. It shows the results of the production and labor reporting.

Site

A schedule order creates a requirement to make a certain item at a certain place, with certain materials, using a certain method. The place is a site. In QAD Enterprise Applications, a site is more a planning term than a actual geographic term.

Organization of orders, schedules

QAD Enterprise Applications organizes orders by site, item, product structure, and routing. It organizes schedules by site, item, product line, product structure, routing, and day.

Product Structures, Routings

An item has components. The list of components is the item's product structure or formula. In QAD Enterprise Applications, you can have more than one product structure for an item. However, each order for an item with a different product structure is treated as a different order. Routings are the methods for making an item. The same logic is true for routings. You cannot combine items with different routings on one order.

Production Lines

Production lines identify a series of work centers and machines, normally dedicated to the manufacturing of a specific number of products or families. Each production line has a certain capacity it is expected to produce. Multiple production lines can have the same routing, but each line can have a different capacity. Scheduled orders and cumulative orders for one production line are treated as different from orders for another line, even if the routings and structures are identical.

Repetitive Schedule and Explosion
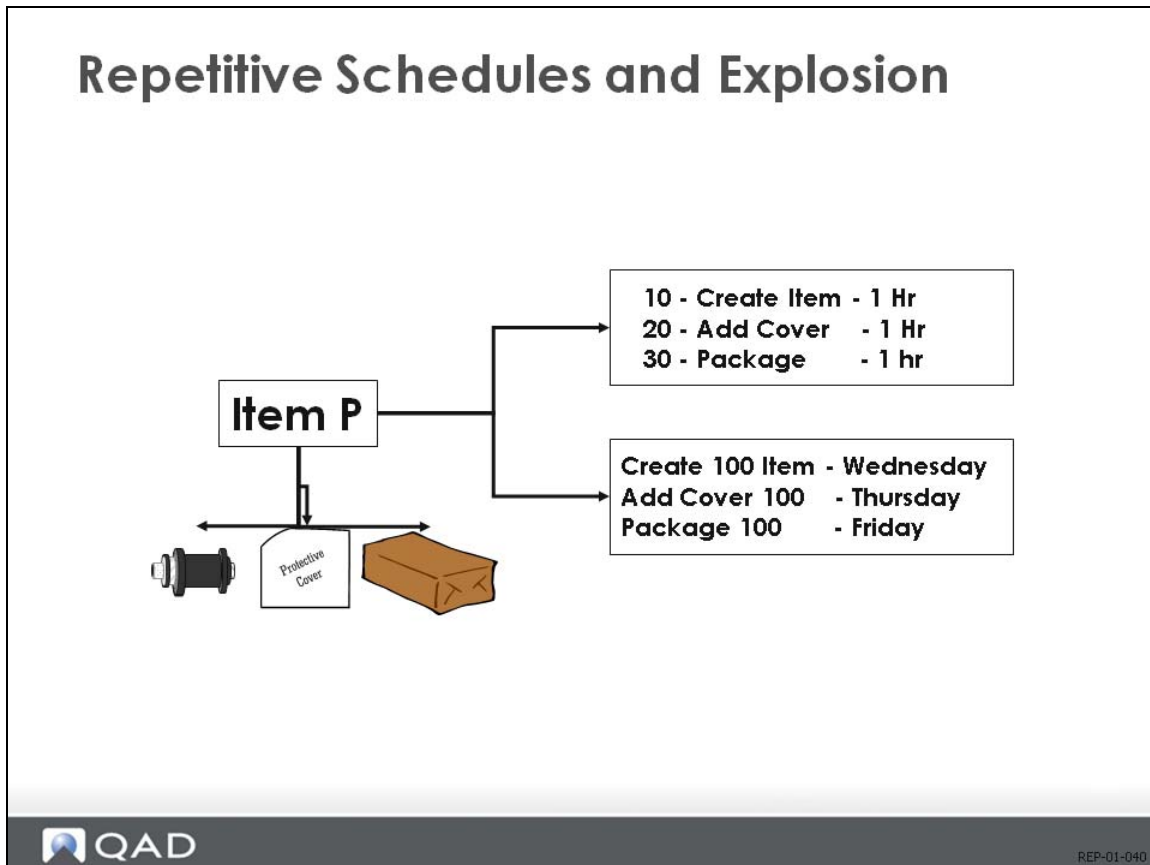
Schedule defined

Of the four basic parts of the repetitive module, the first and simplest is the repetitive schedule. The schedule contains a date, an amount, a product structure or formula, and a routing. It is always a daily schedule. It is not further subdivided by shift. The schedule can be created manually (by a master scheduler) or brought in from the line sequencing module. Entering a repetitive schedule for an item, product structure, and routing establishes supply.

Example explained

In the example shown above, a schedule for 100 devices to be completed on Friday comes in through Schedule Maintenance (18.22.2.1). The product structure and routing default from the item planning data for that item and site. According to this product structure, the device has three components, and each component is added in a step.

Component requirements established after schedule explosion

After you enter the schedule, the system regards it as supply. The component requirements are established only after you run MRP or the repetitive schedule explosion. In the example, the explosion schedules the material and the work centers for each operation. Since each operation takes one day, the requirements for Friday translate into requirements at operation 10 on Wednesday and operation 20 on Thursday (assuming overlap is zero in the routing).

Operation Schedule Report - 18.22.2.5

The full schedule for each operation, including the quantity completed and the quantity open appear in the Operation Schedule Report (18.22.2.5).

Picklist Replenishment
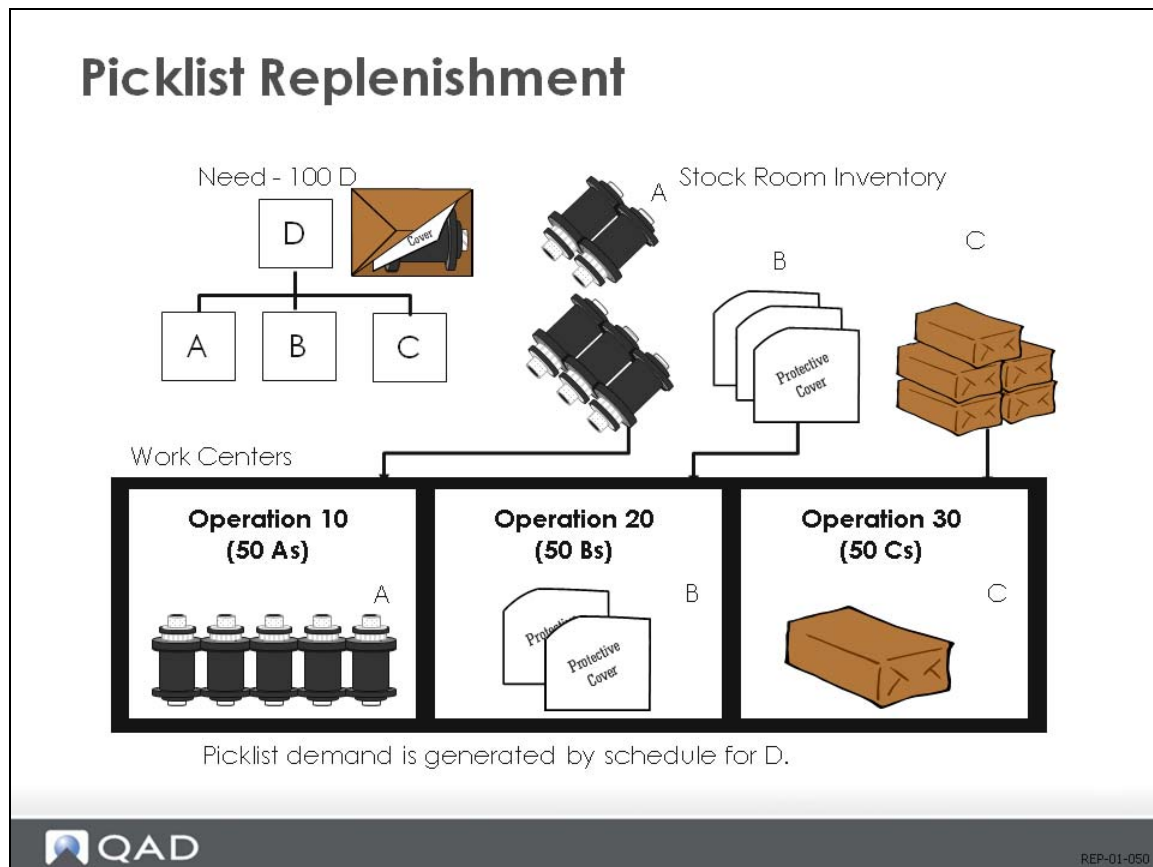
Two types of movement to floor

In most repetitive operations, you manage issues of material solely by backflushing. But in many operations, you must find some method to manage the movement of inventory to the point where it will be used.

Calculate requirements: Repetitive Picklist Calculation (18.22.3.1)

The repetitive picklist enables you to manage the movement of inventory from the stock room to the staging area. It treats each work center as a special inventory location and calculates the demand for replenishment. In the example above, work centers 10, 20, and 30 have 50 items, A, B, and C, respectively. If you enter a schedule for 100 of item D, and each item D requires one item A, one item B, one item C, and 50 more of each item will be required at the work centers. You run a repetitive picklist calculation using Repetitive Picklist Calculation (18.22.3.1).

Repetitive Picklist Print (18.22.3.4) picks, Repetitive Picklist Transfer (18.22.3.6) moves

You can print picklists and record when inventory movement takes place. Since inventory is not issued to WIP at the work center, the movement is a location transfer. Repetitive Picklist Print (18.22.3.5) picks the inventory and prints a picklist. The picking logic used is specified in the Inventory Control File (3.24). Repetitive Picklist Transfer (18.22.3.6) registers the physical transfer of components to the floor.

Line Sequencing

Schedule Simulations

Using the line sequencing workbench you can use planned orders from MRP to create simulated schedules. When you find a satisfactory schedule, you can move it into the repetitive schedule, where it behaves like a manually entered repetitive schedule.

Creating Line Schedule in Line Schedule Workbench (18.22.1.10)

The work of setting up and examining a simulated schedule is done in Line Schedule Workbench (18.22.1.10). You can either enter your simulated schedule manually or import planned orders from MRP.

Recalculation

After you enter the schedule, you direct the system to recalculate the schedule based on the production line's capacity for each day. If MRP schedules 500 for a week, and the line can actually produce 380 for that week, the remaining 120 are postponed until the following week. After recalculation, you can modify the schedule further, but the system always recalculates your modifications afterwards.

Rep. Sched. Update (18.22.1.18) copies schedules into repetitive schedule

All schedules prepared in the line schedule workbench are simulations. They have no effect on supply or demand until you copy them into the repetitive schedule using Repetitive Schedule Update (18.22.1.18).

Repetitive Schedule Update replaces the existing repetitive schedule with the simulated schedule. You can delete the original simulated schedule or save it for future use. Run MRP to synchronize planned orders with the modified repetitive schedule.

Repetitive Reporting
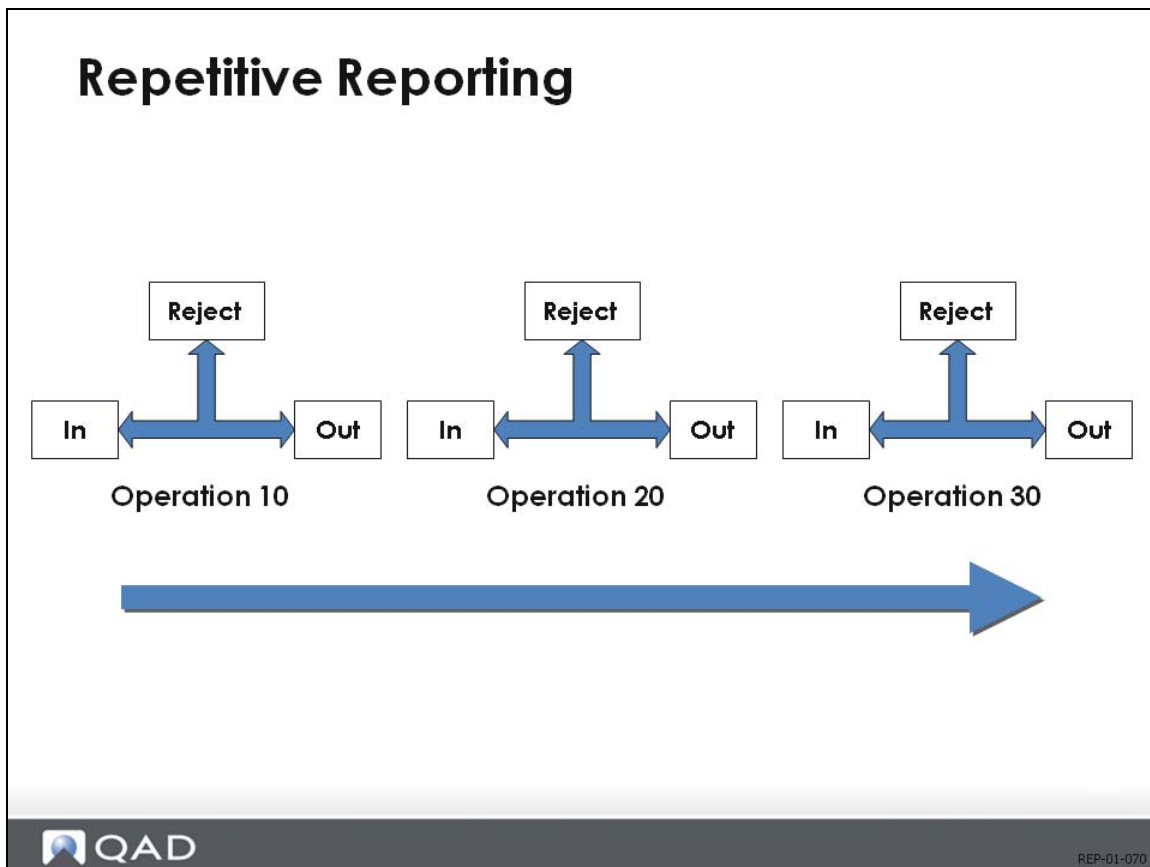
Report Time, Quality, 3 quantity queues: input, output, and reject

Activity reporting covers each employee for a specific site, item number, production line, routing, and bill of material (BOM). Routing operations have three quantity queues: input, output, and reject. The input queue holds quantities from the previous operation. The output queue holds quantities from the current operation that have not been moved to the next operation. The reject queue holds quantities rejected by the current or a subsequent operation.

Backflush Transaction (18.22.13)

Move Transaction (18.22.19) receives completed items

The only transaction that automatically backflushes component inventory is the Backflush Transaction (18.22.13). This transaction also backflushes labor and burden if the operation's routing record has the field Auto Labor Report set to Yes (set in Routing Maintenance [14.13.1]). The Backflush Transaction and the Move Transaction (18.22.19) also receive completed items to inventory, if the transaction is made from the last operation. Rejects and scrap can be entered using the Backflush Transaction.

Scrap Transaction (18.22.18)

Scrap Transaction (18.22.18) enables you to scrap from all three queues. Scrap from the input queue is reported at the previous operation's output queue. Scrap from the output queue should be limited to processed units that remain in the operation's output queue. However, scrap from output and reject queues is not limited to units remaining in that queue, and the value goes negative if over-scrapped.

Reject Transaction (18.22.16)

Reject Transaction (18.22.16) enables you to reject either from the output or input queue of the current operation. From the output queue, you reject previously processed units that have not been moved to the next operation's input queue. When you reject from the input queue, you are moving units back to a prior operation, and recording the reject there.

Rework Transaction (18.22.17)

Rework Transaction (18.22.17) moves reworked units from an operation's reject queue to the output queue of the operation where the unit was rejected, or to the input queue of the operation that follows the To operation. If the rework transaction is from the last operation, it is automatically moved to the last operation's output queue.

Cumulative Orders

Cumulative Orders

A cumulative order accumulates costs and quantities for tracking work-in-process (WIP) for repetitive production. A cumulative order is created for a profile that defines the site, item number, production line, routing code, BOM/formula code for the order, and start and end effective dates.

Create using rep transactions (18.22.13-21) or Cum Ord Create (18.22.11)

You can create cumulative orders using the repetitive transactions (18.22.13-21) or Cumulative Order Create (18.22.11). When you create a cumulative order, a cost rollup establishes the cumulative order cost. Cumulative orders have an assigned ID number, but no order number.

Cumulative Orders and Variances

During transaction processing, rate variances are taken and general ledger (GL) entries created. Usage/method variances are accumulated and taken when one of the following is run:

Post Acc Usage Variances (18.22.9)

- Post Accumulated Usage Variances (18.22.9). This creates GL entries for usage and method variances accumulated since the previous Post Accumulated Usage Variances report. The report gives you the option to update or not update.

Cum Ord Close (18.22.10)

- Cumulative Order Close (18.22.10). This closes the cumulative order, and creates GL entries for usage and method variances accumulated since the previous Post Accumulated Usage Variances report. The report has update and no update options. You can transfer WIP balances to another cumulative order or write off balances to method variance.

All rate and usage variances are measured against the cumulative order cost. GL scrap entries are not created until you run either Post Accumulative Usage Variances or Cumulative Order Close.

Repetitive Setup

Repetitive Setup

Baseline Setup

1.4.1	Item Master Maintenance
13.5	Product Structure Maintenance
1.1.13	Site Maintenance
1.1.18	Location Maintenance
2.7.1	Employee Maintenance
14.1	Department Maintenance
14.5	Work Center Maintenance
14.13.1	Routing Maintenance

Advanced Repetitive Setup

18.22.1.1	Production Line Maintenance
18.22.1.6	Line Changeover Maintenance
18.22.1.22	Shift Maintenance

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Implementation order

The repetitive module uses data already defined. Both the maintenance functions and the relative order within areas are shown. For example, you need to set up departments before you set up work centers.

Production lines

The production line setup requires that you define shifts (if you use them), production line capacities, and changeovers before using production lines.

Schedules

The repetitive schedule itself assumes that you have defined sites and production lines beforehand (only if required). The schedule requires a product structure and routing that is valid for the item you are scheduling.

