Shop Control Guide

Shop Control Guide

Table of Contents

1   Introduction

What does shop control do for you?

Shop control is the means by which shop activities are coordinated to complete jobs. Shop control provides the following features and benefits:

- Releases jobs to production in proper order based on material availability.

- Reschedules jobs as needed to reflect the actual release date.

- Eliminates the need for manual expediting by automatically prioritizing jobs relative to required dates.

- Lists started and ready job sequences within work center queues for worker assignments.

- Enables real time material issues to jobs prior to starting associated job sequences.

- Enables real time labor updating as job sequences are finished.

- Enables real time generation and receipt of subcontract POs for outside services performed during the course of jobs.

- Tracks late jobs and POs and the effects on dependent jobs and sales orders.

- Tracks load days and queue days at the work center and overall shop level.

Our design is optimized for small business

We've designed our shop control system so that it can be successfully used by companies of any size, especially small businesses, for these reasons:

- The master schedule is simplified and easier to work with because it is confined to requirements that need current action.

- Job rescheduling and prioritization is handled automatically to minimize the need for manual intervention.

- All calculations and values are transparent and easy to follow.

Who is this guide for?

This guide is for the benefit of managers, production planners, work center supervisors, workers, and anyone who wants to learn how a shop control system works or is considering using DBA as a manufacturing solution.

2 Why You Need Shop Control

What is shop control?

Shop control is the means by which shop activities are coordinated to complete jobs. Shop control can be actively managed in real time using a shop control system such as DBA or it can be done manually.

Manual shop control is complicated

Shop control occurs whether it is actively managed by software or done manually. Manual shop control is not easy because of the inherent complexity involved in coordinating numerous job sequences among multiple work centers and subcontractors.

Manual shop control encourages "job chains"

Because manual shop control is so complex, MRP is often bypassed in favor of using BOM explosions to manually create "job chains", which are used as a means for determining the order in which multi-level jobs are to be performed out on the shop floor. Each job chain typically has a one-to-one relationship with a sales order.

Job chains encourage expediting

Job chains encourage the use of expediting to meet sales order required dates. Expediting degrades shop throughput because it favors one set of jobs at the expense of other sets of jobs, which then require expediting as well in an endless cycle.

Job chains create excessive jobs and longer times to shipment

Not only do job chains encourage expediting, they also create an excessive number of fragmented jobs with inefficient run sizes that complicate the master schedule. Job chains also preclude the option of making selected sell items and components to stock to eliminate or significantly shorten times to shipment.

Manual shop control is overly reliant on key personnel

Because manual shop control is expediting-intensive, it is overly reliant on key persons who are adept at "getting orders out the door." This leaves the system vulnerable to late shipments when key persons are sick or on vacation or leave the company.

Backflushing material causes inventory problems

Without formal shop control, job components are typically deducted from inventory after the fact at time of job receipt. This is referred to as "backflushing", which causes the following problems:

- On hand quantities are never fully reliable, which complicates stock counts and erodes user confidence in the system.

- Backflushing perpetuates BOM errors because they are rarely detected when components are issued well after their actual use. BOM errors are a major source of inventory problems.

- Backflushing is not compatible with multiple locations and thus discourages their use, even though location control facilitates stock issuing and picking and reduces inventory errors.

Lags in labor updating cause timing issues

Without formal shop control, job labor is typically updated in batches well after job sequences are actually finished. Lags in labor updating pose timing issues. If a job is finished but labor is not updated, delaying job receipt may adversely affect dependent jobs and sales orders. If the job receipt is made without labor updating, the item's inventory cost will be understated. We recommend Standard Hours completions for most items.

It is difficult to identify bottlenecks

When a work center gets overloaded, it can create a bottleneck that adversely affects shop throughput. Machine and worker resources should be deployed when possible to alleviate bottlenecks and optimize shop workflow. In a manual shop control environment, bottlenecks can be difficult to detect, especially in the early stages when preventive action can be taken.

Active shop control is easier and far more effective

An active shop control system is much easier to use and far more effective than manual shop control.

- Instead of using multi-level job chains that correspond to individual sales orders, MRP generates jobs that reflect the aggregate demand among interdependent sell items and subassemblies. This results in fewer jobs with more efficient run sizes that simplify the master schedule.

- Eliminating job chains encourages making selected sell items and subassemblies to stock to eliminate or reduce times to shipment.

- The job release process automatically determines the correct order in which to start multi-level jobs, based on material availability. Jobs are automatically prioritized in work center queues relative to required dates and thus there is no need for manual expediting and all the time it consumes.

- Shop control is incorporated into standard processes and, unlike expediting environments, is not reliant on key persons to be effective.

- Material is issued to jobs in real time so that on hand quantities are reliable, which facilitates stock counts and maintains user confidence in the system.

- Labor is updated as job sequences are finished so that there are never timing issues when finished items are received that can delay dependent jobs or sales orders or understate finished item costs.

- Work centers in early stage bottleneck condition can easily be detected so that machine and worker resources can be deployed where needed to optimize shop workflow.

3   Shop Control Overview

📹 [Video - Shop Control Overview](#)

📹 [Shop Control Screenshot Series](#)

DBA is a shop control system

DBA is a shop control system. A shop control system actively manages shop activities instead of passively updating jobs at time of completion.

Work centers and routings provide the foundation

Work centers and routings provide the foundation that makes shop control possible. Work centers represent machines, sets of interchangeable machines, or work areas. Subcontractors function as outside work centers. Routings are lists of the labor and subcontract processes that comprise each of your manufactured items. Each process is assigned to its associated work center or subcontractor.

MRP generates the master schedule

MRP generates the master schedule, which is an overall plan for meeting your sales order required dates. PO and job supply dates are aligned with job and sales order demand dates so that purchased components, subassemblies, and sell items are available to meet their required dates.

The master schedule gets updated when jobs are released

Jobs are released to production within the *Job Control Panel*. Jobs are only released when material on hand is fully allocated to all job components. When a late PO or subassembly job for a component causes a job to get released late, the job finish date is automatically rescheduled to update the master schedule with a realistic supply date.

The Late Supply screen helps update your SO line Expected Ship date

When the job is released it will update the job finish date. When the job finish exceeds your SO line item *Required* date it will show up on the *Sales > Late Supply* screen where your sales team can update your *Expected Ship* date and notify the customer if necessary.

Work center queues are scheduled by job priority

Within the *Work Center Schedule* screen, a "queue" is displayed for each work center, which is a list of job sequences that are already in progress or are staged in the work center waiting to get started. Job sequences are scheduled in job priority order. Job priority is a measure of each job's estimated remaining production time relative to its required date. Jobs that are running late automatically get priority over other jobs.

As workers are given assignments, the job sequence status can be changed from *Ready* to *Started* to indicate that the sequence has been assigned and is in progress.

The *Work Center Schedule* optimizes shop workflow by coordinating work center activities and eliminating the need for manual expediting

Material is issued to jobs in real time

The *Work Center Schedule* screen is also used to issue material in real time prior to starting job sequences. The *Material* icon in the work center queue indicates when material is needed for a particular job sequence. Clicking the icon launches the *Job Issues* screen opened to the selected job.

Labor is updated as job sequences are finished

The *Work Center Schedule* screen is also used to update job labor as sequences are finished. Job labor can be standard hours or actual hours recorded on the job traveler. The *Labor* icon in the work center queue launches the *Job Labor* screen opened to the selected job sequence.

Standard hours are recommended for improved throughput and costing

When the *Standard* hours type is used against job sequences, labor can be quickly updated in just a few clicks because standard setup and labor hours are applied instead of actual hours. Using standard hours eliminates all the mechanical processes that are required to collect and report actual labor hours. Our recommendation is to use Standard hour sequences and commit to reporting completions when sequences are finished.

The Work Center Schedule is a valuable management tool

The opening *Work Centers* tab in the *Work Center Schedule* screen provides a view of overall shop conditions so that machine and worker resources can be deployed where most needed. Each work center's actual queue days can be compared with standard buffer days to identify bottlenecks. Work center loads include non-released jobs and provide a measure of your overall job backlog.

Who uses the Work Center Schedule?

The *Work Center Schedule* screen can be used by all personnel involved in work in process.

- Managers use the screen to assess overall shop conditions and to deploy resources where needed.

- Supervisors use the screen for worker assignments.

- Supervisors and workers use the screen to issue material to job sequences and to update their labor as sequences are completed.

POs are generated as needed for subcontract services

Outside services such as painting, plating, and heat-treating are commonly performed during the course of jobs. The *First WC* field within the *Job Control Panel* and the *Next WC* field within the work center queue in the *Work Center Schedule* screen indicate when the next work center is a subcontract process. The *Job Subcontracting* screen is used to generate subcontract service POs in real time as needed. Items are received back to the job through the *PO Receipts* screen.

