Time to Shipment MRP Guide

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1 Benefits and Features

What is Time to Shipment MRP?

*Time to Shipment MRP* is a demand-driven planning system for just in time manufacturing. Just in time manufacturing is widely accepted as the most effective way to achieve rapid time to shipment with efficient utilization of inventory.

Core elements include time to shipment planning for sales order required dates, strategic stocking with supply pipelines, demand-driven jobs and purchase orders, job release with allocated materials, and job prioritization for balanced production flow.

Benefits

- Keeps you competitive with faster times to shipment
- Works for any type of manufacturing or size of company
- Logical item settings drive all manufacturing activities
- Demand-driven planning replaces flawed methods to boost efficiency
- Supply pipeline planning minimizes shortages and over-stocking
- Generates consistent and reliable sales order ship dates
- Generates demand-driven jobs and purchase orders just in time
- Master job schedule is self-adjusting without need for manual intervention
- Jobs are released to production in the correct order of assembly
- Job prioritization evens production flow to boost shop throughput

Features

**Item MRP Settings**

- Ship dates are established by *Time to Shipment* target calculated from underlying item settings
- Jobs are backward scheduled from required dates by the *Job Days* allocation for production time
- Job start dates cover calculated *Lead Days* needed for to order components
- PO due dates are established by the *Lead Days* allocation for planned procurement time
- The *Order Policy* determines whether an item is planned to order or for stocking
- *Reorder Point* calculated from a *Monthly Demand* rate and *Safety Factor* triggers stock replenishment
Min Order quantity calculated from planned Supply Days interval establishes order quantities and frequency

Item Review Note handle special planning requirements

Sales Order Required Dates

Sell item Time to Shipment targets establish sales order line item required dates

Job and Purchase Order Generation

Custom to order jobs generated directly from sales order lines

Demand-driven job and PO generation within item planning period action windows

Interdependent demand consolidated into single jobs and purchase orders

Supplier, supplier price, and manufacturer part number can be changed during PO generation

Job Release

Allocates on hand materials to new status jobs in planned start date order

Jobs are released to live production when allocated materials become available

Job finish dates are rescheduled when jobs are released to production

Job Prioritization

Each job is prioritized based on remaining production time relative to its required date

Work center queues are run by job priority to even out production flow and boost shop throughput

Job labor is updated in real time as job sequences are completed
2 MRP Overview

What is Time to Shipment MRP?

*Time to Shipment MRP* is a demand-driven planning system for just in time manufacturing. Just in time manufacturing is widely accepted as the most effective way to achieve rapid time to shipment with efficient utilization of inventory.

**It is not a traditional forecast-driven MRP system**

*Time to Shipment MRP* is not a traditional multi-bucket, forecast-driven MRP system. It is a just in time planning system that only responds to current demand originating from sales orders. Future demand for items is handled with anticipatory stocking instead of forecast-driven explosions.

**Designed for make to order and custom manufacturing**

Unlike forecast-driven MRP systems, which are designed for standard products made to stock, *Time to Shipment MRP* is designed for make to order and custom manufacturing as well as for making items to stock. Instead of generating lower level jobs and purchase orders from BOM explosions, *Time to Shipment MRP* generates lower level requirements from actual job details, which can be customized to order.

**How does Time to Shipment MRP work?**

*Time to Shipment MRP* is comprised to two planning phases and three execution phases that are performed in the following sequential order.

**Planning Phases**

These first two phases establish your overall planning strategy for time to shipment and inventory.

1. **Plan Times to Shipment for SO Required Dates**

   Time to shipment targets establish sales order required dates and are derived from item lead times and order policies. Strategic stocking of key sell items, subassemblies, and materials is used to reduce or eliminate lead time.

2. **Plan Supply Pipelines for Stock Replenishment**

   Planned stock is replenished by supply pipelines at demand-driven intervals for efficient utilization of inventory.

**Execution Phases**

These three phases execute that planning strategy that was established by the first two phases.
3. Generate Demand Driven Jobs and POs

Jobs and POs are generated on a daily basis in response to net demand originating from current sales orders. Job and PO target dates are established by item lead times within a master schedule where supply dates are aligned with demand dates.

4. Release jobs with Allocated Materials

Jobs are released to production when allocated materials become available and are rescheduled relative to the release date.

5. Balance Production Flow with Job Priority

Released jobs are prioritized based on remaining production time relative to the required date. Job sequences are run in job priority order within work centers to balance production flow and ensure that all jobs meet their required dates.

How does Time to Shipment MRP differ from other planning methods?

Time to Shipment MRP is a complete departure from the planning methods used by most small businesses.

Daily job and PO generation instead of intermittent planning

All planning is done in advance with item settings that establish an overall strategy for time to shipment and inventory. Item settings drive job and purchase order generation, which is an automatic process that can be done daily to respond immediately to new demand. Daily generation is essential for just in time manufacturing and reducing time to shipment.

Anticipatory stocking instead of forecast driven supply

Future demand for any item is handled with anticipatory stocking whereby a monthly sales or usage rate and safety factor buffer are applied to the item’s lead time to calculate a dynamic reorder point. Whenever net demand for the item falls below the reorder point, a job or PO is triggered to replenish stock before it gets depleted. Demand-driven jobs and purchase orders are automatically synchronized with actual demand and are firmly set without need for adjustments.

Supply pipelines instead of blanket purchase orders

Purchased items planned for stocking are replenished by supply pipelines at demand-driven intervals. A monthly usage rate, safety factor buffer, the item's lead time, and a supply days interval combine to calculate a dynamic reorder point and minimum order quantity. Whenever net demand falls below the reorder point, a purchase order is triggered for the net demand amount or minimum order quantity, whichever is greater. A demand-driven supply pipeline is self-adjusting with shorter
intervals when demand is greater than expected and longer intervals when demand is less than expected.

**Dynamic reorder point and min order quantity instead of min-max stocking level**

For stocking items a dynamic reorder point and min order quantity are calculated from a monthly sales or usage rate, a safety factor buffer, the item’s lead time, and a supply days interval. Whenever any of these input variables are changed, the reorder point or min order quantity is dynamically recalculated. Whenever net demand falls below the reorder point, a job or PO is generated for the min order quantity or greater that replenishes stock before it gets depleted. Dynamic replenishment planning is essential for efficient utilization of inventory.

**Time to shipment targets instead of ship date guesstimates**

Item lead times and order policies combine to calculate time to shipment targets for top level items, which establish sales order required dates. Strategic stocking order policies are applied to selected items to remove lead time contribution and reduce time to shipment. Time to shipment targets provide customers with consistent and reliable make to order ship dates and enable an overall planning strategy for market competitiveness.

**Demand driven jobs and POs instead of manual planning**

A job or purchase order is generated whenever net demand for an item (on hand + inbound supply + current demand) falls below its reorder point. Items planned to order have a zero reorder point and therefore a job or PO is generated whenever new demand materializes. Within each MRP session, jobs are generated for items level by level in lowest BOM level order so that the jobs generated at each level create demand for jobs at subsequent levels. Purchase orders are always generated last to ensure that each item has a complete job demand profile. Jobs and POs are only generated when needed.

**Target driven scheduling instead of predictive scheduling**

Master schedule dates for sales orders, jobs, and purchase orders are based on time to shipment targets and standard lead days and job days allocations that are consistent from one MRP session to another. Schedule dates are target dates used to prioritize job release, work center scheduling, and shipping so that activities are performed in optimal order for maximum productivity.

**Short term firm schedule instead of longer term tentative schedule**

All master schedule dates for jobs and purchase orders are within the planning period of top level items, which means that all supply dates are short term and firmly set without need for the quantity changes, date changes, and specifications changes that are commonly required with longer term scheduling.
Job release instead of manual rescheduling

When jobs are released to live production based on material availability, they are given new finish dates relative to the released date. This automatically adjusts the master job schedule to reflect actual conditions and eliminates the need for manual rescheduling.
3 MRP Phases

*Time to Shipment MRP* consists of five phases performed in the following sequential order. The first two phases establish your overall planning strategy and the remaining phases execute the strategy. MRP phases are summarized below and are covered in full detail over the next five chapters.

**Planning Phases**

These first two phases establish your overall planning strategy for time to shipment and inventory.

1. **Plan Times to Shipment for SO Required Dates**

Standard lead times 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. A standard *Lead Days* is planned for purchased items and a standard *Job Days* is planned for manufactured items, along with a pre-job *Lead Days* for to order components. Items are assigned a *To Order* or *Stocking* order policy to determine lead time contribution. Item settings are refined as needed until *Time to Shipment* targets reflect your marketing objectives.

2. **Plan Supply Pipelines for Stock Replenishment**

A supply pipeline is planned for each item with a *Stocking* order policy to replenish stock at demand-driven intervals. Supply pipeline settings consist of a monthly *Sales* or *Usage* rate, *Safety Factor* buffer, the item's lead time, and a *Supply Days* interval, which combine to calculate a dynamic *Reorder Point* and *Min Order* quantity. Supply pipelines are entirely demand-driven, which minimizes shortages and prevents over-stocking.

**Execution Phases**

These three phases execute that planning strategy that was established by the first two phases.

3. **Generate Demand Driven Jobs and POs**

Item *Time to Shipment* targets generate sales order line item *Required Dates* to provide the demand that drives daily MRP generation. Jobs and POs are generated and converted level by level in response to current net demand within item planning periods relative to *Reorder Points* and *Min Order* quantities. Job and PO dates are derived and aligned from standard lead times within a coordinated master schedule.

4. **Release Jobs with Allocated Materials**
Open purchase orders are tracked and expedited to ensure that jobs get released on time. Jobs are released to live production per planned start dates when allocated materials become available.

5. 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 optimized 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.
4 Phase 1 - Plan Times to Shipment

The first phase of Time to Shipment MRP is to plan time to shipment targets for sales order required dates.

Summary

Standard lead times 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. A standard Lead Days is planned for purchased items and a standard Job Days is planned for manufactured items, along with a pre-job Lead Days for to order components. Items are assigned a To Order or Stocking order policy to determine lead time contribution. Item settings are refined as needed until Time to Shipment targets reflect your marketing objectives.

MRP Settings Screen

(MRP – MRP Settings)

Standard lead times and order policies are assigned in the MRP Settings screen. For initial setup, complete each of the following tasks in sequential order.

Tasks

1. Plan a standard Lead Days for all P items

In this task you will plan a standard Lead Days for all P items.

The P item Lead Days is a required MRP setting

The purchased item Lead Days is an integral element of Time to Shipment MRP and is a required setting that cannot be skipped or given artificial values. Without exception a standard Lead Days value must be assigned to each and every P item.

The P item Lead Days is standard delivery time

The P item Lead Days is the item's standard delivery time, expressed in calendar days.

   NOTE: If an item has variable delivery where sometimes it can be procured quickly and sometimes not, you must assign a standard Lead Days value somewhere between the two extremes.

Lead Days Purposes

Establishes PO due dates
The item’s standard *Lead Days* establishes PO due dates, which are forward scheduled from the current date at time of MRP generation.

**Contributes to higher-level lead times**

A job that uses a component item with a *To Order* policy must wait until the item is procured or manufactured before the job can be started. When several *To Order* policy components exist, the one with the longest lead time determines the parent item’s pre-job *Lead Days* allocation. Therefore any P item with a *To Order* policy is a lead time contributor to higher-level items.

**Enables late PO tracking**

The standard *Lead Days* determines PO due dates for late PO tracking and expediting in the *PO Schedule* screen, which is vitally important for minimizing delays to dependent jobs.

**Determines item planning periods**

The standard *Lead Days* (along with the system *MRP Interval* setting) determines each item’s planning period action window for PO generation. Any demand beyond the planning period will be responded to in a future MRP session when it falls into the action window and becomes current demand.

**The P item Lead Days is not an isolated setting**

The P item *Lead Days* is not an isolated setting. When a P item has a *To Order* policy, it contributes to the lead times of higher-level M items. If you give the *Lead Days* a padded or inflated value, you get inflated M item lead times and inflated time to shipment targets and distorted sales order required dates. So it is essential that the *Lead Days* is a realistic value that approximates actual delivery time.

**Lead Days Entry**

Go to the *MRP Setting - P Items* screen and enter a value in the *Lead Days* field.

**Guidelines**

- Enter a realistic value that represents the item’s standard delivery time, expressed in calendar days.
- If the item has a variable delivery time where sometimes it can be procured quickly and sometimes not, you must enter a standard *Lead Days* somewhere between the two extremes.

**Never pad or inflate Lead Days to expand item planning periods**
One thing you must absolutely avoid is to pad or inflate P itemLead Days settings in order to expand item planning periods. Inflated Lead Days settings inflate M item lead times and top level time to shipment targets and distort sales order required dates.

**If you prefer longer planning periods:**

Item planning periods keep inventory lean because they prevent POs from being generated prematurely before they are needed. That being said, if you feel more comfortable with longer planning periods, never pad or inflate Lead Days settings, which has harmful consequences. Instead, go to the MRP - MRP Defaults screen and use the Planning Period - Extra Days for P Items setting to expand all P item planning periods by a set number of days.

**Never use the Manufacturer’s lead time**

When planning for electronic components or any item where a manufacturer part number is specified, never use the manufacturer’s lead time as the standard Lead Days because a long lead time will have harmful consequences to higher-level lead times. When a manufacturer’s part is currently not available, you will typically source an alternate part and therefore the manufacturer’s lead time is never used for actual planning.

**Use the Delivery Inquiry for guidance**

For guidance in establishing the standard Lead Days, click the Delivery tab to reference past delivery times.

**When you have thousands of P items:**

Is Lead Days entry practical with thousands of P items? Actually, it can go quickly because within a given supplier, the standard Lead Days values are typically the same or similar for most items. So even though you have thousands of P items, most companies have a small set of suppliers.

**Mass entry by supplier**

Within a given supplier, standard Lead Days values are typically the same or similar for most items. To facilitate mass entry, you can filter the screen by Default Supplier and then apply consistent values to all items sourced by that supplier.

As an alternative to manual entry, you can filter the screen and use the Output tool to generate a spreadsheet for mass Lead Days assignment. When your spreadsheet is completed use the Data Import - Stock Items - MRP Settings - P Items data import utility to import the Lead Days values.
2. Plan a standard Job Days for all M items

In this task you will plan a standard Job Days and Run Size for all M items.

The M item Job Days is a required MRP setting

The manufactured item Job Days is an integral element of Time to Shipment MRP and is a required setting that cannot be skipped or given artificial values. Without exception a standard Job Days must be assigned to each and every M item.