Explosion

The repetitive schedule explosion (which uses the same algorithm as MRP) assumes that you have items, product structures, and routings set up. Each component in the product structure should be associated with a routing operation. Also, locations should be set up for each work center, using the same ID as the work center.

Picklist

The picklist uses the data from the explosion, and the available quantities at the locations in the repetitive area, to determine what requirements exist at the location.

Reporting

Repetitive labor reporting is done by employee, so employees must be set up. Where detailed labor reporting by employee is not require/desired the reporting is often done by the line supervisors employee code or a statical employee code setup by the production line or work center just for reporting purposes.

Repetitive Control File

Enabling Advanced Repetitive Module

To activate the Advanced Repetitive module, you must run Cumulative Ord Accounting Close (18.12) to close out any open cumulative orders in standard repetitive. Then, you set the Enable New Repetitive field in the Repetitive Control File (18.22.24) to Yes.

The following is an explanation of some of the fields found in the control file.

Default for Cum Order Close

Transfer WIP.

Values are Yes and No. This becomes the default for the field of the same name in Cumulative Order Close (18.22.10).

GL account used for posting WIP

WIP Transfer Account.

The GL account debited or credited when closing a cumulative order, and transferring WIP to a new cumulative order.

Method used to set eff dates in new cum orders

End Eff Default Method.

Set to the method you normally use to end effectivity dates on cumulative orders. You have four options:

blank   Start and end effective dates are not set.

1   Start and end effective dates match the dates of the GL period in effect during the transaction.

2   Start and end effective dates match the calendar start and end effective dates of the month of the transaction.

3   Start and end effective dates cover a number of days, so the transaction effective date falls in that interval.

Use only if End Eff Def Method = 3

End Eff Days.

Value is 0 (zero) or greater. Use if the End Eff Default Method is set to 3. Shows the number of days that the start and end effective dates cover.

Includes yield% set up in Routing Maintenance (14.13.1)

Include Yield.

You set this to Yes to have the system include the yield percent established in Routing Maintenance (14.13.1) in the cumulative order cost. It should match the setting for Include Yield% normally used to compute GL costs.

Exercise: Repetitive Setup

This activity gets the system ready to perform the subsequent advanced repetitive activities.

In this activity you are going to switch to the Advanced Repetitive module. You then set up the basic information (e.g., items, component items, product structure) you will need to use the advanced repetitive transactions.

1 Use Cumulative Ord Accounting Close (18.9), and run with all the fields blank.

In the Output field, specify page. This closes any cumulative orders in the old repetitive module.

2 Choose Repetitive Control File (18.22.24), and enter the following:

Next Picklist:	100
P/L Prefix:	PL
Enable New Repetitive:	Yes
Transfer WIP:	Yes
End Eff Default method:	1
End Eff Days:	0
Include Yield:	Yes

You are now ready to start using the Advanced Repetitive module.

Verify Items:

You will setup a production line Ultrasounds.

3 Use Product Structure Inquiry 13.6 to verify the structure for item 01020,. There should be four level 1 components:

- 50010
- 60009
- 60051
- 90093

4 Use Routing Maintenance 14.13.1 to verify the route for item 01020. Set the following data for each of three operations, 10, 20, and 30.

Overlap units:	1
Auto Report Labor:	Yes [checked]

This sets up reporting to automatically move an item to the next operation as soon as each unit is completed and will charge standard labor at completion.

5 Use Routing Cost Roll-Up 14.13.13 for Site 10-100 and the Standard Cost Set, for Item 01020.

6 Use Product Structure Cost Roll-Up 13.12.13 Site 10-100 and the Standard Cost Set, for Item 01020.

Create New Inventory Location

For repetitive operations we choose to have the system to backflush components from a work center stock location. Our production line is going to be setup in work center 1000. We will setup an inventory location with the same code 1000.

7   Use Location Maintenance 1.1.18 to setup location 010-1, in site 10-100, with the description "Prod Line 1". and inventory status code "Y-Y-N."

8   Use Actual Pay Rate Maintenance 14.13.21 for employee 10-EMP01, Alex Ericson, verify his actual pay rate of 24.50/hour. Make the necessary changes. All reporting for our production line will be done by employee 10-EMP01.

Repetitive Schedules

Overview
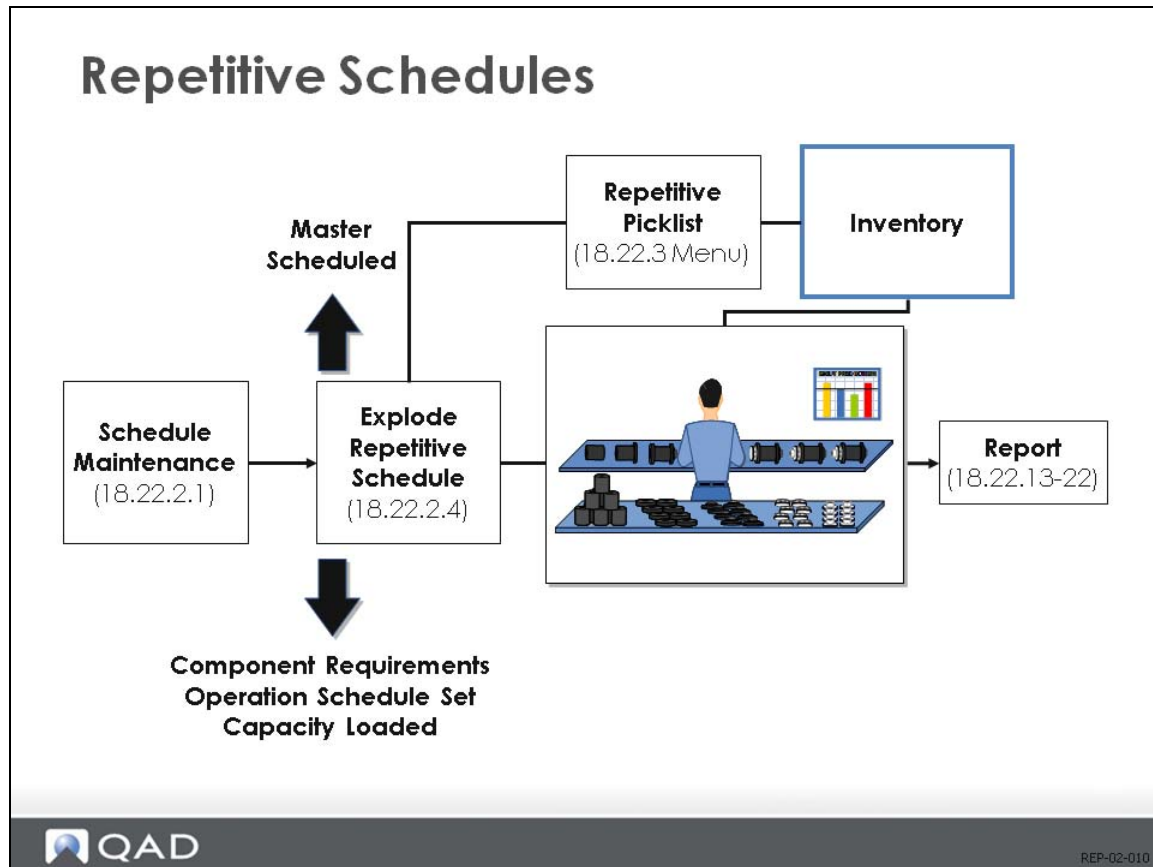
The purpose of this chapter is to enter a repetitive schedule, to explode a repetitive schedule, and then see what happens during the explosion.

Entering schedules has effects on planning. Exploding generates component requirements

Within the system, a repetitive schedule is very much like a master schedule. Entry of schedules has effects on the planning system, and exploding the schedules generates component requirements (like MRP). Exploding the schedule also establishes release dates, which are based on the shop calendar and the routing.

Repetitive Schedules

Create schedule then explode the schedule.

The process of creating a repetitive schedule is very straightforward. You create a schedule, which is simply a listing of quantities that you will make and the days you will make it. Then you explode the schedule, which means that you determine what components are required, and the schedule for each operation.

View schedule in 22.18 (master-schedule amount) or 22.21 (repetitive schedule)

As soon as you enter in a schedule, the amount appears in the Master Schedule Summary Browse/Inquiry (22.18) as a master-scheduled amount. (In Detail Browse/Inquiry (22.21), it appears with the notation, Repetitive Schedule.)

Exploding creates work order (status Exploded; type S).

Order number = item number;
ID = system assigned.

Exploding the schedule causes the system to treat your daily schedule as a daily work order with the status Exploded and type S (scheduled). The order number is the same as the item number, and the ID number is system-assigned. If you look at the order, you can see the status is Exploded, which means that it has its own work order bill and routing.

Creating order bill and routing calculates component requirements.

In creating the bill and routing, QAD Enterprise Applications calculates component requirements. (It uses the same algorithm as MRP.) This means the schedule at each operation is calculated and the requirements for components at those operations are also calculated. The requirements appear in the Master Schedule inquiries but no planned orders are created.

Repetitive Schedule Inputs

Production lines entered in (18.22.2.1)

Schedule Maintenance (18.22.2.1) allows you to enter daily schedules for each production line at a site. If the production line has multiple shifts, this is the total for all shifts. If there are no production lines at the site, a schedule can be entered for the whole site.

Validate product structure and routing in (1.4.7) or (1.4.17)

For each day you can have a different product structure and routing. You can validate both the product structure and routing against the product structure and routing fields shown in the Item Planning Maintenance (1.4.7) or Item-Site Planning Maintenance (1.4.17).

Alternate product structure; alternate routing

If the product structure and routing do not match the settings in the Item Master file (the file containing the planning parameters), then the files containing the alternate structures and routings are checked.

Cumulative order

The system keeps a tally sheet called a cumulative order for each combination of items, sites, production lines, product structures, and routings.

Repetitive Schedule from MRP

Repetitive schedules can also be created from MRP planned orders using the Planned Repetitive Schedule Approval transaction in the MRP module.

Repetitive Schedule from MRP

Item Planning Maintenance

Repetitive Schedule Explosion

Function of schedule explosion

Schedule Explosion (18.22.2.4) generates a schedule based on the routing(s), and a set of requirements based on the product structure(s) specified in the repetitive schedule. It also creates a scheduled work order.

Use Work Order Browse (16.2) to view scheduled work order

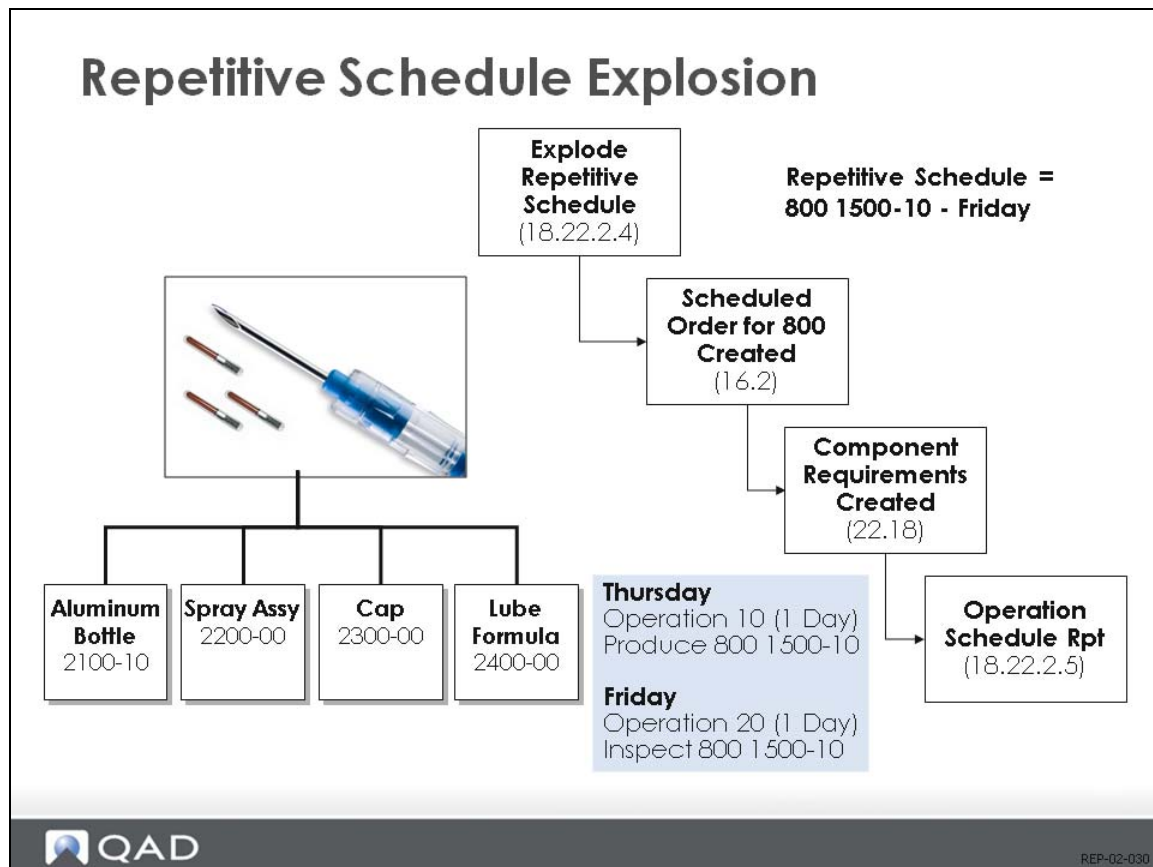The above example shows what happens when 67 of 01020 are scheduled for Friday. When you run the explosion, a scheduled work order is created. You can view this work order in Work Order Browse/Inquiry (16.2). Generally you should not change the work order.

Exploding BOM and routing to determine what must be made and when.

View in summary inquiry.

The bill (product structure) and routing attached to the work order are then exploded to determine what must be made and when. For the components, the logic used is the same as the MRP logic and the effects are somewhat the same. In the example, requirements for Acoustic Transducers(50010), (60009), microprocessor (060051), and glue (90092) are generated. You can view these in Master Schedule Summary Browse/Inquiry (22.18). In the detail inquiry, they are pegged to the schedule order.

Exploding the routing determines actual schedule.

The routing is exploded to determine the actual schedule called for by the schedule you entered. The schedule is viewed as being completed at the end of the day it is entered. The system calculates backwards for each operation for that time. In the example, it takes 1 day to make 67 ultrasounds, and 1 day to inspect 67 ultrasounds. So the schedule tells you that 67 are made on Thursday, and 67 are inspected on Friday.

Repetitive Operation Schedule Report

Use 18.22.2.5 to check results of explosion.

The easiest way of checking the results of the explosion is to run the Operation Schedule Report (18.22.2.5). This report shows you the requirements generated at each operation, on each day, by all schedules meeting the selection criteria.

All Schedules

For example, if several different items or routings are scheduled on a production line during the same period, the load at a particular operation from all schedules is shown. When items are scheduled for different days, but in fact difference in routings mean that some operation will be over-scheduled on a certain day, this report shows you.

Completions Shown

The report also shows quantities complete. If quantities are reported as complete at a later operation, then the same scheduling logic is used to report the quantities that must have been completed at earlier operations. (See the discussion of milestone operations later on.)

Use capacity planning to view load at each operation.

The explosion creates scheduled load in the same way that a work order does. So you can investigate the load created at each operation using Capacity Planning.

Exercise: Setup a Production Line - Create Schedule

1   Use Production Line Maintenance (18.22.1.1) to setup "Line 1" at Site 10-100.

Description:	**Ultrasound Line**
Units/Hour:	6
In the second frame enter	
Item number:	01020
Units per hour:	6

• Click Next and enter item 01030 and set its rate to 3 units/hour.

Both of these items are made on the same line but have different rates.

Create Schedule

2   Use Schedule Maintenance (18.22.2.1) to create a schedule for item 01020, on production line "Line 1". Schedule 67 units per day for the balance of the current week starting with today, not including weekends.

3   Use Item Schedule Inquiry (18.22.2.2) to review the schedule you just created.

View Supply Orders

4   Use Master Schedule Detail Inquiry (22.21) to see the supply orders are pegged to a repetitive schedule for item 01020.

View Component requirements

5   Use MRP Detail Inquiry (23.16) to review the component requirements. Check each component. Note there are no gross requirements for the components because the schedule has not been exploded.

Explode the Schedule

6   Use (18.22.2.4) Schedule Explosion for your item, site, and production line. Direct the output to page.

View requirements

7   Use Master Schedule Detail Inquiry (22.21) to view the requirements for 01020.

Note   Note the supply orders now are daily work orders, with the work order number the same as the item number and unique ID's for each daily repetitive schedule.

8   Use MRP Detail Inquiry (23.16) to view the component requirements for each component part number. Note that all components now have requirements and they are pegged to the repetitive scheduled orders.

Generate Operation Schedule Report

9   Use Operation Schedule Report (18.22.2.5), for your item, site and production line. Set the Day/Week/Month field to D and direct the output to page. Note the Quantity Scheduled to start, Quantity Open and Load Hours Open. Also notice that the operations are scheduled to run concurrently because the overlap was set at 1 unit for all the operations in the routing.

Delete unneeded Schedules

10   Use Schedule Maintenance (18.22.2.1), for item 01020, at Site 01020 on production line "Line 1". As you advance to the schedule frame the delete button will appear. Click Delete and confirm.

