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1 Introduction

Our mission is to help you maximize your efficiency potential

Our company was founded in 1992 to develop software aimed at helping small manufacturing businesses maximize their efficiency potential. The current version of DBA Manufacturing reflects our many years of experience working with smaller manufacturing companies on workflow processes and system implementation.

What is manufacturing efficiency?

The simple definition of manufacturing efficiency is to fulfill customer orders as quickly and reliably as possible using the least amount of inventory and WIP.

It requires seven essential processes

Over the years we've learned that companies can only reach their full efficiency potential by deploying these seven essential processes:

- Essential #1 - Plan a Strategic Inventory
- Essential #2 - Use Target Dates with Flexible Feedback
- Essential #3 - Release Jobs with Material
- Essential #4 - Coordinate Work Centers
- Essential #5 - Issue Materials in Real Time
- Essential #6 - Update Job Labor in Real Time
- Essential #7 - Use WIP-Based Costing

Four core values promote efficiency

To reach your full manufacturing efficiency potential, you must combine the seven essential processes with a company culture that promotes the following core values:

- Value #1 - Planning Settings
- Value #2 - BOM and Job Accuracy
- Value #3 - Inventory Accuracy
- Value #4 - Real-Time Processing

Your efficiency gains will be dramatic

If you deploy all seven essential processes and integrate the four values into your company culture, your efficiency gains will be dramatic for these reasons:

- You will know when you can ship
- You will know when and what to make and buy
- You will know what to do next on the shop floor
- You will know what your products cost to make
2 What Is Manufacturing Efficiency?

Manufacturing efficiency consists of two core elements:

1. Fulfill customer orders as quickly and reliably as possible
   The primary purpose of a manufacturing system is to fulfill customer orders. An efficient manufacturing company fulfills customer orders as quickly and reliably as possible. Target shipping dates are established as orders are received and orders are shipped on time.

2. Use the least amount of inventory and WIP
   Fulfilling customer orders requires inventory – raw materials, components, subassemblies, and finished items – and work in process – which includes labor and subcontract services. An efficient manufacturing company meets sales order required dates using the least amount of inventory and WIP.

Benefits

- Quick and reliable shipments increase customer satisfaction and boost sales.
- Increased sales boost shop utilization, which spreads fixed manufacturing overhead costs over more items to lower unit overhead costs and increase gross margins.
- Minimizing inventory frees up working capital and warehouse space.
- Minimizing WIP increases shop efficiency with smaller run sizes, shorter queue times, less material in aisles and staging areas, and fewer quality problems with less material handling.
3  The Seven Essential Processes

To reach your full efficiency potential, you must take the six steps described below to implement the core practices that are the drivers of manufacturing efficiency. Each step is described in full detail over the next six chapters.

**Essential #1 – Plan Times to Shipment**

Instead of using guesswork with shipping dates and operating with an inventory that is out of control, you plan a demand driven strategy that reduces times to shipment using the least amount of inventory to do so.

**Essential #2 – Use Target Dates with Flexible Feedback**

Instead of struggling with tedious manual planning, inefficient quantities and unreliable dates, and all the expediting that goes with it, you generate jobs and POs quickly and efficiently within a coordinated set of target dates that gives you an action plan for shipping on time.

**Essential #3 – Release Jobs with Material**

Instead of guessing or investigating which jobs have material to get started, or having to rob material from some jobs in order to start other jobs – you avoid all this by using MRP to cover all job demand and by allocating material to jobs so you know exactly which jobs can be released to production at any given time. An additional benefit is that the master schedule gets automatically adjusted without any need for manual intervention.

**Essential #4 – Coordinate Work Centers**

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.

**Essential #5 – Issue Material in Real Time**

Instead of backflushing 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.

**Essential #6 – Update Job Labor Completions in Real Time**

Instead of running the shop by guesswork and expediting, you track job labor sequence Standard hours completions in real time to update job priorities and work center queues, which enables the work center coordination that helps jobs meet their required dates.
Essential #7 – Use WIP-Based Costing

Instead of operating in the dark with incomplete product costs, you will be furnished with estimated and actual product costs that reflect material, labor, overhead, and subcontract services, along with self-adjusting Inventory and WIP accounts.
4 Essential #1 - Plan Times to Shipment

The entire planning system is driven by 3 basic item settings and the auto-calculation of pre-Job Lead Days for your manufactured items. Standard time allocations and order policies are assigned to lower level items and combine to calculate top level item Time to Shipment targets for sales order required dates. Item settings are refined as needed until Time to Shipment targets reflect your marketing objectives.