Finished outputs are received to inventory

Job outputs are received to inventory using the *Job Receipts* screen so that finished items are available for issue to other jobs or shipment to customers. Because material, labor, and subcontract services are updated in real time as job sequences are finished, by the time job receipts are processed, all job costs will be accounted for and can be included in the final receipt cost.

Picking Manager notifies the shipping department

After the job output is receipted into Inventory, the *Sales > Picking Manager* screen will allocate that stock on hand in priority order to open sales lines and ensure that you are always picking and shipping according to your master schedule plan.

Job close is the final step

After the final receipt has been made in the *Job Receipts* screen, the last step in the job cycle is to close the job within the *Job Control Panel*. Closing the job automatically keeps the *Work in Process* account in balance by posting any difference between total job input and job output costs to the *WIP Variance* account.

4   Setup - Work Center Capacities

Work Center Capacity settings are required for all Work Centers

Work Center capacity settings are required to help translate your cycle time raw hours into a more understandable Job Days value that more closely approximates your shop days of operation. Work center capacity settings are used to make the following calculations:

Total Hours/Day
- *Work Center Load Days*
- *Work Center Queue Days*

Job Hours/Day
- *Job Days Inquiry*
- *Job Priority*
- *Slack to Required*
- *Slack to Finish*
- *Remaining Job Days Inquiry*

Buffer Days
- *Job Days Inquiry*

For these calculations to have meaningful value, it is important that you establish your work center capacity settings properly according to the guidelines in this chapter.

Settings are maintained in the Work Center Schedule

The following capacity settings are maintained on the *Schedule* tab within the *Work Center Schedule* screen.

Total Hours / Day

This setting represents the typical total hours available at a work center in a day. This will be the standard shift hours multiplied by the typical number of machines or workers utilized per shift.

Calculation Formula

The *Total Hours / Day* setting is calculated as follows:

        Shift 1 Hours * Typical # Resources
    + Shift 2 Hours * Typical # Resources
    + Shift 3 Hours * Typical # Resources

= Total Hours / Day

Shift Hours

The *Shift Hours* used in the above formula refer to the work center's standard number of shift hours. Do not include overtime hours unless those hours are always applied as a standard practice.

Typical # Resources (Machines or Workers)

The *# Resources* in the above formula can be any of the following, depending on the nature of the work center:

Machine-based work centers

Most machine-based work centers consist of one machine, but some work centers have multiple, interchangeable machines. When that is the case, designate the number of machines that can are deployed within each particular shift.

Partially attended machines

Some machines are attended by a worker for only a portion of the time and the worker can potentially oversee multiple work center machines at once. For scheduling purposes, this machine is a single resource for the full available time per shift. From a costing standpoint, these routing sequences should be set to *Standard* hours type and you can adjust the *Work Center Labor Factor* to cost the labor at the percentage attended.

Fixed team on a machine

Some machines require a fixed number of workers to operate. For scheduling purposes, this machine is a single resource for the full available time per shift. From a costing standpoint, these routing sequences should be set to *Standard* hours type and you can adjust the *Work Center Labor Factor* to multiply by the number of members of the fixed team.

Worker-based work centers

Designate the typical number of workers that are deployed for each shift. If the work center has very flexible capacity where you can flex workers in and out as needed, do your best to choose a typical number of workers per shift utilized.

Example

If you had two 8 hour shifts with a typical deployment of three workers on Shift 1 and one worker on Shift 2, here is a sample calculation:

Shift 1 = 8 hours x 3 workers = 24 Hours

Shift 2 = 8 hours x 1 worker = 8 Hours

Total Hours / Day = 32 Hours

How often should this setting be changed?

In order for capacity metric to have comparison value over time, if is important that all three settings stay fixed and only get updated when capacity significantly changes, such as when you add or subtract a shift, machine, or workstation. These settings represent a potential or typical capacity and are not to be used to reflect actual hours being deployed or the queue days that exist on any given day.

Job Hours / Day

This setting represents the total job hours in a day based on your typical job sequence deployment strategy at this work center.   This will be the standard shift hours multiplied by the typical number of machines or workers utilized per Job Sequence. The key question is do you typically assign multiple workers or machines to a single job sequence in production or do you assign one worker/machine per sequence?

Calculation Formula

The *Job Hours / Day* setting is calculated as follows:

```
   Shift 1 Hours *  # Resources per Job Sequence
 + Shift 2 Hours * # Resources per Job Sequence
 + Shift 3 Hours * # Resources per Job Sequence
 ------------------------------------------------------------------------
 = Job Hours / Day
```

Shift Hours
Use the same *Shift Hours* as in the *Total Hours / Day* setting above.

Resources per Job Sequence
This is the number of resources typically applied per job sequence. For example, a work center may have three machines, but due to tooling limitations a job sequence can only be run on one machine at a time. As another example, a work center may have a capacity of six daily workers, but a job sequence can only be performed by one worker at a time.

Worker-based work center discussion
How you deploy your workers in the Work Center schedule is under your control.   If your policy at a work center is to assign multiple workers to a single job sequence until the sequence is completed, then your Total Hours/Day and your Job Hours / Day can be equal. If it is your policy that

each worker works on their own sequences independently, then the number of resources per Job Sequence would be set to one for the calculation above. You may also land somewhere in between, where your policy is to assign sequences to two workers at a time. For your Job Days calculations to make sense, it will be helpful if you match your typical deployment per sequence strategy in your Job Hours / Day setting.

Example

If you had one 8 hour shift with 3 workers typically deployed to the work center (Total Hrs / Day = 24). The chart below shows the Job Hrs / Day calculation based on your deployment method at this work center. We have also included a column for the affect on the calculated Job Days for a Job that has 50 Job Hours based on its cycle times. You can see if you dedicate multiple workers to a single sequence you will finish your individual jobs much quicker.

Shift Hours	# Workers Assigned Job Sequence	Job Hrs / Day	Job Days based on 50 Job Hours
8	1	8	6.25
8	2	16	3.13
8	3	24	2.08

Buffer Days

This setting serves two purposes:

Accounts for queue days in the Job Days Inquiry

In the *Job Days Inquiry*, which is used to help determine an item's *Job Days* setting, the *Buffer Days* allocates additional time against job sequences to account for typical queue days. During the course of a job, more time is often spent waiting in work center queues than in actual production. Enter what you consider to be a typical queue days for the work center, which can be a decimal amount for work centers with relatively short queue times.

Sets the target queue size for Queue Control

When a work center is subject to *Queue Control*, the *Buffer Days* setting also establishes the work center's target queue size. See the *Using Queue Control* chapter for details.

5   Setup - Job Labor Options

Job labor is updated through the *Work Center Schedule* screen as job sequences are finished. Three options are available in the *Job Labor Defaults* screen that facilitate job labor entry.

Job Labor Defaults

Review the following settings in the *Job Labor Defaults* screen.

Setup

Unless you have a compelling reason for tracking actual setup hours, select the *No Entry – Use Standard Hours* option.

Completions

If you always complete all jobs for the total job quantity, you can select the *Flag as Finished* option to facilitate labor updating without the need to specify the completion quantity. If you have an environment where you finish jobs with quantities above and below the overall; Job quantity, you will want to clear the Flag as Finished option.

Standard Hours

Unless you have a compelling reason for tracking standard hours transactions to specific workers, clear the *Worker Selection Required* option to facilitate labor updating. Our recommendation is to focus on throughput and completions as sequences are finished. The requirement to choose an employee each time you report sequence completions can add friction to the process.

6 Setup - Subassembly BOMs

Shop control is dependent on the time-phased nature of the master schedule. Jobs are released to production in the correct order of multi-level assembly and job sequences are schedule to be performed in sequential order. For shop control to work properly, you must use subassembly BOMs when required.

What is a subassembly?

A subassembly is a manufactured item, consisting of its own processes and components, that is incorporated into a higher-level manufactured item.

When is a subassembly BOM required?

A subassembly should be given its own BOM when either of these two conditions is met:

When it is used in multiple BOMs

Whenever a subassembly is used as a component in more than one BOM, it must be defined with its own BOM. This enables MRP to generate jobs based on interdependent demand, which results in fewer jobs with more efficient run sizes. It also enables the subassembly to be eligible for forecast and supply days planning. Subassembly maintenance benefits as well because any process or component changes are only applied to the one subassembly BOM instead of to each BOM within which it is used.