Chapter 4

Line Schedules

Overview
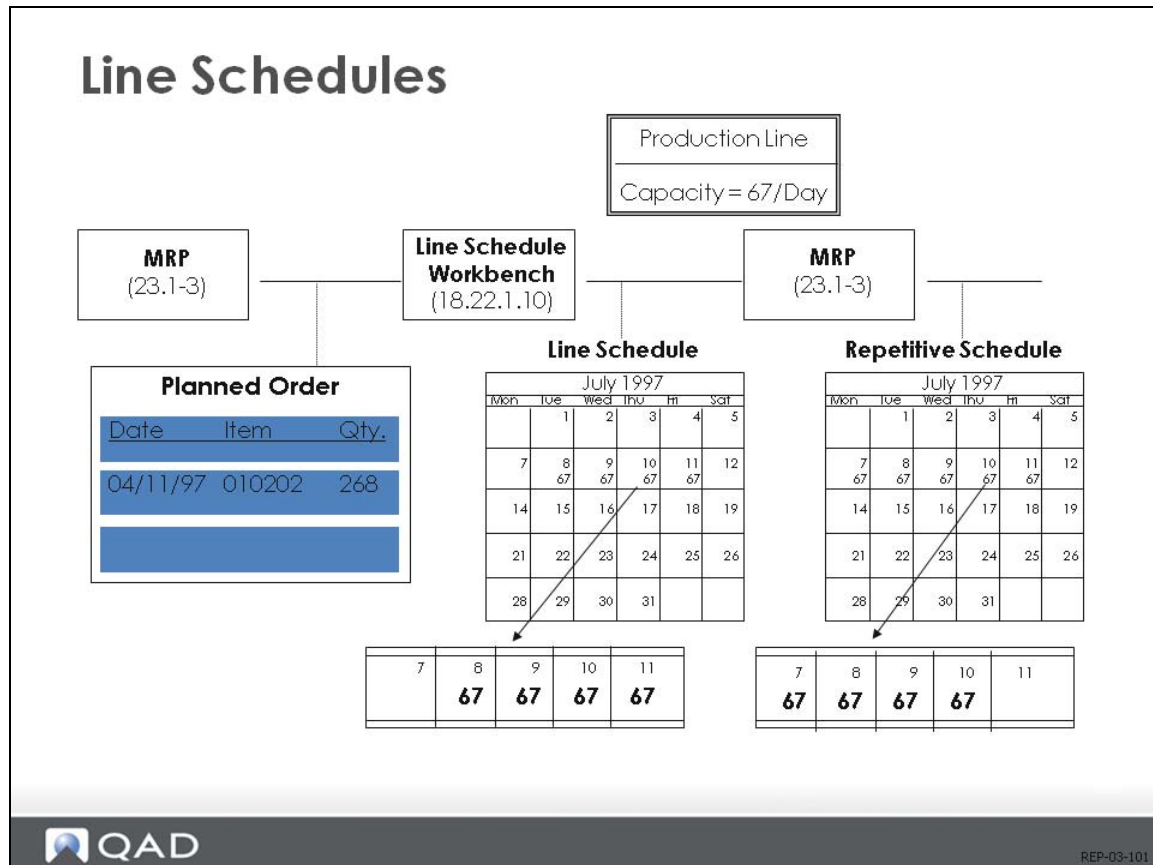
The purpose of this chapter is to give you a familiarity with line sequencing functionality.

After completing this chapter, you should be able to evaluate the workbench setup, import MRP orders, know what happens to them, calculate a line schedule, recalculate a line schedule, and put the schedule into the repetitive schedule.

More advanced students.

You will be shown how to manipulate the line schedules fully, to troubleshoot problems, and to evaluate such things as whether to preserve the workbench while copying it into the repetitive schedule.

Key terms you will become familiar with are:

- Shift
- Line schedule
- MRP planned orders
- Production line
- Changeover

Line Schedules

No connection between MRP planned order & repetitive schedule. MRP Import via (18.22.1.10)

There is no direct connection between an MRP planned order and a repetitive schedule in the system. If a repetitive schedule exists, it is treated as supply by MRP. MRP does not create schedules for a site into one or more production lines, while taking into account the capacity at the production line.

Most useful when lines are fully loaded.

In general, this functionality is most useful when production lines are fully loaded. It is particularly useful when multiple items can be made on the same production line, or when multiple production lines are available to make an item.

Forward Scheduling

The basic pattern is the one shown in the example above. MRP produces some planned orders with due dates. Line Schedule Workbench (18.22.1.10) allows you to import any number of planned orders into a simulation area. There you can load the line with selected orders, and the quantities ordered are recalculated based on the capacity of the line. Essentially, the functionality allows you to do a rough form of finite capacity forward scheduling.

Run MRP after updating simulated schedule in repetitive schedule.

When you are satisfied with a simulated schedule you can copy it into the repetitive schedule and make it a real one. MRP should be run after you have updated the simulated schedule in the repetitive schedule.

Line Schedule Implementation
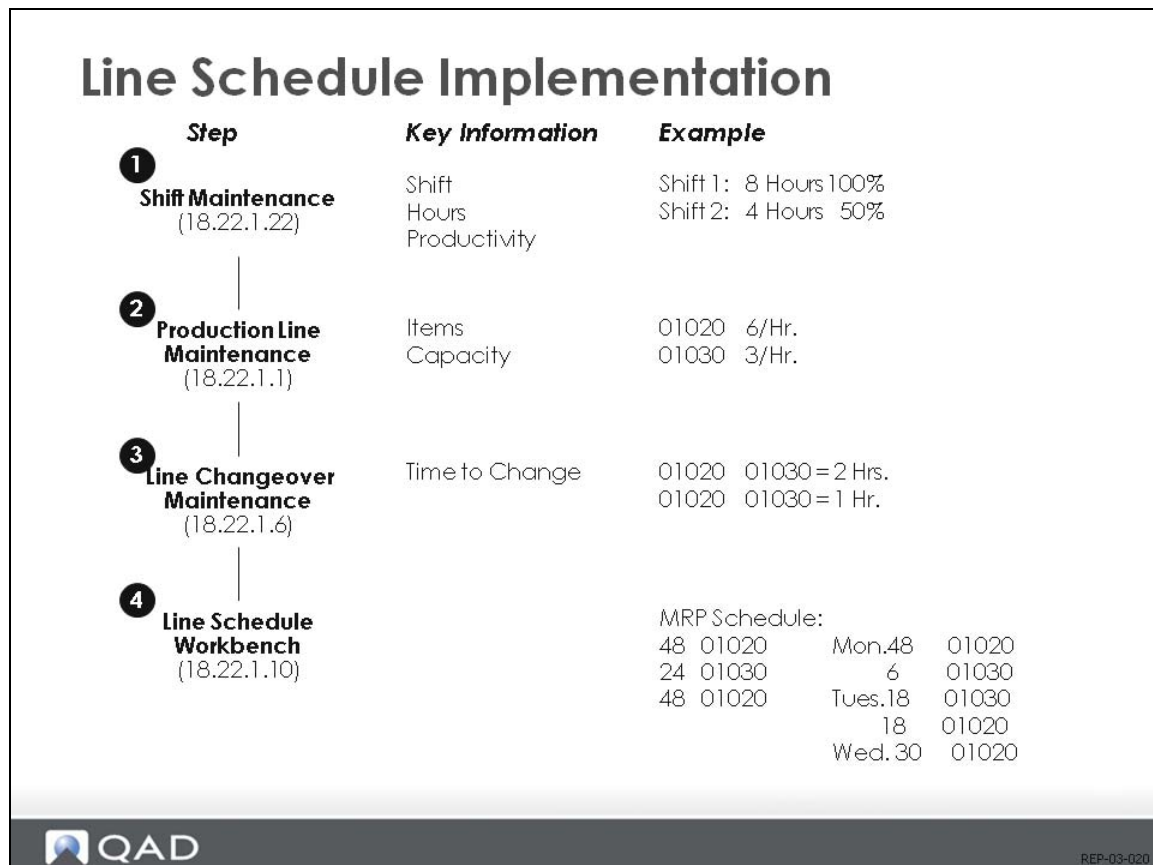
Line Capacity

Line Schedule Workbench (18.22.1.10) recalculates based on the capacity of the line. The capacity is determined by the number of hours the line is in operation, the number of items it can make per hour, and the amount of down time when production is switched to a new item. For each production line, the capacity of the line to make any item can be specified in units per hour.

Multiple Shifts

We assume a line can have multiple shifts. In Backflush Transaction (18.22.13*)*, you can report against the shift. The hours of operation can be set for each shift on each day the shift operates. Since some shifts are more efficient than others, a productivity factor can be added. Productivity is multiplied by the base capacity to determine the actual capacity for the shift.

Changeover Time

The changeover time is the time it takes to switch a container from white paint to red paint. Changeover is unidirectional. It can take more time to switch from white to red than from red to white. If no changeover is specified, it is 0.

Explaining above example.

In the example shown above, two shifts are specified, with the shorter shift being more efficient. It takes 1 hours to switch from 01020 to 01030, but 2 hour in the other direction. The scheduler may have found it more efficient to make all of the 01020 ultrasounds first instead of losing 2 hours for an extra changeover shift from 01030 back to 01020 on Tuesday.

Line Schedule Workbench

MRP Orders

The actual workbench begins with today's date, and asks you to input items daily. Each time you input an item, a list of MRP planned orders displays. You can select any number of orders, altering the amounts if you want. If you alter the amount in the planned order, the system remembers the alteration, and brings it into the work center. If you alter it in the workbench, the system does not alter any planned orders.

Accepting planned amount.

Recalculating workbench.

To accept a planned amount, press r to mark the order with *, then press Go. To have the workbench recalculated based on the capacity, press Go while the cursor is on Quantity or Date fields. The default due date is the first date that the line is open but you can change this.

Note The MRP order due date is ignored.

Methods for altering a calculation.

When you have a calculation, you can alter it in any of the following ways.

- To move an amount elsewhere press r and change the sequence number.
- To add a new amount anywhere press Insert, then provide a number that fits. For example, if you want the sequence to be the number 9, you would put in 8.5, and it will be 9 when it is recalculated. (Unless you enter a due date that would put it elsewhere.)
- To delete an item, go to it, press r, then Delete. Then recalculate or press r and continue, recalculating at the end. Deletions do not change the planned order amounts.

Press Go = recalculation.

In each case, pressing Go causes a recalculation.

Line Sequencing Calculation

Finite Forward Scheduling

When you press Go, the line sequencing calculation takes the amounts you entered and distributes them forward, based on the capacity of the line. The calculation is shown. It is a rudimentary form of finite forward scheduling.

Line Capacity Calculation

The system takes the amount at the earliest due date and tries to determine whether it can be made that day. It calculates the total capacity for the day by summing the capacity at each shift. That capacity is the line capacity multiplied by the productivity multiplied by the number of hours it is open.

Changeover Calculation

If the amount can be made that day, the calculation determines how many hours have been used, and then goes to the next due date. If the item is different, it sees whether there is changeover time and adds that to the hours available for the day. There is no productivity factor for changeover. Changeover occurs in shop calendar hours, not calendar hours. After changeover is subtracted, it tries to fill the rest of the day with that amount.

Calculation if day filled.

If the amount cannot be filled that day, the system calculates how much will fill the day and subtracts that amount from the total. It then tries to fill the next open day with the remaining amount, as described above. It also pushes out the due date for all remaining amounts appearing on the schedule.

Repetitive Schedule Update

Copy line schedule using 18.22.1.18

Once you are satisfied with a line schedule, you can copy it over to the repetitive schedule, where it has effects on the rest of the system. (It appears as a master-scheduled amount, etc.) Use Repetitive Schedule Update (18.22.1.18) to copy the line schedule to the repetitive schedule.

Can delete schedule or retain schedule. Default is Delete = No.

Repetitive Schedule Update allows you to either delete the existing line schedule as you update, or to retain it. The default is to retain it. The reason is you are continuously maintaining a schedule, and you will usually want to add on to the end of it. If the schedule is retained, new MRP orders will be added on later. Otherwise, you need to determine the start date manually.

Can delete simulation you do not want to use.

You can also use this function to delete a simulation that you are not planning to use. Just set Update Repetitive to No and Delete Line Schedule to Yes.

Repetitive Schedule Maintenance

Use Schedule Maintenance to modify the repetitive schedule after it has been created.

Exercise: Create a Second Shift

1 Use Shift Maintenance (18.22.1.22) for your production line at site Proto. Check the Modify box for each day, Monday - Friday.

2 In the lower frame, add a start time of 07:00 for 8 hours with a productivity rate of 90%. Add a start time of 15:30 for a 4 hour shift with a Productivity of 100%

Add this data for all days of the week.

3 Use Shift Report (18.22.1.23) with the output set to page to review the results of your work.

Enter Changeover times

4 Use Line Changeover Maintenance (18.22.1.6) to set the changeover time. The changeover time going from item 01020 to 01030 is 1 hour. The reverse requires 2 hours.

Use the Line Schedule Workbench

5 Use Line Schedule Workbench (18.22.1.10) to enter Line 1 at site 10-100.

Click in the sequence number field and press enter to show the number 1. In the item number field enter 01020, in the quantity field enter 400. Do you see how the quantity per day was calculated?

- Click in the next available sequence field, the number 5 should appear. Enter a quantity of 200 for the 01030. The enter another 400 of the 01020.
  - You should see how the system is scheduling forward based on line rates and productivity factors after subtracting line changeover times from the shift schedule.

Manually Delete Line Schedules

- Place your cursor in the field for sequence number 1 and click the delete button. Note the system places *** in the column labeled Delete. Continue to select all sequence numbers for deletion by clicking in the Sales Order Quantity Number field and clicking the Delete button (which appears next to the Next/Back buttons). When all line are marked for deletion, click Next.
  - In this manner you can create and modify a line sequence schedule.

Create a Line Schedule from MRP Planned Orders

Enter a Forecast

6 Use Forecast Maintenance (22.1) to enter a forecast for item 01020, starting next week enter 350 per week for three weeks. Then enter a forecast for item 01030 starting next week of 175 per week for three weeks.

7 Use Net Change MRP (23.1) for site 10-100. Set the output to Page.

8 Use Planned Order Browse (23.9) to review the planned orders generated by the MRP run. You should see planned orders for your end items the 01020 and 01030 and their components.

Create a Line Schedule

9   Use Line Schedule Workbench (18.22.1.10); for Line 1 at site 10-100, do the following.

Click in the sequence field and advance to the item number and enter 01020, click next and a list of the planned orders pops up. Putting your cursor in the planned order number field and clicking next will place *** next to the order number indicating you have selected it. When you are done selecting all the orders you wish, click next or enter, the schedule will be updated.

- You may now manually adjust or modify as you did in the last activity.

Note   To insert a new Seq Record between existing records, highlight the sequence number and press the "Insert" key on your keyboard. It is recommended that you type a new sequence number that fits logically between the two you are inserting it between, such as 4.5 between 4 and 5. Lastly enter the desired item number.

Update the Repetitive Schedule

10   Use Repetitive Schedule Update (18.22.1.18) to create the schedule from the line sequence. Select your site, production line, and items. Direct the output to page to see the result.

Explode the Schedule for components

11   Use Schedule Explosion (18.22.2.4) to explode the schedule for component requirements. Select your site, production line, and items. Direct the output to page to see the result.
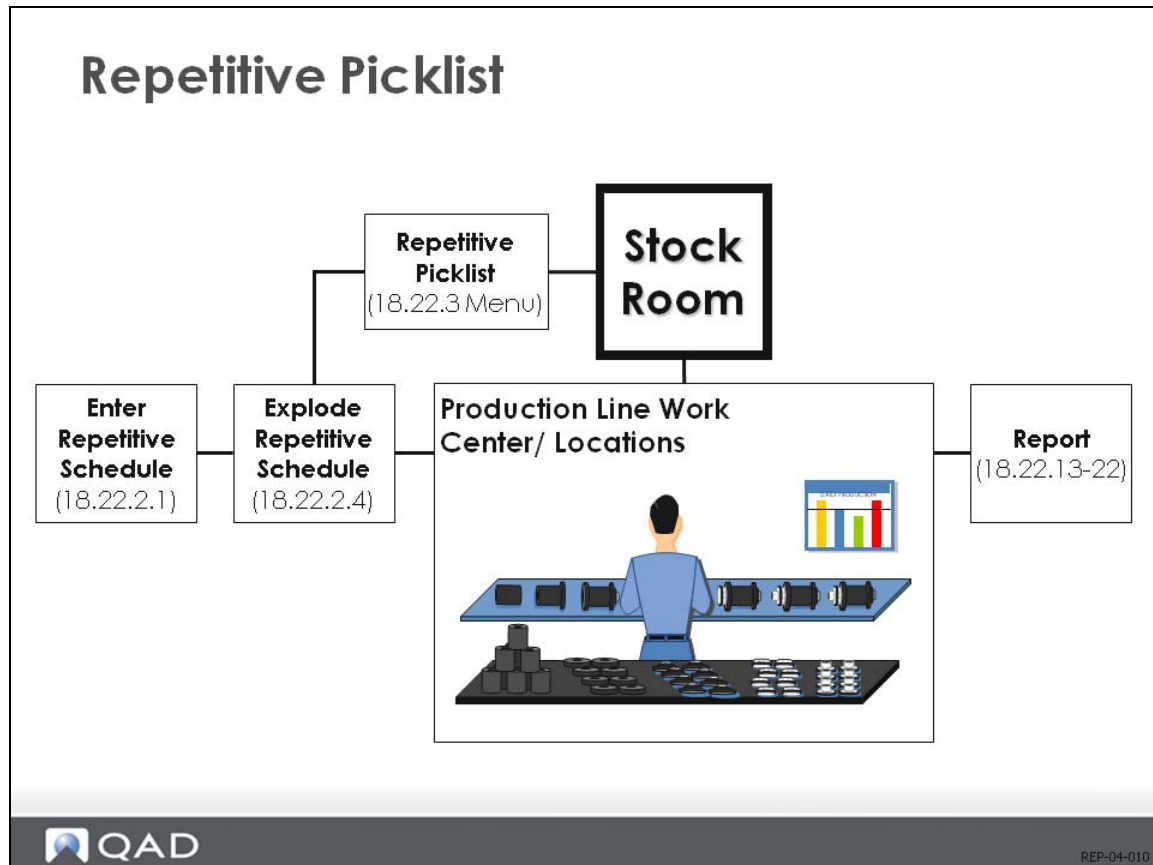
View Production Schedule

12   Use Production Line Schedule Browse (18.22.2.14) to view the schedule for your items.

Chapter 5

Repetitive Picklist

Repetitive Picklist Overview

Work centers = locations

The repetitive picklist allows you to transfer inventory to work center locations in response to schedule requirements. If several repetitively scheduled items have requirements for the same component at a work center, the picklist performs the calculations for all the schedules. To use the picklist, inventory locations with the same name as the work centers must be set up.