The "Big 3" MRP Settings power the system
1. Realistic Lead Days for all purchased items
2. Realist Job Days for all manufactured items
3. A clear cut choice for Order Policy based on lead day contribution

DBA auto-calculates the following:

Pre-Job Lead Days for your manufactured items
The pre-Job Lead Days for each M item is calculated based on the longest Lead Days + Jobs Days among its To Order policy components. Pre-Job Lead Days set the job Planned Start date for Jobs to ensure that you have time to produce To Order subassembly Jobs and procure To Order purchased components.

A Time to Shipment target for your for-sale manufactured items
A Time to Shipment target for your top level for-sale manufactured items is calculated based on the item's own pre-Job Lead Days + Job Days + SO Default Extra Days. The Time to Shipment target is used to establish SO line Required Dates that drive the MRP system demand, system priorities, and material allocations.

MRP Replenishment Time Action Windows
The MRP “action window” refers to each item’s planning period replenishment time. For Manufactured items, replenish time is comprised of the item’s pre-Job Lead Days + Job Days allocations (+ MRP Interval + Non-Shop Days + Extra Shop Days). For Purchased items, replenish time is comprised of the item’s Lead Days allocation (+ MRP Interval + Non-Shop Days + Extra Shop Days). MRP only reacts to demand within the action window, which is firm demand. Any demand outside the action window is tentative demand that is incomplete and highly likely to change as it firms over time. Any requirements outside the action window will be responded to in a future MRP run.

System wide settings: The MRP Interval reflects the typical number of shop days between MRP sessions specified in MRP Defaults The Non-Shop Days
accounts for non-shop days such as weekends when the shop is not in production specified in the Shop Calendar. The Extra Shop Days are extra planning period shop days specified in MRP Defaults.

**Replenishment Time Reorder Points**

For items that you choose to stock using the Demand Driven order policy, a Monthly Potential Demand rate is translated to daily rate and it is multiplied to by the Item's Replenishment Time to come up with a dynamically calculated Reorder Point. The basic principle of Demand Driven stocking is that you trigger an order with enough time to replenish the stock before you run out. This aligns your inventory with your firm demand.

**DBA Innovation - Dynamic Calculations**

When you change any one of the Big 3 MRP Settings, or if you make system wide changes to your MRP Interval, MRP Defaults Extra Days or change your Shop Calendar work days, the system will automatically perform calculations for all items through all levels of production via system triggers. This is an incredibly powerful innovation that is unique to the DBA system.

For example, if you change a long lead day purchased item order policy from To Order to Demand Driven stocking it would remove that component as a lead day contributor in all places it is used. Now imagine that item was used in 100 different bills of material at several different BOM levels. The trigger automatically applies changes from lowest level BOM order to top level manufactured items. There would be an immediate change in M item Lead Days, Time to Shipment targets, Replenishment Times, and Reorder Points for all impacted items.

**Use the Demand Driven order policy for commonly used components**

**Reducing lead times and Times to Shipment**

A To Order policy item is removed as a lead time contributor by reassigning it to the Demand Driven order policy. You can reduce pre-job Lead Days by selectively removing contributor components, which enables jobs to be started earlier. Reassigning top-level M items to the Demand Driven order policy eliminates Time to Shipment altogether.

(MRP>MRP Settings > M Items > Lead Days Inquiry)

**Reducing the Lead Days value:**

The item's pre-job Lead Days allocation can be reduced by removing contributor components. Click the icon at right to launch the Lead Days inquiry, which displays the item's To Order policy components. The Lead Days value is equal
to the component with the longest lead time listed in the *Contribution* column, rounded up to a whole number. Remove that component as a contributor by assigning it a *Demand Driven* Stocking order policy. After doing so, examine the effect on the *Lead Days* value. Continue removing contributor components until the *Lead Days* value is reduced to your satisfaction.

Use the *Demand Driven* order policy for improved inventory efficiency

With the *Demand Driven* order policy, your intent is to have stock on hand of an item readily available to meet a high probability of your anticipated needs. Using this order policy you will have stock on hand for immediate use or sale. If you are fortunate enough to have sales greater than anticipated and you run out of stock on hand, the system will create a new Job or PO for that item and it will automatically receive priority in all work centers that it goes through to get you back on track and cover the shortage efficiently.

The *Demand Driven* order policy eliminates time to shipment for many orders

Setting a *Demand Driven* order policy for sell items eliminates time to shipment altogether because items are available for immediate shipment from stock on hand.

**Demand Driven components reduce time to shipment for custom to order manufactured items**

Setting a *Demand Driven* order policy for key subassemblies and purchased components instead of making and buying them to order means that jobs can be started immediately without delay and thus reduces time to shipment for made to order items.