The Job Days is standard production time

The Job Days setting is the item's standard production time for a typical job quantity, expressed in shop days.

Job Days Purposes

Establishes job dates

The Job Days is accompanied by the pre-job Lead Days, which is automatically calculated and is the time allocated for making subassemblies or procuring materials to order before a job can be started. Together the two settings comprise the item's lead time and establish job start and finish dates.

Contributes to higher-level lead times

A job that uses a component item with a To Order policy must wait until the item is procured or manufactured before the job can be started. When several To Order policy components exist, the one with the longest lead time determines the parent item's pre-job Lead Days allocation. Therefore any lower level M item with a To Order policy is a lead time contributor to higher-level items.

Contributes to Time to Shipment

When a top level sell item has a To Order policy, its pre-job Lead Days and standard Job Days contribute to its Time to Shipment target for sales order required dates. This provides sufficient time for making the item to order.

Enables late job tracking and job rescheduling

The standard Job Days determines job finish dates for late job tracking in the Job Schedule screen and for job rescheduling in the Job Control Panel - Release Jobs screen.

Determines item planning periods
The pre-job Lead Days and standard Job Days (along with the system MRP Interval setting) determine each item's planning period action window for job generation. Any demand beyond the planning period will be responded to in a future MRP session when it falls into the action window and becomes current demand.

The Job Days and pre-job Lead Days are not isolated settings

The Job Days and pre-job Lead Days are not isolated settings. When a lower level subassembly item has a To Order policy, its lead time contributes to the lead times of higher-level items. If you give the Job Days a padded or inflated value, you get inflated lead times at higher levels, inflated time to shipment targets, and distorted sales order required dates. So it is essential that the Job Days is a realistic value that approximates actual production time.

A standard Run Size accompanies the Job Days

Each item's standard Job Days is accompanied by a standard Run Size, which represents a typical job quantity.

Run Size Purposes

- **Used for Job Days Inquiry calculations**
  
  The standard Run Size is used to calculate an estimated Job Days amount in the Job Days Inquiry (see below), which can be used as a reference to help establish the standard Job Days value.

- **Amortizes setup and fixed usage quantity cost**
  
  The standard Run Size is used by the cost rollup to amortize total fixed setup cost and fixed quantity component cost into a unit cost.

Job Days Entry

Go to the MRP Setting - M Items screen and enter a value in the Job Days field.

Guidelines

- Enter a realistic value that is standard production time for a typical job quantity, expressed in shop days. Production time is the total number of days between job start and job finish and includes actual processing time, work center queue time, and move time between work centers.

- Many M items have similar or identical production processes, in which case the same standard Job Days can be applied to multiple items.

- An approximate value based on judgment and past experience will provide good results. Standard Job Days values can be refined over time as you get feedback from actual results.
How can a standard Job Days apply to different job quantities?

How can a standard Job Days setting apply when job quantities vary from job to job? The standard Job Days is for time to shipment planning where the ultimate objective is to achieve consistent ship dates over time from order to order. When a job has an unusually large quantity, the job gets higher priority in work center queues, which reduces overall queue time and enables the job to meet its required date. So dates stay fixed for consistent scheduling and shop activities flexibly adapt to meet the schedule.

Never adjust Job Days for particular situations

One thing you must absolutely avoid is adjusting standard Job Days values on a situational basis to accommodate a particular requirement or order quantity. Doing so will disrupt date alignment within the master schedule. Use standard Job Days settings and the system automatically adjusts job priorities to accommodate unusual quantities.

Never pad or inflate Job Days to expand item planning periods

Another thing you must absolutely avoid is to pad or inflate Job Days settings in order to expand item planning periods. Inflated Job Days settings inflate higher-level lead times and time to shipment targets and distort sales order required dates.

If you prefer longer planning periods:

Item planning periods keep inventory lean because they prevent jobs from being generated prematurely before they are needed. That being said, if you feel more comfortable with longer planning periods, never pad or inflate Job Days settings, which has harmful consequences. Instead, go to the MRP - MRP Defaults screen and use the Planning Period - Extra Days for Lower Level M Items setting to expand all subassembly item planning periods by a set number of days.

Planning periods are never expanded for top level items

Planning periods are never expanded for top level items because premature job generation at the top level will generate premature demand for lower items that would cause excessive inventory and introduce long term dates into what should be a firmly set master schedule. The planning period for top level items is also ideally suited for handling blanket sales orders because it excludes demand from future required dates that does not need current action.

Use the Production Inquiry for guidance
For guidance in establishing the standard Job Days, click the Production tab to reference actual shop days for past jobs.

**Use the Job Days Inquiry for reference**

For assistance in establishing the standard Job Days, click the button in the Job Days field to launch the Job Days Inquiry, which calculates an estimated Job Days based on applying the item’s standard Run Size to current work center capacity settings and routing cycle times.

CAUTION: The calculated Job Days will only have meaningful value if work center capacity settings are properly established.

**Run Size Entry**

Enter a standard Run Size that represents a typical job quantity.

**Use the Production Inquiry for guidance**

For guidance in determining an appropriate Run Size, click the Production tab to reference past job quantities.

### 3. Plan a standard Order Policy for all items

In this task you will plan a standard Order Policy for all manufactured and purchased items.

A standard Order Policy is a required MRP setting

A standard Order Policy for each item is an integral element of Time to Shipment MRP and is a required setting that cannot be ignored or conflict with your actual planning behavior. Without exception a standard Order Policy must be assigned to each and every P and M item.

The item Order Policy is for lead time planning

The item Order Policy is for lead time planning and determines whether the item is a lead time contributor or not.

Any item with a To Order policy is a lead time contributor

A job that uses a component item with a To Order policy must wait until the item is procured or manufactured before the job can be started. When several To Order policy components exist, the one with the longest lead time determines the parent item's pre-job Lead Days. Therefore any P item or lower level M item with a To Order policy is a lead time contributor to higher-level items.

Any top level item with a To Order policy is planned to be made to order, in which case the item's standard Lead Days and Job Days contribute to the item's Time to
Shipment target. Therefore any top level M item is a lead time contributor to its own
time to shipment.

Any item with a Stocking order policy does not contribute to lead time

Any component item with a Stocking order policy will not delay the start of any jobs
because the item is planned for immediate availability from stock. Therefore the
lead time of any P item or lower level M item with a Stocking order policy does not
contribute to higher-level item lead times. Changing an item's order policy from To
Order to Stocking removes the item from higher-level item lead time calculations.

Any top level M item with a Stocking order policy is planned for immediate shipment
from stock and therefore its lead time does not contribute to its own Time to
Shipment target.

The item Order Policy is a binary choice

The item Order Policy is a binary choice, meaning that the item is either planned to
order or for stocking, but not both. It is an “either or” decision.

- If you plan the item with a To Order policy, all lead time calculations are based on
  the item always being purchased or made to order and not having stock on hand.

- If you plan the item with a Stocking order policy, all lead time calculations are
  based on the item always being available from stock on hand.

Clear and consistent order policies are essential for reliable times to shipment

The only way to achieve consistent and reliable times to shipment is with clear and
consistent item order policies that don't vary from order to order, job to job, or planning
session to planning session. This way your actual ordering and stocking activities are
always in harmony with your overall strategic plan.

By contrast, "ad hoc" planning that varies on a situational basis injects inconsistencies
into ordering and stocking that make each planning session a unique set of situations in
a never-ending cycle. The ever-changing nature of ad hoc planning is counter-
productive and makes it impossible to achieve reliable times to shipment.

The Order Policy must reflect your actual ordering or stocking behavior

For meaningful lead time planning it is essential that each item's Order Policy reflects
your actual planning behavior.

- If you buy or make an item to order in actual practice, it must be assigned a To
  Order policy so that its lead time properly contributes to the lead time of higher-
  level items or to its own time to shipment.

- If you stock an item in actual practice, you must assign the item a Stocking order
  policy so that its lead time does not erroneously contribute and distort the lead
times of higher-level items or its own time to shipment.
Consider a Stocking order policy for more efficient purchasing

For many purchased items a *To Order* policy results in an excessive number of small and inefficient purchase orders. Small order quantities can be prevented by assigning a *Min Order* quantity, which will result in occasional stock on hand, but not enough to ensure a reliable supply to remove lead time contribution. Instead of using a *To Order* policy with a *Min Order* quantity, consider assigning the item a *Stocking* order policy, which will result in more efficient and consistent order quantities with the added benefit of removing lead time contribution to higher-level items.

**Apply strategic stocking to appropriate lower level items**

Apply strategic stocking to selected P items and lower level M items to plan for immediate issuing from stock, which eliminates lead time contribution to higher-level items.

- Assign a *Stocking* order policy to any P item where you consider that its lead time (*Lead Days*) would cause an unacceptable delay to starting dependent jobs.
- Assign a *Stocking* order policy to any lower level M item where you consider that its lead time (*Lead Days* plus *Job days*) would cause an unacceptable delay to dependent jobs.

**Apply strategic stocking to appropriate top level items**

Apply strategic stocking to selected top level M items to plan for immediate shipping from stock, which eliminates the item's *Time to Shipment* altogether. Assign a *Stocking* order policy to any top level M item where immediate shipment is a desirable marketing strategy or the item has frequent demand that makes it more efficient to replenish stocking at demand-driven intervals instead of making the item to each order.

**If the item has never been previously stocked**

When an item has never been previously stocked, do not immediately assign a *Stocking* order policy because there will be a delay before stock is actually on hand as planned. Instead, create a manual job or PO for the item to establish an initial stock quantity. After the job or PO is received to inventory, then assign the item an appropriate *Stocking* order policy.

**Avoid CTO job linking with standard items**

When a top level M item is flagged for CTO job linking it is assigned a *To Order* policy and jobs are linked to and generated directly from sales order lines for the exact quantity ordered. CTO linking is ideally suited for one-off, custom items that are made to order and never stocked. For standard items, however, CTO linking is counter-productive and should be avoided because such items are interchangeable from order to order and subject to stocking. There is no ability to adjust CTO jobs to account for stock on hand or to consolidate demand into more efficient job sizes. Furthermore, CTO linking forces
items to be made to order, even in cases where items with frequent orders could be planned with a *Stocking* order policy to enable immediate shipment from stock.

**Order Policy Assignment**

In the *MRP Settings* screen, click the button in the *Order Policy* field to launch the *Order Policy* screen. Select one of the following options in the *Order Policy* panel.

- **To Order**
  Select this order policy when you intend to always buy or make the item to order and do not expect it to be available from stock.

- **Stocking (Monthly Demand)**
  Select this order policy when you intend to maintain stock on hand sufficient to cover the majority of likely monthly demand scenarios. A monthly *Sales* or *Usage* rate, *Safety Factor* buffer, the item's lead time, and *Supply Days* interval combine to calculate a dynamic *Reorder Point* and *Min Order* quantity that generate demand-driven jobs or purchase orders.

  **Use for lean inventory planning**
  Use this order policy for lean inventory planning to achieve efficient utilization of inventory without shortages or over-stocking.

  **Ideally suited for higher value items**
  This order policy is ideally suited for higher value and bulky items that benefit from lean inventory planning to minimize inventory investment and preserve scarce storage space.

  **Use for P items with long lead times**
  Assign this order policy to P items with long lead times. The monthly *Usage* rate, long standard *Lead Days*, and *Supply Days* interval calculate a *Reorder Point* and *Min Order* quantity that generate a supply pipeline of overlapping POs, each due to arrive at staggered intervals. A demand-driven PO pipeline is far more efficient than large and infrequent POs because more frequent replenishment eliminates the risk of lengthy shortages and excessive stock on hand.

**Link:**

[Long Lead Days Purchasing](#)

- **Stocking (Safety Factor)**
  Select this order policy when you intend to maintain stock on hand sufficient to cover all potential monthly demand scenarios. A fixed monthly *Safety Factor*, the item's
lead time, and Supply Days interval combine to calculate a dynamic Reorder Point and Min Order quantity that generate demand-driven jobs or purchase orders.

**Provides a “set it and forget it” pipeline**

Assign this order policy to establish a "set it and forget it" supply pipeline where the item’s Safety Factor can be left as is without need for periodic review and adjustment.

**Ideally suited for lower value items**

This order policy is ideally suited for lower value items where minor over-stocking would have no significant impact on finances or storage space.

**Use for critical items where guaranteed supply is essential**

Use this order policy for critical materials or subassemblies where guaranteed supply is essential to prevent any delays to dependent jobs. In this case some over-stocking to assure supply is preferable to lean inventory planning. For such items, set the the monthly Safety Factor high enough to cover any probable or conceivable peak monthly demand scenario.

**Stocking (Manual)**

This Stocking order policy is not recommended because a manually entered Reorder Point has no logical basis for its value and can easily result in over-stocking.

### 4. Refine Time to Shipment targets

In this task you will review and refine top level item Time to Shipment targets as needed to meet your marketing objectives.

**Time to Shipment targets establish SO Required Dates**

Top level item Time to Shipment targets establish sales order Required Dates, which drive job generation and job and shipping prioritization.

**Enables a company-wide time to shipment strategy**

Time to Shipment targets enable you to formulate an overall time to shipment strategy for staying competitive in your marketplace. This is a company-wide strategy because planned times to shipment and underlying lead times and order policies can be shared with management, sales, and production personnel to achieve common objectives.

**How is Time to Shipment calculated?**
A Time to Shipment target is calculated for each of your top-level M items as follows. You can click the down arrow in the Time to Shipment field to view the calculation variables.

**To Order Policy Items**

When the item has a To Order policy, it is planned to be made to order, in which case Time to Shipment is calculated from the following variables:

**Lead Days**
This is the item's standard Lead Days for pre-job time needed for procurement or production of to order materials or subassemblies.

**Job Days**
This is the item's standard Job Days for production time.

**SO Shop Days**
With To Order policy items the extra Shop Days enables you to extend SO line item Required Dates by an extra day or two.

**Non-Shop Days**
Time to Shipment is factored by this number of days to account for weekly non-shop days defined in the Shop Calendar.

**Stocking Order Policy Items**

When the item has a Stocking order policy, it is planned for immediate shipment from stock. In this case Time to Shipment is calculated from the following variables:

**SO Shop Days**
An extra Shop Days can be specified in the SO Required Dates screen against Stocking order policy items to add an extra day or two to account for orders that are received today, but can't be shipped until tomorrow or the next day.

**Non-Shop Days**
Time to Shipment is factored by this number of days to account for weekly non-shop days defined in the Shop Calendar.