Picklist calculation

Running Repetitive Picklist Calculation (18.22.3.1) allocates inventory. The calculation uses the quantity required at the work center, subtracts what's already there, and then adds or subtracts anticipated supply (existing untransferred picklists) and demand (exploded schedules).

Allocations and picking

Printing the picklist moves the status of the inventory from allocated to picked. The picking logic used is specified in the Inventory Control File. You print a picklist using Repetitive Picklist Print (18.22.3.5). If a picklist was issued and has to be canceled, you can undo it using Repetitive Picklist Undo (18.22.3.8).

Transfer

You must run the Repetitive Picklist Transfer (18.22.3.6) to register the physical transfer of components to the floor. This is required to maintain accurate inventory balances. It does not issue the inventory to WIP. Repetitive components, even when picked, are still backflushed.

Picklist function and usefulness.

The repetitive picklist is a feature of the repetitive functionality used by companies needing to control the transfer of material from the stockroom to the work center. To some extent, a repetitive picklist is a contradiction in terms, repetitive operations do not need picklists. But where space on the floor is limited, or continuous flow of material to the floor needs to be insured, a picklist can be useful.

Work Centers Name = Location Name

The picklist calculation treats work centers as inventory locations. To use the picklist, inventory locations with the same name as the work centers must be set up.

Running picklist allocates inventory

Printing change status.

The repetitive picklist functionality works like other picklist functionality in QAD Enterprise Applications. Running the picklist calculation detail allocates inventory. Printing the picklist moves the status of the inventory from allocated to picked. If a picklist was issued and has to be canceled, you can undo it.

Total at Work Center

It is important to remember that the picklist functionality takes into account all needs at a work center. If several repetitively scheduled items have requirements for the same component at a work center, the picklist will look at all the schedules when determining the need for replenishment.

Repetitive Picklist Cycle
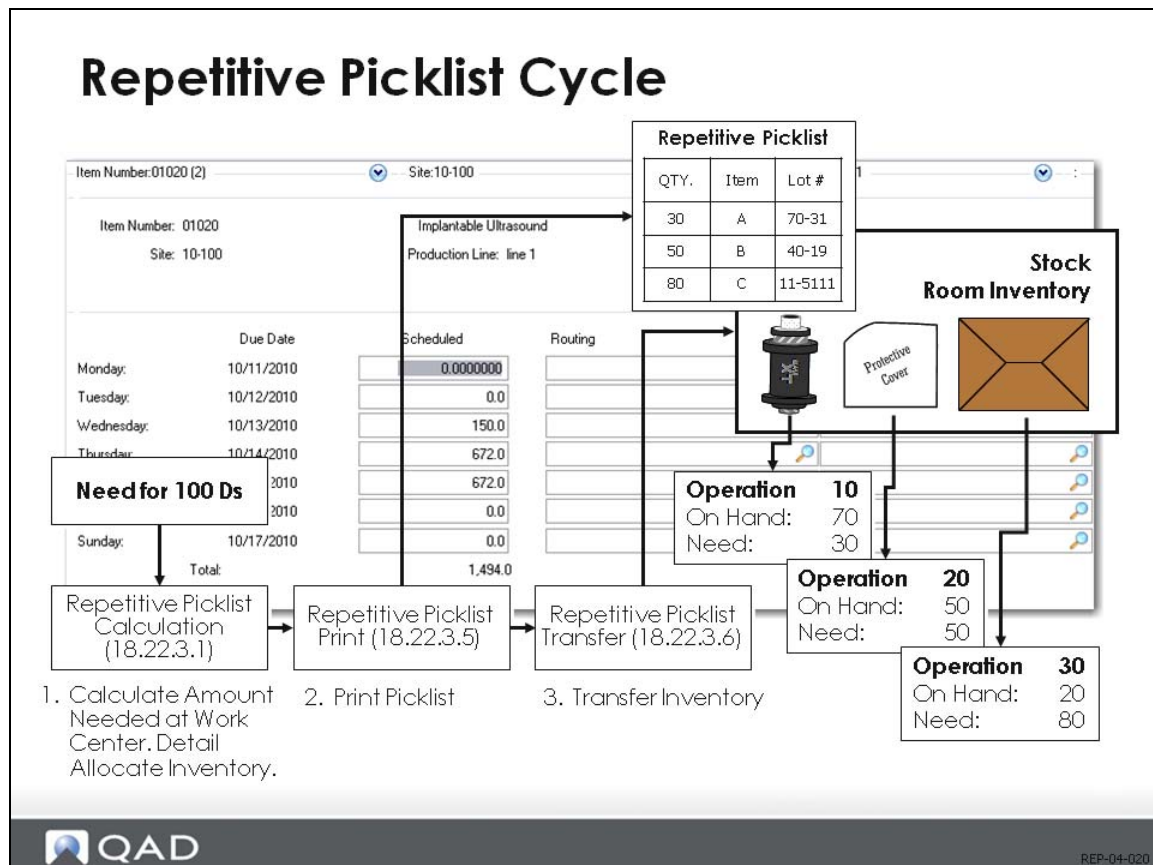
Scheduled amounts in example

In the example shown above, a repetitive schedule for 100 of item D has been entered in the system. Running the explosion shows this means 100 item As are required at operation 10, 100 item Bs at operation 20, and 100 item Cs at operation 30.

Picklist does 3 things: determines what is on hand; what is needed, and detail allocates.

The picklist functionality does three things. Repetitive Picklist Calculation (18.22.3.1) based on what is already on hand, determines what is needed at operations 10, 20 and 30. In the example, this would be 30 of item A, 50 of item B and 80 of item C. During the calculation, it detail allocates the inventory.

Allocates, Picks

Repetitive Picklist Print (18.22.3.5) prints a picklist. This changes the status of the inventory to picked. In the example, each group of picked inventory has a lot number, which means it was detail allocated. The picking logic used is specified in the Inventory Control File (3.24).

Enter transfer of inventory using 18.22.3.6.

Repetitive Picklist Transfer (18.22.3.6) transfers inventory from the default stock location (or wherever you specify) to the work center location. It does not issue inventory to WIP. For example, when an employee takes the picklist, gets the inventory from the stock room, and moves it to the work center, you enter the transfer by running 18.22.3.6.

Repetitive Picklist Calculation

Use (18.22.3.1) to find out WC's requirements; does not satisfy demand of individual schedules.

You use Repetitive Picklist Calculation (18.22.3.1) to find out what requirements exist at specified work centers (i.e., locations). The calculation considers component requirements from the exploded repetitive schedules that match the sites, items, work centers, and production dates specified.

Repetitive Picklist Calculation equation

Repetitive Picklist Calculation uses the following equations:

Shortage at work center = new requirements - net available

Where net available = actual on-hand - quantity allocated - quantity required by other schedules + untransferred picked

Supply - Demand

Existing demand = demand from all exploded rep sch with operations requiring the item. Demand > supply = picklist.

The actual calculation takes existing supply of an item at the work center and subtracts all existing demand for the item. The existing supply is the quantity currently on-hand, plus any supply from existing picklists, minus any quantity already allocated to other purposes (e.g., sales orders or work orders). The existing demand is the demand from all exploded repetitive schedules with operations requiring that item at that work center. If demand exceeds supply, it creates a picklist for the excess.

Function options

Repetitive Picklist Calculation offers you several options to control the picklist calculation. They are:

Use Work Center Inventory.

When set to Yes, the system counts inventory in a work center as inventory.

Detail Requirements.

When set to Yes, the system prints all repetitive schedules generating requirements for a component. Shown is the quantity required, parent item, due and start dates, machine, and operation.

Delete When Done.

When set to Yes, the picklist is automatically deleted after the calculation.

As the equation shows, the picklist supplies materials for the work center, not individual schedules. You can ensure that picklists supply individual schedules by running the picklist calculation immediately after exploding each new schedule.

Repetitive Picklist Sequence Calculations
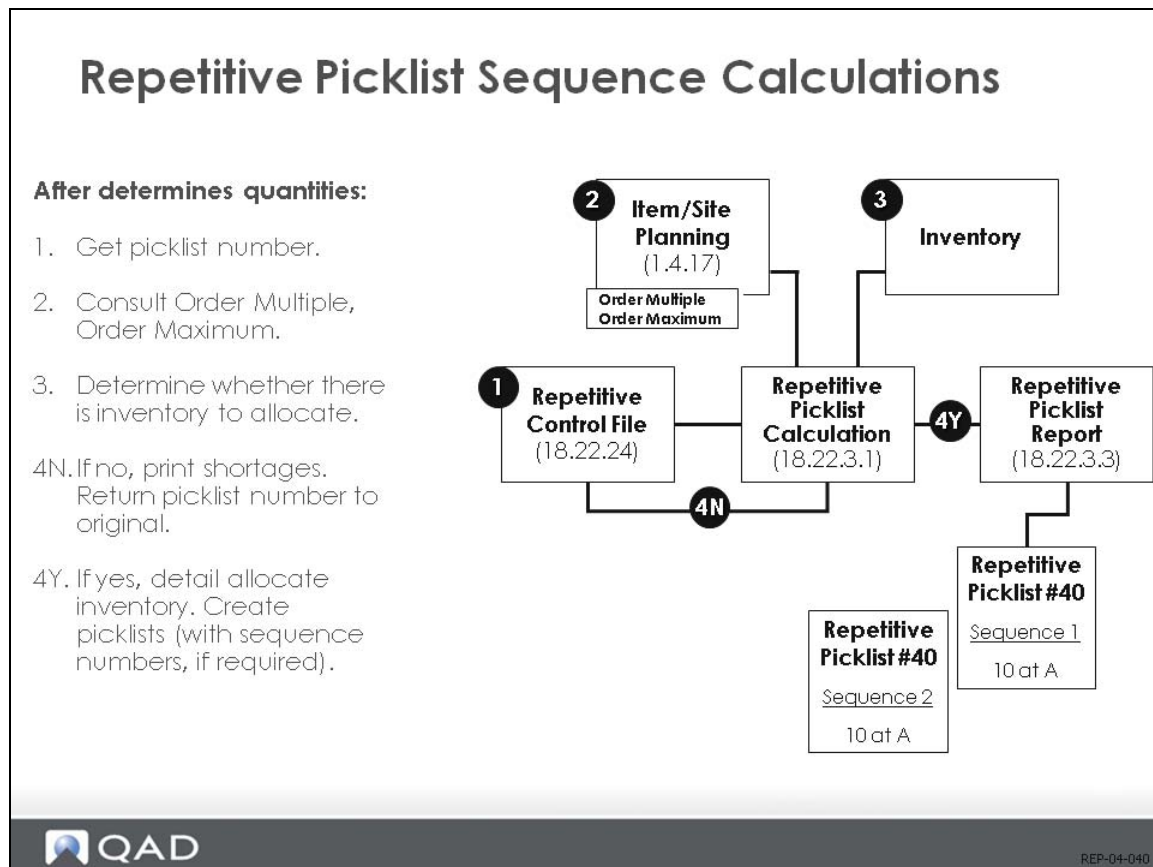
Shortage of an item.

If Repetitive Picklist Calculation (18.22.3.1) determines there is a shortage of the item, it takes the specified picklist number and increments the Repetitive Control File (18.22.24). It then determines how the picklist should be structured by going to the item-site planning parameters for that item.

Using order multiple or order maximum values.

When the order multiple or order maximum values have been set, they generate a sequence of picklists, each with the same picklist number, but with different sequence numbers. This is useful when items come pre-packaged. The order maximum ensures the amount of each sequence is never greater than the specified amount. This is useful when the work center can only hold a certain amount, and so a picklist for a greater amount would be pointless.

Creating a picklist detail allocated inventory. Shortage, generates shortage report; no picklist

The picklist calculation detail allocates inventory by using the picking logic specified in the Inventory Control File (3.24). If there is no inventory to detail allocate, the picklist calculation generates a shortage report but does not create a picklist. Instead, it returns to the Repetitive Control File and sets the picklist number back.

Create picklist

If inventory does exist, the picklist calculation changes the inventory status and prints out a report. The picklists are created and ready to print.

Repetitive Picklists Print/Undo/Delete
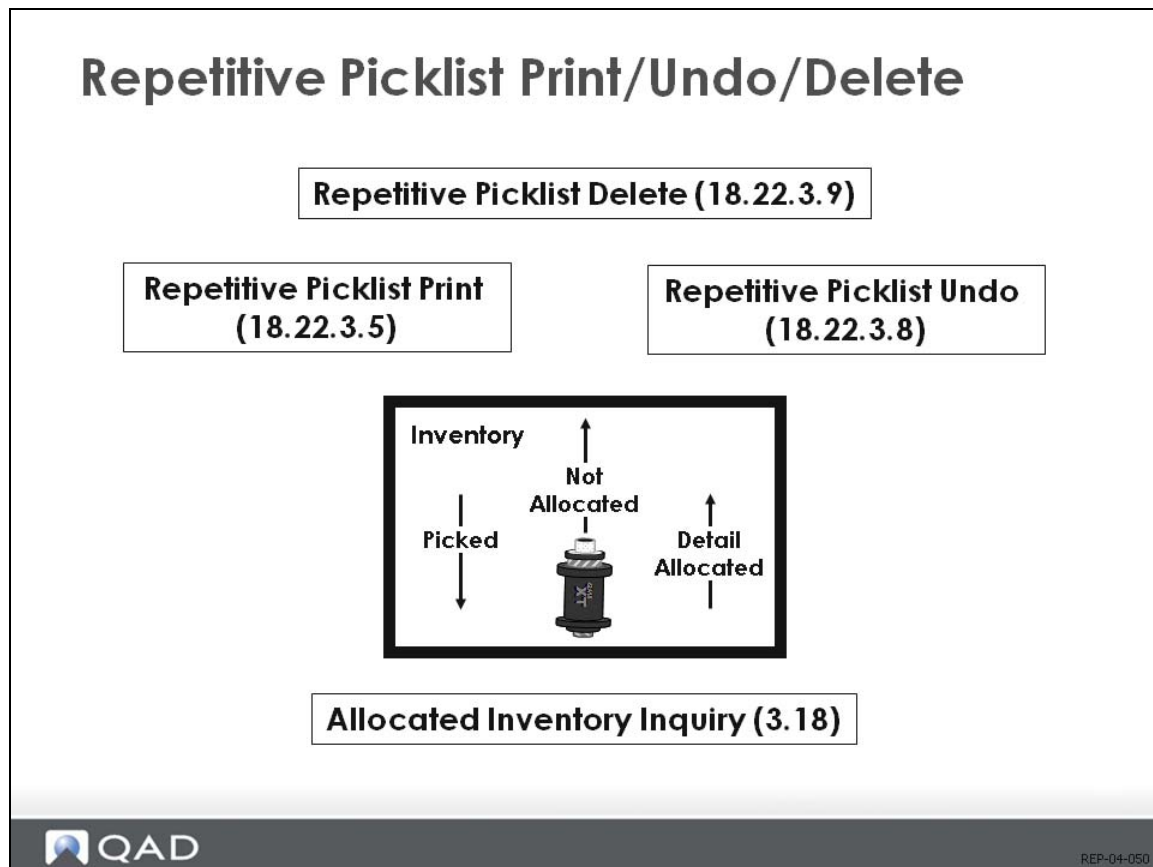
Print picklist - (18.22.3.5)

You use Repetitive Picklist Print (18.22.3.5) to print a picklist. When you print a picklist, the status of the inventory changes to picked. (You can verify this using Allocated Inventory Browse/Inquiry [3.18].) You can reprint a picklist by changing the Reprint Picked flag. If you do this, be aware that you run the danger of generating two picklists and picking inventory twice.

Use (18.22.3.8) to undo picklist after printing

After printing a picklist, you can use Repetitive Picklist Undo (18.22.3.8) to change the inventory status back to detail allocated. This tells the system the inventory is available to be picked again the next time you run Repetitive Picklist Print. Advance Repetitive provides a separate function to reverse the effects of printing in order to ease record-locking problems.

Delete outstanding picklists using (18.22.3.9)

As long as a picklist exists, the system treats it as a supply by later picklist calculations. To start with a clean slate for a work center, you have to delete the outstanding picklists. You do this using Repetitive Picklist Delete (18.22.3.9). Deleting reverses all effects of running any picklist function. If the inventory is picked or allocated, it is returned to unallocated status.

Repetitive Picklist Transfer

Transfer inventory using (18.22.3.6) offers several options.

To record that inventory has been moved, use Repetitive Picklist Transfer (18.22.3.6). This function is extremely flexible. It allows you to rapidly transfer picklist items as created, enter new quantities, or issue inventory from a different site.

Use Alloc and Picked options

It is possible to use the transfer function even if the picklist has not been printed. You can transfer inventory that has been allocated, picked, or neither allocated nor picked. The Alloc and Picked flags set the default for your transfers. If you are not printing picklists, but just allocating, set Alloc to Yes, to have the allocated inventory transferred. If you are printing picklists, set Picked to Yes.

Issue Anything - system will warn you

If you do not want to accept the defaults, you can specify the inventory you are issuing. You can in fact issue any inventory from any site-location to any work center. However, you are given a warning when you select inventory not on the picklist, and another if the inventory is not available. Issuing inventory not detail allocated or picked leaves the currently detail allocated or picked inventory open on the picklist.

Issue transactions recorded in the Transaction History file.

After issuing inventory, the system records an ISS-TR transaction and a RCT-TR transaction in the Transaction History file. If no quantity remains open on the picklist, the picklist is closed. Note this is not an inventory issue, so there are no general ledger consequences.

QAD

Exercise: Repetitive Picklist Calculation

Create Inventory

1   Use Receipts Unplanned (3.9) to inventory balances for the components required for the 01020. Receive the following into their default location.

50010 Implantable Ultrasound 500 ea.

60009 Probe housing 500 ea.

60051 Microprocessor 500 ea.

90093 Shipping Carton 5,000 ml.

Repetitive Picklist Calculation

2   Use Repetitive Picklist Calculation (18.22.3.1) to calculate a Picklist for your production line schedule. Enter Parent Item 01020 in both the from and to fields and specify site.