**The Dell Computer example**

Dell Computer provides a good example of how having key components on hand reduces time to shipment for make to order items. Dell ships custom configured products to order almost immediately without delay. It can do this because all
required components are on hand and available for immediate assembly on a just in time basis.

**Strategic inventory reduces time to shipment using the least amount of inventory**

“Strategic inventory” is a plan for reducing times to shipment using the least amount of inventory to do so. You decide which items are to be made or purchased Demand Driven and against those items you enter a monthly potential demand and supply days target to minimize inventory.

**Reducing times to shipment gives you a competitive edge**

Strategic inventory enables you to dramatically reduce times to shipment, which gives you a competitive edge in the marketplace over slower rivals. Increased customer satisfaction boosts sales and faster payment cycles boost cash flow.

**Shipping dates will be reliable and achievable**

Whenever you enter a sales order line, the program uses strategic inventory settings to calculate a required date, which is the driver of your MRP system and target dates throughout. You always leave the line item requirement date unchanged and you have an Expected Ship Date that you can use as your communication date to customers. Instead of guessing when orders can be shipped, you will now operate with reliable and achievable shipping dates that reflect your strategic inventory plan.

**Orders that exceed your stock on hand are auto-prioritized in all work centers**

If you are fortunate enough to have a sale that exceeds your potential monthly demand value and you run out of inventory on hand, the system will automatically prioritize jobs in the system in all of the work centers that they flow through. This helps you get back on schedule in the most efficient way possible.

**Late Supply screen helps you improve customer communications on shipment dates**

The Sales > Late Supply screen will provide feedback to help update the Expected Ship Date for items that are running behind schedule.

**Apply Demand Driven order policies to applicable items**

Strategic inventory is achieved by applying a Demand Driven order policy against any item you wish to have on hand to meet your anticipated needs. See *What to Do* below for guidance in making these determinations.

**Enter a Monthly Potential Demand and Supply Days target**
When you assign a Demand Driven order policy, you must also enter a Monthly Potential Demand and Supply Days target. These settings drive two calculations:

- A Reorder Point is automatically calculated from the item’s monthly potential demand and replenish time to trigger job or PO generation whenever net demand falls below the Reorder Point.

- A Min Order amount is calculated from the supply days target so that each job or PO quantity covers so many days of forecast demand.

**Dynamic Reorder Point and Min Order updating**

The Reorder Point and Min Order amounts are dynamically recalculated whenever a change is made to the item’s monthly demand value or replenish time variables (Lead Days or Job Days).

**The Supply Days minimizes stock on hand**

The Supply Days target minimizes stock on hand and enables widespread use of strategic inventory without massive inventory investment. For example, if your average Supply Days target is 30 days, the total stock on hand for your entire strategic inventory will be roughly equal to 15 days of potential demand. This is because stock on hand peaks when supply is received, but then declines close to zero prior to the next receipt. 15 days supply is the midpoint of the replenishment cycle and therefore represents the average stock on hand at any given time.

**Strategic inventory is the foundation of manufacturing efficiency**

Planning a strategic inventory is the foundation of manufacturing efficiency and sets the table for all your other key processes. Item reorder points and replenish time settings establish sales order required dates and are used by MRP to generate a coordinated master schedule. The master schedule gets adjusted based on actual material availability from inbound jobs and POs. Jobs get prioritized within work centers relative to their required dates. The Late Supply screen helps you update your expected ship dates and keep your customers informed. All of these processes function smoothly and efficiency when they emanate from a strategic inventory.

**Boosting your manufacturing efficiency**

Planning a strategic inventory is an essential element in boosting your manufacturing efficiency. Instead of using guesswork with shipping dates and operating with an inventory that is out of control, you plan a stocking strategy that reduces times to shipment using the least amount of inventory to do so.
5 Essential #2 - Use Target Dates with Flexible Feedback

All manufacturing companies have the same challenge

All manufacturing companies have the same fundamental challenge when planning sales orders, jobs, and POs. When can orders be shipped and what items need to be made and purchased to meet target shipping dates?

DBA generates target dates automatically based on your Big 3 MRP Settings

Your MRP settings (P item Lead Days, M item Job Days, and a clear cut Order Policy) are used by DBA to automatically calculate the Pre-Job Lead Days for your manufactured items, your Time to Shipment targets for sales orders and your replenishment time action windows for your items. These settings and calculations are used to establish SO line required dates, job planned start and finish dates, and PO line due dates.

SO required dates are generated during order entry

SO line required dates are auto-generated during order entry and serve as MRP target dates. The SO line requirement dates are the principle driver of demand for the MRP system and also are used for allocations in the Sales > Picking Manager screen to ensure that you are always shipping in priority order.