**Review and refine Time to Shipment targets as needed**

In this task you should review all Time to Shipment targets to verify that they have realistic values and meet your marketing objectives. When you encounter a value that needs refinement, you can take any of the following measures:

**Make sure standard lead times are realistic**
Make sure that all your P item Lead Days and M item Job Days settings are realistic. If these lead time settings are padded or inflated, your Time to Shipment targets will be inflated as well.

**Make sure stocked items have a Stocking order policy**

Make sure the items you stock in actual practice are given a Stocking order policy or else those items will contribute to higher level lead times, which will inflate top level Time to Shipment targets.

**Eliminate Time to Shipment with strategic stocking**

You can eliminate Time to Shipment altogether (except for SO Shop Days and Non-Shop Days) by assigning the top level item a Stocking order policy.

**Reduce pre-job Lead Days by removing lead time contributors**

You can reduce the item’s pre-job Lead Days by removing contributor components. To do so, examine the item’s Lead Days inquiry, which displays the To Order policy component that contributes the longest lead time. Assign that component item a Stocking order policy to remove it as a lead time contributor. After doing so, examine the effect on the Lead Days and continue removing contributor components as needed.

**Reduce the item’s standard Job Days**

You can reduce the item's standard Job Days over time as you get more efficient with demand driven manufacturing.
5 Phase 2 - Plan Supply Pipelines

The second phase of *Time to Shipment MRP* is to plan supply pipelines for *Stocking* order policy items.

**Summary**

A supply pipeline is planned for each item with a *Stocking* order policy to replenish stock at demand-driven intervals. Supply pipeline settings consist of a monthly *Sales* or *Usage* rate, *Safety Factor* buffer, the item's lead time, and a *Supply Days* interval, which combine to calculate a dynamic *Reorder Point* and *Min Order* quantity. Supply pipelines are entirely demand-driven, which minimizes shortages and prevents overstocking.

**Order Policy Screen**

*MRP - MRP Settings - Order Policy Screen*

Supply pipeline settings for M and P items with a *Stocking* order policy are entered in the *Order Policy* screen within the *MRP Settings* screen, which is accessed by clicking the button to the right of the *Order Policy* field.

**Tasks**

1. **Plan a supply pipeline for Stocking (Monthly Demand) items**

In this task you will plan a supply pipeline for all items that are assigned a *Stocking (Monthly Demand)* order policy.

**What is a supply pipeline?**

A supply pipeline is a steady stream of jobs or purchase orders that replenishes stock for an item at demand-driven intervals. When viewed on a graph, a supply pipeline has a saw tooth pattern where each peak on the graph is a supply receipt and each subsequent slope is actual usage. An efficient pipeline replenishes stock just in time before it gets fully consumed. With long lead time items, a supply pipeline can consist of multiple overlapping POs, each due to arrive at staggered intervals.

**How the Stocking (Monthly Demand) order policy works**

The *Stocking (Monthly Demand)* order policy generates a supply pipeline by means of a monthly *Sales* or *Usage* rate, *Safety Factor* buffer, the item's lead time, and *Supply Days* interval, which combine to calculate a dynamic *Reorder Point* and *Min Order* quantity.

All jobs and purchase orders are triggered by actual demand. Whenever net demand (stock on hand + all inbound supply - actual demand within the item's planning period
action window) falls below the item's *Reorder Point*, MRP generates a job or purchase order with a supply quantity equal to net demand or the *Min Order* quantity, whichever is greater.

**When to use**

Select the *Stocking (Monthly Demand)* order policy when you intend to maintain stock on hand sufficient to cover the **majority** of likely monthly demand scenarios.

**NOTE:** If the item is critical and requires a guaranteed supply that covers any potential monthly demand scenario, use the *Stocking (Safety Factor)* instead (see next task).

**Use for lean inventory planning**

Use this order policy for lean inventory planning to achieve efficient utilization of inventory without shortages or over-stocking.

**Ideally suited for higher value items**

This order policy is ideally suited for higher value and bulky items that benefit from lean inventory planning to minimize inventory investment and preserve scarce storage space.

**Use for P items with long lead times**

Assign this order policy to P items with long lead times. The monthly *Usage* rate, long standard *Lead Days*, and *Supply Days* interval calculate a *Reorder Point* and *Min Order* quantity that generate a supply pipeline of overlapping POs, each due to arrive at staggered intervals. A demand-driven PO pipeline is far more efficient than large and infrequent POs because more frequent replenishment eliminates the risk of lengthy shortages and excessive stock on hand.

**Link:**

[Long Lead Time Planning](#)

**Replace blanket POs with a supply pipeline**

If you are using blanket POs with a set of scheduled deliveries, each such item should be assigned the *Stocking (Monthly Demand)* order policy and the blanket purchase order should be replaced with a supply pipeline so that future POs are generated by MRP. Blanket POs are counter-productive because they require constant adjustments to avoid shortages and over-stocking when scheduled supply inevitably differs from actual demand. By contrast, MRP generates demand-driven purchase orders at self-adjusting intervals.

**Supply pipeline settings provide planning transparency**
A big benefit of supply pipeline settings is that they provide complete transparency on the planning assumptions that were used to calculate the Reorder Point and Min Order quantity. This transparency enables the planner and others in the company to be fully aware of the planning logic that drives stock replenishment.

**Supply Pipeline Entry**

**Select the Stocking (Monthly Demand) option**

In the MRP Settings screen, click the button in the Order Policy field to launch the Order Policy screen. In the Order Policy panel, select the Stocking (Monthly Demand) order policy.

**If you receive a Projected Shortage warning:**

When you change an item’s order policy from To Order to Stocking (Monthly Demand), upon saving the program checks if stock on hand is sufficient to cover one planning period of forecast demand. If not, you receive a Projected Shortage warning that displays the projected shortage amount. This means that you will be unable to immediately begin issuing the item from stock. You are presented with two options:

**Cancel Changes**

With this option you leave the order policy as To Order for the time being and you create a manual job to cover the projected shortage. After the manual job is completed, change the order policy to Stocking (Monthly Demand).

**Ignore Suggestion and Save Changes**

With this option the order policy is changed to Stocking (Monthly Demand), even though initial shortages may occur. MRP will generate an immediate job to cover the projected shortage, but that job will be late relative to its required date if any current demand exists or materializes in the near future.

**Enter a monthly Sales or Usage rate**

Enter a monthly Sales or Usage rate in the Monthly Demand panel at left, which is expected monthly demand. You can use past history for reference by reviewing recent trends in the Average Monthly Trend panel at left or by reviewing monthly averages in the Sales and Usage history in the lower panel.

**The monthly rate is a general trend, not a precise forecast**

Unlike a forecast, which is a precise prediction of future demand, the monthly Sales or Usage rate represents a general trend in demand and does not need the precision of a forecast. The monthly rate is inherently imprecise because it is always padded with a Safety Factor buffer to account for overage above the
monthly demand rate. Enter a "ball park" monthly demand rate and an appropriate Safety Factor buffer and you will get good results.

Enter a Safety Factor for monthly overage

The monthly Sales or Usage is an average rate, but actual demand in any given month always varies above or below the average. Some items have steady demand with little monthly variance, whereas other items have highly variable demand that swings wildly up or down in any given month. Enter a Safety Factor buffer that covers the item's potential overage (variance) above the monthly demand rate.

Safety Factor Guidelines

- One effective method for establishing an appropriate Safety Factor buffer is to examine the Sales and Usage history in the lower panel to find the highest demand that occurred in any given month. Subtract the monthly Sales or Usage rate from that amount and use the result as the Safety Factor entry.

- Another method for establishing an appropriate Safety Factor is to use the Std Dev displayed in the Average Monthly Trend panel at left. The standard deviation is a measure of variability in a data set, so only use this method when the item has a complete history profile. Statistically, the standard deviation covered 86% of the historical variance above the monthly average for the past 180 or 360 day period. If past trends continue to the present, the Std Dev provides a reliable Safety Factor buffer.

- If the item is new and does not have historical data, apply a common sense overage amount to the monthly Sales or Usage that is consistent with the overage pattern of similar items.

Enter a Supply Days interval

In the Min Order panel, select the Calculated option. Enter a Supply Days interval, which is the planned number of days to be supplied by each replenishment job or PO. For example, if you plan for a job or PO to be generated twice a month, enter a Supply Days interval of ‘15’. If you plan for a job or PO to be generated once a month, enter a Supply Days of ‘30’.

Use smaller intervals for lean inventory

The Supply Days interval is a powerful tool for lean inventory planning. To keep inventory as lean as possible, use smaller Supply Days intervals to generate smaller and more frequent jobs or POs. Smaller and more frequent replenishment minimizes stock on hand and reduces the duration of shortages.

The Reorder Point is dynamically calculated

The item's Reorder Point is dynamically calculated as follows:
Variables
Sales + Usage + Safety Factor = Monthly Demand
Monthly Demand / 30 = Daily Demand
Replenish Time = Lead Days + Job Days

Formula
Daily Demand * Replenish Time = Reorder Point

If the item’s Sales, Usage, Safety Factor, Lead Days, or Job Days gets changed, the Reorder Point is automatically recalculated so that it always reflects your current planning settings.

The Reorder Point is a trigger point, not a stocking level

The Reorder Point is a trigger point for job or PO generation and is not a stocking level. A trigger point has no obvious meaning in itself and should not be of concern when it has a high value. An item with an extremely long lead time, for example, will have a high Reorder Point value, but job or PO quantities are determined by actual demand and the Min Order quantity and will be a much lower amount.

The Min Order quantity is dynamically calculated

The item’s Min Order quantity is dynamically calculated as follows:

Variables
Sales + Usage + Safety Factor = Monthly Demand
Monthly Demand / 30 = Daily Demand
Supply Days

Formula
Daily Demand * Supply Days = Min Order

If the item’s Sales, Usage, Safety Factor, or Supply Days gets changed, the Min Order quantity is automatically recalculated so that it always reflects your current planning settings.

Review supply pipeline settings on a periodic basis

Review supply pipeline settings on a periodic basis to ensure that monthly demand rates and safety factor buffers remain valid. You can use the MRP - MRP Analysis Codes screen to assign and schedule sets of items for periodic review. See the following chapter for reference.
2. Plan a supply pipeline for Stocking (Safety Factor) items

In this task you will plan a supply pipeline for all items that are assigned a Stocking (Safety Factor) order policy.

What is a supply pipeline?

A supply pipeline is a steady stream of jobs or purchase orders that replenishes stock for an item at demand-driven intervals. When viewed on a graph, a supply pipeline has a saw tooth pattern where each peak on the graph is a supply receipt and each subsequent slope is actual usage. An efficient pipeline replenishes stock just in time before it gets fully consumed. With long lead time items, a supply pipeline can consist of multiple overlapping POs, each due to arrive at staggered intervals.

How the Stocking (Safety Factor) order policy works

The Stocking (Safety Factor) order policy generates a supply pipeline by means of a fixed monthly Safety Factor, the item's lead time, and Supply Days interval, which combine to calculate a dynamic Reorder Point and Min Order quantity that generate demand-driven jobs or purchase orders.

All jobs and purchase orders are triggered by actual demand. Whenever net demand (stock on hand + all inbound supply - actual demand within the item's planning period action window) falls below the item's Reorder Point, MRP generates a job or purchase order with a supply quantity equal to net demand or the Min Order quantity, whichever is greater.

When to use

Select the Stocking (Safety Factor) order policy when you intend to maintain stock on hand sufficient to cover any potential monthly demand scenario.

Provides a “set it and forget it” pipeline

Assign this order policy to establish a "set it and forget it" supply pipeline where the item’s Safety Factor can be left as is without need for periodic review and adjustment.

Ideally suited for lower value items

This order policy is ideally suited for lower value items where minor over-stocking would have no significant impact on finances or storage space.

Use for critical items where guaranteed supply is essential
Use this order policy for critical materials or subassemblies where guaranteed supply is essential to prevent any delays to dependent jobs. In this case some overstocking to assure supply is preferable to lean inventory planning. For such items, set the the monthly Safety Factor high enough to cover any probable or conceivable peak monthly demand scenario.

Supply Pipeline Entry

Select the Stocking (Safety Factor) option

In the MRP Settings screen, click the button in the Order Policy field to launch the Order Policy screen. In the Order Policy panel, select the Stocking (Safety Factor) order policy.

If you receive a Projected Shortage warning:

When you change an item’s order policy from To Order to Stocking (Safety Factor), upon saving the program checks if stock on hand is sufficient to cover one planning period of forecast demand. If not, you receive a Projected Shortage warning that displays the projected shortage amount. This means that you will be unable to immediately begin issuing the item from stock. You are presented with two options:

Cancel Changes

With this option you leave the order policy as To Order for the time being and you create a manual job to cover the projected shortage. After the manual job is completed, change the order policy to Stocking (Monthly Demand).

Ignore Suggestion and Save Changes

With this option the order policy is changed to Stocking (Monthly Demand), even though initial shortages may occur. MRP will generate an immediate job to cover the projected shortage, but that job will be late relative to its required date if any current demand exists or materializes in the near future.

Enter a monthly Safety Factor

In the Monthly Demand panel enter a Safety Factor amount that covers potential monthly demand. The amount should cover potential peak demand, not average demand.

Monthly Safety Factor Guidelines

- If the item has a complete history profile, you can use the highest monthly amount listed in the Sales and Usage history panel panel as the monthly Safety Factor.
- If the item is new and does not have a complete history profile, enter a common sense monthly Safety Factor amount that is consistent with similar items.

**Enter a Supply Days interval**

In the *Min Order* panel, select the *Calculated* option. Enter a *Supply Days* interval, which is the planned number of days to be supplied by each replenishment job or PO. For example, if you plan for a job or PO to be generated twice a month, enter a *Supply Days* interval of ‘15’. If you plan for a job or PO to be generated once a month, enter a *Supply Days* of ‘30’.

**Use smaller intervals for lean inventory**

The *Supply Days* interval is a powerful tool for lean inventory planning. To keep inventory as lean as possible, use smaller *Supply Days* intervals to generate smaller and more frequent jobs or POs. Smaller and more frequent replenishment minimizes stock on hand and reduces the duration of shortages.

**The Reorder Point is dynamically calculated**

The item's *Reorder Point* is dynamically calculated as follows:

**Variables**

- Safety Factor = Monthly Demand
- Monthly Demand / 30 = Daily Demand
- Replenish Time = Lead Days + Job Days

**Formula**

Daily Demand * Replenish Time = Reorder Point

If the item’s Safety Factor, Lead Days, or Job Days gets changed, the *Reorder Point* is automatically recalculated so that it always reflects your current planning settings.

