MRP Guide

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1 MRP Benefits and Features

Time to Shipment MRP enables you to fulfill customer orders quickly and reliably with efficient utilization of inventory

Benefits

- Keeps you competitive with faster times to shipment
- Works for any size or type of manufacturing business
- Common sense item settings drive all manufacturing activities
- Eliminates manual planning methods
- Lean inventory planning minimizes shortages and over-stocking
- Generates consistent and reliable sales order ship dates
- Generates efficient jobs and POs within a self-aligned, self-adjusting master schedule
- “Just in time” architecture eliminates job quantity changes and cancellations
- Job finish dates are automatically rescheduled when jobs are released to live production

Features

Item Settings

- Planned time to shipment calculation for sell items based on underlying settings
- Manufactured item lead days allocations establish job start dates
- Lead days auto-calculated from to order subassemblies and components
- Job days allocations establish job finish dates
- Optional job days calculation from work center and routing settings
- Purchased item lead days allocations establish PO due dates
- Dynamic reorder points trigger replenishment jobs and POs from actual demand
- Planned supply days establish job and PO quantities
- Item review notes handle special planning requirements

SO Required Dates

- Planned times to shipment establish SO line item required dates

Job and PO Generation

- Custom to order jobs generated directly from SO lines
✓ Demand-driven job and PO generation within item action windows
✓ Consolidates interdependent demand into single jobs and POs
✓ Ability to change PO supplier, price, or manufacturer part number

**Job Release**
✓ Allocates available material to jobs in start date order
✓ Job release to live production based on material availability
✓ Reschedules job finish date relative to job released date

**Job Prioritization**
✓ Each job is prioritized relative to its required date
✓ Work centers are run by job priority to help all jobs meet their required dates
✓ Job labor is updated in real time as job sequences are completed
2 What Is Time to Shipment MRP?

You can unleash your efficiency potential by using Time to Shipment MRP to drive your manufacturing activities.

Time to Shipment planning is a universal requirement

Every manufacturing company has a planning system of some kind for estimating ship dates and creating jobs and purchase orders to meet those dates. It may be a formal MRP system, but more commonly it is a collection of manual planning methods such as shortage reports, BOM explosions, multi-level job linking, blanket POs, and so on.

Planning governs the efficiency of your manufacturing system

Your planning system governs the overall efficiency of your manufacturing system. Inefficient planning results in longer lead times, chronic shortages, over-stocking, inefficient job and PO quantities, higher costs, and late shipments. Conversely, efficient planning reduces lead times, minimizes shortages and over-stocking, generates efficient jobs and POs, lowers costs, and ships orders on time.

Amazon and globalization have changed the game

The manual planning methods of the past were fine in their day, but the game has changed for small manufacturers. In the age of Amazon and globalization, customers throughout the supply chain expect prompt shipment, even when products are customized to order. If you don’t up your efficiency game, you will inevitably lose market share to faster and more nimble competitors.

Unleash your efficiency potential

If you’ve hit the efficiency wall with your traditional planning methods, you can unleash your efficiency potential by replacing those methods with DBA’s Time to Shipment MRP system.

What is Time to Shipment MRP?

Time to Shipment MRP is a “just in time” planning system driven by sales order ship dates. Planned time to shipment targets establish sales order ship dates and are calculated from lead days and job days allocations and order policies assigned to sell items, subassemblies, and purchased items. Multi-level jobs and POs are generated within a self-aligned, self-adjusting master schedule to meet sales order ship dates.

Boosts your manufacturing efficiency
Time to Shipment MRP boosts your manufacturing efficiency with lean inventory settings, efficient jobs and POs that consolidate interdependent demand, and automatic job rescheduling when jobs are released to live production. You completely eliminate all manual planning processes, which frees you to focus on the common sense item settings that are the drivers of your efficiency.

**Replaces reactive planning with a consistent strategy**

Time to Shipment MRP enables you to develop an overall time to shipment strategy that fits your marketing objectives and provides customers with reliable and consistent performance over time. By contrast, manual planning methods react to situational conditions and yield different and unpredictable results with each planning session.