Leave the Detail Requirements and Delete When Done boxes Unchecked.

Set the output to page to view the result. Note the report shows none available in the work center stock location.

• Run the report again with the Detail Requirements and Delete When Done boxes Checked. Note the system now sees work center inventory and shows daily detail. Also note the new Picklist number.

View Repetitive Picklists

3   Use Repetitive Picklist Inquiry (18.22.3.2), or Repetitive Picklist Report (18.22.3.3) to view any or all picklists. Note that the Picklist report shows the inventory has been allocated.

4   Use Repetitive Picklist Print (18.22.3.5) to print a hard copy Picklist for a stock clerk to use in picking and transferring material.

Repetitive Picklist Transfer

5   Use Repetitive Picklist Transfer (18.22.3.6) to transfer the items on the pick list from there inventory location to the work center stock location. Enter (or use the lookup) your Picklist. Click Next or enter. The system retrieves the pick list item and quantities as allocated. You may over ride the transactions by changing the data in the lower frame. To transfer the entire Picklist as calculated, click Next, then Back and confirm that all data is correct.

View Inventory

6   Use Inventory Detail by Item Browse (3.2) to view the inventory. You will see the inventory in the ProtoStk location as well as the production line location Proto.

Chapter 6

Repetitive Transactions

Advanced Repetitive Transactions Overview

The Advanced Repetitive module has 10 different transactions available for activity reporting. A brief description of each follows

Backflush (18.22.13)

This is the primary transaction of the Advanced Repetitive module. You can backflush components of the current operation and any preceding non-milestone operations. You can also backflush standard labor and burden if the routing record of the reporting operation, or any preceding non-milestone operation, indicates the auto labor report as Yes. In addition to reporting quantity moved and labor hours, scrap and reject quantities can also be reported and backflushed. This is the only repetitive transaction that has automatic backflushing capabilities.

Reject (18.22.16)

The Reject transaction has two uses. You can reject previously backflushed units from the current operation's output queue, and you can reject units from the current operation's input queue and record the reject at a prior operation. No hours can be reported, and no backflushing will take place.

Scrap (18.22.18)

The Scrap transaction allows scrapping from an operation's input queue (the scrap will be recorded at the previous operation), from an operation's reject queue, and from balances in an operation's output queue. No hours can be reported, and no backflushing will take place with this transaction.

Rework (18.22.17)

Use the Rework transaction to move rejected units from an operation's reject queue back to the rejecting operation's output queue, or to the input queue of the operation following the rejecting operation. Rework hours can be entered, and additional components can be issued. However, no automatic backflushing takes place.

Move (18.22.19)

The Move transaction performs a move from an operation's output queue to the next operation's input queue. In the case of the final operation, it performs a move into stock. When moving to stock from the final operation, the user can modify the receipt to enter location and lot/serial references. No labor hours can be reported. This transaction normally has limited use, since an operation can be set to have the backflush transaction and rework transaction perform this task automatically.

WIP Adjust (18.22.21)

The WIP adjust transaction allows quantities to be adjusted at an operation's input, output, or reject queues. Labor hours cannot be entered, and there are no backflushing capabilities. A GL transaction is generated using the account number entered and the WIP GL account number.

Labor (18.22.15), (18.22.20), (18.22.22)

There are two separate labor transactions that charge WIP, and two that report indirect labor. Use the Run Labor Transaction (18.22.14) for reporting regular labor chargeable against WIP. The Setup Labor Transaction (18.22.15), which also charges WIP, is used to enter separate set-up times. The other two labor transactions, Down Time Transaction (18.22.20) and Non-productive Labor Feedback (18.22.22), are used to report indirect labor and are not subject to applied burden.

Repetitive Transactions
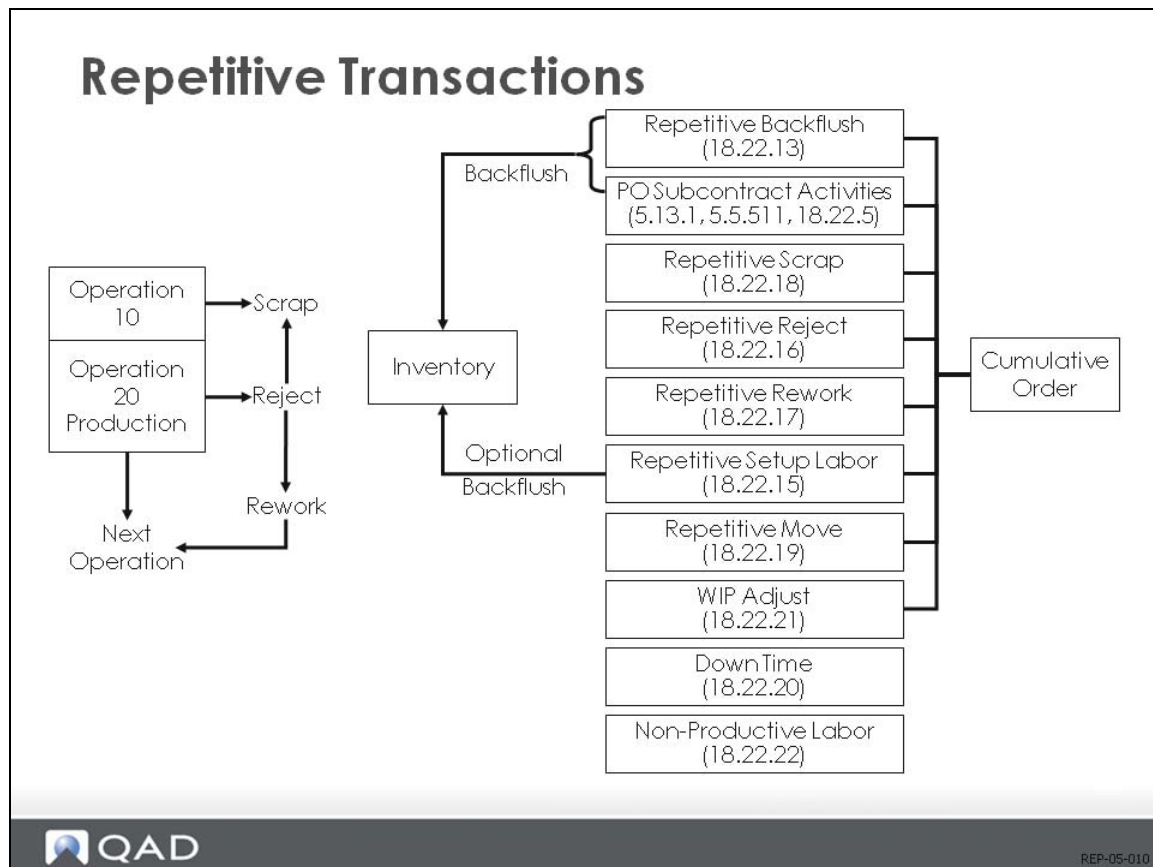
Backflush Transaction

Backflush Transaction (18.22.13) is the primary tool to report production line activity. You can report the number of gross units processed, scrapped units, rejected units, and labor hours. You can backflush components of the reporting operation, and any components of any preceding non-milestone operations. You can also backflush standard labor and burden if the routing record of the reporting operation, or any preceding non-milestone operation, shows Auto Labor Report as Yes. The Backflush Transaction can be used at both milestone and non-milestone operations.

System Interfaces

Repetitive transactions effect other areas of the system. When processing quantity movement through the various repetitive operations, inventory transactions are recorded and posted as backflushing occurs. Labor and burden costs are recorded by manual entry or as a result of backflushing.

Transactions generate the calculation of manufacturing cost variances and create general ledger entries. Most transactions generate quantity and cost posting to the cumulative order and associated operation and bill of material (BOM) records.

Then, units are moved to stock or scrapped, information is posted to the repetitive schedule, and the MRP exploded work order. When MRP is run, issued component quantities remaining on the production line are visible for requirement planning. Purchase order receipts and supplier schedule receipts are integrated with the Repetitive module generating GL entries. Components are then backflushed and posted to various repetitive files.

Backflush Transaction

First Window - fields

The repetitive transactions (18.22.13-21) all use the same first window. The Employee field is mandatory, and you must enter a valid employee set up either from Payroll, Employee Maintenance (29.15.1) or Routing, Actual Pay Rate Maintenance (14.13.21).

A valid effective date, site, item number, and operation are required. Shift is optional. If the item number is associated with a production line, a valid production line must be entered (Line field). Routing and BOM are entered only if using a routing different from the default. If the default routing/BOM is manually entered, an error message displays unless the default routing has been set up as an alternate. ID is a system-generated cumulative order ID and cannot be modified.

Lower Window - fields

In the lower window, the fields Work Center, Machine and Department default to data referenced from the routing operation, and can be overridden.

The Qty Processed field shows the total quantity being processed, and includes any quantity entered to the Qty Scrapped and Qty Rejected fields. If the Multi Entry field for scrap and reject is Yes, a separate pop-up window appears for entry of up to ten lines of reason codes and quantities. The quantities entered will be accumulated, and posted to the Qty Scrapped and/or Qty Rejected fields.

The Reject To Op field must reference either the current operation or the one that precedes it. The default is the current operation. If the Modify Backflush field is Yes, the Component Issue screen appears. If Move Next Op field is also Yes, then the Receipt Data screen also appears when reporting the last operation.

The Move Next Op field indicates if the quantity processed, less rejected, and scrapped quantities, is to be moved to the input queue of the next operation. If the operation being reported is the last operation, the move causes an increase in the quantity of finished material inventory. The default comes from the cumulative order routing operation record, which is set from the same field in the routing file when the cumulative order is created.

Backflush Modification

Modify backflush = Yes

Ordinarily, a backflush transaction simply causes the appropriate material to be issued. But what if you have used different amounts, have had to use different items as substitutes, or had to use different items. You can record this by setting Modify Backflush to Yes, as shown above.

List Components

A new window listing the default components used displays. If milestone operations are being used, the operation at which the components will be used is listed. The assumption is you are changing amounts, so the highlighted component defaults when you press Enter.

Controls

You may enter in any item in any amount. QAD Enterprise Applications assumes you have procedural controls over the use of modify backflush. The typical uses, however, are to change amounts, or to add minor amounts of things like floor stock.

Substitutes

If you have substituted one item for another, you can set the Substitute flag to indicate that fact. The item must have been set up as a substitute in Item Substitution Maintenance (13.19). The quantity substituted is then subtracted from the default quantity of the original item.

BOM and Routing Changes

The component backflush logic looks at the product structure in effect as of the transaction effective date. If components are added, changed, or removed from the current product structure during the life of a cumulative order, and backflush transactions occur, the differences cause material usage variances. Product structure and routing changes can be phased into cumulative orders by setting the cumulative order effective dates to match the product structure and routing effective dates.

Milestone Operations
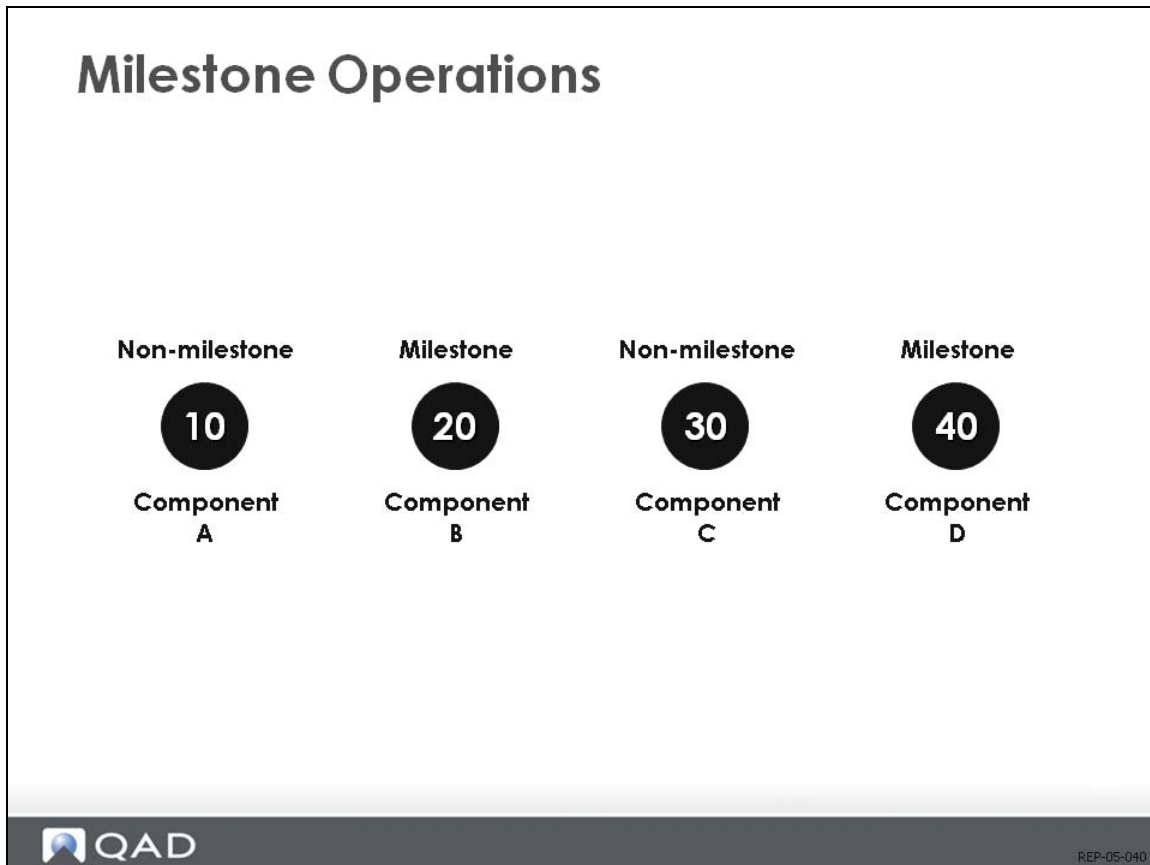
Milestone operations are routing operations where production counts are recorded. Completions initiate a backflush for this and all previous non-milestone operations, back to but not including a previous milestone. In the example above, when you report production at operation 40, the system backflushes components C and D. Production at operation 20 will backflush A and B.

Although all operations, including non-milestone operations, can use any repetitive transaction (18.22.13-21), you should limit the use of Backflush Transaction (18.22.13), at non-milestone operations, to scrap and reject.

Completing Scheduled Orders

Recording Completions

When you report you have completed and moved items at the final operation, the quantity is posted as completed at the operation, and is also posted to the repetitive schedule and the related work order. If there are multiple schedules for an item, the system determines the earliest open schedule date, and posts the completed quantities from that point forward. If the system cannot find enough open balances, the operation will be posted with the transaction quantity. However, the repetitive schedule and work order record will be posted with the open quantity available.

Modify schedule completions using (18.22.2.6)

View using (18.22.2.2) or (18.22.2.5)

View WO completions using (16.2)

Modify repetitive schedule completions using Cumulative Completed Maintenance (18.22.2.6). View the repetitive schedule completions using either Schedule Browse/Inquiry (18.22.2.2) or Operation Schedule Report (18.22.2.5). View work order completions using Work Order Browse/Inquiry (16.2).

Delete using (18.22.2.7)

Delete repetitive schedules and related work orders using Schedule Delete (18.22.2.7).

Managing Schedule Consumption

How schedules are consumed

Schedule consumption relieves demand from open schedules for reported completions. In the Advanced Repetitive module the earliest open schedule is always consumed, not just completions over the scheduled quantity for that date. The example above shows how schedule consumption for lower than predicted quantifies comes from old schedules, without using current schedules. Each day's completions fall short of the schedule. The first schedule consumed is the earliest schedule open (containing open scheduled quantities). By Friday, only Thursday's schedule is being consumed.

Use Schedule Delete (18.22.2.7)

Limit schedule consumption in the past by deleting schedules left open that fall before a specific date. In Schedule Delete (18.22.2.7), the date defaults to Monday's date. This provides a means to establish the earliest open schedule for purposes of limiting the backward use of open schedules.

Run (18.22.2.7)

Run Schedule Delete as a QAD Enterprise Applications batch, a UNIX cron, or at job to ensure regular deletion of schedules.

Adjustments to Cumulative Completed
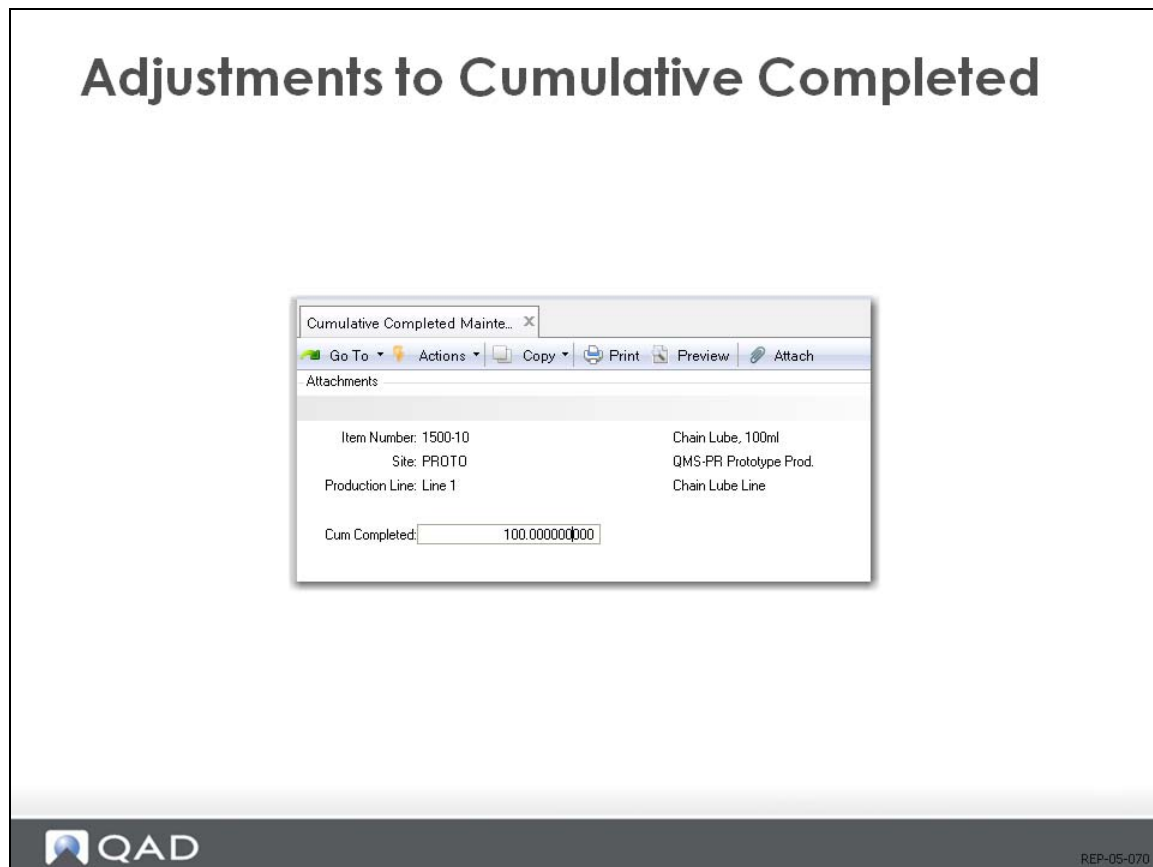
Cumulative Completed Maintenance (18.22.2.6)

Cumulative Completed Maintenance (18.22.2.6) displays the current cumulative completed for all open schedules and permits adjustment of this total.