When its quantity differs from the parent quantity

Whenever a subassembly has a different quantity than the quantity of the parent item within which it is used, it must be defined with its own BOM. This is because the BOM routing is based on the parent quantity for scheduling and costing calculations. If you mix subassembly sequences in with parent item sequences, the wrong quantity gets used, which makes scheduling and costing calculations nonsensical.

Subassembly BOMs are a necessity with MRP and shop control

Using subassembly BOMs is a necessity with MRP and shop control. They enable MRP to generate subassembly jobs when needed in response to interdependent demand. They enable jobs to be released in the correct order of multi-level assembly as subassembly jobs are finished. They enable each subassembly to get its own traveler and to have its routing sequences scheduled in sequential order within work centers.

Creating subassembly BOMs

If you are currently defining subassembly specifications within other BOMs and need to give them their own BOMs to conform to the above guidelines, take the following steps:

- Create a BOM parent item to represent the subassembly.

- Create a BOM header for the subassembly parent item, assigning it a BOM type of 'BOM'.

- In the new BOM, enter the subassembly routing sequences and components.

- In the BOMs within which the subassembly was previously defined, delete the routing sequences and components associated with the subassembly.

- In the BOMs within which the subassembly was previously defined, add the subassembly parent item as a component.

Do not use phantom assemblies as subassemblies

Phantom assemblies are sets of components that are typically used with custom manufacturing to represent product options. A phantom assembly does not have revision or routing specifications. Phantom assemblies are not suitable substitutes for subassemblies for these reasons.

- A phantom assembly does not have a routing and therefore any processes associated with the phantom must be incorporated into each parent BOM in which it is used.

- A phantom assembly can never be made on its own job or be stocked. This eliminates any possibility of using forecast and supply days planning with the phantom to reduce lead times for the BOMs in which it is used.

- A phantom assembly cannot be released to production in the correct order of assembly relative to higher level jobs because it is never made on its own job.

To change a phantom assembly to a subassembly, take the following steps:

- Change its *BOM Type* from 'Phantom' to 'BOM'.

- Enter the routing sequences required to assemble the parent item.

7   Monitoring Open POs

Jobs are only released to production when material is fully allocated to all job components. To prevent late job release, it is important that open POs are monitored to insure that materials are received by their scheduled supply dates.

Master Schedule Dates

The master PO schedule can be viewed in the *PO Schedule* screen and consists of the following dates:

Due Date

This is the original planned supply date generated by MRP. It is forward scheduled from the current date by the item's *Lead Days* allocation, rounded forward if needed to land on a shop day. This date stays fixed and is the basis for evaluating the item's *Lead Days* setting and supplier delivery performance.

Expected Date

This date is initially the same as the *Due Date*. If a PO is running late relative to its *Required* date and the supplier furnishes you with a firm delivery date, you can enter it as the *Expected* date to update the master schedule with a realistic supply date.

Required Date

This is the date that the item is needed to supply dependent demand events or to replenish stock. It is established as follows:

- If the earliest dependent demand event is a job, this is the job's *Planned Start* date.

- If the earliest dependent demand event is a sales order, this is the SO line item's *Required* date.

- When the PO is for stock and there are no dependent demand events, the date is made equal to the last day of the item's planning period at time of MRP generation.

Status Fields

Two status fields in the *PO Schedule* screen help you monitor supplier delivery and assess the impact of late POs on dependent demand events.

Days Past Due

A *Days Past Due* value means that the current date is 'X' calendar days past the PO line's *Due Date*, which means that the PO is late relative to its planned supply date.

Contact the supplier

When a PO has not been received by its planned *Due Date*, you can contact the supplier to expedite delivery or receive a firm delivery date.

Update the Expected date

If the supplier furnishes you with a firm delivery date, enter it in the *Expected* date field to update the master schedule with a realistic supply date.

Days Past Req

A value in this field means that the *Expected* date or current date, whichever is latest, is 'X' calendar days past the PO line's *Required* date, which will affect dependent demand events.

Supply Dependencies

The icon in the *Dependencies* field, which launches the *Supply Dependencies* inquiry, becomes visible when the PO line is scheduled to be received late relative to dependent demand events. Dependent demand events are jobs or sales orders with demand dates earlier than the *Expected* date or the current date.

Dependent Jobs

Jobs listed in the *Supply Dependencies* inquiry will be delayed for release to production if the PO line is not received on time. No action is needed because dependent jobs that are released late will automatically receive greater priority in work center queues and may still be finished by their required dates.

Dependent Sales Orders

Sales order lines listed in the Supply Dependencies inquiry will be late for shipment if the PO line is not received by its Required date. When this is the case, you may wish to inform the customer when shipment is likely to be made.

Never change the SO line Required date

When shipment is likely to be delayed, never change the sales order line *Required* date, which must be left as is to give the sales order high priority within the *Shipment Planner* in the *Order Picking* screen.

Use the SO line Expected Ship date as the customer communication date

The *Sales > Late Supply* screen will help you update the *Expected Ship* date for items that are running behind schedule

What causes late dependencies?

Late dependencies associated with POs occur for the following reasons:

Late PO

A late PO line creates a late dependency when its *Days Past Due* is sufficient to cause the current date or *Expected* date to be past the *Required* date.

Manual PO

A manually created PO can cause a late dependency because it lacks the proper date alignment that occurs when POs are generated through MRP.

Cancel and cease using manual POs

Manual PO creation should be ceased immediately because manual POs are not compatible with the master schedule. All POs should be generated through MRP based on actual demand with proper date alignment. Any blanket POs with multiple future receipt dates should be cancelled. Each affected supplier should be notified that the remaining quantities on each blanket PO are cancelled and will be replaced with individual POs from this point forward. Instead of using a blanket PO, which is a crude form of forecasting, it is much more efficient to use a forecast -derived *Reorder Point* in combination with a *Supply Days* setting so that POs get triggered by actual demand.

Manual Job

Late dependencies can be caused by a job created manually without the proper date alignment that occurs when jobs are generated by MRP.

Cease manual job creation

Manual job creation should be ceased immediately because manual jobs are not compatible with the master schedule. All jobs should be generated through MRP based on actual demand with proper date alignment.

Premature Job Release

Late dependencies can be caused by releasing a job prematurely when material is not fully allocated. Never release jobs without allocated material. Doing so disables the self-adjusting nature of the master schedule and distorts material allocation for other jobs.

8   Releasing Jobs to Production

Jobs are released to production in the *Job Release* screen within the *Job Control Panel*. Jobs are released on their *Planned Start* date, provided that material is fully allocated to all job components. Otherwise, job release is delayed until material is fully allocated.

📹 Video - Shop Control Guideline Job Release

Job release adjusts the master schedule

When a delayed job gets released, the *Job Finish* date is automatically forward scheduled from the *Released* date to update the master schedule with a realistic supply date. This is what makes the master schedule self-adjusting without need for manual intervention.

Job release saves time

Job release saves a great deal of time because you always know exactly when jobs can be started without having to manually investigate whether purchased components have been received or subassemblies completed.

Job release is especially useful with multi-level jobs

When you release jobs only when material is fully allocated, jobs will get released in perfect order because subassembly jobs will be finished in order to be available for allocation to higher level jobs.

Material is allocated in a batch process

Whenever the *Job Control Panel* screen is launched, a batch process allocates component stock on hand ('Material') to all open jobs. Material is allocated first to *Released* status jobs in *Planned Start* date order and then to *New* status jobs in *Planned Start* date order.

Do not release when Shortage is indicated

When a red icon and 'Shortage' is displayed in the *Material* field, it means that the job is at or past its *Planned Start* date, but one or more of its components is not fully allocated. Without allocated material, job release must be delayed.

Material Allocation Inquiry

You can click the red icon in the *Material* field to launch the *Material Allocation* inquiry, which provides a list of the components that are not currently fully allocated to the job. In most cases an open PO or job exists to supply the component, but has not yet been received. You can get a list of projected supply and demand transactions by clicking the icon in the *Stock Status* field.

NOTE: Within the *Projected* tab of the *Stock Status* inquiry you can click the PO or job number in the *Source* field to drill down to the *PO Schedule* or *Job Schedule* screen to view the underlying details of the supply event associated with the component shortage.

Do not ignore the shortage warning

It is vitally important that you only release jobs for which material is fully allocated. If you ignore the shortage warning and release a job anyway, the released job "steals" allocated material from non-released jobs and the rescheduling function is compromised.

Job release can occur multiple times per day

Job release is not a once a day process. If you have a relatively high volume of multi-level jobs, jobs should be released periodically throughout the day so that higher level jobs can be released in a timely fashion as subassembly jobs get completed. Releasing jobs is a simple process that is a big time-saver because it eliminates all the manual investigation that would otherwise be needed to determine which jobs are completed and which ones are to be started next.