**The Reorder Point is a trigger point, not a stocking level**

The *Reorder Point* is a trigger point for job or PO generation and is not a stocking level. A trigger point has no obvious meaning in itself and should not be of concern when it has a high value. An item with an extremely long lead time, for example, will have a high *Reorder Point* value, but job or PO quantities are determined by actual demand and the *Min Order* quantity and will be a much lower amount.

**The Min Order quantity is dynamically calculated**

The item’s *Min Order* quantity is dynamically calculated as follows:
Variables

Safety Factor = Monthly Demand

Monthly Demand / 30 = Daily Demand

Supply Days

Formula

Daily Demand * Supply Days = Min Order

If the item’s Safety Factor or Supply Days gets changed, the Min Order quantity is automatically recalculated so that it always reflects your current planning settings.
6 Phase 3 - Generate Jobs and POs

The third phase of Time to Shipment MRP is to generate demand-driven jobs and purchase orders.

Summary

Item Time to Shipment targets generate sales order line item Required Dates to provide the demand that drives daily MRP generation. Jobs and POs are generated and converted level by level in response to current net demand within item planning periods relative to Reorder Points and Min Order quantities. Job and PO dates are derived and aligned from standard lead times within a coordinated master schedule.

Actions

1. Use the default Required Date to drive MRP and shop priorities

When entering a sales order line item, use the default Required Date as a standard target date to drive MRP generation and shop priorities.

The Required Date drives MRP and shop priorities

The line item Required Date is the target demand date that drives MRP generation and determines job and picking priority. The default Required Date is established by the item's planned Time to Shipment target and thus reflects your time to shipment strategy.

Leave the default Required Date as is

Always leave the default line item Required Date as is so that it aligns with MRP planned job dates and provides consistent time to shipment from one order to the next over time. The only exception to this guideline is for blanket sales order entry where the date is manually entered as a future ship date requested by the customer.

The Required Date is a target ship date

The Required Date is a target ship date that does not adjust to particular situations. Instead, adjustments are made by MRP and shop activities to meet the target date. Here are a couple of examples:

- When an unusually large order is entered for a Stocking order policy item that is not covered by stock on hand, the Required Date stays fixed as is and does not get moved out. Instead, MRP immediately generates a job to replenish stock and the early Required Date gives the job high priority in work center queues to automatically expedite the job.
When an unusually large order is entered for a To Order policy item, the Required Date stays fixed as is and does not get moved out. Instead, MRP immediately generates a job to order and the Required Date gives the job higher priority in work center queues to meet the target ship date.

**Never move the Required Date out when past due**

Never move the line item Required Date out when it is past due. A late Required Date gives the order high priority in job release, work center scheduling, and order picking. If the Required Date gets moved out, the order gets lower priority, which is counter-productive. Instead of changing the Required Date, you can freely change the Expected Ship date (see next action), without affecting shop priorities.

**Only change the Required Date to enter a blanket sales order**

Only change the default line item Required Date when entering a blanket order where the customer requests a set of future shipments. In that case, enter a separate line for each shipment quantity and change the Required Date to correspond to the requested ship date. MRP is ideally suited for blanket orders because no action is taken against future shipments until the line item Required Date falls into the item's planning period action window.

**The Required Date is updated with quote conversion**

Whenever a quote is converted to a live sales order, each line item Required Date is refreshed relative to the current date to ensure date alignment with MRP job generation.

**Extend Required Dates with extra shop days if needed**

*(Sales - Sales Setup - SO Required Dates)*

You can extend default Required Dates on an across the board basis by item order policy using the extra Shop Days settings in the SO Required Dates screen. Here are examples of how the extra Shop Days setting might be used:

- Against Stocking order policy items you may wish to extend Required Dates by an extra shop day because orders cannot always be shipped on the same day they are received.
- Against To Order policy items you may wish to extend Required Dates by one or more extra shop days to provide additional time for one-off BOM customization or other pre-MRP activities.

**Avoid frequent adjustments**

Avoid frequent adjustments to extra Shop Days settings because it can cause newer orders for an item to have earlier Required Dates than older orders.
2. Use the Expected Ship date and Promise Date for reference purposes

The Expected Ship date and Promise Date do not affect MRP

The sales order line item *Expected Ship* date and the header *Promise Date* are customer communication dates that do not affect MRP generation or job and picking priority.

The Expected Ship date accompanies the line item Required Date

The *Expected Ship* date accompanies the line item *Required Date* and indicates when the line item is likely to be shipped. The program automatically makes the *Expected Ship* date equal to the *Required Date* when a new line is created, when a quote is converted, and when the *Required Date* is modified for blanket order entry. Unlike the *Required Date*, which is a target date for MRP generation and job and picking priority, the *Expected Ship* date can be freely changed as needed.

Use the Late Supply screen to update expected ship dates

Use the *Late Supply* screen to update line item *Estimated Ship* dates for sales order line items that will not meet their *Required Date* due to late supply from jobs or purchase orders of insufficient stock on hand. The *Expected Ship* date is for customer communications and can be freely updated as needed without affecting job or picking priority.

The header Promise Date can be used for customer communications

You also have the option of using the *Promise Date* for customer communications, which is a header level date that indicates when you think the entire order is likely to ship. The *Promise Date* has no effect on MRP and can be freely changed to reflect actual conditions.

Establishing the Promise Date

When you create a new sales order you can specify the *Promise Date* prior to line item entry or you can update the *Promise Date* after line item entry.

- If you specify a *Promise Date* prior to line item entry, it establishes a minimum *Required Date* against all the line items. This may be helpful in cases where line items have highly variable *Required Dates* and you want items to have the same target dates.
- If you leave the default *Promise Date* as is and entire the line items, you can assess line item *Required Dates* and then update the *Promise Date* to cover the latest date among the line items.
3. Generate MRP on a daily basis

MRP is used on a daily basis to generate demand-driven jobs and purchase orders.

Jobs and POs are generated through MRP

All jobs and POs are generated by the MRP screen. Jobs are always generated first in multi-level order so that each level generates the demand that drives subsequent levels. POs are always generated last so that purchased items have complete demand profiles.

Run MRP on a daily basis for “just in time” scheduling

MRP should be run on a daily basis so that jobs and POs are generated “just in time” to respond in timely fashion to any new demand that materializes within item planning period action windows.

Each MRP session is typically split by a planner and buyer

Each MRP session is typically split by a production planner and a buyer or is handled by one person who performs both roles.

The planner converts planned jobs

The production planner, who maintains item order policies and supply pipelines, M item standard Lead Days and Job Days settings, and top level item Time to Shipment targets, generates planned jobs and converts them into live jobs.

The buyer converts planned POs

The buyer, who maintains P item standard Lead Days settings, supplier line cards, and purchase prices, reviews and converts planned POs into live POs after verifying supplier selection, pricing, and manufacturer part number availability.

Never delay MRP generation

The only way to achieve “just in time” planning is to generate MRP on a daily basis to 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, MRP generation takes little time and should be run at least once per day.

Never generate partial or fragmented MRP sessions

Each MRP session is designed for complete generation and conversion through all job levels and conclusion with PO generation and conversion. Complete generation is essential for achieving a coordinated master schedule. Never skip levels or generate jobs on one day and POs on another.
Never delay planned job or PO conversion

When MRP generates a planned job or PO, it must be converted immediately 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 supply dates are aligned with demand dates and jobs are prioritized in work center queues relative to their 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 materials and distorting work center priorities.

Job generation and conversion

CTO jobs are generated first

In the first phase of MRP generation, jobs are generated directly from sales order lines for CTO (custom to order) items. Jobs are backward scheduled from the sales order line’s Required Date, which was established by the item’s Time to Shipment target and is within the item’s planning period action window.

Net demand jobs are generated level by level

After jobs are generated for CTO items, MRP generates jobs level-by-level for all other manufactured items. A job is generated whenever current net demand (stock on hand + all inbound jobs - actual demand within the item’s planning period) falls below the item’s Reorder Point. The job quantity will be equal to actual net demand or the item’s Min Order quantity, whichever is greater.

Long-term demand is not included

Any long-term demand outside the item’s planning period action window is not included in the net demand calculation. This is because there is ample time to generate a job later when the demand eventually falls into the item’s action window and becomes short-term and firmly set. “Just in time” planning takes no action against long-term demand because it is tentative, incomplete, and subject to scheduling and specification changes and order cancellations.

Interdependent demand is consolidated into single jobs

Because the job schedule is limited to short-term demand that is firmly set, there is no need to isolate demand into separate sets of multi-level jobs in case scheduling or specifications changes are needed. Consequently, interdependent (shared) demand for each item is consolidated into a single job for more efficient scheduling and production.
Job conversion should be a completely automatic process

Job conversion at each level should be a completely automatic process that goes very quickly. Unless a *Review Note* is specified for special instructions (see next), there is no manual intervention to be applied.

Use a Review Note for special situations

A *Review Note* should be used for items where the planned job must be modified for special situations. For example, a formula might be required to calculate a specific job quantity. Or perhaps the planned job must be split to accommodate machine size limitations. Assign such items a *Review Note* in the *MRP Settings* screen with special instructions included. During MRP generation the job cannot be converted until the *Review Note* has been read and confirmed as completed.

Using Review Notes

PO generation and conversion

Jobs are always generated first

Jobs and POs are generated in a single, multi-level process. Jobs are always generated first because they provide the demand that drives PO generation.

POs are triggered by actual net demand

A PO is generated whenever current net demand (stock on hand + all inbound POs - actual demand within the item’s planning period) falls below the item’s *Reorder Point*. The PO quantity will be equal to actual net demand or the item’s *Min Order* quantity, whichever is greater.

Long-term demand is not included

Any long-term demand outside the item’s planning period action window is not included in the net demand calculation. This is because there is ample time to generate a PO later when the demand becomes current and firmly set. “Just in time” planning takes no action against long-term demand because it is often tentative, incomplete, and subject to scheduling and specification changes and order cancellations.

EXTRA DAYS FOR PLANNING PERIOD.

Interdependent demand is consolidated into single POs

Because the PO schedule is limited to short-term demand that is firmly set, there is no need to isolate demand into separate POs for each job. Consequently, interdependent (shared) demand for each item is consolidated into a single PO for more efficient scheduling and optimal pricing.
Verify that each PO has a valid Supp Price

The integrity of the costing system depends on each PO having a realistic DBA Unit Cost, which is derived from the Supp Price. When the PO is received, the DBA Unit Cost updates the item’s unit Inventory Cost, which is the cost that gets applied to job issue transactions. Therefore your most important responsibility with PO conversion is to make sure that each planned PO has a valid Supp Price.

Verify Supplier selection

When generated, each planned PO is assigned to the item’s Default Supplier. You can freely change the Supplier to any of the item’s alternate suppliers and you can also create a new supplier line card record for the item, which includes the supplier part number, unit of measure, conversion multiplier, and supplier price.

Verify Mfgr Part No availability

If a Mfgr Part No is specified against the item, make sure it is available. If not, you can freely change the Mfgr Part No to any of the item’s alternate manufacturer part numbers. You can also create a manufacturer and manufacturer part number record for the item.

Use Review Notes for special situations

Unlike planned job conversion, which is largely a completely automated process, planned POs often require active intervention prior to conversion. For example, some items may require a price quote with each purchase. Other items may require price comparison among multiple suppliers to find the best current price. Other items may require verification of manufacturer part number availability.

A formal means for conveying special purchasing instructions is to document them in a Review Note that is assigned to the item in the MRP Settings screen. During MRP generation the planned PO cannot be converted until the Review Note has been read and confirmed as completed.

Using Review Notes

POs can be converted by supplier

Planned POs can be converted incrementally by supplier. This enables you to focus on one supplier at a time to verify prices and supplier and manufacturer part numbers. Each set of planned POs for a supplier is converted into a single, multi-line purchase order.

Augment converted POs if needed

Each planned PO is a minimum action profile. After the PO has been converted, the PO can be augmented manually within the Purchase Orders screen to accommodate special situations. For example, to fill a truck or container you may
wish to increase the PO quantity or add extra items. Or you may wish to increase the PO quantity to meet a volume level commitment with a supplier.

**Review actual POs and send to suppliers**

After PO conversion is completed, the final task is to go to the *Purchase Orders* screen to conduct a final review of each *Opened* status PO, which is a PO that has not yet been sent to the supplier. After each such PO has been reviewed and finalized, click the *Print* button to Email or print the PO, which changes the PO status to *Printed* to indicate that it has been sent to the supplier.
7 Phase 4 - Release Jobs with Material

The fourth phase of *Time to Shipment MRP* is to release jobs to production when allocated materials become available.

**Summary**

Open purchase orders are tracked and expedited to ensure that jobs get released on time. Jobs are released to live production per planned start dates when allocated materials become available.

**Actions**

1. **Expedite POs to release jobs on time**

Open purchase orders are tracked and expedited to ensure that jobs get released on time.

**POs are tracked in the PO Schedule screen**

POs in progress are tracked in the *Purch - PO Schedule* screen. PO lines are displayed in ascending *Due Date* order so that late POs are displayed at the top of the list.

**A Days Past Due value indicates a late PO**

A late PO is identified by a *Days Past Due* value, which is the number of calendar days that have elapsed since the PO line’s *Due Date*.

**The Supply Dependencies inquiry lists delayed jobs**

When a late PO is causing a delay to one or more job start dates, the icon in the *Dependencies* field becomes visible. Click the icon to launch the *Supply Dependencies* inquiry, which lists each delayed job and the number of days that have elapsed (or are expected to elapse if there is an *Expected Date*) since the job start date.

**Dependent jobs cannot be released**

Dependent jobs listed in the *Supply Dependencies* inquiry cannot be released to production in the *Jobs - Job Control Panel - Release Jobs* screen until the late PO is received and all other materials are fully allocated.

**Expedite late POs with suppliers**

It is essential that late POs are expedited so that dependent jobs can be released to production without further delay. A late PO is expedited by communicating with the
supplier and applying appropriate pressure to get the PO delivered as soon as possible.

**Enter an Expected date**

If the supplier furnishes an estimated delivery date, enter that date in the *Expected* date field. This causes the *Expected* date to differ from the *Due Date*, which indicates that you have communicated with the supplier. The *Expected* date provides reference as to when the PO is likely to arrive and is the basis for projected transactions in the *Stock Status* inquiry.

**Track POs on a daily basis**

PO tracking is an essential process because jobs cannot be released and started without materials. Late POs must be tracked and expedited on a daily basis because each day a new set of POs can potentially become late and delay dependent jobs.