Reduction in cum quantity vs increase in cum completed

A reduction in the cumulative quantity completed reduces the quantity completed on the latest reported schedules, and increases demand by this quantity. An increase in the cumulative completed increases the earliest open schedule, and decreases demand by this quantity. If you use this function you should run MRP to re-plan the item. (The cumulative completed quantity is reduced when you delete schedules. Therefore, the cumulative completed is a rolling total of open schedules.)

No general ledger or inventory transactions are created by this adjustment.

There is no audit trail for these adjustments. Because of this, report totals may no longer tally as expected. This program should be secured and used only by an individual who knows the impact.

Reporting Production (Cumulative Orders)

Reporting Productions (Cumulative Orders)

Cumulative Order
02-0005   1014
Site
Production Line
Product Structure
Routing

	Operation 10	Operation 20 (Milestone)	
Standard/1000	1 Hour	1 Hour	Report 1.5 Hours @ 8.00/Hour - 1000
Standard Cost			
Labor	10.00	10.00	
Burden	20.00	20.00	
Reported	1 Hour	Labor 15.00	Actual Cost
		Burden 30.00	
	10.00	Labor Rate Var. -3.00	$2.00/Hr * 1.5 Hrs.
	20.00	Burden Rate Var. -6.00	
		Labor Usage Var. 5.00	5 Hrs * Standard
		Burden Usage Var. 10.00	Labor

QAD

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Cumulative Order

When you report transactions against a cumulative order, you are reporting that you have spent money on material, labor, burden, and subcontract. The total value of those expenditures is accumulated into total cost in the cumulative order. Detail costs of material, labor, burden, and subcontract receiving are kept in each associated operation record.

Example

At each operation the actual labor and actual material are recorded, and a number of calculations are made. In the example shown above, an employee reports 1000 have been completed at milestone operation 20, and it took the employee 1.5 hours to do it. The standard for 1000 is to take 1 hour at 10.00/hour. Operation 10 is a milestone.

Previous Operation

For operation 10, any associated components are backflushed generating material cost. If Auto Labor Report (in the routing record) is Yes, labor and burden costs are automatically generated.

QAD

Labor Rate Variance

At the current operation a number of variances are generated. The difference between the cumulative order standard hourly pay rate and the actual employee's pay rate is reported as a labor rate variance. Rate variances are posted with the labor and burden costs.

Labor Usage Variance

The current operation has a standard labor time of one hour. The actual labor time was one and one-half hours. This generated a usage variance of one-half hour, which generated a labor cost usage variance of $5.00 (standard labor rate of $10.00 *.5 hours = $5.00) and a burden variance of $10.00 (standard burden rate of $20.00 *.5 hours = $10.00). Usage variances are not posted immediately, but accumulate, and will be posted when Post Accumulated Usage Variances (18.22.9) or Cumulative Order Close (18.22.10) are run with Update set to Yes.

Cumulative Order Selection

Identifying appropriate cum order at backflush

When a backflush transaction is processed, the values entered in the Effective (date), Site, Item Number, (production) Line, BOM and Routing fields identify the appropriate cumulative order.

Selecting cum order using effective date

The selected cumulative order has start and end effective dates that include the transaction effective date. The following table explains how a cumulative order is selected, based on the effective date entered.

If...	Then...
A cumulative order has a blank start effective date, its effective interval is from the end effective date into the indefinite past,	it will always be selected if the transaction effective date is on or before the end effective date.
A cumulative order has a blank end effective date,	its effective interval is from its start effective date into the indefinite future. It will always be selected if the transaction effective date is on or after the start effective date.
A cumulative order has blank start and end effective dates,	it will always be selected.
No cumulative order is found matching the criteria,	one is immediately created. The start and end effective dates are set according to the setting of the End Eff Default Method field in the Repetitive Control File (18.22.24).
The dates in the new cumulative order overlap with the dates in another cumulative order,	the dates in the new cumulative order are adjusted forward or backward to prevent overlap.

Cum order create process

The cumulative order create process retrieves the routing in effect as of the transaction effective date, and copies it to the cumulative order. For each operation in the routing, this process retrieves the product structure in effect as of the transaction effective date, and copies it to the cumulative order operation. When accessing the product structure file, phantoms are blown through.

Operation costs

A cost roll-up is then performed on the new cumulative order. The calculated operation costs are recorded by operation in the cumulative order routing. These costs are used for WIP valuation reporting and calculating variances.

Cumulative Order Create

Cumulative Order Create (18.22.11)

Use Cumulative Order Create (18.22.11) to create new cumulative orders in advance while current cumulative orders are still in effect. You can do this in the middle of the month for work orders whose end effective date is the end of the month. This prevents the repetitive transactions from having to create new cumulative orders all at once, with resulting response time degradation, which can be noticeable for items using large numbers of components.

End Effective

In addition to the usual selection criteria, the End Effective field is used for selection purposes. Cumulative orders whose end date matches the End Effective date are selected.

When cum order created

For each cumulative order selected, the system checks to see if a cumulative order exists with an effective date range including the day after the entered Effective Date. A new cumulative order is created if none exists. The Start and End Effective dates of the new cumulative order are set according to the Repetitive Control File (18.22.24) fields.

Cumulative Order Create (18.22.11)

To use this function, orders must already exist in the system.

You cannot use this program to create a cumulative order where none exists. Use Cumulative Order Maintenance (18.22.6) or Backflush Transaction (18.22.13) to create cumulative orders.

Cumulative Order Maintenance

Cumulative Order Maintenance (18.22.6)

Cumulative Order Maintenance (18.22.6) provides for maintenance of the start effective and end effective dates, and allows you to delete closed cumulative orders.

A cumulative order is created for a profile that defines the site, item number, production line, and start and end effective dates. No two orders having the same profile can have overlapping effective dates. When a cumulative order is entered, the work order ID is automatically assigned, the work order number is blank, the work order type is C (Cumulative), and the work order status is R (Released).

Cumulative Order Browse/Inquiry and Report

Cumulative Order Browse/Inquiry (18.22.7)

You can use Cumulative Order Browse/Inquiry (18.22.7) or Cumulative Order Report (18.22.8) to see the cumulative order, start and end effective dates, and status.

Cumulative Order Close

Closing cum orders - criteria

Cumulative Order Close (18.22.10) selects unclosed cumulative orders using criteria you specify. Cumulative orders must have an end effective date on or before the end effective date you enter. Cumulative orders with a blank end effective date will not be selected. If an order has a blank end effective date, you need to enter an end effective date using Cumulative Order Maintenance (18.22.6). Then, you close the order.

How to close before end eff date

To close a cumulative order before its end effective date, use Cumulative Order Maintenance (18.22.6) to set the end effective date to yesterday's date. The system creates a new cumulative order for the balance of the period if the End Eff Default Method is set to 1 or 2 in the Repetitive Control File (18.22.24).

Once the order is selected

When a cumulative order is selected, the system first calls the subprogram used by Post Accumulated Usage Variances (18.22.9) to calculate, post and report usage variance. It transfers WIP queue if the Transfer WIP flag is set to Yes in the Repetitive Control File.

Engineering Change Phase-In
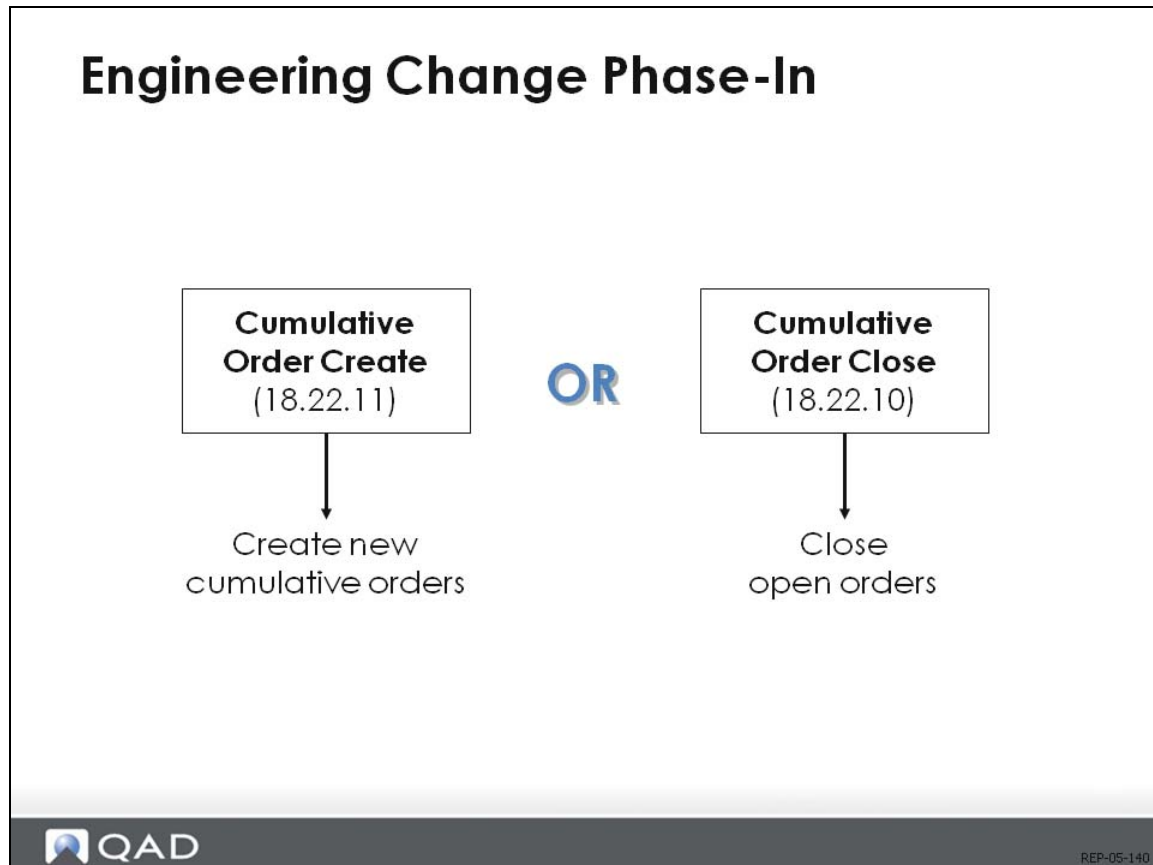
Cumulative Order Create (18.22.11)

You can phase in engineering (bill and routing) changes by creating new cumulative orders in Cumulative Order Create (18.22.11), or by closing open orders in Cumulative Order Close (18.22.10). This removes the need to run WIP Material Cost Revaluation (16.22). WIP Material Cost Revaluation does not impact new repetitive cumulative orders.

QAD Enterprise Applications uses the latest BOM and routing to determine the cumulative order cost. Whenever a new cumulative order is created, you want to close the existing cumulative order and open a new one if there is an engineering change affecting a bill or routing. By running Cumulative Order Close and transferring WIP, there is no need to run WIP Material Cost Revaluation. Also, you should delete any repetitive schedule and re-enter them so they are exploded using the latest BOM and routing.

It is optional whether you re-roll up the standard cost. If the GL cost is not recalculated, the system will generate a method variance with each new receipt.

Mistakes in Reporting (Repetitive Transaction History)

Reversing transactions

When data entry errors occur, they need to be corrected by reversing the original transaction. You do this by entering the same information, for the same operation, with negative quantities and/or hours. You then re-enter the transaction with the correct data. Reversing the transaction and re-entering it leaves a better audit trail than entering a net correction. By re-entering, you can also correct data in addition to quantity and hours.

Transaction History

You can view the results of repetitive transactions using the following.

- To determine the effect of a transaction on an operation's input, output or reject queue, run WIP Status Browse/Inquiry (18.22.12) or WIP Status Report (18.22.4.11).
- To verify the data of specific transactions, run Operation Transaction Browse/Inquiry (18.22.4.1) or Operation Transaction Detail Browse/Inquiry (18.22.4.2).
- To verify material backflushing and receipt to stock, run Transactions Detail Browse/Inquiry (3.21.1), Transactions by Item Browse/Inquiry (3.21.2), or Inventory Detail by Item Browse/Inquiry (3.2).

Repetitive Downtime and Non-Productive Labor

Down Time Transaction (18.22.20) and Non-Productive Labor Feedback (18.22.22)

Down Time Transaction (18.22.20) and Non-productive Labor Feedback (18.22.22) do not charge costs against WIP. Both debit cost of production and credit labor.

Down Time Transaction references the cumulative order, operation, item, production line and site. Non-productive Labor Feedback allows you to enter a project ID and record comments.

Reason codes

Reason codes can be entered for both transactions, with type Downtime for the Down Time Transaction and type Down for the Non-productive Labor Feedback.

Exercise: Transaction Feedback

Create Reason Codes

1   Use Reason Code Maintenance (36.2.17), to setup reason codes. Find the reason type "DOWNTIME" already on the system, add Reason Code 1, Safety Meeting. Find reason type REJECT, and code 1 Out of Spec. Find type SCRAP, add code 1 Test Failure.

Backflush

2   Use Backflush Transaction (18.22.13) to report production. Use employee 10-EMP01 to report your item 01020 at operation 10. Report 100 units Processed, Scrap 1 unit with reason code 1 and Reject 1 unit with reason code 1. If you needed more reason codes to account for scrap or reject you could select multi-entry, to open a pop up window to enter more data.

View Operation Transactions

3   Use Operation Transaction Detail Inquiry (18.22.4.2) to review the backflush you just did. The screen opens on the last transaction captured. Use the Up - Down scroll arrows to move through the transactions.

View Inventory Transactions

4   Use Transaction Detail Inquiry (3.21.1) to view the inventory transaction associated with the backflush at operation 10. You should see an ISS-WO to reflect the component consumed at operation 10. Use the Up - Down scroll arrows to move through the transactions.

Backflush

5   Use Backflush Transaction (18.22.13) to report production. Use employee 10-EMP01 to report your item 01020 at operation 30. Report 100 units all at standard.

- Review the effects of this transaction with the Operation Transaction Detail Inquiry (18.22.4.2), and the Transaction Detail Inquiry (3.21.1). In the Inventory transaction history you should now see a REC-WO for the 100 units you reported at the last operation.

Review Schedule

6   Use Item Schedule Inquiry (18.22.2.2) to review the progress on your schedule.

Review Cumulative Order

7   Use Cumulative Order Inquiry (18.22.7) to review your cumulative order. Note the start and end effective dates. These have been set to GL calendar periods as setup in the Control File.

Change Cumulative Order Effective Date

8   Use Cumulative Order Maintenance (18.22.6) to change the End Effective Date of your current active order to yesterday's date. Use the up and down arrows on your keypad to find your ID number.

Close Cumulative Order

9   Use Cumulative Order Close (18.22.10) to close your cumulative order. Set transfer WIP and Update to yes.

View Cumulative Order

10   Use Cumulative Order Inquiry (18.22.7) to review your cum order status. Note the closed order and a new order effective today until the end of the month.

Cumulative Order Create

11   Use Cumulative Order Create (18.22.11) to create a new cum order for next month. Specify your item and site and production line. Set the End Effective Date to the last day of the current month, set the output to page, and process the transaction. You should see a new cum order for the next fiscal period.
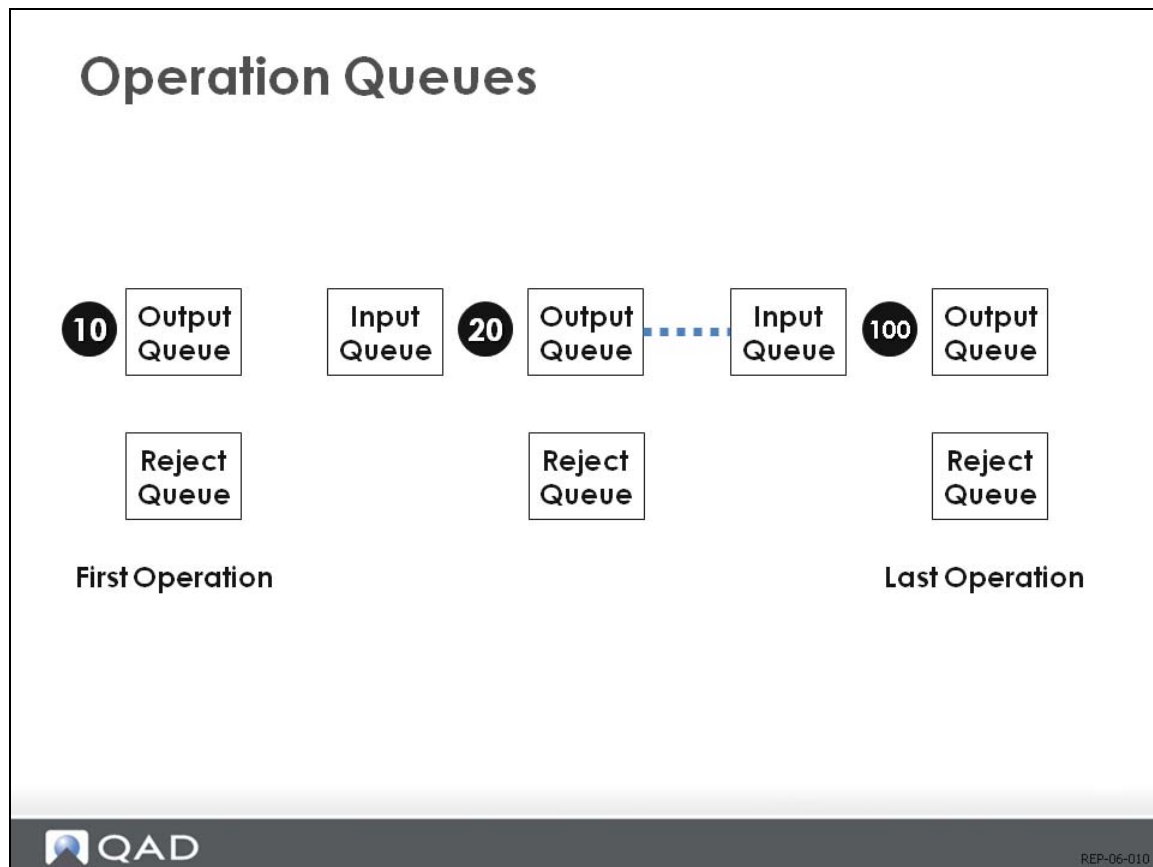
Set Effective Default Method

12   Use Repetitive Control (18.22.24) to change the default effective days. Place your cursor in the field End Eff Default Method. Note the four available selections. Method three is used with the End Effective Days filed. For the purposes of this exercise, set this to 90 days.