**“Just in time” architecture**

Many traditional planning methods create long-term jobs and POs in anticipation of future demand scenarios, which is inefficient because it necessitates over-stocking and is subject to scheduling and specification changes and order cancellations. By contrast, Time to Shipment MRP has a “just in time” architecture that limits job and PO generation to actual current demand within item action windows, which reduces inventory and minimizes scheduling changes.

**Ideal for custom to order manufacturing**

Long-term planning based on potential demand scenarios doesn’t work for custom to order manufacturing because custom specifications cannot be known in advance. By contrast, the short-term nature of “just in time” planning is ideally suited for custom manufacturing because jobs only get generated after custom specifications are finalized.

**Beware of software packages with optional MRP modules**

Beware of any manufacturing software package that offers MRP as an optional add-on for advanced users only, which forces non-MRP customers to continue using manual planning methods that limit their efficiency potential. Furthermore, any MRP module that is too complicated for average companies to use is not a suitable solution for small business.

**MRP benefits any type of manufacturing business**

Instead of being an optional add-on, Time to Shipment MRP is integral to the DBA Manufacturing process workflow. Instead of being for advanced users only, Time to Shipment MRP with its “just in time” architecture enables any size or type of manufacturing business to benefit from efficient planning.
3 "Just in Time" Architecture

Time to Shipment MRP is designed with a “just in time” architecture whereby jobs and POs are only generated when triggered by actual short-term demand within item action windows.

Traditional MRP is not for small business

Traditional MRP is not suitable or for small business because it is based on maintaining long-term forecasts and demand scenarios in which planned jobs are tentative and subject to scheduling and specification changes and order cancellations. Long-term planning with constant rescheduling is extremely complicated, especially in multi-level environments, and is not feasible for custom to order manufacturing where longer-term specifications cannot be known.

Time to Shipment MRP works for any small business

By contrast, Time to Shipment MRP is designed with a “just in time” architecture that works for any small business because jobs and POs are only generated when triggered by actual short-term demand within item action windows, which eliminates the need for quantity and specifications changes that complicates long-term planning. The “just in time” architecture is ideally suited for custom to order manufacturing where all jobs are short-term and specifications are finalized just prior to job generation.

“Just in Time” Elements

Time to Shipment MRP’s “just in time” architecture consists of the following elements:

- Item Action Windows
- Time to Shipment Targets
- Reorder Points
- Min Order Quantities
- SO Required Dates
- Job Generation
- PO Generation
- PO Tracking
- Job Release
- Job Priority

Let's now examine each element in detail.

Item Action Windows

Time to Shipment MRP’s “just in time” architecture limits job and PO generation to net demand within each item’s action window, which is the planning days allocated for
making or buying the item. Demand within the action window is firmly set and can be acted upon without later need for quantity or specifications changes.

No action is taken against demand outside the action window. Longer-term demand is tentative, incomplete, and prone to date, quantity, and specifications changes, as well as order cancellations. When long-term demand for an item eventually becomes short-term demand as it falls into the item’s action window, it is then firmly set and can be acted upon without later need for quantity or specifications changes.

Item action windows are established as follows:

**Manufactured Items**

The action window for manufactured items is determined by each item’s calculated *Lead Days* allocation, which is the number of days required to make subassemblies or purchase materials to order before a job can be started, plus the item’s *Job Days* allocation, which is the number of days planned for making a typical job quantity.

**Purchased Items**

The action window for purchased items is determined by each item’s *Lead Days* allocation, which is the number of days planned for procuring the item.

**Allocations also determine scheduling dates**

*Lead Days* and *Job Days* allocations not only establish item action windows, they also determine job start and finish dates and PO due dates. Scheduling dates are coordinated so that PO due dates and job finish dates are aligned with higher-level job start dates and sales order required dates.

**Allocations must be realistic and plausible**

Tim to Shipment MRP’s “just in time” architecture only works when *Lead Days* and *Job Days* allocations are realistic and plausible so that item action windows are limited to current demand and scheduling dates have meaningful values and alignment.

**Times to Shipment Targets**

Time to Shipment MRP’s “just in time” architecture uses planned *Time to Shipment* targets to establish sales order required dates and drive job generation.

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

Planned *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 scheduling allocations and order policies can be shared with management, sales, and production personnel to achieve common objectives.
How is the Time to Shipment calculated?

A planned *Time to Shipment* target is calculated for each of your manufactured sell items.