The Released date is considered the actual start date

The job *Planned Start* date is the original job start date. When the job gets released, the *Released* date is captured and is considered the actual start date for analysis purposes.

Job travelers can be printed concurrent with release

Each time a batch of jobs is released, you are prompted to print job travelers for the newly released jobs. This is highly convenient and is the best way to insure that travelers get printed when needed and include timely schedule dates.

Always review your Est Job Costs inquiry prior to release

You can access the *Est Job Costs* inquiry prior to updating your release Jobs. Always make sure that your Estimated Job Costs are reasonable and within your expectations. If you encounter errors in material costs or routing costs, correct them in the Job directly and perform a *Cost Rollup* and apply the changes to NEW jobs to update your existing estimated costs. You want all of your employees to take a pro-active approach to costs and this will minimize errors down the road that are very hard to fix after the job is finished.

9   Issuing Material in Real Time

Material is issued to jobs in real time prior to starting job sequences.

All manufacturing companies have the same challenge

All manufacturing companies have the same challenge when it comes to tracking stock on hand. You need to know what's actually on hand to plan jobs and POs, to know when jobs can be started, to know what can be issued to jobs, to know what can be shipped, and to be able to conduct stock counts.

Job release assures material availability

Jobs are only released to production when material is fully allocated to all job components and therefore the job release process assures that material will be available when needed for specific job sequences.

> **Link:**
>
> 📄 [Releasing Jobs to Production](#)

Issue material on a "just in time" basis

Because material is fully allocated on job release, there is no need to hoard material in advance, which clogs aisles and staging areas. Instead, material can be issued on a "just in time" basis prior to job sequences being started.

Location control saves time and reduces errors

If you have been using a single "dummy" location against all items instead of actual locations, we highly recommend using location control. Tracking material by specific location saves time and reduces errors by making it easier to find items and detect and correct mistakes. It also adds a discipline to receiving, issuing, and picking processes that promotes a "real time" culture among shop personnel.

Boosting your manufacturing efficiency

Issuing material in real time is an essential element in boosting your manufacturing efficiency. Instead of bacflushing components after the fact so that you never know what is actually on hand and what has already been issued to work in process, you issue materials on a "just in time" basis for real time inventory tracking that benefits all your inventory-related processes.

What to Do

The Material icon indicates when material is needed

Within the work center queue in the *Work Center Schedule* screen, a red *Material* icon indicates when material is needed and has not yet been issued to a job sequence.

Any components assigned to the sequence are to be issued prior to sequence start. Additionally, if the *First Seq* checkbox is selected, this is the job's first sequence, in which case all components that are not assigned to specific sequences are to be issued as well.

Click the icon to issue the material

To issue the material, click the icon in the *Material* field to launch the *Job Issues* screen, which is filtered to include just the components that are to be issued to this sequence.

Do not use the job traveler as an issue list

Do not use the job traveler as an issue list because it is not designed for that purpose and does not include location or lot and serial information. Components and quantity per amounts are listed on the traveler for manufacturing specification purposes.

Use the issue list or dispatch list

You can issue the material using the issue list or dispatch list method.

Issue List Method

The issue list is printed by clicking the *Issue List* button above the grid in the *Job Issues* screen. The issue list includes stock quantities by location and by lot and serial number and is limited to the components needed for this sequence. You print the issue list, gather the material, and then you return to the *Job Issues* screen to make your entries.

Dispatch List Method

The dispatch list method works in the opposite manner. You issue the material on the screen first and then you go to the *Batch History* tab and click the *Dispatch* button to print the dispatch list. The dispatch list provides a listing of the components, locations, and lot and serial values that were issued.

The dispatch list is highly useful if you rely on warehouse personnel to gather the material for you. You submit the dispatch list to the warehouse and it provides all the instructions needed for gathering and delivering the material to the work center.

Always issue material in real time

It is vitally important that material is always issued on the screen in real time when it actually gets issued out on the shop floor. This assures that on hand quantities are always accurate, which helps with stock counts and gives users confidence that inventory numbers have meaningful value.

Failure to issue affects downstream work centers

If material does not get issued against an associated job sequence, the material icon will continue displaying in red against all downstream job sequences until the material gets issued.

Return unused material and correct the BOM if needed

When a sequence is completed, any unused material should be returned to stock. This is done by clicking the *Return* button on the *Transactions* sub-tab within the *Job Issues* screen, which enables you to return a portion of the original issue amount back to stock.

If the unused material was due to an error in the bill of materials, it is vitally important that the BOM gets corrected immediately so that the error does not get perpetuated in future jobs.

10   Assigning Sequences to Workers

Assigning job sequences to workers is done in the *Schedule* tab within the *Work Center Schedule* screen.

All manufacturing companies have the same challenge

All manufacturing companies have the same challenge when it comes to running the shop – what job sequence should be run next in each work center? With lots of work centers and lots of jobs, this is not easy to do, which is why most shops rely heavily on manual expediting to get jobs through the shop.

Job sequences are assigned in the Work Center Schedule screen

Assigning job sequences to workers is done in the *Schedule* tab within the *Work Center Schedule* screen.

Job sequences are limited to Started, Ready, and Next status

Job sequences are listed by work center and are limited to those with a status of *Started*, *Ready*, and *Next*, which are described as follows and listed in this order:

Started
This status identifies job sequences that have been assigned to workers and are in progress.

Ready
This status identifies job sequences that are finished in the previous work center, but have not yet been started in this work center. These job sequences can be considered "on deck."

Next
This status identifies job sequences that are in progress in the previous work center, but are not yet finished. These sequences are listed to accommodate situations where a job sequence can overlap and be run in parallel with a previous sequence.

Sequences are sorted by Priority within status

Within each status, sequences are sorted by ascending job *Priority*, which is calculated as follows:

Shop Days to Required – Remaining Sequence Days = Priority

A negative number means that remaining production time exceeds available shop time and therefore the job is trending late relative to its required date. Conversely, a positive number means that available shop time exceeds remaining production time and therefore the job is trending on schedule. Sequences are sorted lowest to highest

Priority value so that jobs trending late automatically get greater priority without need for manual expediting.

Assigning sequences by priority optimizes shop workflow

When job sequences are assigned in priority order across all work centers, overall shop workflow is optimized so that jobs get finished on schedule without need for manual expediting.

Boosting your manufacturing efficiency

Coordinating work centers is an essential element in boosting your manufacturing efficiency. Instead of running the shop by guesswork and expediting, you run work center sequences in job priority order so that jobs are automatically expedited to meet required dates.

What to Do

Change status to Started when worker assignment is made

Assigning job sequences to workers is done as follows. Within *Ready* status sequences you always select the job sequence at the top of the list, which has the greatest priority. After the assignment has been communicated to the appropriate worker, click the button in the *Status* field to change the status from *Ready* to *Started*. This lets you know that the sequence has been assigned and is now in progress.

Update job labor as sequences are finished

Work centers can only be coordinated when job labor is updated as sequences are finished, which updates job priority values and work center queues.

Link:

📄 [Update Labor as Sequences Are Finished](#)

11 Updating Labor as Sequences Are Finished

Job labor is updated as job sequences are finished.

All manufacturing companies have the same challenge

All manufacturing companies face the same challenge when it comes to monitoring work in process – where does each job stand at any given time? A great deal of effort gets wasted investigating job progress to expedite jobs through the shop.

Recording labor sequence completions real time is a requirement for shop control

Shop control is the means by which shop activities are coordinated to complete jobs. Using shop control will dramatically boost your manufacturing efficiency. Job labor tracking provides the information and feedback that makes shop control possible.

The benefits of job labor tracking (real time sequence completions)

Job labor tracking has a profound impact on your efficiency.

- It enables the *Work Center Schedule* screen to govern all shop activities, including worker assignments, material issues, and labor updating.

- It enables the job *Priority* calculation that determines the optimum job sequence order within work centers.

- It enables finished jobs to be received in real time without any delays for labor costing.

Labor must be updated as job sequences are finished

Real time labor updating is done using the *Work Center Schedule* screen. The *Labor* icon is clicked against the finished sequence to launch the *Job Labor* screen, which is opened to the selected job.

Standard hours are recommended for improved throughput and costing

When the *Standard* hours type is used against job sequences, labor can be quickly updated in just a few clicks because standard setup and labor hours are applied instead of actual hours. Using standard hours eliminates all the mechanical processes that are required to collect and report actual labor hours. Our recommendation is to use Standard hour sequences and commit to reporting completions when sequences are finished.