MRP creates jobs for your for sale manufactured items based on firm SO demand

MRP creates your top level jobs when sales orders requirement dates fall within the item's planning period action window. This ensures that your Jobs are always based on firm sales order demand. The Planned Start Date of a Job is the target release date for the system and drives demand for lower level jobs and POs.

MRP aligns subassemblies and purchased components with the planned start date of your jobs

MRP will then progress through all levels of production generating subassembly jobs aligning the finish date of the subs with the Planned Start Date (planned release date) of their parent jobs. After all levels of production have been converted, MRP will then generate purchase orders and align the purchased components with the Planned Start Date of their jobs.

PO Schedule provides feedback on late materials

You will clearly see purchased components that are late for job release in the dependency view of the PO Schedule screen. This screen can provide a valuable resource for tracking POs that are holding up your production schedule. If a supplier
firms up a delivery date, you can manually update the PO expected date and this will flow through to the Job Release screen and dependency view.

**The production schedule is firmed up at Job Release**

Jobs are released to production based on material availability from inbound jobs and POs and stock on hand. Jobs are only released when all materials are available and allocated by DBA for the job. Upon release, jobs are assigned new finish dates to reflect actual released dates. The released job finish date establishes a new and reliable supply date for that item.

**Late Supply screen helps you manage customer communications**

The *Sales > Late Supply* screen provides feedback to your office staff to update the Expected Ship Date for Jobs that are running behind schedule.

**Picking Manager helps ensure that you are shipping on time**

The *Sales > Picking Manager* allocates your stock on hand in priority order to ensure that you are staying on time across all sales orders company wide.

**Scheduling is totally automated**

The scheduling system is totally automated, meaning that there is no need for manual intervention with any scheduling dates except for rare exceptions. All dates are derived from item order policies and allocations.

**Boosting your manufacturing efficiency**

Generating a master schedule is an essential element in boosting your manufacturing efficiency. Instead of struggling with tedious manual planning, inefficient quantities and unreliable dates, and all the expediting that goes with it, you generate jobs and POs quickly and efficiently within a coordinated master schedule that gives you an action plan for shipping on time.

DBA is a demand-driven system that uses target required dates with flexible feedback to drive shop activities.

**DBA Scheduling Screens**

Demand-driven scheduling consists of four schedules, each of which is generated by the program without need for manual intervention.

1. **Sales Order Schedule**

   Sales orders establish the target demand dates that drive the scheduling system. The program calculates a *Required Date* for each line item, derived from the lead
Manufacturing Efficiency Guide

Item required dates are consistent over time

Each item’s Required Date basis is the same number of days from order to order, regardless of quantity, which provides customers with consistent times to shipment. Jobs with larger quantities get higher priority in work center queues, which reduces waiting time and enables such jobs to meet their target demand dates.

Required dates prioritize order picking

Orders for an item are picked in earliest Required Date order so that orders are shipped in the order they were received. The Sales > Picking Manager screen allocates available stock on hand to sales orders in line item Required Date order and indicates which orders are fully or partially ready for picking.

The Expected Ship date reflects actual conditions

Each line item Required Date is accompanied by an Expected Ship date, which reflects actual conditions and can be used as the customer communications date. Unlike the Required Date, which is a target demand date that drives MRP and shop priorities, the Expected Ship date can be freely changed as needed.

Job Finish dates provide feedback for Expected Ship dates

When a job is scheduled late relative to its target required date, it provides feedback for the Late Supply screen, which lists dependent sales order lines that are likely to be shipped late and enables updating of Expected Ship dates.

2. PO Schedule

DBA is a demand-driven MRP system. Purchase orders are generated in response to actual demand within each item’s planning period, which is the action window for buying the item. Future demand from jobs outside the planning period is ignored for now and is responded to in future MRP sessions.

Demand-driven inventory replaces forecasts and projections

Future requirements are planned with demand-driven stocking instead of forecasts and projections to avoid injecting longer-term, tentative, and revision-prone demand into the schedule. A monthly demand rate is incorporated into item reorder points for demand-driven stocking. POs only get triggered by actual demand, which caps and minimizes any over-stocking.

PO due dates are derived from item Lead Days settings

PO due dates are derived from item Lead Days settings and do not vary by quantity. This provides consistent date alignment with job planned start dates over multiple MRP sessions.

All POs are for current delivery
PO due dates are derived from item \textit{Lead Days} settings. Demand-driven stocking eliminates longer-term, tentative, and revision-prone POs from the schedule. All purchase orders are sent to suppliers immediately upon creation and are for current delivery.