**Stocking Item**

When the item has a *Stocking* order policy, it is planned for immediate shipment from stock. In this case *Time to Shipment* is limited to any extra *Shop Days* specified in the *SO Required Dates* screen, plus a *Non-Shop Days* factor to account for weekends and holidays.

**To Order Item**

When the item has a *To Order* policy, it is planned to be made to order. In this case *Time to Shipment* is comprised of the item’s *Lead Days* allocation, *Job Days* allocation, any extra *Shop Days* specified in the *SO Required Dates* screen, plus a *Non-Shop Days* factor to account for weekends and holidays.

**Time to Shipment is reduced over time with Job Days allocations**

Planned *Time to Shipment* targets can be reduced by tightening planned *Job Days* allocations over time as you get more efficient in the shop.

**Time to Shipment is reduced with component stocking**

When a sell item has a *To Order* policy, its calculated *Lead Days* can be reduced or eliminated by assigning a *Stocking* order policy to contributor components, which removes each such component from the calculation because the component is now planned for immediate issuing to the job instead of being made or purchased to order.

**Reorder Points**

With *Time to Shipment MRP*, stock is replenished for *Stocking* order policy items “just in time” when triggered by a calculated *Reorder Point*. Whenever current net demand (stock on hand plus all inbound supply less actual demand within the item’s action window) falls below the *Reorder Point*, MRP generates a job or PO to replenish stock.

**Calculated from a Monthly Demand rate or Safety Factor**

A *Monthly Demand* rate, which can be an average, projected, or theoretical monthly rate, and/or a monthly *Safety Factor* is entered, which is an amount sufficient to cover any monthly demand spike that is likely to occur. The monthly rate is translated into a daily amount that is multiplied by the item’s replenish time (*Lead Days* plus *Job Days*) to calculate the *Reorder Point*.

The calculated *Reorder Point* ensures that a job or PO gets triggered early enough to cover planned demand over the time it takes to replenish stock.
Stock replenishment is only triggered by actual demand

Manual planning and traditional MRP often create long-term jobs and POs to cover anticipated demand scenarios. This is not the case with "just in time" replenishment in which jobs and POs for Stocking order policy items are only triggered by actual demand. If planned demand fails to materialize, no action is taken, which prevents needless over-stocking.

Actual demand “pulls” inventory into the system

Creating long-term jobs and POs is inefficient because it “pushes” inventory onto the system, whether it is needed or not. By contrast, “just in time” planning uses actual demand to “pull” inventory into the system only when it is actually needed.

Min Order Quantities

For items with a Stocking order policy, the Reorder Point is accompanied by a calculated Min Order quantity, which determines the size and frequency of replenishment jobs and POs. Whenever a job or PO is generated, the quantity will be equal or greater than the Min Order quantity.

Calculated from a Supply Days interval

A Supply Days interval is entered, which is the number of demand days to be supplied by each job or PO quantity. The Monthly Demand and/or monthly Safety Factor that was entered to calculate the Reorder Point is translated into a daily demand amount that is multiplied by the Supply Days interval to calculate the Min Order quantity.

If actual demand happens to be equal to planned demand, the calculated Min Order quantity ensures that the interval between replenishment jobs or POs will be equal to the Supply Days.

Generates a PO pipeline for extremely long lead time items

The Supply Days interval is ideal for purchasing items with extremely long lead times because actual demand will trigger a pipeline of POs in progress that smooths out supply and minimizes the duration of any shortage.

The interval time between POs is self-adjusting. For example, if actual demand happens to be less than planned, the next PO gets delayed and interval time is increased. Conversely, if actual demand happens to be greater than planned, the next PO is generated earlier and interval time is decreased.

For details, see The PO Pipeline Effect at the end of the 2. Lead Inventory Planning chapter.

SO Required Dates
Time to Shipment MRP’s “just in time” architecture uses sales order demand to trigger top-level job generation. When a sales order line item is entered, the line item Required Date is populated by the item’s planned Time to Shipment and is a target ship date that determines job and shipping priority.

**Consistent time to shipment is the objective**

The objective of Time to Shipment MRP is to provide each sell item with a consistent and reliable time to shipment from one order to the next. This is achieved by establishing a realistic and stable planned Time to Shipment target for each sell item and allowing it to populate sales order required dates without interference.