> **Use Standard hours for partially attended processes**
> Some work center machines can be started and run without the need for a worker to be present the entire time. To handle this scenario, the cycle time

should be for the complete run time for the process. You can adjust the labor costing using the *Labor Cost Factor* in the *BOM > Work Center > Details* tab. For example, if the work center process is attended 20% of the time you can set the *Work Center Labor Cost Factor* to .20 and the *Mfg OH Factor* to 1. The costing will adjust the absorbed labor rate and leave the mfg overhead rate fully intact.

Use Standard hours for work center processes that require a team of workers

Some work centers require a fixed team size to perform a process. To handle this scenario, the cycle time should be for the complete run time for the process. You can adjust the *Labor Cost Factor* in the *BOM > Work Center > Details* tab to adjust the labor cost rate to reflect the team. For example, if the process requires a team of 2 workers, you can set the Labor Cost Factor to 2.

Use Actual hours sparingly

When the *Actual* hours type is used against job sequences, actual labor hours are collected manually and entered as an alternative to standard hours. Actual hours are appropriately used in these situations:

- When a process is one-off, custom in nature and has high variance potential from the estimated cycle time.

- Job Shop environments that typically manufacture with a Job Quantity of 1

Special Warning Regarding Actual Hours

Our experience has shown that it is very difficult to perform actual hours in most manufacturing environments. The reality of most shops are that once an item is finished it is shipped out as soon as possible regardless of whether all of the costing information has been submitted. It is very easy to make errors or omissions in labor entry that can have a very consequential effect on your cost of sales accounts and make your income statement a challenge to interpret. Since the product is likely already out the door, there is not an opportunity to fix the costs after the fact. We strongly recommend Standard hours completions for most companies.

Actual Job labor tracking requires 100% participation

Shop control is totally dependent on timely labor updating to have any meaningful use. Like any complex system, it is only as good as its weakest link. Therefore, shop control requires 100% participation among all workers and supervisors in updating their own labor as sequences are finished with no tolerance for delay.

Labor updating as the final step in any process

Never get behind on labor updating because doing so destroys the effectiveness of shop control. The best way to avoid this is to instill the notion in all production personnel that a job sequence is not considered finished until the labor gets updated. Workers can easily be trained to use the *Job Labor* screen and make their own entries.

Boosting your manufacturing efficiency

Tracking job labor is an essential element in boosting your manufacturing efficiency. Instead of running the shop by guesswork and expediting, you track job labor in real time to update job priorities and work center queues, which enables the work center coordination that helps jobs meet their required dates.

What to Do

Review your routing Hours Type settings - Set most for Standard hours

Review all your BOM routing sequences and make sure the appropriate *Hours Type* is selected to meet your labor tracking objectives. Our recommendation is to use *Standard* hours and focus on real time completions of labor sequences.

Review Job Labor Defaults

Go to the *Job Labor Defaults* screen and review options that facilitate job labor entry.

- Unless you have a compelling reason for tracking actual setup hours, select the *Setup - No Entry – Use Standard Hours* option.

- Unless you have a compelling reason for tracking actual sequence completion quantities, select the *Completions – Flag as Finished* option to facilitate labor updating.

- Unless you have a compelling reason for tracking standard hours transactions to specific workers, clear the *Standard Hours - Worker Selection Required* option to facilitate labor updating.

Format the job traveler for actual hours collection (only for Actual hours sequences)

The job traveler can be used to collect the labor hours that accumulate prior to sequence finish. When you format your job traveler layout, select the *Labor Collection* option. Additionally, you can specify the number of *Labor Lines per Sequence*.   Within each "Actual' hours type job sequence on the traveler, manual entry fields are provided to enter the *Worker* number, *Date*, *Start Time*, *End Time*, *Total Hours*, *Completions*, and *Finished* flag. Workers can manually update this information throughout the course of performing the job sequence.

Provide workstation access to each work center

It is essential that each work center has access to a computer workstation to enable real time labor updating.

Update labor as each job sequences is finished

As each job sequence is finished, update labor by clicking the *Labor* icon within the *Work Center Schedule* screen. This launches the *Job Labor* screen, which is opened to the selected job sequence.

- If *Hours Type = Standard*, flag the sequence as finished or pre-fill or enter the completed quantity.

- If *Hours Type = Actual*, enter the total hours and flag the sequence as finished or pre-fill or enter the completed quantity. If the total hours are calculated on the job traveler, enter the total hours. You have the option of clicking the down arrow in the *Hours* field to open the *Hours Calculator*, which calculates the hours based on start and end times with deductions for shift breaks.

12   Subcontract Service Processing

Subcontract services such as painting, plating, and heat-treating are performed on jobs devoted solely to performing an outside service or during the course of multi-sequence jobs. POs for subcontract services are generated as needed through the *Job Subcontracting* screen.

📹 Video - Subcontracting Overview

📹 Subcontracting Screenshot Series

There are two methods for setting up subcontract services

Let's say you fabricate a part that needs to be sent out for painting. There are two basic methods you can use for setting up the subcontract service.

Subcontract BOM

The most flexible method is to set up the subcontract service with its own BOM. The BOM will consist of one routing sequence for the subcontract service and one component for the unpainted part that gets sent to the subcontractor. The BOM parent is added to all higher-level BOMs that use the painted part as a component. The unpainted part can be a manufactured item with its own BOM or it can be a purchased item. MRP will generate jobs and POs as required for the painted and unpainted parts. With this method subcontract service jobs are purely for subcontracting with no mixing of in house and outside processes. The painted part and unpainted part can also be given their own MRP settings for maximum planning flexibility.

Subcontract Sequence

With this method you add the subcontract service routing as a routing sequence within each BOM that requires the painted part. In this case, the routing will mix in-house processes with the outside process. This method is less flexible because you must perform the subcontract service within each job it is required with no ability to make it on its own job when interdependent demand exists. It also adds to each item's calculated *Job Days* with no ability to make the painted part to a forecast to reduce lead time.

The job traveler and Next WC field help initiate action

The job traveler clearly indicates when a subcontract process is to be performed and can be used as a trigger to initiate PO generation in the *Job Subcontracting* screen. Also, within the *Work Center Schedule* screen, the *Next WC* field clearly identifies when the next work center is an outside service process.

Issue Materials and Generate POs for Ready status sequences

All subcontract job sequences with a status of *Ready*, *Next*, or *Open* are listed in the *Job Subcontracting* screen. *Ready* status sequences are ready to be sent to the subcontract supplier for processing.

A red *Material* icon indicates when material is needed. These are the materials that you will be sending to the Subcontractor for servicing. Click the icon to launch the *Job Issues* screen, which enables the material to be issued in real time. After the issue batch is updated, a dispatch list can optionally be printed and included with the PO to provide the supplier with a list of materials.

Select the *Convert* checkbox against each *Ready* status sequence and then click the *Convert* or *Convert & Print* button to generate the PO, which changes the sequence status to *Started*. The printed PO can then be sent to the supplier and/or included with the parts.

Make sure the PO has a reasonable supplier price

Make sure that the PO has a reasonable supplier price because it is used as the unit cost that will be applied to the job. The supplier price is maintained in the BOM routing sequence and flows through to the job routing sequence.

NOTE: Be aware that the price on the supplier invoice, which can arrive well after the PO is received, does not flow back to the job. Instead, the PO price is used for job costing and therefore must be given a realistic value.

Do not generate POs in advance

Even though *Open* and *Next* status job sequences are included in the *Job Subcontracting* screen, limit PO generation to *Ready* status sequences. This way POs are generated on a "just in time" basis consistent with all other shop control processes.

PO receiving updates the job sequence.

Receiving the PO in the *PO Receipts* screen updates the completed quantity against the job sequence and changes the next sequence status to *Ready*. When final receipt is indicated, the sequence status changes to *Closed* and the next sequence status changes to *Ready*.

Timely PO receiving is a requirement

As with all other shop control processes, subcontract service POs must be received in real time to update current sequences and downstream work centers.

13   Receiving Finished Items to Inventory

Finished items are received to inventory through the *Job Receipts* screen.

The status indicators should all be green at final receipt

When shop control processes are correctly performed "just in time" per the guidelines outlined in previous chapters, all the status indicators at the top of the screen should be displayed in green at time of final receipt. This indicates that all sequences are closed, all labor sequences have transactions, all subcontract sequences are fully received, and all components have issue transactions.

- Issue materials from the Work Center schedule screen in real time when and where the materials are needed
- Report labor as sequences are completed.   Do not attempt to report labor after the job final receipt has occurred.