\textbf{The expected date reflects actual conditions}

Late POs are monitored in the \textit{PO Schedule} screen to expedite delivery from suppliers and to assess impact on dependent jobs. If the supplier furnishes a firm delivery date, the line item \textit{Expected Date} can be updated to update the system supply date.

\textbf{3. Released Job Schedule}

Jobs are released to live production when allocated materials become available, which is often dependent on inbound supply from subassembly jobs and purchase orders. When a job gets released, it is given a new \textit{Job Finish} date relative to its actual released date. The new Finish Date is a reliable supply date that automatically provides up to date feedback system wide.

\textbf{Initial job dates are placeholders}

Initial dates for new status jobs are placeholder dates that maintain multi-level date alignment in the master job schedule up through job release. The \textit{Planned Start} date is the target date for Job Release.

\textbf{Job release is when the schedule goes live}

The job release process is when the schedule goes live because it is the point at which jobs begin actual production.

\textbf{Job release is delayed when materials are not available}

A job is only released to production when allocated materials become available. When subassembly jobs or inbound POs are behind schedule, job release is delayed for any jobs that are dependent on those materials. These items will provide clear feedback in the dependency inquiry in the \textit{Job Release, Job Schedule} and \textit{PO Schedule} screens.

\textbf{Jobs are automatically rescheduled with release}

When a job does get released, it is given a new \textit{Job Finish} date relative to its actual released date, which makes the live job schedule self-adjusting.

\textbf{Job release ensures the correct order of assembly}

Job release is performed multiple times per day as lower level jobs are finished, which provides supply for dependent higher level jobs waiting to be released and ensures that jobs are released and started in the correct order of assembly.

\textbf{The job finish date reflects actual conditions}

If during the course of a job it becomes apparent that the job will be finished later than scheduled, the \textit{Job Finish} date can be manually adjusted in the \textit{Job Schedule} screen and this will update the system supply date.
Late Supply screen improves communication between the shop and the office

When a job is running late and is released for production the finish date (supply date) is moved outward. When the finish date is greater than the sales order requirement 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 Expected Ship date and contact the customer if appropriate.

4. Work Center Schedule

The Work Center Schedule screen prioritizes production activities and is used to execute the released job schedule.

Jobs spend more time in queues than in production

A job typically spends more time in work center queues than it does in actual production. Whenever a job arrives in a work center, it competes with other jobs and must wait its turn to begin production. The Work Center Schedule manages this process by allocating queue time based on job priority.

Each job is automatically prioritized

Each released job is prioritized based on remaining production time relative to its target demand date. Jobs running behind schedule get higher priority over jobs running ahead of schedule.

Larger jobs get higher priority

When a job has an unusually large quantity, it has more production time, which gives the job higher priority than would otherwise be the case with a normal quantity. The job will experience less waiting time in work center queues, which is how it can meet its target demand date in spite of the larger quantity.

Prioritized production expedites jobs and optimizes production flow

Prioritized production, where work centers are run by job priority, is far more efficient than ad hoc expediting done one job at a time. Jobs are efficiently expedited in coordinated fashion, which optimizes production flow and boosts shop throughput.

Materials are issued in real time

Along with real time labor updating, materials are issued as they are used by job sequences for real time inventory tracking.

Labor sequences are updated in real time

Within the Work Center Schedule job sequences are updated in real time to update job priorities, work center queues, and enable real time job tracking. Labor updating is facilitated by applying standard hours to completion quantities as sequences are closed.

Deploying workers and machines
Monitoring work center queues in the Work Center Schedule identifies bottlenecks and areas of the shop that need attention. This enables efficient deployment of workers and machines or application of overtime hours and extra shifts.

**Target Dates Guidelines**

**Avoid adding extra days to P Item Lead Days or M Item Job Days**

The scheduling system works most efficiently when the MRP “action window’ is equal to each item’s replenish time. Avoid adding extra days or padding to your P Item Lead Days or M Item Job Days. Fictional values in your lead days and job days will severely impact your system target dates, material allocations and your inventory stocking levels. If your objective is to enlarge your item’s planning period action window during MRP generation, you can go to the MRP Setup - MRP Defaults and add extra days to your MRP replenishment time.

**Do not co-opt item order policies for cross-purposes**

Do not co-opt item order policies for cross-purposes where you sometimes plan an item to order and sometimes plan it for stock (Demand Driven). The only proper use of item order policies is for each item to always be planned to order or to always be planned to stock (Demand Driven).

**Use default SO Required dates**

Use default SO line Required dates, which reflect your item order policies and allocations, without manual intervention. If any required date is not as desired, change the underlying settings so that your planned time to shipment meets your strategic objectives for this order and future orders as well. Never allow the required date to be used as a “wish date” by salespeople because it is a manufacturing date that must be aligned with dependent jobs and POs. You can use the Expected Ship date for customer communications. The Expected Ship date can be freely changed without impacting system dates or allocations.