**When a Stocking item is not covered by stock**

There may be instances where 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, the “just in time” architecture leaves 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.

**When a To Order item is covered by stock**

Conversely, there may be instances where a relatively small order is received for an item with a To Order policy that can be covered by stock on hand (due to spare stock or an order cancellation) instead of being made to order as planned. Instead of moving the Required Date in, the “just in time” architecture leaves 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 in Order Picking 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.

**The required date is only changed for a scheduled order**

The only instance where the default required date should be manually changed is when the customer requests a scheduled order with one or more future ship dates, as would be the case with a blanket order. MRP will take no action on the sales order line item until the required date eventually falls into the item’s action window.

**Job Generation**

Time to Shipment MRP’s “just in time” architecture generates jobs when triggered by actual demand within each item’s action window.

**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 planned Time to Shipment and is within the item’s 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 plus all inbound jobs less actual demand within the item’s action window) 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 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 generation is an automatic process**

Job generation is an automatic process that requires no review or manual intervention. Job start and finish dates are derived from item Lead Days and Job Days allocations and are left as is. Any rescheduling is done later when jobs are released to production based on material availability (see Job Release below).

**Jobs are generated on a daily basis**

“Just in time” job generation requires that jobs be generated on a daily basis to respond immediately to demand from new sales orders or demand from higher-level jobs or scheduled sales orders that falls into item action windows and becomes current net demand.

**Never create long-term jobs**

Time to Shipment MRP’s “just in time” architecture is only designed for short-term jobs generated within item action windows. Never enter manual jobs to plan for long-term
demand because job quantities cannot be changed, lower-level jobs are consolidated for higher-level demand, and there is no long-term rescheduling capability.

Generate demand-driven jobs instead

Time to Shipment MRP’s “just in time” architecture provides a far more efficient means to plan for long-term demand. Assign the item a stocking order policy and enter a Monthly Demand amount to calculate a Reorder Point. Jobs will get generated when triggered by actual demand and will be short-term and firmly set without need for scheduling or specifications changes.

PO Generation

Time to Shipment MRP’s “just in time” architecture generates POs when triggered by actual demand within each item’s action window.

Jobs are always generate 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. It is not uncommon for a planner to generate jobs first and then for a buyer to finish the MRP session with PO generation.

POs are triggered by actual net demand

A PO is generated whenever current net demand (stock on hand plus all inbound POs less actual demand within the item’s action window) 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 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 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 often tentative, incomplete, and subject to scheduling and specification changes and order cancellations.

Interdependent demand is consolidated into single jobs

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.

Planned POs are optimized for supplier and pricing maintenance
Another benefit of PO generation is that planned POs are optimized for convenient supplier selection, pricing maintenance, and manufacturer part number specification. This assures that POs are sent to the supplier of choice with accurate pricing.

**Blanket POs are replaced with Supply Days intervals**

Blanket POs are commonly used as a manual planning method for anticipatory stocking. Blanket purchasing is inefficient for the buyer and the supplier because long-term POs are tentative and must be periodically adjusted whenever actual demand differs from anticipated demand. If periodic adjustments are not made, the unavoidable result will be shortages or over-stocking.

“Just in time” planning replaces inefficient blanket purchasing by generating demand-driven POs in planned *Supply Days* intervals. This eliminates the need for scheduling adjustments and prevents shortages and over-stocking.

**Using Supply Days intervals**

The *Supply Days* interval is ideal for replenishing stock at planned intervals. Assign the item a *Stocking* order policy and enter a *Monthly Demand* amount, which is the anticipated demand rate, to calculate a *Reorder Point*. Enter a *Supply Days*, which is the desired interval between POs, to calculate a *Min Order* quantity. MRP will generate a demand-driven PO in approximate 30 day intervals.

The *Supply Days* interval is self-adjusting, which benefits you and your supplier because it eliminates all the PO scheduling changes and communications that are required to maintain a blanket PO. For example, if actual demand is less than the *Monthly Demand* amount, the next PO will be delayed until actual net demand falls below the item’s *Reorder Point*. Conversely, if actual demand is greater than the *Monthly Demand* amount, the next PO will be generated earlier than planned and for a greater quantity if needed.