Red status indicates process failure that needs corrective action

A red status indicator is never permissible against a final receipt and represents a process failure, meaning that an entire process was not performed at all. If this occurs with any frequency, it is a symptom of serious problems in your process workflow that must be addressed and corrected immediately. Sporadic or chronic failure to update transactions on a just in time basis will result in a complete breakdown of the shop control system.

Green is the sign of a properly functioning system

On the other hand, when the status indicators are consistently green at time of final receipt, it means that shop control is functioning properly.

Receive items at a reasonable cost

Besides verifying that status indicators are green, it is also vitally important that the item be received at a reasonable *Unit Cost*. This is the cost that is used to update the item's inventory cost, which is the cost that gets applied to subsequent job issues and customer shipments.

Make sure the unit cost is realistic

When you receive a finished item, the program calculates a *Suggested Cost* and inserts it into the *Unit Cost* field, which is the cost that will be applied to the receipt transaction. When you make a partial receipt, the *Suggested Cost* will always be equal to the *Est Job Cost* directly above it.

When you make a final receipt, the *Suggested Cost* depends on your *Job Cost Defaults* system setting.

- If your system is set to the *Estimated Job Cost* preference, the *Suggested Cost* will be equal to the *Est Job Cost*. Any amount in the *WIP Balance* field will be posted to your *WIP Adjustments* account.

- If your system is set to the *WIP Balancing Unit Cost* preference, and all four status indicators are Green in color, the *Suggested Cost* is a calculated unit cost that balances all receipt costs with actual job costs. In this case the *WIP Balance* will be zero.

When you use the *WIP Balancing Unit Cost* preference, always make sure the *Suggested Cost* is underlined realistic, meaning that it is within acceptable range to the *Est Job Cost* above it and is not affected by an obvious costing error.

If the *Suggested Cost* is not realistic, it could be due to an obvious costing error to one of the job inputs, which should be immediately corrected, or the job could have experienced a cost distortion caused by a one-off event such as a machine breakdown or some other unusual factor. In either case, override the suggested *Unit Cost* with a realistic cost. Any *WIP Balance* amount will be posted to *WIP Adjustments* and will be correctly accounted for.

Typical sources of costing errors

When the *Suggested Cost* is not realistic, here are typical sources of costing errors:

- The status indicators at the top of the screen – *Seq Status*, *Hours Status*, *Subcon Status*, *Issues Status* – should all be displayed in green. If not, it means that some job processes may not be completed and therefore the cost profile is incomplete. In that case, see that those transactions are made.

- Do not enter labor hours after final receipt. Labor should be reported as routing sequences are completed. Entering labor hours after final receipt can lead to very large costing errors that cannot be addressed easily because in most cases the product has already been shipped and invoiced.

- When the indicators are all displayed in green and the *Suggested Cost* differs greatly from the *Est Job Cost*, there is likely one input cost that has a gross error. Most typically this involves a bad labor hours entry, where it is easy to add an extra zero or make a mis-calculation that can grossly distort job labor cost. Review the *Job Costs* tab within the *Job Inquiry* screen and look for obvious errors and make appropriate corrections.

Release jobs to production as the final step

If you are in an environment where subassembly jobs are often immediately issued to higher level jobs, after job receipts are updated go immediately to the *Job Control Panel* screen and release jobs that are now eligible for release. Any jobs with current planned start dates that were waiting for newly received subassembly items can now be released.

14   Closing Finished Jobs

Finished jobs are closed within the *Job Control Panel* screen.

Job Close completes the job processing cycle

When a job is closed, its WIP balance is brought to zero by adjusting the *WIP* account up or down to account for any variance between the total job input costs and the total job receipt output costs. This results in a debit or credit to *Work in Process* and an offsetting debit or credit to *WIP Adjustments (Cost of Sales).*

Total WIP value is self-adjusting and always in balance

The total value of the *Work in Process* account reflects the current WIP balance of all jobs in progress at any given time. Whenever a job is closed, its WIP balance is adjusted to zero and thus the overall *Work in Process* account value is always in perfect balance with the underlying jobs in progress.

All Jobs must be closed in a timely manner

The goal should be to *Close* your Jobs as close to your *Finish Date* as possible. This will align your *WIP Adjustment (Cost of Sale)* value more closely with your final job receipts to inventory.

All Jobs must be closed, without exception

Some companies delay or avoid closing Jobs with a large *WIP Adjustment* value. This is not the correct approach. The transactions that created this adjustment value (Job input costs versus Job output receipt costs) have already occurred in the system. The *WIP Adjustment (Cost of Sale)* posting is the correction to your overall Cost of Sales that is required to balance out your system.

Will a large WIP Adjustment value adversely affect my profitability on the Income Statement?

No. Your overall *Cost of Sales* will be correct and will be neutral with regards to your profitability. Lets look at an example of a Job for a Qty of 100 that had a Job Estimate of $1.00 per unit and the Job was received at $10.00 per unit by accident. This led to *Inventory* value being overstated by $900. The *WIP Adjustment (Cost of Sales) - Variance* value is $900 in the *Job Control Panel - Close Job* screen due to the receipt cost being $900 more than the input costs for the job.

Scenario 1 - The item was picked and shipped immediately

If the product was immediately picked and shipped, the *Cost of Goods Sold* was inflated by $900. When the Job is Closed, the *WIP Adjustment* (Cost of Sales) for $900 would offset the *Cost of Goods Sold* and the overall net affect on your *Cost of Sales* would be zero.

Scenario 2 - The inflated value was discovered in Inventory and adjusted via Change Inventory Value

In this case, it was discovered that the inventory value was much higher than usual. Prior to any transactions were made, the unit cost was adjusted from $10.00 to the correct value of $1.00 in the *Change Inventory Cost* screen. This would create a Cost of Sales entry into the *Inventory Adjustment Account* (Cost of Sales). When the Job is Closed, the *WIP Adjustment* (Cost of Sales) for $900 would offset the *Inventory Adjustment* (Cost of Sales) $900 and the overall net affect on your *Cost of Sales* would be zero.

When can I correct Job Costs for Finished Jobs?

You have a very limited window of opportunity to correct your Job costs after your have completed your final job receipt and Finished a Job. If you recently finished the Job, it is in the same accounting period, and all of the quantities are still in inventory, you can reverse your Job Receipts and correct the Job costs and re-receipt the Job. For almost all other scenarios, it is best to Close the Job and post the *WIP Adjustment* (Cost of Sales) value to offset the transactions that have already occurred.

Never reopen a job to correct job costs

Never reopen a job to correct job costs by reversing and redoing transactions. Job cost discrepancies have already been posted to variance accounts and it is not possible to retroactively change receipt costs and apply those changes to subsequent issue and picking transactions.

15   Monitoring Released Jobs

Jobs that are in production can be monitored within the *Job Schedule* screen. Your primary objective in monitoring released jobs is to detect and communicate with customers when dependent sales orders are likely to be supplied late relative to their required dates.

Released jobs are displayed by default

The *Job Status* option in the upper panel of the *Job Schedule* screen has the option of displaying *Released* or *New* status jobs. *Released* status jobs are displayed by default and are jobs in production.

Master Schedule Dates

The master job schedule consists of the following dates:

Planned Start
This date is the original target demand date for supply from stock on hand, POs, or lower level jobs.

Released
This is the date the job was released to production and is considered the actual job start date.

Job Finish
This date is the expected supply date for the job. It is established as follows:

- When MRP generates the job, the *Job Finish* date is forward scheduled from the job *Planned Start* date by the item's *Job Days* allocation, skipping over non-shop days.

- When the job is released to production in the *Job Control Panel*, the *Job Finish* date is forward scheduled from the job *Released* date by the number of job days captured at time of job creation. This updates the master schedule with a realistic supply date.

Manually Adjusting the Job Finish date

- The Job Finish can be manually adjusted for released jobs to reflect the reality of your shop if you know you will not be hitting the finish date target. Updating the supply date (Finish date) will provide feedback for all dependent jobs and sales orders.

   Late Supply screen improves communication between the shop and the office for top level for sale items

When the *Finish* date is greater than the sales order line *Required* date this job will show up in the *Sales > Late Supply* screen. This will immediately let the office know which jobs are running late and they can update the SO line *Expected* Ship date and contact the customer if appropriate

Required
This is the date that the parent item is needed to supply dependent demand events or to replenish stock. It is established as follows:

- If the earliest dependent demand event is a job, this is the job's *Planned Start* date.

- If the earliest dependent demand event is a sales order, this is the SO line item's *Required* date.

- When the job is for stock and there are no dependent demand events, the date is made equal to the last day of the item's planning period at time of MRP generation.