**Do not adjust SO Required dates when supply jobs are trending late**

Do not adjust SO line Required dates when supply jobs are trending late. Otherwise, the sales order loses priority within the Sales > Picking Manager.

**Use the 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.

**Generate MRP on a daily basis**
The most efficient way to perform just in time planning is to generate MRP on a daily basis. This way you always respond immediately to any new demand that arises. Unlike manual planning, which is time-consuming and therefore is often done only once or twice a week in lengthy sessions, daily MRP generation only takes a few minutes.

**Never generate partial or fragmented MRP sessions**

Each MRP session is designed for complete generation and conversion through all job levels and always finishing with PO generation and conversion. Complete generation is an absolute requirement for achieving a coordinated master schedule. Never skip levels or generate jobs on one day and POs on another.

NOTE: This guideline does not mean that two people cannot participate in an MRP session. A production planner, for example, could generate the entire session and convert jobs, but could pause the session after PO generation so that a buyer could convert the planned POs after verifying supplier prices and other details.

**Never delay planned job or PO conversion**

When MRP generates a planned job or PO, it must be converted immediately in order to avoid introducing late dates into the master schedule. Never delay conversion because this defeats the “just in time” nature of the master schedule.

**Do not bypass MRP with manual jobs and POs**

MRP generates a coordinated master schedule in which all dates are inter-connected and work centers are prioritized based on meeting required dates. When you interject a manually created job or PO into the master schedule, it has no relationship with other dates and disrupts the schedule by misallocating material and distorting work center priorities.

**Do not create future jobs**

Do not manually create future jobs in anticipation of future demand or to comply with blanket sales orders. This is a crude form of forecasting that is not compatible with just in time planning and the master schedule. The correct way to plan for anticipated demand is to enter a *Monthly Forecast* and *Supply Days* target to automatically generate demand-driven jobs at planned intervals.

**Do not manually adjust job dates**

Job dates are coordinated upon creation with dependent demand dates and are automatically adjusted at time of job release with no need for manual intervention prior to job release.

**Only release jobs when material is available**
Never release a job without allocated material, which disables the means by which jobs are started in the correct order of assembly and given new finish dates to reflect actual conditions on the ground.

**Run work center sequences in job priority order**
Whenever possible, run work center sequences in job priority order so that late trending jobs are automatically expedited as needed to meet their required dates.

**Track job labor using Standard Hours completions**
Track job labor as sequences are finished, using standard or actual hours, in order to update work center queues and job priorities.

**Use the Late Supply screen to manage customer communications for shipment dates**
The `Sales > Late Supply` screen provides feedback to your office staff to update the SO line `Expected Ship` date for Jobs or POs that are running behind schedule.

**Use the Picking Manager to ensure that you are following your plan**
The `Sales > Picking Manager` screen allocates your stock on hand in priority order to ensure that you are staying on time across all sales orders company wide.
6 Essential #3 - Release Jobs with Material

The third essential process for manufacturing efficiency is to release jobs based on material availability, which automatically adjusts the master schedule to reflect actual receipts from inbound jobs and POs.

All manufacturing companies have the same challenge

All manufacturing companies have the same fundamental challenge -- when can jobs be started and in what order?

Jobs are released to production in the Job Release screen

Jobs are released to production in the Job Release screen within the Job Control Panel. DBA automatically allocates all supply with existing demand according to your plan. 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.

Initial job dates are placeholders

Initial dates for new status jobs are placeholder dates that maintain multi-level date alignment in the schedule up through job release. The Planned Start date is the target date for Job Release.

Job release is when the schedule goes live

The job release process is when the schedule goes live because it is the point at which jobs begin actual production.

Job release is delayed when materials are not available

A job is only released to production when allocated materials become available. When subassembly jobs or inbound POs are behind schedule, job release is delayed for any jobs that are dependent on those materials. These items will provide clear feedback in the dependency inquiry in the Job Release, Job Schedule and PO Schedule screens.

Jobs are automatically rescheduled with release

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

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 you can update your SO line *Expected Ship* date and notify the customer if necessary.

**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. When you perform a *Job Receipt* for a subassembly Job, you will want to immediate go to the Job Release screen and release the next level Job.

**The “golden rule” – never release without material**

The “golden rule” of scheduling is -- never release jobs without material. Releasing jobs without fully allocated materials causes a host of problems, including corruption of the self-adjusting rescheduling process, distortion of job priority calculations, misallocation of materials, and reintroduction of inefficient “rob Peter to pay Paul” practices.