**PO Tracking**

POs in progress are tracked on a daily basis so that late POs can be expedited to minimize delays to dependent jobs.

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

POs in progress are tracked in the *PO Schedule* screen. A late PO is identified by a *Days Past Due* value. If the late PO is causing dependent jobs to be delayed, those jobs are listed in the *Supply Dependencies* inquiry.

**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. If the supplier furnishes an estimated delivery date, that date can be entered.
in the *Expected* date field 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.

**Job Release**

Jobs are released to live production “just in time” when allocated materials become fully available. Released jobs are given an updated finish date to reflect their actual release date.

**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 *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 materials can be released on schedule**

Green lighted jobs with allocated materials 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.

**Jobs with shortages must be delayed**

Red lighted jobs with a shortage of allocated material against one or more components cannot be started as scheduled. Job release must be delayed until allocated materials become fully available.

**Each released job is given an updated 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 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.

**Job Priority**

Time to Shipment MRP’s “just in time” architecture also applies to work centers whereby job sequences are run in priority order so that all jobs meet their required dates and orders get shipped on time.

**Jobs are dynamically prioritized**

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

\[
\text{Job Priority} = \frac{\text{Days to Required Date} - \text{Remaining Sequence Days}}{\text{Remaining Sequence Days}}
\]

*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 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.

**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 through the Work Center Schedule screen, which updates work center queues and Job Priority calculations. Labor can be updated at standard or actual hours and each sequence can be flagged as finished or a completed quantity can be entered.

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.

**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.
4 Planning Mistakes

This chapter reviews six common planning mistakes that are incompatible with Time to Shipment MRP's objectives and “just in time” architecture.

Mistake #1 - Inflated Allocations

Time to Shipment MRP generates a realistic master schedule with multi-level alignment of PO, job, and sales order dates. This can only be achieved when item scheduling allocations are realistic. Do not incorporate an artificial “safety factor” into item Lead Days and Job Days allocations, which causes the following problems:

- P item Lead Days allocations contribute to the calculated Lead Days of higher-level M items. So when you artificially inflate P item Lead Days allocations, you also inflate higher-level M item Lead Days allocations, which corrupts the integrity of job scheduling dates.
- Lower-level M item Job Days allocations contribute to the calculated Lead Days for higher-level M items. So when you artificially inflate lower-level Job Days allocations, you also inflate higher-level Lead Days allocations, which corrupts the integrity of job scheduling dates.
- Because lower-level allocations contribute to higher-level M item Lead Days allocations, it is not possible to plan realistic Time to Shipment targets for sell items when lower-level allocations are artificially inflated.
- Artificially inflating P item Lead Days allocations makes all POs appear to be on time, even when some are actually late, which eliminates your ability to track late POs and communicate with suppliers.
- Artificially inflated M item Lead Days and Job Days allocations result in all jobs being released early, even when some are actually late, which degrades job prioritization.

Realistic Time to Shipment targets drives MRP

Establishing realistic Time to Shipment targets for the items you sell drives Time to Shipment MRP. Time to Shipment targets are calculated up from the Lead Days and Job Days allocations and order policies of the sell item and its lower-level components. Top level Time to Shipment calculations can only be realistic when all lower-level item Lead Days and Job Days allocations are also realistic and kept free from artificial padding.

Meet, don’t beat, the schedule

The purpose for using realistic Lead Days and Job Days allocations is to generate a master schedule that is realistic and achievable, not one with inflated dates that are always easy to beat. When dates are always easy to beat, you eliminate the valuable
feedback on planned versus actual performance that boosts your efficiency over time. For efficient manufacturing, your objective should be to meet, not beat, the schedule.

“Just in time” scheduling is easier and highly efficient

“Just in time” scheduling is easier than any other conceivable method because it is completely automatic and is driven entirely by item settings.

“Just in time” scheduling is highly efficient because you operate within a multi-level, time-phased schedule with meaningful dates and job priorities. The job schedule is fully self-adjusting when jobs are released to live production and jobs are automatically prioritized in work center queues relative to their required dates.

Avoid any schemes that artificially inflate or “trick” Lead Days and Job Days allocations and your planning will be much easier and far more efficient.