The Job Schedule screen is not used for active scheduling - Job Release is the core scheduling function

The *Job Schedule* screen is for information purposes and is not an active scheduling screen. Job dates are initially established at time of MRP generation. Dates against *New* status jobs cannot be changed because those dates are short term, just in time dates that will be automatically rescheduled as needed when jobs are released to production.

Job Progress Indicators

The following fields are indicators of job progress relative to its scheduled finish date and required date.

Days Past Req
A value in this field means that the *Job Finish* date or current date, whichever is latest, is 'X' shop days past the job's *Required* date, which may affect dependent demand events.

Supply Dependencies

The icon in the *Dependencies* field, which launches the *Supply Dependencies* inquiry, becomes visible when the job is scheduled to finish late relative to dependent demand events. Dependent demand events are sales orders or jobs with demand dates earlier than the *Job Finish* date or the current date.

The supply job may still finish on time

Even though the supply job has a *Days Past Req* value, it does not mean that the job will definitively miss its *Required* date. A job that is trending late automatically receives greater priority in work center queues, which reduces waiting time and may enable the job to be finished by its *Job Finish* date.

Dependent Sales Orders

Sales order lines listed in the *Supply Dependencies* inquiry will be late for shipment if the supply job is not finished by its *Required* date. If you conclude that the supply job has no chance of being finished on time, you may wish to inform the customer when shipment is likely to be made.

Never change the Required date

When a supply job is trending late, do not move out dependent sales order line *Required* dates. Leave the dates fixed as is for these reasons:

- If a sales order line *Required* date gets moved out, the original date is lost and the new date appears to be on time, which eliminates the ability to measure on-time shipping performance.

- If the sales order line *Required* date stays fixed as is, the supply job gets assigned greater priority in work center queues, which automatically expedites the job. If the *Required* date gets moved out, however, the supply job appears to be on time and gets assigned an average priority and does not get expedited.

- If the sales order line *Required* date stays fixed as is, the sales order moves towards the top of the *Shipment Planner* list within the *Order Picking* screen. This way the sales order line gets high shipment priority when the supply job is received and stock becomes available for shipment. If the *Required* date gets moved out, however, it does not receive high priority and could get shipped after other less urgent sales orders.

Dependent Jobs

Jobs listed in the *Supply Dependencies* inquiry will be delayed for release to production if the supply job is not finished on time. No action is needed because dependent jobs that are released late will automatically receive greater priority in work center queues and may still be finished by their required dates.

Days Past Finish
A value in this field means that the current date is 'X' shop days past the *Job Finish* date, which indicates a late job that failed to meet its scheduled finish date.

Slack to Finish

This value indicates whether a job is trending ahead of, even with, or behind its *Job Finish* date and is calculated as follows:

Shop Days to Job Finish – Remaining Job Days = Slack to Finish

A positive value means that the job is trending ahead of its finish date. A zero value means the job is trending exactly on schedule. A negative value means the job is trending late.

Slack to Req

This value indicates whether a job is trending ahead of, even with, or behind its *Required* date. It is calculated as follows:

Shop Days to Required – Remaining Job Days = Slack to Required

A positive value means that the job is trending ahead of its *Required* date. A zero value means the job is running exactly even with its *Required* date. A negative value means the job is running late relative to its *Required* date.

Priority

This is the *Priority* used within the *Work Center Schedule* to determine the optimal order in which job sequences should be performed. It is calculated as follows:

Shop Days to Required – Remaining Sequence Days = Priority

Job sequences are prioritized within work center queues in ascending *Priority* order starting with the largest negative value.

16   Monitoring Shop Conditions

Overall shop conditions can be monitored in the opening tab within the *Work Center Schedule* screen. The following setting and metrics can be compared across work centers:

Buffer Days

The *Buffer Days* is a manual setting that represents what you consider to be the work center's typical queue days.

Queue Days

The *Queue Days* is the job hours backlog for job sequences in the work center queue, expressed in shop days. The queue consists of job sequences with a status of *Started* or *Ready*. Estimated remaining setup and labor hours are translated into shop days using this formula:

> Setup & Labor Queue Hours / Total Hours/Day = Queue Days

The queue is expressed in shop days so that you can compare queues across different work centers. This enables you to identify bottlenecks that adversely affect shop throughput.

Comparing *Queue Days* among your work centers enables you to identify temporary bottlenecks in the shop where a work center's actual *Queue Days* significantly exceed its typical *Buffer Days*. This can help you decide where best to deploy available workers on any given day.

Load Days

The *Load Days* is the work center's total job hours backlog, expressed in shop days. It includes all job sequences for *New* and *Released* status jobs. Estimated setup and labor hours are translated into shop days using this formula:

> Setup & Labor Hours / Total Hours/Day = Load Days

The load is expressed in shop days so that you can compare loads across different work centers. This enables you to determine which areas of the shop are most potentially affected by current job volume.

The grand total at the bottom of the *Load Days* column is the total load on the shop as a whole. As you assess this metric over time, you will gain a feel for the shop's optimal load capacity. When you sense that the shop is getting overloaded, it may be your signal to take remedial action such as working overtime or hiring additional workers.

17   Using Queue Control

Queue Control is an optional shop control feature that enables you to establish a target queue size for space-constrained or bottleneck work centers.

Work Center Types

Queue Control is used against two types of work centers:

Space-Constrained Work Center

When a work center has limited staging space for items in its queue, *Queue Control* can be used to place a limit on queue size to prevent overcrowding of the staging area.

Bottleneck Work Center

A "bottleneck" work center is a key machine or process with limited capacity through which most jobs must pass, either directly or indirectly. No matter how efficient your other work centers are, it is the bottleneck work center(s) that limits the pace at which jobs can get through the shop. To maximize shop throughput, it is vital to keep the bottleneck work center(s) fully utilized with a target queue size.

Activating Queue Control

Queue Control is activated on the *Schedule* tab within the *Work Center Schedule* screen. Select the *Queue Control* checkbox and then enter a *Buffer Days* amount to establish the target queue size.

Establishing the Buffer Days

The appropriate *Buffer Days* amount depends on the work center type.

Space-Constrained Work Center

Set a *Buffer Days* amount that appropriately limits the amount of material that can accumulate in the available staging area.

Bottleneck Work Center

In general, the *Buffer Days* amount for a bottleneck work center will be relatively large because the intent is to provide a backlog of work that keeps the work center fully utilized at all times. Set the amount high enough to insure a steady backlog of work, but not so high as to exceed available staging space or to create excessive waiting time.

Using Queue Control at shop level

In the opening tab of the *Work Center Schedule* screen, the *Q-Control* checkbox column identifies all work centers that are subject to *Queue Control*.

If a work center's *Queue Days* amount is displayed in green, it is less than its target *Buffer Days* setting. If the *Queue Days* amount is displayed in red, it is greater than its target *Buffer Days* setting. Color coding helps as follows:

- When a space-constrained work center has a red *Queue Days*, it means that the work center staging area is full and measures should be taken to temporarily stop giving it more work.

- When a bottleneck work center has a green *Queue Days*, it means that the queue is below its target size and measure should be taken to temporarily give it more work to prevent it from being idle.

Using Queue Control at job sequence level

In the *Schedule* tab within the *Work Center Schedule* screen, the *Next WC* field can be used to assess queue conditions and alter worker assignment selection, if needed.

The down arrow in the *Next WC* field displays the *Buffer Days* and *Queue Days* associated with the job's next sequence. If the next work center is subject to *Queue Control*, color coding is applied to these two fields. If the *Queue Days* amount is displayed in green, it is less than the target *Buffer Days* setting. If the *Queue Days* amount is displayed in red, it is greater than the target *Buffer Days* setting. Color coding helps as follows:

- When the next work center is a space-constrained work center with a red *Queue Days*, it means that the work center staging area is full. If you assign this job sequence, it may not have space available in the next work center for staging completed items. In that case, you may wish to assign a lower priority sequence instead that has no such constraint in its next work center.

- When the next work center is a bottleneck work center with a green *Queue Days*, it means that the next queue is below its target size. In that case, you may wish to instead assign a lower priority job sequence destined for the bottleneck work center so that the bottleneck work center stays busy and avoids being idle.

18 Shop Control Guidelines

This chapter lists 11 basic guidelines that should be followed for shop control to work properly and provide good results.

1. Use MRP to generate the master schedule

The purpose of shop control is to execute the master schedule. Do not use manual planning to create the master schedule. Only MRP is capable of incorporating interdependent demand and properly coordinating supply dates with dependent demand dates.