Chapter 7

WIP Control

Operation Queues

Operation queues - exception first operation

Operations have input queues, output queues and reject queues. The exception is the first operation. It does not have an input queue.

Output queue of last operation - when it accumulates quantities

The last operation's output queue is usually empty if the routing setting for Move to Next Op (Operation) is set to Yes in Routing Maintenance (14.13.1). When backflush transactions are processed at the last operation, good units are moved to stock, and rejected materials are moved to the reject queue. If the Move Next Op field is set to Yes, you would accumulate quantities in the output queue of the last operation only if rejected materials are reworked and moved to the output queue of the last operation.

WIP Status Browse/Inquiry (18.22.12)

Use WIP Status Browse/Inquiry (18.22.12) to view quantities in the input, output, and reject queues for an operation.

WIP Status Browse/Inquiry and Report

WIP Status Report (18.22.4.11)

Use WIP Status Report (18.22.4.11) to see a report for WIP queue quantities for all operations in selected cumulative orders. The report also shows the cumulative activities affecting each of the queue quantities. Activities such as cumulative completed, scrapped, adjusted, rejected, reworked and moved to next operation.

Reject Transactions

Backflush Transaction (18.22.13)

Reporting rejects at milestone operations.

Use Backflush Transaction (18.22.13) for most of your reject reporting. This transaction backflushes the rejected units, and records all costs at the operation. When you use this transaction to report rejects at a milestone operation, the quantity must be in the input queue of the current operation or in the input/output queues of prior non-milestone operations.

Reporting rejects at non-milestone operations

If you are rejecting with backflush at a non-milestone operation, the quantity to be rejected must be in the input queue of that non-milestone operation.

Reject Transaction (18.22.16)

Reject Transaction (18.22.16) does not backflush. Use it to reject previously backflushed units from the current operation's output queue, or to reject quantities from the current operation's input queue, and record the reject at a prior operation.

Scrap Transactions

Use Backflush Transaction (18.22.13) for scrap reporting

Must be quantity in input queue.

Use Backflush Transaction (18.22.13) for most of your scrap transactions. It backflushes the scrapped units and records all costs at the operation. There must be a quantity in the input queue operation in order to record scrap with this transaction.

Scrap Transaction (18.22.18)

Use Scrap Transaction (18.22.18) to scrap from the input, output or reject queues without backflushing. This transaction is often used to scrap previous rejected units.

Rework Transactions

Rework quantities; how to report

You should report rework quantities after the quantities have been rejected. When you first report rejected quantities, use the Reject to Op field (in the Backflush Transaction [18.22.13]) or the To Operation field (in Reject Transaction [18.22.16]) to send the quantity to the operation where rework will occur. In WIP Status Browse/Inquiry (18.22.12), the rejected quantities appear as negative numbers in the output queue of the operation where the reject occurred, and as a positive number in the reject queue of the receiving operation.

Use Rework Transaction (18.22.17) to move rework items back into production

After reworking items, use Rework Transaction (18.22.17) to move the items back into the production line. Use the To Operation and To Queue fields to select the operation and queue, typically an input queue since any output queue requires an additional Move Transaction (18.22.19). The reworked quantities appear as a negative number in the rework operation's reject queue, and as a positive number in the target queue.

Reworked units

Reworked units are backflushed at the operation rejecting them. You must rework them back to the output queue, or to the input queue of the operation following it. If you rework them to an operation preceding the rejecting operation, they undergo additional backflushing. If you rework them to the following operation, they escape normal backflushing. Using Rework Transaction, you can input labor and material costs. Automatic backflushing is not performed.

WIP Adjustments

Adjusting WIP; use (18.22.12), (18.22.4.11), or (18.22.21)

You can reconcile actual WIP quantities with those stated in QAD Enterprise Applications using the WIP Status Browse/Inquiry (18.22.12) or WIP Status Report (18.22.4.11). Where quantities do not match, you can use WIP Adjust Transaction (18.22.21).

Adjusting queues

WIP Adjust Transaction can be used to adjust an input, output, or rejected queue for any operation. The current queue balances display when you run the program. When you adjust the output or reject queues, you change their balances at the current operation. When you adjust the input queue, the net change is made to the prior operation's output queue as well as to the current operation's input queue.

Adjustment results

Each adjustment creates operation history records and generates general ledger transactions. A queue increase debits WIP and credits the inventory discrepancy account. Negative adjustments credit WIP and debit the inventory discrepancy account. You can designate a GL account and cost center for the transaction. The default is the inventory discrepancy account.

QAD

Open schedule quantities

Open schedule quantities are also updated. Increases in the queue balances of the final operation's output queue, increase scheduled completions. Decreased queue balances, decrease completions.

Defining Milestone and Non-Milestone Operations

Defining Milestone and Non-Milestone Operations

Operation	10	20	30	40 (Milestone)
Completions reported		9		50
Scrap reported		9		
Backflush (parent quantity)	59	59	50	50
Operation balance after backflush	0	0	0	50

Zeroing Non-milestone Balances

Operation	10	20	30	40 (Milestone)
Completions reported		20		15
Backflush (parent quantity)	15	15	15	15
Operation balance after backflush	0	0	0	15

Returning WIP Balances to Inventory

QAD

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Use milestones to report labor and completions

Milestone operations are normally used to report all labor and completions. However, you can also use non-milestone operations to report labor and completions (usually only those that are over or under standard).

Decide to recognize standard labor or actual labor

You can also control whether you automatically recognize standard labor (and therefore do not report it) or only actual labor (and therefore report everything) at any operation.

Definition critical

The definition of milestone and non-milestone operations is critical to the successful implementation of the Advance Repetitive module.

How non-milestone operations are maintained

In this module, if you use a non-milestone operation to report scrap, rejects, rework, or discrepant labor, you create WIP balances at non-milestones. This allows for more accurate tracking of WIP costs and quantities.

QAD

Normally, however, non-milestones are maintained at zero inventory. Therefore, QAD Enterprise Applications will consume all WIP balances at non-milestone operations when reporting completion's at subsequent milestone operations.

For example, you have four operations. Operation 10 is a milestone, Operation 20 is a non-milestone, Operation 30 is a non-milestone, and Operation 40 is a milestone. Operation 20 output queue equals 30 complete. Operation 30 output queue equals 25 complete. If you report production at Operation 40 for 50 parts complete, the system will first consume WIP at Operation 30, then it will consume WIP at Operation 20. The resulting values in Operation 20 equal 5, and Operation 30 equal 0. This process prevents the duplication of consuming component parts and labor costs.

Always report completions at milestone operations

You should always report completions at a milestone operation. The reason for this is you can temporarily lose portions of your reported completions at non-milestone operations. For example, in the second example shown above, reporting 20 completions at non-milestone operation 20 and then reporting 15 completions at the subsequent milestone operation, backflushed components for only 15 items and sends the value of 5 items from operation 20 back into inventory.

Correct Use of the Auto Labor Report Field

Auto Labor Report set in Routing Maintenance (14.13.1)

The Auto Labor Report field appears in Routing Maintenance (14.13.1). When Auto Labor Report is set to Yes, a backflush at any milestone automatically includes standard labor costs in the operation cost. Any actual labor reported is in addition to (or, if a negative number, a subtraction from) standard.

When Auto Labor Report is set to No, no standard costs are included. Only actual labor entered is used to cost the operation.

Gives control over tracking costs

Must report labor correctly.

The Auto Labor Report field provides control over what costs you want to track at actual versus standard for each operation. However, greater care must be used in reporting labor correctly. Reporting run labor at operations where Auto Labor Report is set to Yes will result in incorrect, unfavorable variances. Just as not reporting run labor at operations where Auto Labor Report is set to No will result in incorrect, favorable variances.

WIP and MRP
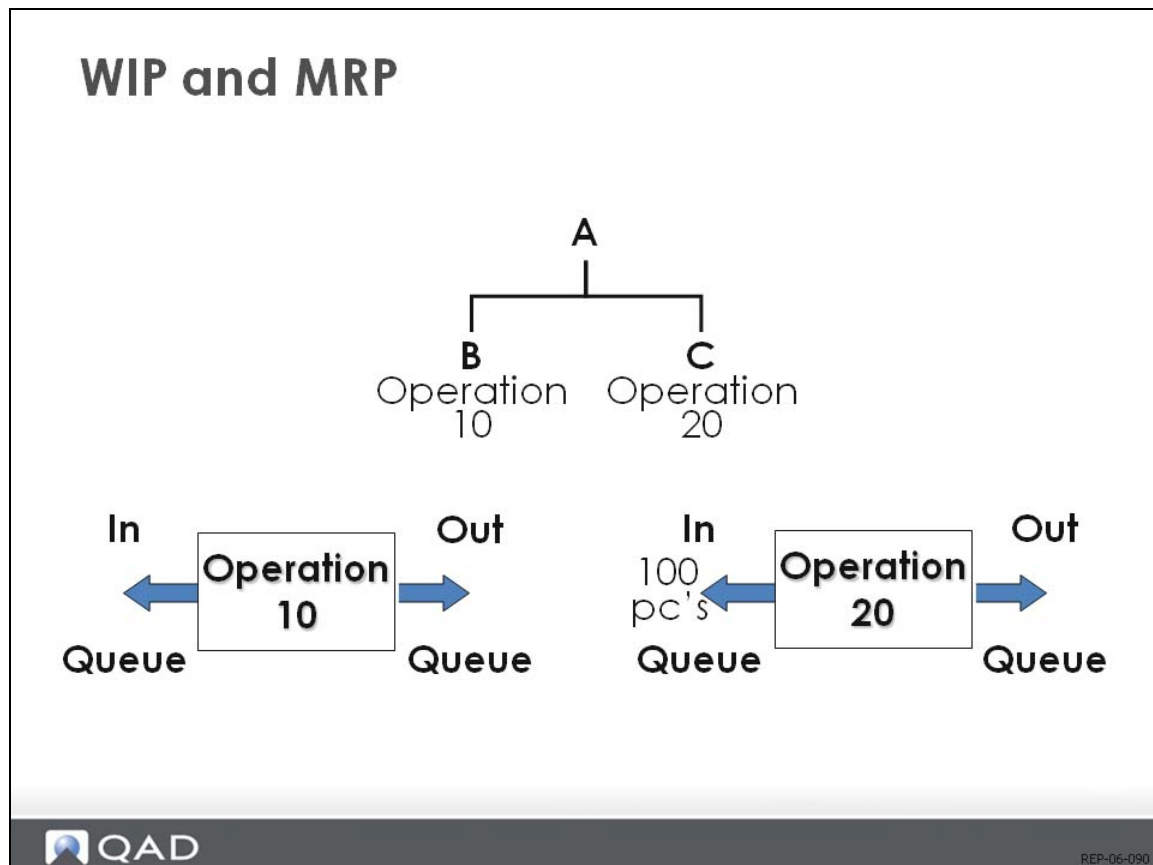
You do not need a repetitive schedule to report production in QAD Enterprise Applications. The system uses the exploded schedule to net WIP and determine correct component requirements.

In the example shown above, there is demand for 100 pieces of item A and a repetitive schedule is in place for 100 pieces. The system determines there are 100 pieces of item A in the in queue of operation 10. Therefore, only 100 pieces of component C are required to complete the order. (Component B has already been consumed at operation 10.) If there is no repetitive schedule in place, the system will not net WIP, and order both components B and C.

WIP Write-Off

Choices for cum orders.

In Advanced Repetitive, you can choose whether to:

- Close a cumulative order and write everything to variances
- Close a cumulative order and transfer everything to the new order
- Leave the order open and post only the variances

Cumulative Order Close (18.22.10)

If you choose to write off any WIP and start a new cumulative order with a clean slate, set the Transfer WIP field to No and Update to Yes in Cumulative Order Close (18.22.10).

Accumulated Usage Variances (18.22.9)

If your WIP values are relatively small and stable, you can leave the cumulative order open, and post only the variances at fixed period end using Post Accumulated Usage Variances (18.22.9).

Transferring WIP

The following table shows the process the system follows to transfer WIP. You enter the data in Cumulative Order Close (18.22.10). The system finds a cumulative order for the site, immediately following the end effective data entered.

Table 7.1

If...	Then...
There is a cumulative order, and it is not closed,	it receives the WIP quantities of the cumulative order being closed.
There is a cumulative order, but it is closed,	it does not transfer.
There is no cumulative order,	it creates a new one to which WIP will be transferred.

Here are the steps for each operation in the cumulative order being closed:

1   The system posts the value of the WIP queue inventory to scrap or the WIP transfer account specified in the Repetitive Control File (18.22.24).

2   The system records the posting event by creating an operation history record of type Close.

3   The cumulative order is flagged closed.

a   If the Transfer WIP field is set to Yes (in the Repetitive Control File), the system transfers WIP balances.

4   The system looks for an operation in the receiving order with the same number as this operation. If there is one, it proceeds with the transfer. Otherwise, it ignores this operation, and does not transfer the WIP.

5   If this operation is not the first operation, and the same operation in the receiving order is the first operation, the system ignores this operation, and does not transfer WIP.

6   The system adds the WIP queue quantities in this operation to the WIP begin queue balance quantities in the receiving order operation.

7   The system records the transfer by creating an operation history record of type Transfer.

8   The system reinstates the WIP value by debiting the new cumulative order WIP account, and crediting the old cumulative order scrap account, or the WIP transfer account (specified in the Repetitive Control File).

9   If the cost of the WIP queue inventory at this operation is different from the cost of the receiving operation, the system calculates and posts the differences to Method Change Variance.

At the end of the report, the remaining amount in the WIP value accumulator field displays as Residual WIP Value. Residual WIP Value at this point should be close to zero, if it is the result of a rounding error.

You can run Cumulative Order close in non-update mode to generate a report without updating the database (set Update to No).

Exercise: Black flush and View WIP

1 Use Backflush Transaction (18.22.13) to report production. Use employee 10-EMP01 to report your item 01020 at operation 10. Report 100 units Processed, scrap 1 unit with reason code 1 and reject 1 unit with reason code 1.

2 Use WIP Status Inquiry (18.22.12) to view your item at operation 10 and 20. Note the status of the input and output queues.

3 Use Backflush Transaction (18.22.13) to report 90 units complete at operation 20.

4 Use WIP Status Inquiry (18.22.12) to view your item at operation 10 and 20. Note the status of the input and output queues.

5 Use Backflush Transaction (18.22.13) to report 80 units complete at operation 30.

6 Use WIP Status Inquiry (18.22.12) to view your item at operation 10 and 20. Note the status of the input and output queues.

  • You should see the WIP progress through the input/output queues of the various operations.

View Inventory Transactions

7 Use Transaction Detail Inquiry (3.21.1) to review the inventory transactions created by the backflush transactions. You should see the 80 units from operation 30 going into finished goods.

Reject Two Units

8 Use Reject Transaction (18.22.16) to reject two units at operation 20. Confirm the update.

Scrap One Unit

9 Use Scrap Transaction (18.22.18) to scrap one unit at operation 30 from the input queue. Confirm the update.

View Operation Transactions

10 Use Operation Transaction Detail Inquiry (18.22.4.2), note the reject and scrap transactions did not result in a backflush.

View WIP

11 Use WIP Status Inquiry (18.22.12) to view the status at operation 20 and 30. Note the units in the reject queue.

Issue Component for Rework

12 Use Rework Transaction (18.22.17) to report rework of the two rejected units. Select your item and operation 20, enter quantity reworked as 2, set Modify Backflush to Yes. Charge 2.0 hrs to actual run time, set "To Operation" to operation 30, and To Queue to Output. In the Issue Data Input window select item 2200-00, spray assembly, the quantity 2.

To confirm the update at the end, press back 3 times.

View Reworked Unit

13 Use WIP Status Inquiry (18.22.12) to view the reworked units at operation 30. Verify the reworked units are in the output queue at operation 30.

Move Reworked Units

14 Use Move Transaction (18.22.19) to move the reworked units from the output queue to the inventory location. Select your item and operation 30, specify the quantity to Move as 2, confirm the update to begin the inventory update process.

- You could use Transaction Detail Inquiry (3.21.1) to confirm the receipt into inventory.

Chapter 8

Costs and Variances

Overview

In this chapter you will see how the Advanced Repetitive module handles costs. You will be learning how this module handles variances and yield. Also discussed is the accounting close. For complete information on costing see the Cost Management course.