Mistake #2 - Hybrid Planning

Time to Shipment MRP establishes consistent and reliable Time to Shipment targets for your sell items. This is achieved by using consistent order policies and consistent scheduling allocations to generate jobs and POs. Avoid “hybrid” planning schemes that create unplanned stock for To Order policy items, which causes the following problems:

- Stocking an item that has a To Order policy wrongfully causes the item to contribute to higher-level Lead Days calculations, which adversely elongates Time to Shipment targets and SO required dates.
- One form of hybrid planning is to create manual jobs and POs for To Order policy items. This not only adversely elongates higher-level Lead Days calculations as described above, it also causes over-stocking because inventory is “pushed” onto the system. By contrast, “just in time” job and PO generation keeps inventory lean by “pulling” inventory into the system only when triggered by actual demand.
- Another form of hybrid planning is to create unplanned stock for a To Order policy item by manually boosting job and PO quantities beyond what is needed to fulfill actual demand. Unplanned stock wrongfully causes the item to contribute to higher-level Lead Days calculations, which adversely elongates Time to Shipment targets and SO required dates.

Plan for stock with a Stocking order policy

If you decide that an item should be stocked, never use hybrid planning for that purpose because of the problems listed above. Instead, assign the item a Stocking order policy and enter a Monthly Demand rate and/or Safety Factor to calculate a Reorder Point. The Stocking order policy properly excludes the item from higher-level Lead Days calculations and the Reorder Point will generate replenishment jobs or POs when triggered by actual demand.
MRP automatically adjusts to actual demand

When actual demand differs from the Monthly Demand rate and/or Safety Factor that is built into the calculated Reorder Point, MRP automatically makes the following adjustments without any need for manual intervention:

- If actual demand is greater than planned, a replenishment job or PO will be triggered to cover any shortage. If a job gets triggered, it will have an immediate required date that gives the job top priority in work center queues to reduce queue time and minimize the duration of the shortage.

- If actual demand is less than planned, the next replenishment job or PO will be delayed until actual net demand falls below the Reorder Point. This caps stock on hand and minimizes over-stocking.

Mistake #3 - Shortage Report Planning

Manual job and PO creation from a shortage report bypasses MRP altogether and causes the following problems:

- Shortage reports fail to take into account the time-phased nature of multi-level demand, which makes job scheduling highly complicated and promotes over-stocking.

- Manual job and PO dates are often outside item action windows and include longer-term demand that is tentative, incomplete, and prone to date, quantity, and specifications changes, as well as order cancellations.

- Manual jobs lack the multi-level date alignment that is achieved with MRP job generation. This corrupts the job release process, which relies on sequential, multi-level date alignments for material allocation priorities.

- Manual jobs lack meaningful required dates, which are needed for job priority calculations. Without meaningful job priorities you lose the ability to manage and coordinate work center queues.

MRP screens are the ultimate shortage report

Using a self-devised shortage report is reinventing the wheel. This is because MRP conveys all the information found in any shortage report, but does it in a time-phased manner and combines it with job and PO conversion. MRP is the ultimate shortage report for these reasons:

- MRP job generation is a set of shortage reports, each presented in top-down multi-level order so that the jobs converted at each level generate demand for subassemblies at the next level.

- POs are always generated after jobs are fully converted so that purchased items have complete demand profiles.
For To Order policy items, jobs and POs are only generated when actual demand materializes within the item’s action window.

For Stocking order policy items, jobs and POs are only generated when actual net demand within the item’s action window falls below its Reorder Point.

For all items, jobs and POs only respond to short-term demand within item action windows, which is firmly set without being prone to quantity or specifications changes or order cancellations.

MRP generation is done daily so that demand progressively falls into item action windows and gets acted upon "just in time" for efficient scheduling.

PO due dates and lower-level job finish dates are aligned with higher-level job planned start dates. This enables the job release process to allocate available materials in job planned start date order.

Planned jobs and POs are automatically converted to actual jobs and POs without any need for manual entry.

Review notes can be required and used for items with special planning instructions.

The Stock Status inquiry can be accessed against any item to view all demand and supply transactions as well as item planning settings.

The No Action Needed inquiry can be accessed against any item to view future demand outside the item’s action window, which will be responded to in future MRP sessions.

Planned POs are conveniently optimized for alternate supplier selection, pricing verification, and manufacturer part number designation.