**2. Release jobs to production when materials become available**

Jobs are released to live production per planned start dates when allocated materials become available.

**Newly created jobs are assigned New status**

When a job is first created through MRP, it is assigned a *New* status. It is important to distinguish *New* status jobs, which are waiting to go into production, from *Released* status jobs, which are in live production. *New* status jobs have tentative *Planned Start* and *Job Finish* dates, whereas *Released* status jobs have an actual *Released* date and a firm *Job Finish* date.

**Never reschedule New status jobs**

Never manually reschedule dates against *New* status jobs because these are tentative dates that will be automatically rescheduled during the job release process. *New* status job dates were established during MRP generation and are aligned in a multi-level, time-phased manner that prioritizes jobs for materials allocation in job release.

**A job cannot be started without materials**

A job cannot physically be started until all its required materials are on hand and are not allocated to other jobs. Job materials may include subassemblies, purchased components, and raw materials.

**The Release Jobs screen allocates stock on hand**

*New* status jobs are released to live production in the *Jobs - Job Control Panel - Release Jobs* screen. Whenever the screen is launched, a batch process allocates
available stock on hand first to Released status job components and then to New status job components in Planned Start date order.

**Jobs with a green Material icon are ready for release**

When the Material icon is green in color, stock on hand is fully allocated to all the job’s components and the job is at or past its Planned Start date. Such jobs can safely be released to live production because the allocation process ensures that materials will be available for issuing to the job when needed and won’t be grabbed by other jobs.

**Auto-Select option**

You can click the Auto-Select button to mass-select all jobs with a green Material icon.

**Jobs with a yellow Material icon are ready for early release**

When the Material icon is yellow in color, stock on hand is fully allocated to all the job’s components, but the job is not yet at its Planned Start date. If you wish to release the job earlier than planned, manually select the Release checkbox.

**Jobs with a red Material icon must be delayed**

When the Material icon is red in color, the job is at or beyond its Planned Start date, but stock on hand is not fully allocated to all the job’s components. In this case job release must be delayed until allocated materials become fully available.

**Material Allocation Inquiry**

You can click the icon in the Material field to launch the Material Allocation inquiry, which displays all the job’s components and indicates which ones have an allocation shortage. Against each component you can click the Stock Status inquiry to view inbound supply and other competing demand events for the item.

**Each released job is given an updated Job Finish date**

When a job gets released, its status changes from New to Released and the job is given an updated Job Finish date relative to its actual Released date. This process makes the master job schedule self-adjusting and ensures that all Released status jobs have realistic finish dates.

**Jobs should be released throughout the day**

Job release is not a once a day process. Whenever subassembly jobs are received to inventory in the Job Receipts screen, the job release process should be run so that any higher-level jobs dependent on the subassembly item can be released in timely and sequential fashion.
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.
8 Phase 5 - Run Work Centers by Job Priority

The fifth and final phase of *Time to Shipment MRP* is to run work centers by job priority to ensure that all jobs meet their required dates and sales orders get shipped on time.

**Summary**

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.

**Actions**

1. **Run work centers in job priority order**

Work centers are run in job priority order to balance production flow so that all jobs meet their required dates.

Each job has a **Required Date**

Each job has a formal *Required Date*.

- In the case of a CTO job, it is the *Required Date* of the associated sales order line item.
- For all other top-level item jobs, if the job has dependent sales orders, it is the earliest line item *Required Date* among them. If there are no dependent sales orders, the job is for stock replenishment, in which case its *Required Date* was established by the item’s replenish time (*Lead Days + Job Days*).
- For lower-level item jobs, if the job has higher-level dependent jobs, it is the earliest *Planned Start* date among them. If there are no dependent higher-level jobs, the job is for stock replenishment, in which case its *Required Date* was established by the item’s replenish time (*Lead Days + Job Days*).

**Jobs are dynamically prioritized**

Jobs are dynamically prioritized relative to their *Required Date* as job labor sequences are completed. *Job Priority* is calculated as follows:

\[
\text{Day to Required Date} - \text{Remaining Sequence Days} = \text{Job Priority}
\]
Days to Required Date is the number of shop days from today to the job’s Required Date. Remaining Sequence Days is the job’s total remaining setup and labor hours divided by each work center’s daily capacity (Job Hours / Day).

The Job Priority number is a trending indicator

The Job Priority number is a rough indicator as to how a job is trending towards meeting its Required Date. A negative number indicates that the job is trending late. A positive number indicates that the job is trending early.

Work centers are run in Job Priority order

The Jobs - Work Center Schedule screen is used to coordinate and update shop labor activities. Each work center has a queue consisting of job sequences that are either waiting in the work center to be started or are already in progress. Job sequences are listed in ascending Job Priority order so that jobs trending late get priority over jobs trending early, 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.

Jobs released later than planned get top priority

When a job is released to production later than planned, a negative or relatively low Job Priority will be calculated, which results in the job being listed towards the top of work center queues. Top priority automatically expedites the job through the shop because it will experience less queue time than other jobs. In many cases the prioritization effect will enable the job to get back on schedule and meet its Required Date.

Prioritized labor keeps all jobs on schedule

When all work centers are run in Job Priority order, jobs that are trending late experience less overall queue time than jobs trending early. This coordinates shop labor in a balanced fashion so that all jobs stay on schedule and orders get shipped on time.

Workers update their labor as sequences are completed

Whenever a worker completes a job sequence, he or she must update job labor, which updates work center queues and Job Priority calculations.

Labor is updated directly in the Work Center Schedule screen. Click the Labor icon against the job sequence, which launches the Job Labor screen. Labor can be updated at standard or actual hours, depending on the Hours Type specified against each job sequence. The sequence can be flagged as finished or a completed quantity can be entered, depending on your system preference in the Jobs - Jobs Setup - Job Labor Defaults screen.
Workers will need access to a workstation either in the shop or along its perimeter to update labor whenever a sequence is completed. Each such workstation can be dedicated to labor entry and access can be shared by multiple workers.

**All workers in all work centers must participate**

Prioritized labor only works when all workers in all work centers participate in updating labor as sequences are completed. This is because labor updating in each work center updates the queues in subsequent work centers. If any worker or work center fails to participate, the queue linkages will be broken and job prioritization will not work.

**Real time completions yield many benefits**

Real time completions entry yields many benefits besides job prioritization. Instead of conducting tedious manual investigations, you will now know where every job stands at any given time. When finished items are received to inventory, all labor costs are fully accounted for without any need to stop and enter labor after the fact.

**Job materials are issued “just in time”**

Another benefit of the *Work Center Schedule* screen is that it enables materials to be issued to jobs “just in time” before sequences are started. The *Material* icon indicates whether materials are needed and links directly to the *Job Issues* screen so that inventory can be updated in real time. The job release process ensures that materials are available, so there is no longer any need to hoard materials in advance to protect against being grabbed by other jobs.
9 Demand-Driven Scheduling

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

How It Works

Demand-driven scheduling consists of five 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 time and order policy settings that comprise the item’s planned *Time to Shipment* target.

**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 *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. New Job Schedule

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

**Job dates are consistent over time**
Job dates are derived from item Lead Days and Job Days settings and do not vary by quantity. This provides multi-level alignment of supply and demand dates over multiple MRP sessions. 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.

**Job start dates are target demand dates for lower level supply**

Jobs are often dependent on components supplied by subassembly jobs and purchase orders. Each Job Start date is the target demand date for lower level jobs and purchase orders.

**Demand-driven stocking 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. Jobs only get triggered by actual demand, which caps and minimizes any over-stocking.

**The new job schedule is short term and firmly set**

Demand-driven stocking eliminates longer-term, tentative, and revision-prone jobs from the schedule. Consequently, the new job schedule is short term and firmly set and remains as is until jobs are released to production.

3. **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 stocking 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 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.
The expected date reflects actual conditions

Late POs are monitored in the 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 Expected Date can be updated for reference.

4. 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 Job Finish date relative to its actual released date, which makes the job schedule self-adjusting.

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. New status job dates are left as is.

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.

Jobs are automatically rescheduled with release

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

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.

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 Job Finish date can be manually adjusted in the Job Schedule screen.

5. 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 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.

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.

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. This facilitates stock counts by eliminating the need to account for materials in WIP.

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.

Benefits

Provides customers with consistent times to shipment

With other planning systems ship dates are established ad hoc and vary from order to order.

By contrast, DBA’s demand-driven scheduling provides customers with consistent and reliable ship dates over time. Each item’s sales order required dates are calculated from its planned Time to Shipment target and do not vary with different order quantities. Instead, job priority flexibly adapts so that larger jobs experience less waiting time in work center queues.
Eliminates constant rescheduling

Other planning methods generate longer term jobs and POs from forecast explosions. This demand is tentative and must be firmed up as actual demand materializes, which requires constant rescheduling to avoid shortages and over-stocking. Rescheduling is complex because demand is interdependent among lower level items, which causes many companies to resort to inefficient job linking to simplify the process. Because rescheduling is so time-consuming, planning sessions are limited to once or twice a week, which delays timely response to new demand.

By contrast, demand-driven scheduling only generates jobs and POs from actual demand within item planning periods, which is the action window for making or buying the item. This demand is firmly set and job dates are left as is until jobs are released to live production. MRP generation takes very little time and is run daily for immediate response to new demand.

Provides sales with feedback from production

In other systems the communication between sales and production regarding job status is inefficient and requires manual investigation. Customers are often left in the dark regarding the status of their orders.

By contrast, the Late Supply screen in DBA provides the sales department with feedback from production. The screen lists sales order lines dependent on jobs scheduled for late finish and enables Expected Ship dates to be updated to reflect each item’s likely ship date.

Eliminates material hoarding

Other systems suffer from “rob Peter to pay Paul” syndrome where shop personnel hoard materials so that favored jobs can be started.

By contrast, the job release process in DBA allocates materials on hand to jobs in planned start date order. This eliminates any need for material hoarding and determines when jobs can be started. When inbound supply from purchase orders or subassembly jobs is late, release must be delayed for dependent jobs. When a job does get released, it is given a new job finish date relative to its released date, which makes the job schedule self-adjusting.

Identifies bottlenecks that need attention

In other systems the only way to know what’s going on in the shop is through manual investigation. Bottlenecks easily escape detection and do not receive timely attention.

By contrast, the Work Center Schedule in DBA provides complete visibility of work center queues. Unusual queue sizes quickly identify bottlenecks that can be mitigated by deploying workers and machines or overtime hours or extra shifts.

Prioritizes shop activities

In other systems jobs are expedited one at a time to meet promised ship dates, which penalizes other jobs that get moved to the back of work center queues.
By contrast, the Work Center Schedule in DBA prioritizes shop activities so that workers always know what to run next in each work center. Jobs are run in priority order within work center queues so that jobs running behind schedule get priority over jobs running ahead of schedule. Running work centers by job priority optimizes production flow so that all jobs meet their target demand dates.

**Tips for Success**

**Make target demand dates tight and realistic**

Shop productivity and throughput increase when target demand dates push shop personnel to greater performance. By contrast, padded dates are easy to beat and encourage complacency. For best results, make item Lead Days and Job Days settings tight and realistic.

**Apply safety to expected dates, not lead days or job days**

If your objective is to pad ship dates with a safety factor, apply padding to line item Expected Ship dates, but not to item Lead Days or Job Days settings. When Lead Days and Job Days settings are padded, numerous problems ensue, including unrealistic sales order required dates, inability to track late POs, chronic early job release, and invalid job prioritization.

**Never enter future jobs**

Never enter future jobs to explode projected demand because it is not compatible with demand-driven scheduling. Future job projections corrupt the new job schedule with longer term, tentative supply that is highly subject to revisions. Instead, replace long term projections with demand-driven stocking whereby a monthly demand rate is incorporated into item reorder points. It is a far more efficient way to plan for future requirements because jobs only get triggered by actual demand and are firmly set upon creation.

**Never enter blanket purchase orders unless required**

Do not enter blanket purchase orders unless required by a supplier because they are not compatible with demand-driven scheduling. Future purchase orders corrupt the PO schedule with longer term, tentative supply that is highly subject to revisions. Instead, replace blanket POs with demand-driven replenishment whereby a monthly demand rate and supply days interval are incorporated into item reorder points and min order quantities. Each PO is triggered by actual demand, which prevents shortages and over-stocking and eliminates the constant revisions required to manage blanket POs.

**Never release jobs without material**

Never release jobs without allocated materials because doing so circumvents the rescheduling process that is central to demand-driven scheduling.

**Run work centers in priority order**

When an item has different job quantities, demand-driven scheduling adapts with job priority instead of varying the lengths of jobs. Jobs with larger quantities get higher
priority, which reduces waiting time in work center queues. Always run work centers in job priority order and update job labor sequences in real time.
10 Using Review Notes

MRP is driven entirely by item settings

*Time to Shipment MRP* is driven entirely by item settings. All workflow processes, including sales order required dates, job and PO generation, job release, and job prioritization, are automatic and self-adjusting without need for manual intervention.

Use Review Notes for special situations

There can always be special planning situations that can’t fully be handled by standard item settings.

- With manufactured items, for example, a formula might be required to calculate a specific job quantity. Or perhaps the planned job must be split to accommodate machine size limitations.

- Purchased items often require active intervention prior to planned PO conversion. For example, some items may require a price quote with each purchase. Other items may require price comparison among multiple suppliers to find the best current price. Other items may require verification of manufacturer part number availability.

Use Review Notes to handle special planning situations

Any such special requirements can be documented with a *Review Note* that gets included with each planned job or PO during MRP generation.

*Review Notes* are created in the *MRP - MRP Settings* screen. Select the *Review* checkbox against any M or P item, then click the *Review Note* icon. A pop-up screen is displayed within which you can enter unlimited freeform text to document special planning instructions.

Review Notes must be read and confirmed during MRP generation

If an item has a *Review Note*, during MRP generation a planned job or PO cannot be converted until the *Review Note* is read and confirmed as completed. This provides a formal process for communicating special planning instructions.
11 Using MRP Analysis Codes

MRP analysis codes enable you to schedule periodic reviews of MRP item settings for different sets of items. They are set up and managed in the *MRP - MRP Analysis Codes* screen.

**Analysis code setup**

MRP analysis codes enable you to schedule periodic reviews of MRP settings for related sets of items. Against each analysis code you specify the desired frequency interval between each analysis, which can be weekly, monthly, yearly, or a custom number of days. You then assign a set of related items to the analysis code. Analysis codes are designated for M items or P items, but not for both.

Use the *Search* button to display all analysis codes for an item, all items that have analysis codes, and all items that do not have analysis codes.