Cumulative Orders

In this chapter you will see how the Advanced Repetitive module handles costs. You will be learning how this module handles variances and yield. Also discussed is the accounting close. For complete information on costing see the Cost Management course.

Repetitive functions are normally used in high-volume manufacturing environments, there you do not need detailed costs for each individual production order instead you need to know the costs over a period of time. This period can be as short as a single production run, but normally is much longer (many companies accumulate and report cots on a aggregate by GL period). To allow for this, Repetitive functions accumulate costs on a special type of work order – a cumulative order – one for each item, site, and production line.

The cumulative orders are created automatically when the first production activity is reported against an item, site, and production line. At this time the system uses the current bill of material and routing, GL material costs, and work center rates to calculate a cumulative order cost. The system calculates a cost by operation and uses this cost to value WIP and scrap. The results of this

calculation can be seen by running the cumulative order Cost Report (18.22.4.10). Any difference between the cumulative order cost and the GL cost will generate a method variance when items come out of WIP and enter inventory.

Costs and Variances
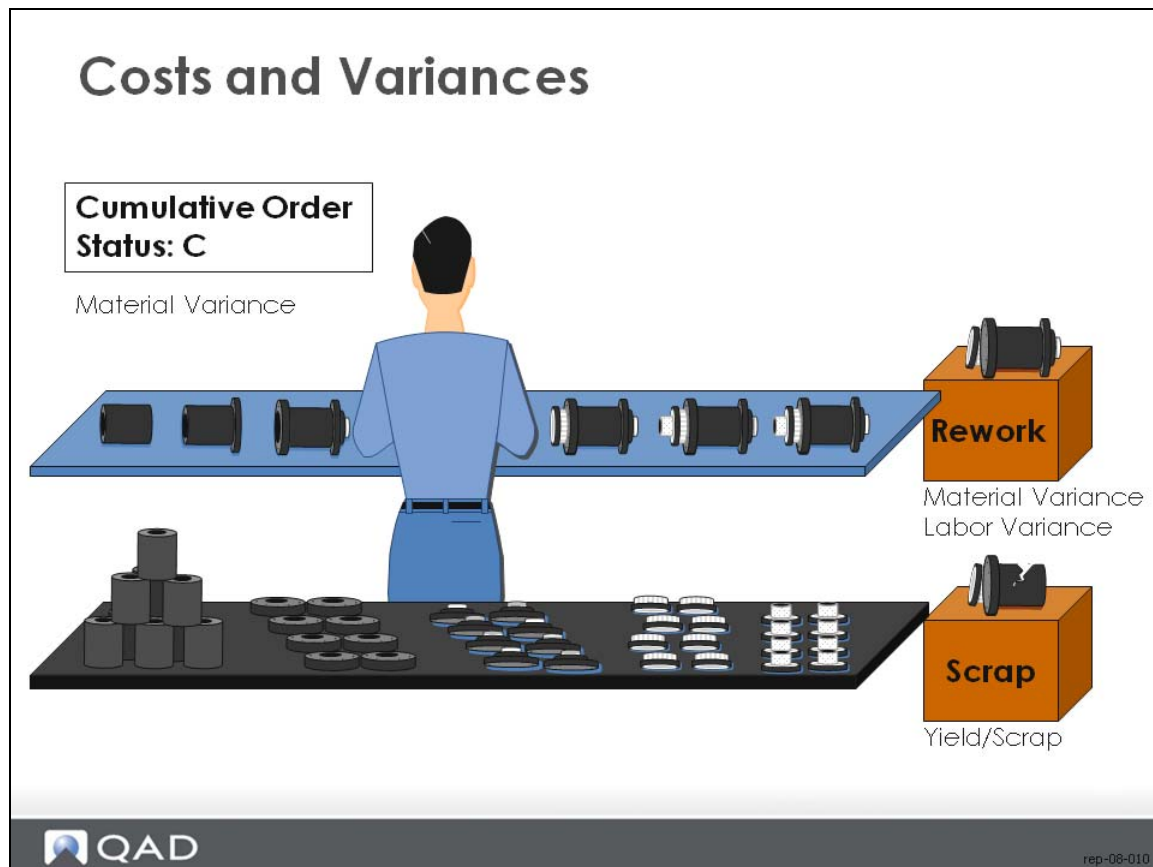
WIP/ Variances

In Repetitive, both actual and standard costs are captured for all transaction reporting. In a standard cost system, the value of WIP is the standard cost at the time the system creates the cumulative order. The difference between this value and the value of all actual costs charged against the cumulative order is called a variance. For example, when units need to be re-worked, you use additional labor and, possibly, additional material. This normally produces a usage variance. If an employee who performs work on units has a different pay rate than the standard pay rate for the operation, this produces a rate variance. Variances can be either favorable (when you expend less resources than standard) or unfavorable (when you expend more resources then standard).

Yield/Scrap

Scrapped units do not always generate a variance. To generate a variance due to scrap, you must scrap either more or less than standard. For example, if an operation is expected to produce 90 units for each 100 units started, you would tell the system you expect to lose 10 percent of your units that come through that operation. You do this by putting a yield factor on the operation in the item's routing. If you process 200 units and 20 are scrapped, you do not generate a variance. Components can also by yielded. For example, the quantity per for a component is 1.00. It has been determined that for every 100 units issued, 2 of that item will not be usable. The two percent

attrition rate can be entered as a scrap percentage in the item's product structure. When the component is backflushed, an additional 2 percent is issued to the line. No variance is generated since the 2 percent was factored into the standard.

Usage Variance

Material Usage Variance

A material usage variance is generated when there is a difference between the actual quantity of components backflushed and the standard quantity required.

Labor and Burden Usage Variance

A labor usage variance is generated when there is a difference between the actual hours needed to complete an operation and the standard hours.

Rate Variance

Rate variance

All transactions consuming resources immediately calculate and post rate variance. Rate variances are calculated as the difference between the cost of the resources as contained within the cumulative order as taken from the routing and work center files in effect when the order is created.

Component rate variance

For component material, rate variance is calculated as the difference between the GL standard cost presently in effect and the GL standard cost captured in the cumulative order. Usually, there is no component material rate variance. It occurs if the GL standard cost of the component material changes during the lifetime of the cumulative order.

Labor and burden rate variance

Labor and burden rate variance is calculated in a similar way. When a cumulative order is created, standard labor and burden rates are captured from the routing and work center files in effect. When labor is reported at a cumulative order operation work center, rate variance is calculated as the difference between the employee pay rate and the captured labor standard.

Subcontract rate variance

Subcontract rate variance is the difference between the purchase order price per unit and the subcontract cost per unit as captured in the cumulative order. This is posted by Purchase Order Receipts (5.13.1).

When rate variances post

Rate variances are posted only if GL standard costing is in effect for the finished item. Rate variances are not posted if GL average costing is in effect.

Method Change Variance

When MCV is posted

Method Change Variance (MCV) is calculated and posted by the following transactions.

- Cumulative Order Close (18.22.10)
- Backflush Transaction (18.22.13)
- Labor Transaction (18.22.14)
- Setup Labor Transaction (18.22.15)
- Rework Transaction (18.22.17)
- Move Transaction (18.22.19)

How (18.22.13) and (18.22.19) posts MCV

In the Backflush Transaction and Move Transaction, MCV can be posted when moving from the output queue of the last operation to finished material inventory. MCV is calculated as the difference between the final operation cost contained in the cumulative order and the current GL standard cost of the finished material, extended by the quantity being reported.

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Posting MCV from WC other than cum order op WC

In the above transactions when labor is reported, MCV can be posted when reporting at a work center other than the cumulative order operation work center. MCV is calculated as the difference between the standard labor and burden rates of the work center being reported and the standard labor and burden rates of the cumulative order operation center, extended by the number of hours reported. This prevents charging unexpected rate variances to the work centers.

How (18.22.10) posts MCV

In Cumulative Order Close, MCV can be posted when transferring WIP quantities to new cumulative orders. MCV is calculated as the difference between the operation cost in the former cumulative order operation and the operation cost of the future cumulative order operation, extended by the quantity transferred.

MCV and GL costing

Method change variances are posted only if GL standard costing is in effect for the finished item. Method change variances are not posted if GL average costing is in effect.

Booking Variances and Closing Order

Rate Variances

Material, labor, burden and subcontract rate variances are posted at the time of the transaction.

Usage Variances

Material, labor and burden usage variances are accumulated and are posted whenever either Post Accumulated Usage Variances (18.22.9) or Cumulative Order Close (18.22.10) is run with Update set as Yes.

Method variances

Method variances are normally taken at the time of the transaction. When you use a work center that has labor and/or burden rates different from the default, a method variance occurs. A method variance also occurs when an item is received into stock and the cumulative order has a standard cost different from the item's GL standard cost.

Close the order

The cumulative order and its associated operation records are the depository for the accumulation of costs and quantity balances. You determine how long the cumulative order remains open. When closing a cumulative order, you can either write off any WIP balances remaining or transfer balances to another cumulative order. When you use the transfer option, the system will attempt to locate an existing cumulative order in which to transfer the balances. If no appropriate cumulative order exists, a new one is created.

Post Accumulated Usage Variances

Post Accumulated Usage Variances (18.22.9)

Post Accumulated Usage Variances (18.22.9) calculates and posts accumulated usage variances in cumulative orders, according to the criteria entered. This lets you post usage variances on demand without having to close the cumulative order.

Calculating usage variances

For each open cumulative order selected, usage variances are calculated by operation for component material, WIP labor, labor burden and subcontract. The variances calculated are for the entire life of the cumulative order. The amounts to post are reduced by any amounts previously posted. Additionally, floor stock expense is posted.

Calculating component material usage variance

Component material usage variance is calculated as the difference between the actual and expected quantities issued, extended by the cumulative order operation component cost. The expected issue quantity is the cumulative order operation standard quantity required times the quantity processed at the operation. Component materials issued that are not in the cumulative order operation product structure are considered non-standard and are treated entirely as usage variance.

Calculating labor and burden usage variances

Labor and burden usage variances are calculated as the difference between actual and expected labor hours, extended by the cumulative order operation labor hours per unit, times the quantity processed at the operation.

Calculating WIP material scrap usage variance

WIP material scrap usage variance is calculated as the difference between the actual and expected scrap quantities, extended by the cumulative order operation cost. The expected scrap quantity is the quantity processed, less the cumulative order yielded quantity processed at the operation. For example, if the yield factor at an operation is 75% and 100 were processed at the operation, the expected scrap quantity would be 100 less 75% = 25. The amount of variance is posted to the scrap account of the product line of the finished material item number.

Scrapping without posting

It is possible to scrap a quantity without producing a scrap posting. Consider the above example when yield is 75% and the expected scrap quantity is 25. If the actual quantity scrapped is 25, then no variance results. If there is no labor or component usage variance elsewhere, WIP is charged with exactly the amount of resources expected to produce 75. This is reflected in the fact that the operation cost has already been yielded.

Scrap always posted

If scrap is always posted regardless of yield, then the Include Yield field in the Repetitive Control File (18.22.24) should be set to No. This sets the cumulative order yields to 100%.

Posting usage variance

Usage variance are posted only if GL standard costing is in effect for the finished item. Usage variances are not posted if GL average costing is in effect.

Operation history records

Record the usage variance posting by creating operation history records with one of the following types:

    MUV-CMP (material usage variance-component)

    MUV-WIP (material usage variance-work in progress)

    FLOORSTK (floor stock expense)

    RLUV (run labor usage variance)

    RBUV (run labor burden usage variance)

    SLUV (set-up labor usage variance)

    SBUV (set-up labor burden usage variance)

    SUV (subcontract usage variance)

Run without updating

This program can be run in a non-update mode (Update set to No). This generates a report but no database updates occur.

Exercise: Close Cumulative Order

1   Use Cumulative Order Browse/Inquiry (18.22.7) to review the cumulative orders for your item.

2   Use Cumulative Order Maintenance (18.22.6) to end the effectivity of your cumulative order by setting the end effective date to yesterday.

3   Use Cumulative Order Close (18.22.10) to close the order. Set Transfer WIP to Yes and Update to Yes.

4   Use Post Accumulated Usage Variances (18.22.9) for your item and production line and review the report output.

Review Report

5   Use WIP Status Report (18.22.4.11) for your item. You should see a new cumulative order with the transferred WIP in the input queue.

Close Cumulative Order

6   Use Rep Operations Accounting Report (18.22.4.9) for the cumulative order ID that was effective yesterday. Review the report output.

Appendix A

QAD Product Costing

Product Costing in QAD Enterprise Applications

A brief outline-for details refer to the course Product Costing

In the standard core product QAD Applications keep product costs in two cost sets; the current cost set and the GL (standard) cost set. Additional cost sets may 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 being reset on a regular schedule, usually the fiscal year. The GL cost set may be defined as an Average Cost using functionality in the Cost Management Module.

The current cost set may be updated automatically by the system using either the last cost (for purchase orders and work orders) or an average cost. There is an option 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.

In the standard core product QAD Applications keep 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 may be defined as sub sets 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 may be system calculated using rates defined in the Work Center records and times defined in the Route records.

Burden is variable overhead and Overhead is fixed overhead. Burden may 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 rollup 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 roll up work in the current cost set until costs are verified as correct. Costs may then be copied to the GL Cost Set. Either cost set may be frozen to prevent unintentional cost changes and to improve system response in new item cost roll ups.

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

General Ledger Transactions

This appendix lists GL transactions created by the Advance Repetitive Scheduling module.

Table B.1

Function		Notes	DR/CR	Account	Defaults From
18.22.5.11	Sub Shipper Issue				
		Unplanned issues for containers.	DR	Cost of Production	1.2.1
			CR	Inventory	1.2.1
		For previous nonmilestone operations: Issue components.	DR	WIP	1.2.1
			CR	Inventory	1.2.1
			CR	Material Rate Variance	1.2.1/36.1
		Earned labor and burden.	DR	WIP	1.2.1
			DR	Labor Rate Variance	14.1/36.1
			DR	Burden Rate Variance	14.1./36.1
			DR	Method Change Variance	1.2.1
			CR	Labor	14.1/36.1
			CR	Burden	14.1./36.1
18.22.9	Post Accumulated Usage Variances				
		Post floorstock expense.	DR	WIP	1.2.1
			CR	Floorstock Expense	1.2.1
		Post component material usage variance.	DR	WIP	1.2.1
			CR	Material Usage Variance	1.2.1
		Post WIP material scrap usage variance.	DR	Scrap	1.2.1/36.1
			CR	WIP	1.2.1
		Post run labor usage variance.	DR	Labor Usage Variance	14.1/36.1
			CR	WIP	1.2.1
		Post run labor burden usage variance.	DR	Burden Usage Variance	14.1/36.1
			CR	WIP	1.2.1
		Post setup labor usage variance.	DR	Labor Usage Variance	14.1/36.1
			CR	WIP	1.2.1
		Post setup labor burden usage variance.	DR	Burden Usage Variance	14.1/36.1
			CR	WIP	1.2.1
		Post subcontract usage variance.	DR	Subcontract Usage Variance	1.2.1
			CR	WIP	1.2.1
18.22.10	Cumulative Order Close				
		Post accumulated usage variances. (Refer to 18.22.9, above.)			
		Post WIP value to scrap account or WIP Transfer account.	DR	Scrap/Transfer	1.2.1/18.22.24
			CR	WIP	1.2.1

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		If transfer, reinstate WIP value.	DR	WIP	1.2.1

Section	Transaction	Description	Dr/Cr	Account	Code
		If transfer, reinstate WIP value.	DR	WIP	1.2.1
			DR	Method Change Variance	1.2.1
			CR	Scrap/Transfer	1.2.1/18.22.24
18.22.13	Backflush Transaction	Issue components.	DR	WIP	1.2.1
			CR	Inventory	1.2.1
			CR	Material Rate Variance	1.2.1/36.1
		Actual + earned labor and burden.	DR	WIP	1.2.1
			DR	Labor Rate Variance	14.1/36.1
			DR	Burden Rate Variance	14.1/36.1
			DR	Method Change Variance	1.2.1
			CR	Labor	14.1/36.1
			CR	Burden	14.1/36.1
		Material receipts.	DR	Inventory	1.2.1/36.1
			DR	Overhead	1.2.1
			CR	WIP	1.2.1
			CR	Method Change Variance	1.2.1
18.22.14	Run Labor Transaction	Actual labor and burden.	DR	WIP	1.2.1
			DR	Labor Rate Variance	14.1/36.1
			DR	Burden Rate Variance	14.1/36.1
			DR	Method Change Variance	1.2.1
			CR	Labor	14.1/36.1
			CR	Burden	14.1/36.1
18.22.15	Setup Labor Transaction	Actual labor and burden.	DR	WIP	1.2.1
			DR	Labor Rate Variance	14.1/36.1
			DR	Burden Rate Variance	14.1/36.1
			DR	Method Change Variance	1.2.1
			CR	Labor	14.1/36.1
			CR	Burden	14.1/36.1
18.22.17	Rework Transaction				

		Actual labor and burden.	DR	WIP	1.2.1
			DR	Labor Rate Variance	14.1/36.1
			DR	Burden Rate Variance	14.1/36.1
			DR	Method Change Variance	1.2.1
			CR	Labor	14.1/36.1
			CR	Burden	14.1/36.1
		Issue components.	DR	WIP	1.2.1
			CR	Inventory	1.2.1
			CR	Material Rate Variance	1.2.1/36.1
18.22.19	Move Transaction				
		Material receipts.	DR	Inventory	1.2.1/36.1
			DR	Overhead	1.2.1
			CR	WIP	1.2.1
			CR	Method Change Variance	1.2.1
18.22.20	Down Time Transaction				
		Actual labor.	DR	Cost of Production	14.1/36.1
			CR	Labor	14.1/36.1
18.22.21	Wip Adjust Transaction				
		Value of WIP being adjusted.	DR	WIP	1.2.1
			CR	Inventory Discrepancy	1.2.1/36.1
18.22.22	Non-productive Labor Feedback				
		Actual labor.	DR	Cost of Production	14.1/36.1
			CR	Labor	14.1/36.1