**Mistake #4 – Self-Devised Scheduling**

Time to Shipment MRP with its “just in time” architecture generates a self-aligned, self-adjusting, and self-prioritizing master sales order, job, and PO schedule. This is achieved as follows:

- Planned Time to Shipment targets are used to generate sales order line item required dates.
- Realistic Lead Days and Job Days allocations are used to generate job start and finish dates and PO due dates.
- Job finish dates are automatically rescheduled when jobs are released to live production when allocated materials become available.
- Jobs are automatically prioritized in work center queues relative to their required dates.

This simple and efficient scheduling architecture is driven entirely by item settings -- Lead Days and Job Days allocations and order policies.
• Any self-devised scheme that circumvents this scheduling architecture will be highly inefficient and problematic.

• Manual scheduling schemes that skip Lead Days and Job Days allocations have no item action windows to distinguish between short-term demand that needs action versus long-term demand that can be acted upon later.

• Manual sales order required dates are difficult to establish and if are not applied to items consistently from order to order result in conflicting job and shipping priorities.

• The job release process cannot effectively allocate materials in sequential multi-level order unless job start dates are established in a consistent, logical manner.

• Any scheme that skips the job release process has no automatic means for rescheduling jobs based on actual shop conditions.

• Uncoordinated dates result in meaningless and confusing job and sales order late dependencies in the PO Schedule and Job Schedule screens.

**Mistake #5 - Future Demand Explosions**

Another planning mistake is using any scheme that creates future jobs to explode long-term demand for lower-level items, which causes the following problems:

• Manual jobs for long-term forecasts are “placeholder” jobs with no basis in actual demand. Placeholder jobs and all their dependent subassembly jobs and POs require constant cancellation and reentry because actual demand always differs from forecast demand.

• Long-term demand outside item action windows is tentative, incomplete, and prone to date changes, quantity changes, and specifications changes, as well as order cancellations.

• Acting prematurely against long-term demand outside of item action windows results in needless over-stocking that ties up working capital and storage space.

**Do not use live jobs for forecasting**

The motivation for exploding future demand is to anticipate the materials at all levels that will be needed to supply the forecast. It is a big mistake to use live jobs for forecasting because actual demand always differs from forecast demand and live jobs become obsolete.

Using live jobs for forecasts is even more problematic at lower levels. Any forecast error at the parent job level generates errors of similar magnitude down through dependent subassembly jobs and POs.

**Use forecast-driven Reorder Points instead**
Instead of using live jobs to explode future demand, build your forecasts into calculated Reorder Points so that jobs and POs can be triggered "just in time" by actual demand. Do the following for each forecasted sell item as well as any subassembly items and purchased items that are to be supplied from stock.

Give the item a Stocking order policy and enter a Monthly Demand rate and/or monthly Safety Factor as your forecast, which calculates a Reorder Point. MRP will trigger a job or PO whenever actual net demand within the item’s action window falls below the Reorder Point.

Hobs and POs are now triggered by short-term actual demand that is firmly set without being prone to scheduling changes, specifications changes, or order cancellations.

**Mistake #6 - Blanket POs**

A common planning mistake is to use blanket POs to forecast an item’s long-term material requirements.

**Actual demand always differs from forecast demand**

Using a live PO as a forecast is problematic because actual demand always differs from forecast demand. Blanket POs therefore require constant monitoring and rescheduling to prevent shortages or over-stocking.

**Blanket POs must be actively managed**

Blanket POs require active management to keep supply aligned with actual demand. Careful monitoring is needed so that dates are moved out or quantities boosted when actual demand is greater than the forecast. Conversely, when actual demand is less than the forecast, dates must be moved out or quantities reduced to prevent an accumulation of stock on hand.

**Build your forecast into a Reorder Point instead**

Instead of using live POs for forecasting, build your forecasts into calculated Reorder Points so that POs are triggered “just in time” by actual demand. To do so, give the item a Stocking order policy and enter a Monthly Demand rate and/or monthly Safety Factor as your forecast, which calculates a Reorder Point. MRP will trigger a PO whenever actual net demand within the item’s action window falls below the Reorder Point.