**Performing an analysis**

Whenever you launch the *MRP Analysis Codes* screen, any analysis codes due for an analysis are listed with the *Next Analysis* date displayed in bold red. You click the *Action* button to launch the *MRP Settings* screen, which is filtered to just the items assigned to the analysis code.

One by one you can review each item’s MRP settings and make adjustments as needed. After each item is reviewed, you can optionally select its *Analysis Complete* checkbox to track your progress. You can pause and return to your analysis as often as you wish.

When the analysis is completed, you click the *Action* button and indicate that the analysis is complete. The analysis gets saved to history and the next analysis date is scheduled.

**Ideally suited for critical items**

MRP analysis codes are ideally suited for maintaining the monthly demand settings -- *Sales or Usage* and *Safety Factor* buffer -- against critical items assigned to the *Stocking (Monthly Demand)* order policy, meaning items with relatively high inventory value or high strategic impact on other items. Periodic review and adjustment keeps monthly demand settings aligned with actual demand trends.
Long Lead Days Purchasing

Plan a supply pipeline for long lead time items

When a purchased item has an extremely long lead time, such as several weeks or months, it is highly risky to generate and receive one PO at a time. If a shortage occurs, it could take weeks or months for the next PO to arrive. Such a lengthy shortage would bring all dependent jobs to a standstill.

The ideal planning method for long lead time items is to generate a pipeline of multiple overlapping POs, each due to arrive at staggered intervals. If a shortage happens to occur, it will be relatively short in duration because the next PO is likely to arrive soon and delays to dependent jobs will be of minor impact.

PO pipeline setup

A PO pipeline is achieved by assigning the item a Stocking (Monthly Demand) order policy. Enter a monthly Usage rate and Safety Factor buffer, which combine with the item’s standard Lead Days to calculate a dynamic Reorder Point that triggers PO generation. Enter a planned Supply Days for the desired interval between POs, which combines with the monthly demand rate to calculate a dynamic Min Order quantity.

The Reorder Point will have a relatively high value

An extremely long standard Lead Days will cause the Reorder Point to have a relatively high value compared to items with short standard Lead Days. Do not be concerned by the high value because the Reorder Point is a trigger point and not a stocking level.

Net Demand will also have a relatively high value

Net Demand is calculated as follows:

Net Demand = Stock On Hand + All Inbound POs - Actual Demand

Take note all inbound POs are included in the calculation, which gives Net Demand a relatively high value.

Actual demand triggers the next PO

The next PO gets triggered when Net Demand falls below the item’s Reorder Point. So even though the item has high Net Demand and Reorder Point values, it is the difference between the two values that triggers the next PO.

PO intervals are self-adjusting

The intervals between POs are self-adjusting with actual demand. For example, if actual demand happens to be less than planned, the next PO is automatically delayed and the supply days interval becomes longer than planned. Conversely, if actual demand
happens to be greater than planned, the next PO is automatically generated earlier and the supply days interval becomes shorter than planned.

Example

A simple example illustrates how a staggered PO pipeline works. If the item has Monthly Demand (Usage plus Safety Factor) of 100 and a Lead Days of 180, its calculated Reorder Point is 600.

\[
100 \text{ Monthly Demand} / 30 \text{ Days} = 3.33 \text{ Daily Demand}
\]
\[
3.33 \text{ Daily Demand} * 180 \text{ Lead Days} = 600 \text{ Reorder Point}
\]

The item has a Supply Days interval of 30, which results in a Min Order quantity of 100.

\[
30 \text{ Supply Days} * 3.33 \text{ Daily Demand} = 100 \text{ Min Order Qty}
\]

If actual monthly demand exactly equals planned monthly demand, a PO will be triggered every 30 days so that at any given time there will be six POs in progress, each with a PO quantity of 100.

Let’s now examine how the next PO gets triggered. After the oldest PO is received, stock on hand will be 100 and five POs will remain in progress. If a job requires 10 units, Net Demand falls below the Reorder Point and the next PO gets triggered.

\[
100 \text{ Stock on Hand} + 500 \text{ POs in Progress} - 10 \text{ Job Demand Qty} = 590 \text{ Net Demand}
\]
\[
590 \text{ Net Demand} < 600 \text{ Reorder Point}
\]
\[
\text{Triggers PO} = 100 \text{ Qty} (\text{Min Order} = 100)
\]
13 MRP Guidelines

*Time to Shipment MRP* is a demand-driven planning system that only responds to actual demand originating from current sales orders. Item lead time, order policy, and supply pipeline settings combine to generate consistent and reliable times to shipment with efficient utilization of inventory.

To ensure your success with *Time to Shipment MRP*, replace your traditional planning methods with the settings and processes prescribed by these guidelines.

1. **All P items require a standard Lead Days for procurement time**

   Without exception, all P items require a standard *Lead Days* for expected procurement time. The standard *Lead Days* establishes PO due dates, lead time contribution to higher-level items, and item planning periods, and also enables late PO tracking. For all these reasons, a realistic value is required that is not padded or artificially inflated.

   **Never pad or inflate standard Lead Days**

   Never pad or inflate the standard *Lead Days* because whenever an item has a *To Order* policy, its *Lead Days* contributes to the lead times of higher level items and progressively magnifies lead times at each higher level, resulting in severely distorted *Time to Shipment* targets.

2. **All M items require a standard Job Days for production time**

   Without exception, all M items require a standard *Job Days* for expected production time. The standard *Job Days* establishes job start and finish dates, lead time contribution to higher level items and time to shipment, and item planning periods, and also enables late job tracking. For all these reasons, a realistic value is required that is not padded or artificially inflated.

   **Never pad or inflate standard Job Days**

   Never pad or inflate the standard *Job Days* because whenever an item has a *To Order* policy, its *Job Days* contributes to the lead times of higher level items or to its own *Time to Shipment* target.

3. **All items require a standard Order Policy**

   Without exception, all items require a clear and consistent *Order Policy* to determine planning intent and lead time contribution. When you assign an item a *To Order* policy, your intent is to always buy or make the item to order. You do not expect stock to be on hand and therefore the item's lead time contributes to the lead times of higher-level items or to its own time to shipment target. When you assign an item a *Stocking* order policy, your intent is to always maintain stock on hand. You expect
stock to be available for the majority of likely demand scenarios and therefore the item is not a lead time contributor. Use the Stocking (Monthly Demand) order policy for higher value items that benefit from lean inventory planning and for purchased items with long lead times. Use the Stocking (Safety Factor) order policy for lower value items or critical items where shortage prevention is more important than lean inventory planning.

**The Order Policy must reflect your actual planning behavior**

If you buy or make an item to order in actual practice, it must be assigned a To Order policy so that its lead time properly contributes to the lead time of higher-level items or to its own time to shipment. If you stock an item in actual practice, you must assign the item a Stocking order policy so that its lead time does not erroneously contribute and distort the lead times of higher-level items or its own time to shipment.

**Avoid CTO job linking with standard items**

When a top level M item is flagged for CTO job linking it is assigned a To Order policy and jobs are linked to and generated directly from sales order lines for the exact quantity ordered. CTO linking is ideally suited for one-off, custom items that are made to order and never stocked. For standard items, however, CTO linking is counter-productive and should be avoided because such items are interchangeable from order to order and subject to stocking. There is no ability to adjust CTO jobs to account for stock on hand or to consolidate demand into more efficient job sizes. Furthermore, CTO linking forces items to be made to order, even in cases where items with frequent orders could be planned with a Stocking order policy to enable immediate shipment from stock.

**4. Refine Time to Shipment targets to reflect your marketing objectives**

Time to Shipment targets are calculated for all top level M items to establish sales order required dates. Each item's Time to Shipment target is derived from the standard lead times and order policies of the item itself and lower level lead time contributors. All Time to Shipment targets must be refined as needed until they reflect your marketing objectives. Time to Shipment can be eliminated altogether by assigning the top level item a Stocking order policy. Time to Shipment can be reduced with strategic Stocking order policy assignment to key components to remove them as contributors to the item's pre-job Lead Days, and by tightening the item's standard Job Days over time as you get more efficient in the shop.

**5. All Stocking items require a supply pipeline**

All items with a Stocking order policy require supply pipeline settings to replenish stock at demand-driven intervals. The Stocking (Monthly Demand) order policy is ideally suited for higher value items that benefit from lean inventory planning and for purchased items with long lead times. A monthly Sales or Usage rate, Safety Factor
buffer, the item's lead time, and a Supply Days interval combine to calculate a dynamic Reorder Point and Min Order quantity. The Stocking (Safety Factor) order policy provides a "set it and forget it" order policy that is ideally suited for lower value items or critical items where shortage prevention is more important than lean inventory planning. A monthly Safety Factor covers all peak demand scenarios and combines with the item’s lead time and Supply Days interval to calculate a dynamic Reorder Point and Min Order quantity.

Do not use the Stocking (Manual) order policy

Do not use the Stocking (Manual) order policy because it does not enable Supply Days pipeline planning, plus it has no logical basis for its value, which promotes over-stocking.

Replace blanket POs with a supply pipeline

If you are using blanket POs with a set of scheduled deliveries, each such item should be assigned the Stocking (Monthly Demand) order policy and the blanket purchase order should be replaced with a supply pipeline so that future POs are generated by MRP. Blanket POs are counter-productive because they require constant adjustments to avoid shortages and over-stocking when scheduled supply inevitably differs from actual demand. By contrast, MRP generates demand-driven purchase orders at self-adjusting intervals.

6. Purchase long lead time items with a supply pipeline

Assign the Stocking (Monthly Demand) order policy to P items with long lead times. The monthly Usage rate, long standard Lead Days, and Supply Days interval calculate a Reorder Point and Min Order quantity that generate a supply pipeline of overlapping POs, each due to arrive at staggered intervals. A demand-driven PO pipeline is far more efficient than large and infrequent POs because more frequent replenishment eliminates the risk of lengthy shortages and excessive stock on hand.

7. Always leave the SO line Required Date as is for current orders

The sales order line item Required Date is established by the item’s Time to Shipment target. Always leave the Required Date as is for current orders because it is an internal MRP date that is aligned with dependent job dates and provides consistent shipping priority relative to other orders. Never use the Required Date as a "wish date" by salespeople and never move the date out when it is past due. The only time the date should be manually changed is to enter a blanket order where the customer requests a set of future quantities and ship dates.

Use the Expected Ship date for customer communications

The line item Required Date is accompanied by the Expected Ship date, which is an external date used for customer communications. The Expected Ship date is
updated directly in the *Late Supply* screen, which lists sales order line items that are likely to miss their target *Required Date* due to late supply from jobs or purchase orders or insufficient stock on hand.

8. **Generate MRP on a daily basis to full completion**

For just in time manufacturing it is essential to generate MRP on a daily basis to full completion. Daily job and PO generation enables MRP to respond immediately to new sales order demand or existing demand that falls into item planning period action windows. Daily generation also prevents misalignment of job and PO dates with required dates. Complete each MRP session in full by converting all planned jobs at all levels and all planned POs to ensure complete demand profiles and date alignments. Always generate and convert jobs and POs in the same session, even when jobs are converted by one person and POs by another.

**Never create future jobs**

All jobs are generated through MRP in response to current net demand within item planning period action windows. Never enter future jobs for any reason because they conflict with the demand-driven architecture of the master schedule. In contrast to current demand, which is firmly set, future demand is tentative and subject to date changes, quantity changes, cancellations, and specifications changes that adversely affect interdependent items at lower levels. Instead of future jobs, you can enter sales orders with future required dates, as with blanket orders, and then MRP will only respond to current demand when required dates eventually fall into item planning period action windows.

9. **Verify and update supplier prices before PO conversion**

To ensure the integrity of the costing system, always verify and update supplier prices before converting planned POs. The planned POs screen within MRP is optimized for pricing maintenance with the ability to create and update supplier price records and present review notes for special pricing instructions. The costing system depends on realistic PO prices because when a purchased item is received, its inventory cost is updated by the PO cost and is the cost basis for subsequent job issue transactions. The PO invoicing process often occurs well after actual receipt and has no retroactive effect on receipt costs or inventory costs.

10. **Expedite late POs on a daily basis**

Monitor late POs on a daily basis in the *PO Schedule* screen and contact suppliers to expedite delivery so that dependent jobs can be released to production without delays to planned start dates.

11. **Release jobs only when materials are fully allocated**

Release jobs to live production in the *Release Jobs* screen only when materials are fully allocated. The job release process is a vital MRP function that serves two
purposes. First, materials are allocated to jobs in planned start date order so that jobs are started in the correct order of multi-level assembly. Second, released jobs are rescheduled with new finish dates relative to their actual release date, which automatically updates the job schedule to reflect work in process.
14 FAQs

Am I required to use MRP?

The short answer is yes. Time to Shipment MRP is the core element in DBA's demand-driven, just in time manufacturing architecture and can't be replaced with alternate planning methods.

Just in time manufacturing requires a standard Lead Days for procurement time against all P items, a standard Job Days for production time against all M items, and a consistent To Order or Stocking order policy for lead time contribution against all items. Stocking order policy items require supply pipeline settings to replenish stock at demand-driven intervals. Demand-driven jobs and purchase orders are generated by MRP on a daily basis to assure that materials are on hand by job planned start dates.

This demand-driven, just in time architecture is not compatible with alternative planning methods. Use the item planning settings as designed and you will get good results, whether you make to order or to stock or have standard or customized products. On the other hand, if you bypass or co-opt item settings or bypass MRP generation with manual planning, you will get very poor results.

Why are shortage reports not available?

DBA is a demand-driven, just in time manufacturing system that uses Time to Shipment MRP for item planning and job and PO generation. DBA does not include any shortage reports because manual planning from static shortage reports is incompatible with DBA's demand-driven, just in time architecture.

Manual planning from shortage reports is counter-productive

Manual planning from static shortage reports is counter-productive because it fails to account for the time-phased nature of demand, which means that items are often made or purchased far earlier than needed. It also fails to account for the progressive nature of lowest-level BOM demand creation whereby demand at one level generates demand for subassemblies and materials at subsequent levels. Manually created jobs and purchase orders lack proper date alignment and don't reflect the correct order of assembly for job release or coherent required dates for prioritized production. Manual planning is highly vulnerable to human error and prone to shortages and over-stocking.

Time to Shipment MRP cannot be replaced with alternative planning methods

Time to Shipment MRP is the core element in DBA's demand-driven, just in time manufacturing architecture and can't be replaced with alternate planning methods.