**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.

**Boosting your manufacturing efficiency**

Releasing jobs with material is an essential element in boosting your manufacturing efficiency. Instead of guessing or investigating which jobs have material to get started, or having to rob material from some jobs in order to start other jobs -- you avoid all this by using MRP to cover all job demand and and by allocating material to jobs so you know exactly which jobs can be released to production at any given time. An additional benefit is that the schedule gets automatically adjusted without any need for manual intervention.

**What to Do**

**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. It is common that when you do a Job Receipt for a subassembly, that you will immediately go to the Job Release screen and release the next job level waiting for that subassembly. 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.

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.
7 Essential #4 - Coordinate Work Centers

The fourth essential process for manufacturing efficiency is to coordinate your work centers so that sequences are run in job priority order so that jobs are automatically expedited to meet their required dates.

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.

Run Work Centers by Job Priority

Each released job is given a calculated priority based on remaining production time relative to the job required date. Within work center queues, sequences are run in job priority order so that jobs trending behind schedule get priority over jobs trending ahead of schedule, which optimizes production flow and boosts shop throughput. Jobs with unusually large quantities get higher priority and thus experience less waiting time, which enables larger jobs to meet their target required dates.
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:

- Essential #6 - Track Job Labor
8 Essential #5 - Issue Material in Real Time

The fifth essential process for manufacturing efficiency is to issue material to jobs in real time in order to achieve accurate on-hand quantities for the benefit of MRP and all your inventory processes.

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.

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.
9 Essential #6 - Update Job Labor in Real Time

The sixth essential process for manufacturing efficiency is to track job labor to update job priorities and work center queues.

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

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 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.

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 completions 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.
- If you always complete all jobs for the exact total job quantity, you can select the *Flag as Finished* option to facilitate labor updating without the need to specify the completion quantity.
- 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 (Actual hours sequences only)**

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.
10 Essential #7 - Use WIP-Based Costing

The seventh essential process for manufacturing efficiency is to use WIP-based costing to operate with complete cost profiles and accurate costs of goods sold.

All manufacturing companies have the same challenge

All manufacturing companies have the same challenge when it comes to product costing – how can labor, overhead, and subcontract services be incorporated into product costs? Only with complete cost profiles can you make good pricing and product decisions.

The Shop Rates screen is used to calculate hourly rates

The Shop Rates screen is used to calculate hourly rates for labor and manufacturing overhead that get applied to your work centers.

Hourly rates can be factored in the Work Centers screen

In the Work Centers screen you can factor hourly shop rates up or down to account for differences in work center personnel and overhead consumption.

The Cost Rollup calculates estimated costs for M items

The Cost Rollup screen is used to roll the costs of material, labor, overhead, and subcontract services up through all levels of your product structures to calculate a total estimated cost for each of your manufactured items. This is especially useful with one-off custom items because you can then apply a markup over cost to furnish a price to the customer.

An estimated job cost is calculated when jobs are created

Whenever a job is created, the program calculates an estimated job cost, which can be viewed in summary or detail fashion within the Job Inquiry.

What is WIP-based product costing?

WIP-based product costing is the process by which job costs are accumulated and absorbed into the inventory cost of finished items.

Absorbed job costs are applied to job receipts

When finished quantities are entered in the Job Receipts screen, the program calculates the total unit job cost for you, which includes material, labor, overhead, and subcontract service costs. The calculation can be at actual or estimated job cost, depending on the system setting in the Job Cost Basis screen. Job receipt costing is the means by which all these cost elements get absorbed into item inventory values, which flow through to cost of goods sold when items are shipped and invoiced.
**WIP gets balanced with job close**

Jobs are closed in this screen. As each job gets closed, your WIP account gets automatically balanced. Any difference between job input and output costs gets posted to a *WIP Adjustment* variance account.

**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.

**The WIP account is self-adjusting with no period end procedures**

Because it is self-adjusting, you never make journal entries to the *Work in Process* account. Any such journal entry will corrupt the account and cause it to be out of balance with the WIP balances in the underlying jobs in progress.

**The Inventory account is self-adjusting with no period end procedures**

The *Inventory* account is also self-adjusting and is never subject to journal entry except to establish its initial value on system startup. When manufactured items are received to inventory, the cost reflects labor, subcontract services, and manufacturing overhead and thus needs no further adjustment. Any cost adjustments are made at the item level through the *Change Inventory Cost* screen and never by journal entry.

**Boosting your manufacturing efficiency**

Using WIP-based product costing is an essential element in boosting your manufacturing efficiency. Instead of operating in the dark with incomplete product costs, you will be furnished with estimated and actual product costs that reflect material, labor, overhead, and subcontract services, along with self-adjusting Inventory and WIP accounts.