2. Do not release jobs without allocated material

Do not release jobs to production without allocated material. Material availability provides the means by which jobs are started in proper order of assembly and rescheduled to reflect actual release dates. Releasing without allocated material disables the self-adjusting nature of the master schedule and distorts material allocation for other jobs.

3. Assign job sequences in priority order

Jobs are automatically prioritized in the *Work Center Schedule* screen based on remaining sequence days relative to required dates. To optimize shop workflow and meet sales order required dates, it is essential that job sequences be assigned to workers in the suggested priority order whenever possible.

4. Issue material in real time

In order to insure accurate on hand quantities for MRP generation, job issues, order picking, and stock counts, and to give users confidence that inventory numbers have meaningful value, it is essential that material be issued to jobs in real time through the *Work Center Schedule* screen prior to starting associated job sequences.

5. Update labor as job sequences are finished

Shop control depends on timely labor updating so that work center queues reflect current conditions for worker assignments. It is therefore essential that job labor be updated through the *Work Center Schedule* screen as job sequences are finished. We strongly recommend that you use Standard Hours completions from most scenarios.

6. Process subcontract POs in real time

Shop control depends on timely updating of all job sequence processes. It is therefore essential that POs for subcontract job sequences are generated in real time

as needed through the *Job Subcontracting* screen and are received in real time through the *PO Receipts* screen.

7. Always receive finished items at a reasonable cost

To insure the integrity of inventory costing, which affects job costing and cost of goods sold, it is vitally important that finished items be received to inventory at a reasonable unit cost in the *Job Receipts* screen. A "reasonable" cost means one that is not significantly distorted by an obvious costing error such as an extra zero in job hours entry. When the actual job cost is dramatically different than the estimated job cost and there is no time to investigate the cause, always enter a reasonable unit cost instead of accepting an obviously erroneous cost.

8. Require 100% participation among shop personnel

Shop control is a system that is totally dependent on "just in time" process updating to have any meaningful use. Like any complex system, it is only as good as its weakest link. Therefore, shop control requires 100% participation among all workers and supervisors in entering their own material issues, labor hours, subcontract POs, job receipts, and job releases on a just in time basis with no tolerance for delay. Total participation will dramatically improve your efficiency and shop throughput.

9. Do not change SO required dates - use the Expected Ship date as your customer communication date

After a sales order line *Required* date is initially established, leave it fixed, even when it is dependent on a supply job that is trending late. The fixed date preserves greater priority for the supply job and maintains high priority for the sales order within the *Shipment Planner* in the *Order Picking* screen.   The *Sales > Late Supply* screen will help your office staff manage the SO line *Expected Ship* date for items that are running behind schedule.

10. Never reopen closed jobs for cost correction

Never reopen a job to correct job costs by reversing and redoing transactions. Job cost discrepancies have already been posted to variance accounts and it is not possible to retroactively change receipt costs and apply those changes to subsequent issue and picking transactions.

11. Do not change WC capacities to reflect daily deployments

In order for capacity metrics to have comparison value over time, it is vitally important that work center capacity settings – *Total Hours / Day*, *Job Hours / Day*, *Buffer Days* -- stay fixed and only get updated when capacity significantly changes, such as when you add or subtract a shift, machine, or workstation. These settings represent a potential or typical capacity and are not to be used to reflect actual hours being deployed or the existing queue days on any given day.

19   FAQs

Can shop control be used without MRP?

Shop control is designed to work in conjunction with a master schedule where jobs and POs reflect aggregate demand and supply dates are coordinated with demand dates. This can only be achieved by generating the master schedule using MRP.

Can shop control be used without an accurate inventory?

Job release is the foundation of shop control because it determines when jobs go into live production and reschedules job finish dates when needed to update the master schedule with realistic supply dates. Job release is dictated by material availability, which requires an accurate inventory. Furthermore, shop control is designed to work in conjunction with a coordinated master schedule, which requires MRP generation that also depends on an accurate inventory for net demand calculations.

If you are operating with an unreliable inventory, you will be unable to use DBA with any success. There are two key practices you can implement to correct this problem:

- Make BOM accuracy an absolute requirement in your company culture. Whenever BOM errors are encountered during the course of a job, make sure the parent BOM gets corrected for the benefit of future jobs. BOM errors are the source of many inventory problems.

- Issue material in real time using the *Material* icon in the *Work Center Schedule* screen instead of after the fact at time of job closing. This takes no extra time because material must be issued at some point anyway. Real time issuing eliminates potential delays to job receipts and will give your personnel confidence that inventory numbers have reliable meaning.

Why can't I manually reschedule New status jobs?

When a job is initially generated, it is given a status of *New* and a planned start and finish date derived from its parent item's *Lead Days* and *Job Days* settings. Manual rescheduling of *New* status job dates is not permitted prior to job release because doing so would disrupt the inter-connected date relationships that comprise the master schedule.

Instead, job rescheduling is done automatically when material availability enables jobs to be released to production in the *Job Control Panel*. If the actual release date differs from the planned start date, the job finish date is rescheduled to update the master schedule with a realistic supply date.

Can job release be bypassed?

Job release is a mandatory process. It determines which jobs can be released to live production based on material availability. If the job release date differs from the planned

start date, the job finish date is rescheduled to update the master schedule with a realistic supply date.

Job release saves a great deal of time because you always know exactly when jobs can be started without having to manually investigate whether purchased components have been received or subassemblies completed.

Is it harmful to release jobs without material?

The job release process makes it much easier to manage actual work in process out in the shop. It ensures that all new jobs have sufficient material to get started and that job finish dates are updated to correspond with actual release dates.

Whenever the *Job Control Panel* screen is launched, a batch process allocates component stock on hand to all open jobs. Material is allocated first to *Released* status jobs in *Planned Start* date order and then to *New* status jobs in *Planned Start* date order.

It is vitally important that you only release jobs for which material has been fully allocated to all job components. If you ignore the allocation and release a job anyway, the released job "steals" allocated material from non-released jobs and the rescheduling function is compromised.

When multiple levels are made on the same day, should all the jobs be released at once?

When you use MRP for job generation, it is highly unlikely that multi-level subassembly jobs will be scheduled to start on the same day. This phenomenon typically only occurs when manual planning is used to create job chains. Start date overlap is just one of many problems caused by job chaining and is best corrected by using MRP.

If it so happens that multi-level jobs do get scheduled to start on the same day, never release the jobs all at once, which can only be done by ignoring the material shortage warning. If you release jobs without material, they all get listed in work center queues as active jobs and there is no way to know which job sequence should be run next.

If you release jobs only when material is fully allocated, jobs will get released in perfect order.

Is it necessary to release jobs several times a day?

Job release is not a once a day process. If you have a relatively high volume of multi-level jobs, jobs should be released periodically throughout the day after finished items are received so that higher level jobs can be released in a timely fashion as subassembly jobs get completed.

Releasing jobs is a simple process that is a big time-saver because it eliminates all the manual investigation that would otherwise be needed to determine which jobs are completed and which ones are to be started next.

Is using the Work Center Schedule mandatory?

DBA is designed for timely updating of material and labor through the *Work Center Schedule* screen.

It is time consuming and inefficient to manage work areas through manual planning. Constant investigation is required to track jobs and determine what job sequences are to be worked on next. Without software guidance, it is easy to work on the wrong job sequences or to ignore obvious bottlenecks that cause late shipments and generate excessive expediting.

The *Schedule* tab within the *Work Center Schedule* screen is a big time saver because it lists the active job sequences in each work center in job priority order. Job priority is determined by each job's production time remaining relative to its required date. Assigning job sequences to workers in the suggested order throughout all work centers optimizes shop workflow and eliminates the need for manual expediting.

Work center scheduling is an activity that cannot be avoided because it must be performed regardless whether it is driven by software or done manually. A shop is a complex system with many participants and resources. It is a lot easier and far more efficient to manage work centers using software than doing so by instinct, manual tracking, and expediting.

Is real time updating practical?

Real time material and labor updating through the *Work Center Schedule* screen is not only practical, it saves a great deal of time and dramatically improves shop throughput.

It saves time because the alternative, which is updating at the end of the day, means that you are relegated to operating the shop in the dark without any current information.

Real time updating is highly practical because the entries are easy to make and can be done by the workers themselves or their supervisors. It only takes a few clicks to update any job sequence for material issues or labor. Furthermore, these entries cannot be avoided and they are easier to make as they occur compared to the tediousness of batch entry. Any worker or supervisor, even with no computer experience, can be taught to make these simple and highly repetitive entries.

Can I assign jobs a manual priority?

A manual override to the job priority calculation is not provided nor is it needed. A manual override encourages expediting, which is a destructive practice because it favors expedited jobs at the expense of other jobs, which corrupts the master schedule.