Just in time manufacturing requires a standard Lead Days for procurement time against all P items, a standard Job Days for production time against all M items, and a consistent To Order or Stocking order policy for lead time contribution against all items.
Stocking order policy items require supply pipeline settings to replenish stock at demand-driven intervals. Demand-driven jobs and purchase orders are generated by MRP on a daily basis to assure that materials are on hand by job planned start dates.

This demand-driven, just in time architecture is not compatible with alternative planning methods. Use the item planning settings as designed and you will get good results, whether you make to order or to stock or have standard or customized products. On the other hand, if you bypass or co-opt item settings or bypass MRP generation with manual planning, you will get very poor results.

Why is a BOM demand explosion not available?

DBA is a demand-driven, just in time manufacturing system that uses Time to Shipment MRP for item planning and job and PO generation. DBA does not include a BOM demand explosion because it is counter-productive and incompatible with the system's demand-driven, just in time architecture.

Just in time manufacturing is item-based

Just in time manufacturing is item-based. This means that demand for each sell item, subassembly, and purchased item is independently assessed in each MRP session without regard to any particular sales orders, jobs, or product structures to which the item may belong.

You don’t make a product structure

With just in time manufacturing you rarely make an entire product structure like you see depicted in a multi-level BOM view. Subassemblies and purchased items in a product structure are often independently planned for stocking and many such items are used in multiple BOMs and often have interdependent demand from multiple jobs.

BOM demand explosion is a traditional planning method

BOM demand explosion is a traditional planning method whereby demand for a parent item is exploded down through all levels so that the entire product structure can be made with a set of linked jobs.

BOM explosions are counter-productive

BOM explosions isolate demand into separate product structures and force all subassemblies in the structure to be made to order. This planning method is counter-productive.

- BOM explosions fail to account for interdependent demand from multiple jobs and result in an excessive number of fragmented jobs with inefficient run sizes.
- BOM explosions force subassembly items to be made to order, even in cases where it would be more efficient to plan the item for stocking to reduce time to shipment.
Linking occurs naturally with item-based manufacturing

With item-based manufacturing, linking of a sorts occurs naturally when supply events happen to align with demand events. Unlike hard-linking, natural linking also flexibly allows one supply event to align with multiple demand events.

The Stock Status inquiry shows the destination of any item

It is not necessary to use hard-linking on job travelers to know the destination of a finished subassembly item. The Stock Status inquiry, which can be accessed within the Job Receipts and Job Schedule screens, indicates which jobs are pending for the item.

Do not attempt a simulated BOM explosion

Do not attempt to create your own BOM demand explosions and manual jobs to simulate your traditional planning method in DBA. This is completely incompatible with Time to Shipment MRP’s item-based architecture and interferes with time to shipment planning, item order policies, scheduling dates, and job release.

Time to Shipment MRP cannot be replaced with alternative planning methods

Time to Shipment MRP is the core element in DBA’s demand-driven, just in time manufacturing architecture and can’t be replaced with alternate planning methods.

Just in time manufacturing requires a standard Lead Days for procurement time against all P items, a standard Job Days for production time against all M items, and a consistent To Order or Stocking order policy for lead time contribution against all items. Stocking order policy items require supply pipeline settings to replenish stock at demand-driven intervals. Demand-driven jobs and purchase orders are generated by MRP on a daily basis to assure that materials are on hand by job planned start dates.

This demand-driven, just in time architecture is not compatible with alternative planning methods. Use the item planning settings as designed and you will get good results, whether you make to order or to stock or have standard or customized products. On the other hand, if you bypass or co-opt item settings or bypass MRP generation with manual planning, you will get very poor results.

Why does MRP not include forecasts?

Just in time manufacturing responds to current demand

Time to Shipment MRP is designed for just in time manufacturing, which only responds to current demand that needs action now. Forecasts of all types, including the multi-bucket forecasts in old-style MRP systems as well as future jobs and blanket purchase orders, attempt to align future supply with projected demand and are consequently vulnerable to shortages and over-stocking.
Time to Shipment MRP does not include forecast planning

*Time to Shipment MRP* does not include forecast planning because it is counterproductive and incompatible with just in time manufacturing. Instead, supply pipelines are planned to replenish stock at demand-driven intervals.

Manual forecast planning is prone to shortages and over-stocking

Many small businesses use manual forecast type planning methods such as future job explosions and blanket purchase orders to synchronize long-term supply with projected demand. Forecast type planning is counter-productive because it is prone to shortages and propagates over-stocking.

Forecast supply always differs from actual demand because no one can predict the future with pinpoint precision. When forecast supply for an item is less than actual demand, a shortage occurs. When forecast supply is greater than actual demand, overstocking occurs and continues propagating unless scheduled quantities are reduced in coordination with suppliers. Inventory easily gets out of control.

Future jobs are tentative and subject to frequent changes

Future jobs are tentative by nature and require frequent quantity changes, date changes, and cancellations to stay synchronized with actual demand, as well as component changes to stay current with latest BOM specifications. Modifying or cancelling jobs is highly problematic because of interdependencies with other jobs and purchase orders that may already be in progress.

Demand-driven jobs are firmly set

By contrast, *Time to Shipment MRP* only generates jobs in response to current demand that needs action now. Demand-driven jobs are firmly set without being subject to the quantity changes, date changes, cancellations, and specification changes that are commonly required with future jobs.

Supply pipeline planning triggers demand-driven jobs and POs

Instead of trying to synchronize supply and demand with future jobs and blanket purchase orders, *Time to Shipment MRP* uses supply pipeline planning to ensure that stocking order policy items trigger demand-driven jobs and purchase orders at regular intervals without shortages and over-stocking.

Stock replenishment is triggered by actual demand at regular intervals using dynamic *Reorder Points* and *Min Order* quantities. A monthly *Sales* or *Usage* rate and *Safety Factor* buffer are incorporated into the *Reorder Point* and a *Supply Days* interval is incorporated into the *Min Order* quantity.
For low-value items, a fixed monthly Safety Factor buffer can be used without a monthly demand rate to provide a “set it and forget it” setting that can be left indefinitely as is without need for periodic review.

**A supply pipeline is self-adjusting**

Unlike future jobs and blanket purchase orders, a supply pipeline is self-adjusting in response to actual demand. When actual demand for an item is greater than the monthly demand rate and safety buffer, replenishment is triggered earlier than the supply days interval, which minimizes the duration of any shortage that may occur. When demand is less than the monthly demand rate and safety buffer, replenishment is delayed until it is needed, which automatically caps stock on hand and prevents overstocking.

**How does MRP replace blanket purchase orders?**

Blanket purchasing is a traditional planning method used by many small businesses to align future supply with projected demand. Blanket purchasing is a forecast type planning method that is incompatible with just in time manufacturing and should be replaced with supply pipeline planning.

**Blanket purchasing is a forecast type planning method**

Blanket purchasing is a forecast type planning method. The basic problem with all forecasting methods is that forecast supply always differs from actual demand because no one can predict the future with pinpoint precision.

**Forecasting is prone to shortages and over-stocking**

When forecast supply for an item is less than actual demand, a shortage occurs. When forecast supply is greater than actual demand, over-stocking occurs and continues propagating unless scheduled quantities are reduced in coordination with suppliers. Inventory easily gets out of control.

**Blanket purchase orders require constant adjustment**

Blanket purchase orders require constant monitoring and adjustment to synchronize supply with actual demand so that shortages and over-stocking are avoided. If scheduled deliveries are less than actual demand, quantities must be increased or delivery dates expedited to avoid shortages. If future quantities are greater than actual demand, they must be adjusted downward or else over-stocking will occur and continue propagating.

**Blanket purchasing is inefficient for both parties**

Managing blanket purchase orders not only requires constant monitoring by the manufacturer, it also requires close coordination and communication with the supplier. Both parties are aware that blanket purchase orders are tentative and subject to
changes. It is easy for the left hand to not know what the right hand is doing and for mistakes to occur, sometimes with extremely costly consequences.

**Time to Shipment MRP does not include forecast planning**

*Time to Shipment MRP* does not include forecast planning because it is counter-productive and incompatible with just in time manufacturing. Instead, stock replenishment planning is used to generate supply pipelines that are self-adjusting to actual demand.

**Supply pipeline planning triggers POs at demand-driven intervals**

Instead of trying to synchronize supply and demand with blanket purchase orders, *Time to Shipment MRP* uses supply pipeline planning to ensure that stocking order policy items trigger purchase orders at demand-driven intervals without shortages and over-stocking.

Stock replenishment is triggered by actual demand at regular intervals using dynamic *Reorder Points* and *Min Order* quantities. A monthly *Usage rate* and *Safety Factor* buffer are incorporated into the *Reorder Point* and a *Supply Days* interval is incorporated into the *Min Order* quantity.

For low-value items, a fixed monthly *Safety Factor* buffer can be used without a monthly *Usage rate* to provide a “set it and forget it” setting that can be left indefinitely as is without need for periodic review.

**A supply pipeline is self-adjusting**

Unlike blanket purchase orders, a supply pipeline is self-adjusting in response to actual demand. When actual demand for an item is greater than the monthly usage rate and safety buffer, the next purchase order is triggered earlier than the supply days interval, which minimizes the duration of any shortage that may occur. When demand is less than the monthly usage rate and safety buffer, the next purchase order is delayed until it is needed, which automatically caps stock on hand and prevents over-stocking.

**All purchase orders are firmly set**

Unlike blanket purchase orders, demand-driven purchase orders are firmly set without any need for date or quantity changes. Replenishment purchase orders are much more efficient for the manufacturer because they are self-adjusting to actual demand, and much more efficient for the supplier because they are fully actionable without being subject to changes or requiring confirmation.

**How does MRP generate POs for long lead time items?**

Long lead time items must be planned for stocking
Items with extremely long lead times must be planned for stocking because purchasing such items to order would cause unacceptable delays to jobs.

**Forecast type purchasing is the traditional planning method**

Many small businesses traditionally use forecast type methods to purchase long lead time items. One such method is to create an occasional large purchase order that supplies projected demand over one lead time cycle. Another such method is to create blanket purchase orders that replenish stock at pre-set intervals to supply projected demand over time.

**Forecast type purchasing is vulnerable to lengthy shortages**

Any forecast type purchasing method is vulnerable to lengthy shortages whenever planned supply fails to cover actual demand. If the next purchase order does not get expedited, which is often not possible, the shortage can be of long duration with costly job delays as a consequence.

**Forecast type purchasing is also vulnerable to severe over-stocking**

Any forecast type planning method is also vulnerable to severe over-stocking whenever planned supply significantly exceeds actual demand. In many cases the next purchase order is already in progress and can’t be cancelled or delayed, which results in excessive stock on hand that ties up working capital and storage space.

**MRP generates a demand-driven supply pipeline**

*Time to Shipment MRP* generates a demand-driven supply pipeline for long lead time items that prevents lengthy shortages and severe over-stocking. Instead of attempting to synchronize future supply with projected demand, stock replenishment planning is used to trigger a pipeline of demand-driven POs, each due to arrive at staggered intervals.

**A Reorder Point is calculated from a monthly usage rate and safety buffer**

For each long lead time item, you enter a monthly *Usage* rate along with a *Safety Factor* buffer to cover potential variance above the monthly average. The program applies these settings to the item’s standard *Lead Days* to calculate a dynamic *Reorder Point*. The *Reorder Point* will have a relatively high value because of the long lead time, but don’t worry, it is a trigger point, not a stocking level.

**A Min Order quantity is calculated from a supply days interval**

A *Supply Days* interval is entered, which is the desired interval between purchase orders. The *Supply Days* and monthly demand settings combine to calculate a dynamic *Min Order* quantity.

**Purchase orders are demand-driven**
A purchase order gets triggered whenever actual demand causes the total supply pipeline (stock on hand plus all open purchase orders) to fall below the item’s Reorder Point. The purchase order quantity will be for the item’s Min Order quantity or greater if needed.

**The supply pipeline is self-adjusting**

Unlike blanket purchase orders that must be manually adjusted to stay synchronized with actual demand, which is often not possible with long lead time items, a demand-driven supply pipeline is self-adjusting.

When actual demand is greater than the monthly usage rate and safety buffer, the next purchase order gets triggered immediately, even when other purchase orders for the item are already in progress. When actual demand is less than the monthly usage rate, the next purchase order is automatically delayed, which caps stock on hand and prevents over-stocking.

**The pipeline ensures that any shortages are of short duration**

A demand-driven supply pipeline for an item often consists of multiple open purchase orders, each due to arrive at staggered intervals. If a shortage happens to occur, it will be short in duration because the next purchase order in the supply pipeline is likely to arrive soon.

**How does MRP handle blanket sales orders?**

**Just in time manufacturing only responds to current demand**

Just in time manufacturing only responds to current demand within item planning period action windows. This is highly useful for handling blanket sales orders from customers because it isolates current demand that may need action now from long term demand that can be actioned upon later.

**What is the item planning period action window?**

Each top level manufactured item has its own item planning period action window, which consists of the item’s standard Lead Days plus standard Job Days as well as the system MRP Interval setting and any non-workdays that get encountered. Essentially, the planning period provides sufficient time to manufacture the item should it have to be made to order.

**Long term demand is ignored by MRP**

Only sales order line items with required dates that fall within the item’s planning period are included by MRP in net demand calculations. Any long term demand outside the planning period is ignored by MRP because there is ample time to manufacture the item later if needed when that demand eventually falls into the planning period and becomes current.
The item planning period keeps inventory and WIP lean and efficient

The item planning period is the means by which jobs are generated “just in time” instead of prematurely before they are actually needed, which keeps inventory and work in process lean and efficient.

Blanket sales orders can be freely entered

You can freely enter blanket sales orders with future required dates and quantities because MRP will automatically respond to each required date when it eventually falls into the item’s planning period action window.

Why does MRP require an accurate inventory?

Inventory accuracy is essential for net demand calculations

MRP cannot function without an accurate inventory, which is essential for the net demand calculations that drive job and PO generation. 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 remedy this problem:

Remedy #1 - Make BOM accuracy an absolute requirement

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.

Remedy #2 - Issue materials to jobs in real time

Issue materials to jobs in real time within the Work Center Schedule instead of after the fact at time of job receipt. This takes no extra time because it must be done at some point anyway and in most cases only a few clicks using the Pre-Fill option. Real time job issues eliminate delays to job receipts and will engender user confidence that inventory numbers are reliable.

How can MRP settings be maintained against thousands of items?

Item MRP settings are essential

Item MRP settings are essential because they determine time to shipment targets and the supply pipelines that replenish inventory. These settings are vitally important no matter how many stock items you may have.