**What to Do**

**Review shop rates once per month**

Review the variances for direct labor and shop overhead once per month for an appropriate date range (3 months minimum) in the *Shop Rates* screen and adjust your shop rates as needed if you sense that an absorbed cost variance is trending in any direction away from actual costs.

**Perform cost rollups at frequent and regular intervals**
Roll up estimated costs at frequent and regular intervals to insure that estimated job costs reflect current work center rates and component costs. Run a mass update to purchase item costs in the Estimated Purchase Costs screen at least once per month and run a batch rollup in the Cost Rollup screen at least once a week.

**Receive finished items at a realistic cost**

When finished items are received to inventory in the Job Receipts screen, always make sure the unit cost is realistic, meaning that it is within acceptable range to the estimated job cost and is not affected by an obvious costing error.

**What Not to Do**

**Never attempt to adjust past costs**

Even when large variances are reported in the Shop Rates screen, never attempt to adjust past costs by reopening jobs or reversing invoices or any other means. These are harmful practices that do not work and cause numerous accounting problems. Large variances are properly handled by variance accounts and do not require correction. Past labor and overhead costs are usually in closed accounting periods and have long ago been co-mingled with other costs and absorbed into the cost of other items.

**Never make journal entry adjustments to your Inventory account**

Never make journal entry adjustments to your Inventory account. This is a self-adjusting account that is always fully reconciled with the total inventory value of stock on hand.

**Never make journal entry adjustments to your Work in Process account**

Never make journal entry adjustments to your Work in Process account. This is a self-adjusting account that is always fully reconciled with underlying job costs.

**Do not devise your own costing method**

WIP accounting is not compatible with any other costing method. If you are accustomed to some other method in your previous system, do not attempt to replicate it in any form or fashion within DBA.

**Do not use the sales order for costing or planning**

Do not use the sales order for costing or planning purposes. This practice yields false numbers, promotes inefficient job planning, and compromises the integrity and effectiveness of DBA’s WIP accounting system. Sales orders should only be used to establish sales demand in terms of quantities and required dates and to establish selling prices.
11 The Four Efficiency Values

To reach your full manufacturing efficiency potential, you must combine the seven essential processes with a company culture that promotes the following core values:

**Value #1 – Planning Settings**

An efficient manufacturing company is devoted to using planning settings instead of manual planning and expediting.

Manual planning and expediting are inherently inefficient. Manual planning is tedious, time-consuming, non-timely, prone to shortages and over-stocking, and relies on job chaining, BOM explosions, and other MRP workarounds. Expediting favors one job at a time at the expense of many other jobs and to overall shop throughput.

In a company culture that values planning settings, high priority is given to maintaining item MRP settings – Lead Days allocations, Job Days allocations, order policies, Monthly Demand, and Supply Days targets. Shop managers adhere to the master schedule with job release and work center priorities. As a result, customer orders will be fulfilled quickly and reliably while keeping inventory and WIP to a minimum.

**Value #2 – BOM and Job Accuracy**

An efficient manufacturing company is devoted to maintaining accurate BOMs and job details.

BOM inaccuracy flows through to job detail and is the source of myriad problems, including erroneous PO generation, shortages, job delays, assembly errors, costing errors, and inventory errors.

In a company culture that values BOM accuracy there is no tolerance for errors in BOM specifications or job details. Whenever errors are encountered, they are fixed immediately in the job and in the BOM so that future jobs will not encounter problems. Any customization that is made out on the shop floor is immediately reflected in job details to insure accurate PO generation and inventory updating.

**Value #3 – Inventory Accuracy**

An efficient manufacturing company is devoted to maintaining an accurate inventory.

An accurate inventory is essential because stock on hand is the driver of MRP generation, job release, and the shipment planner.

In a company culture that values inventory accuracy there is no tolerance for inventory errors. All inventory processes are performed correctly and in real time. Whenever an error is encountered, it is fixed immediately. Mass physical inventories are avoided in favor of systematic cycle counting, especially for items with variable job usage.
Value #4 – Real-Time Processing

An efficient manufacturing company is devoted to performing all workflow processes in real time.

Delaying job issues, labor updating, and other processes until job finish is highly inefficient because you never know the status of work center queues or job priorities. As a result, expediting is required to meet job required dates, which favors some jobs at the expense of all other jobs and the shop as a whole. Furthermore, processing delays also result in incomplete job receipt costs that adversely affect inventory value and cost of goods sold.

In a company culture that values real-time processing, materials are issued to jobs when sequences are started and labor is updated as sequences are finished.