At first glance, applying MRP settings to thousands of items may seem a daunting task, but when you examine how settings are actually maintained, it is a much smaller-scale
effort that is well within any planner’s capability to manage. Let’s break down how settings are established and maintained.

**P items can be mass-updated by default supplier**

Each P item is assigned to a default supplier. Most items sourced by a supplier have the same *Lead Days*, so even though you may have thousands of P items, you most likely have a relatively small number of default suppliers. You can filter the *MRP Settings* screen by default supplier and then enter the same *Lead Days* against all or most of the items. You can also export the grid contents to a spreadsheet, copy and paste the desired *Lead Days* against all items, and then use the *P Items – MRP Settings* import utility to import the values.

**Many M items have the same Job Days**

Most companies typically have far fewer M items than P items. Among M items, many have similar processes and can therefore be given the same or similar *Job Days* allocation. The actual number of *Job Days* decisions is therefore much smaller than the number of M items. *Job Days* allocations are not subject to frequent revision.

**The Stocking (Safety Factor) order policy settings remain fixed**

Many items planned for stocking can be assigned the *Stocking (Safety Factor)* order policy, which uses a fixed monthly *Safety Factor* setting to calculate the *Reorder Point* that triggers stock replenishment. This is a “set it and forget it” stocking method because there is no need for periodic review of monthly usage. This order policy is suited for lower value items where minor over-stocking has minimal impact on working capital or storage space.

**Supply Days intervals are rarely subject to change**

All stocking order policy items are given a *Supply Days* interval to calculate the *Min Order* quantity that determines the size and frequency of jobs or POs. A substantial number of items will be given the same *Supply Days* interval and once it is established, it is rarely changed.

**Use MRP analysis codes to schedule monthly demand reviews**

The item settings that should be reviewed on a periodic basis are the monthly *Sales* or *Usage* and *Safety Factor* buffer maintained against items with a *Stocking (Monthly Demand)* order policy. Higher value, more critical items benefit from more frequent review, whereas lower value, less critical items can be reviewed less often.

Use the *MRP Analysis Codes* screen to create analysis codes that are then scheduled for settings review at periodic intervals. Items are assigned to appropriate analysis codes. The screen indicates when analysis codes are due for review and the *Action* button is used to initiate a settings analysis for its associated items in the *MRP Settings* screen.
Why is it harmful to pad Lead Days and Job Days?

Padding lead times is counter-productive

With just in time manufacturing it is counter-productive to pad or inflate item Lead Days and Job Days settings because it distorts Time to Shipment targets for sell items and you lose the ability to track late POs and late starting jobs.

Lead times are inter-connected

Item lead times are inter-connected. Whenever an item has a To Order policy, its Lead Days and/or Job Days contribute to the lead times of higher level items. So whenever you pad or inflate lead times at one level, it can inflate lead times at the next higher level. Furthermore, the inflation effect magnifies at each higher level and can result in severely distorted Time to Shipment targets for top level items. This defeats one of the core purposes of Time to Shipment MRP, which is to achieve realistic and reliable ship dates.

Realistic PO due dates are important

The P item standard Lead Days establishes PO due dates. If you pad or inflate Lead Days, PO due dates are not realistic and you lose the valuable ability to track and expedite late POs in the PO Schedule.

Realistic job dates are important

The M item standard Job Days establishes job start and finish dates. If you pad or inflate Job Days, planned start dates are not meaningful and you lose the ability to track late starting jobs in the Release Jobs screen.

Meet don’t beat the schedule

To be successful with Time to Shipment MRP, make it your planning objective to meet, not beat the schedule. Strive for realistic Lead Days and Job Days so that Time to Shipment targets are plausible and achievable and so that job and PO dates provide the feedback needed for staying on schedule so that orders get shipped on time.

Why is it harmful to use CTO linking with standard items?

When an M item is flagged for CTO linking, a job is generated and hard-linked to each sales order line for the exact quantity ordered. CTO linking is automatically applied to one-off, custom items that are made to order and never stocked.

CTO linking is counter-productive for standard items

For standard items, however, CTO linking is counter-productive and should be avoided.
- Standard items are interchangeable from order to order and are potentially subject to stocking.
- There is no ability to adjust CTO jobs to account for stock on hand or to consolidate demand into more efficient job sizes.
- CTO linking forces items to be made to order, even in cases where items with frequent orders could be planned with a Stocking order policy to enable immediate shipment from stock.

**Linking occurs naturally with item-based manufacturing**

Some companies use the CTO setting solely to get the sales order number and customer referenced on the job traveler. This practice is contrary to just in time manufacturing, which is item-based rather than order-based. With item-based manufacturing, linking of a sorts occurs naturally when supply events happen to align with demand events. Unlike hard-linking, natural linking also flexibly allows one supply event to align with multiple demand events.

**The Stock Status inquiry shows the destination of any item**

It is not necessary to use the job traveler to know the destination of an item or what is available to ship. The Stock Status inquiry, which can be accessed within the Job Receipts and Job Schedule screens, indicates which sales orders are pending for the item or whether the item is intended for stock. The Shipment Planner within the Order Picking screen lets you know when items are ready for shipment.

**Avoid the CTO setting for efficient manufacturing**

For efficient just in time manufacturing, avoid using the CTO setting with standard items and discontinue relying on the job traveler for sales order references.

**Why can’t the SO Required Date be freely changed?**

**The line item Required Date is a manufacturing date**

The sales order line Required Date is solely for manufacturing purposes and is not designed to be used as a “wish date” by salespeople.

**Each SO line has a Required Date and Expected Date**

When a line item is entered, the program establishes a Required Date and an Expected Date, both of which have the same initial date.

- The Required Date is populated by the item’s Time to Shipment target and must be left as is because it is an internal MRP date that drives job generation and establishes job and shipping priority.
• The *Expected Date* is the customer communication date and can be freely changed without any effect on job generation or job and shipping priority.

**Only change the Required Date for a scheduled order**

The one instance where the *Required Date* should be changed is when the customer requests a scheduled order, as would be the case with a blanket sales order. See the following FAQ for more details.

**Never use the Required Date as a “wish date”**

Never use the *Required Date* as a “wish date” by salespeople. It is an MRP date that is established by the item’s planned *Time to Shipment* target and must be left as is for alignment with job finish dates.

**Never move the Required Date out when it is past due**

Never move the *Required Date* out when it is past due. Always leave it as is so that it remains visible as a late job dependency in the *Job Schedule* and so that it retains its priority in the *Shipment Planner*.

**Do not change the Required Date for an unusually large order**

Do not change the *Required Date* when an unusually large order for an item with a *Stocking* order policy is not covered by stock on hand as planned. Instead of moving the *Required Date* out, leave the date as is to maintain this order’s job and shipping priority relative to other orders that may exist for the same item. The shortage may be of minimal duration because a replenishment job may already be in progress. If a new job gets generated, it will automatically be expedited because it will receive highest priority in job release and work center queues.

**Do not change the Required Date for a small order**

Do not change the *Required Date* when a relatively small order is received for an item with a *To Order* policy that happens to be covered by stock on hand. Instead of moving the *Required Date* in, leave the date as is to maintain this order’s shipping priority relative to other orders that may exist for the same item. The *Shipment Planner* automatically allocates available stock to orders in *Required Date* order so that this order will be immediately shipped provided that another order does not have greater priority.

**Use the Shipment Planner for Order Picking**

Pick sales orders for shipment using the *Shipment Planner* so that available stock on hand is given priority to sales orders according to scheduled *Required Dates*.

The *Shipment Planner*, which is accessed from the *SO No* field in the *Order Picking* screen, lists open sales orders prioritized by earliest line item *Required Date*. 
Always pick the next ready-to-ship sales order listed first and sales orders will get fulfilled in the correct scheduled order.

The Expected date can be freely changed

The line item Required Date is accompanied by the Expected Date, which is the communication date for the customer. This date can be freely changed without any impact on MRP or the Shipment Planner. If the Job Schedule indicates that an dependent sales order is likely to be supplied later than planned, you can move the Expected Date out to reflect that reality.

How can MRP reduce my overall inventory?

Traditional inventory planning methods typically result in over-stocking, which ties up working capital and scarce storage space. Time to Shipment MRP keeps inventory lean with supply pipeline planning and can dramatically reduce overall inventory.

What causes over-stocking?

Traditional planning methods cause over-stocking in the following ways:

- Manual planning from static shortage reports fails to account for the time-phased nature of demand and often results in jobs and purchase orders being created prematurely before they are actually needed.
- Future jobs used as forecasts to explode lower level demand can result in severe over-stocking at all levels when forecast demand is greater than actual demand.
- Blanket purchase orders can result in severe over-stocking when scheduled deliveries are greater than actual demand.
- Manual reorder points without logical basis in monthly demand and replenish time result in over-stocking.

Supply pipelines keep inventory lean

You can dramatically reduce over-stocking by replacing all your traditional inventory planning methods with supply pipeline planning.

With supply pipeline planning, replenishment is triggered by actual demand at regular intervals using a dynamic Reorder Point and Min Order quantity. A monthly Sales or Usage rate and Safety Factor buffer are incorporated into the Reorder Point and a Supply Days interval is incorporated into the Min Order quantity.

Supply pipelines are self-adjusting

Unlike future jobs and blanket purchase orders, supply pipelines are self-adjusting in response to actual demand.
• When actual demand for an item is greater than the monthly demand rate and safety buffer, replenishment is triggered earlier than the supply days interval, which minimizes the duration of any shortage that may occur.

• When demand is less than the monthly demand rate and safety buffer, replenishment is delayed until it is needed, which automatically caps stock on hand and prevents over-stocking.

Why is the Reorder Point not a stocking level?

Do not confuse the Reorder Point with a stocking level. 

• A stocking level is a planned quantity of stock on hand expressed as an average, minimum, or maximum. DBA does not include stocking levels because they lack time-phasing and do not account for supply in progress.

• A Reorder Point is a trigger point for job or PO generation calculated from a monthly Usage rate and Safety Factor applied to replenish time. Whenever current demand causes total supply from stock on hand and inbound jobs or POs to fall below the Reorder Point, a job or PO gets generated.

The Reorder Point is a timing-related field

The Reorder Point is a timing-related field that determines when a job or PO gets triggered. It is not an order quantity or a stocking quantity.

The Supply Days interval determines order quantities

Order quantities are determined by the Supply Days interval. The Supply Days interval is applied to the monthly Usage rate and Safety Factor to calculate a Min Order quantity. When a job or PO gets generated, the quantity will be equal to current net demand or the Min Order quantity, whichever is greater.

WARNING: Do not use manual Reorder Points

When an item is assigned the Stocking (Manual) order policy, the Reorder Point can be entered manually without calculation from a monthly usage rate and replenish time. This order policy is not recommended because a manual Reorder Point has no logical basis for its value and often gets used by mistake as a stocking level, which can result in severe over-stocking.

Why do I not always see jobs and POs generated at lower levels?

When MRP generates a top level job, it is natural to expect to see associated lower level jobs and POs generated during the same MRP session. This would be the case if all manufacturing events were to occur on the same day.
In reality, however, manufacturing events unfold over time. Any subassembly item that is required immediately will be given a job within the current MRP session. But any subassembly item that is not required at this time will be given a job in a future MRP session. That future job quantity may incorporate additional demand for the item that happens to materialize in the intervening time.

The same principle applies to purchased items. Any item that is required immediately will be given a PO within the current MRP session. But any item that is not required at this time will be given a PO in a future MRP session. That future PO quantity may incorporate additional demand for the item that happens to materialize in the intervening time.

What determines when an item is required? An item is only needed now when its required date falls within its planning period, which is the number of days allocated by MRP for making or buying the item.

If you wish to "pad" item planning periods

For optimal just in time manufacturing, the item planning period should not be padded because a longer planning period causes jobs and POs to be generated earlier than needed. Nevertheless, if you prefer longer planning periods, never pad the standard Lead Days and Job Days settings themselves because a longer planning period causes jobs and POs to be generated earlier than needed. Instead, go to the MRP Defaults screen and use the Planning Period - Extra Days for Lower Level M items and Extra Days for P Items settings to expand item planning periods by a set number of days. Take note that planning periods cannot be expanded for top level M items.

Why should I not take action on requirements outside the planning period?

The planning period is the number of days allocated by MRP for assessing net demand and is determined by the item’s replenish time.

Think of the planning period as the item’s “action window.” When net demand causes an item’s required date to fall within its planning period, a job or PO must be generated to replenish stock by the required date. When a required date lies beyond the planning period, however, no action is needed because there is ample time to wait and generate a job or PO later when the required date eventually falls into the action window.

Taking premature action against future requirements is problematic because additional demand can materialize day by day as the required date draws closer to the action window. Generating a job or PO prematurely reacts to an incomplete demand profile and corrupts the “just in time” principle that keeps inventory and WIP as lean as possible.

If you expect a lower-level job or PO to be generated and it does not occur within the current MRP session, do not worry and do not intervene with any manual action. The job or PO will be generated in a future MRP session without fail and has no possibility of being forgotten and missed.
If you wish to "pad" item planning periods

For optimal just in time manufacturing, the item planning period should not be padded because a longer planning period causes jobs and POs to be generated earlier than needed. Nevertheless, if you prefer longer planning periods, never pad the standard Lead Days and Job Days settings themselves, which has harmful consequences. Instead, go to the MRP Defaults screen and use the Planning Period - Extra Days for Lower Level M items and Extra Days for P Items settings to expand item planning periods by a set number of days. Take note that planning periods cannot be expanded for top level M items.

Why should I not delay MRP to consolidate jobs and POs?

MRP is designed for "just in time" planning that relies on daily job and PO generation. Daily generation is needed because all dates in the master schedule are interconnected in end-to-end fashion to meet required dates. Running MRP at less than daily intervals injects late dates into the schedule that cause job release delays and late shipments.

If your objective is to generate fewer and larger quantity jobs and POs, never attempt to accomplish this by delaying MRP generation. Instead, use the item Supply Days setting as needed to increase the size and reduce the frequency of POs or jobs.

How is MRP used with customized products?

There is a perception among some that MRP is only suitable for standardized products. With DBA this is not the case at all. In fact, using MRP is what makes DBA ideal for custom manufacturing of any kind, including engineering to order, remanufacturing, and disassembly.

One-off BOMs are generated in quotes and are used to customize routing, component, and output details prior to job generation. When MRP generates the job, custom details are automatically incorporated into the master schedule exactly the same as with standard products. If job details must be modified during the course of the job, this automatically affects item demand profiles and MRP will respond accordingly with additional supply as needed.