**Accompany the Reorder Points with Supply Days interval**

After the Reorder Point is established, enter a planned Supply Days interval, which calculates a Min Order quantity that determines the size and frequency of POs. For example, if you enter a Supply Days interval of 30, MRP will generate a demand-driven PO in approximate 30 day intervals.
The Supply Days interval is self-adjusting

The *Supply Days* interval is self-adjusting, which benefits you and your supplier because it eliminates all the PO scheduling changes and communications that are required to maintain a blanket PO. For example, when actual demand is less than the *Monthly Demand* amount, the next PO will be delayed until actual net demand falls below the item’s *Reorder Point*. Conversely, when actual demand is greater than the *Monthly Demand* amount, the next PO will be generated earlier than planned and for a greater quantity if needed.
5 MRP Workflow Overview

The Time to Shipment MRP process workflow is covered in the next seven chapters and consists of the following elements:

1. Time to Shipment Planning
   Planned Time to Shipment targets are established for sell items by assigning Lead Days and Job Days allocations and a To Order or Stocking order policy to all manufactured and purchased items.

2. Lean Inventory Planning
   For each Stocking order policy item, inventory is kept lean with a dynamically calculated Reorder Point, which is derived from a Monthly Demand rate and/or monthly Safety Factor, and a dynamically calculated Min Order quantity, which is derived from a planned Supply Days interval.

3. SO Required Dates
   Each sell item’s planned Time to Shipment target establishes the line item Required Date during sales order entry, which drives job generation, job prioritization, and shipment priority.

4. Job and PO Generation
   For To Order policy items, MRP generates a job or PO whenever new demand materializes. For Stocking order policy items, MRP generates a job or PO whenever net demand within the item’s action window falls below its Reorder Point. Supply dates for POs and lower-level jobs are aligned with higher-level job planned start dates.

5. PO Tracking
   POs in progress are tracked in the PO Schedule screen so that late POs are expedited to minimize delays to dependent jobs.

6. Job Release
   Materials on hand are allocated to jobs in planned start date order so that each job is released to live production when its materials become fully available. Job release is delayed for jobs dependent on late inbound POs or subassembly jobs. Each released job gets a new job finish date relative to its actual release date, which makes the job schedule fully self-adjusting without need for manual intervention.

7. Job Prioritization
Each released job is given a *Job Priority* calculation based on estimated production time remaining relative to the job’s required date. Job sequences are listed in work center queues in *Job Priority* order so that jobs trending late get run first and experience less overall queue time. Running work centers by *Job Priority* coordinates queue time throughout the shop so that all jobs meet their required dates and orders get shipped on time.
6 1. Time to Shipment Planning

The first MRP workflow process is Time to Shipment planning. Planned Time to Shipment targets are established for sell items by assigning Lead Days and Job Days allocations and a To Order or Stocking order policy to all manufactured and purchased items.

MRP Settings

(MRP – MRP Settings)

Time to Shipment planning is done in the MRP Settings screen. For initial setup, complete each of the following tasks in sequential order.

1. Assign a Lead Days allocation to all P items

Assign each and every P item a Lead Days allocation, which is the number of calendar days planned for PO scheduling.

Purpose

The purchased item Lead Days allocation establishes the item’s action window for PO generation, establishes the PO line item Due Date, and contributes to M item Lead Days allocations when the item has a To Order policy.

Lead Days Entry

Go to the P Items screen. In the Lead Days field, enter the number of calendar days you wish to allocate for PO scheduling.

Guidelines

- The Lead Days allocation must be realistic and plausible. An approximate “ball park” allocation is sufficient for good results.
- The Lead Days allocation should be sufficient to cover procurement time, receipt processing time, and potential variations in delivery time.
- If the item has a variable lead time where sometimes it can be procured quickly and sometimes not, you must enter a single Lead Days allocation either somewhere in the middle or towards the longer lead time. Never adjust the Lead Days on a situational basis.
- When planning for electronic components or any item where a manufacturer part number is specified, never use the manufacturer’s lead time as the Lead Days allocation. This is because you will typically source an alternate part when the default manufacturer’s part is not currently available. A lengthy manufacturer’s lead time is never used for actual planning and will corrupt
item action windows, PO due dates, and higher-Level M item Lead Days allocations.

- Never artificially inflate Lead Days allocations because it will corrupt the Lead Days of higher-level M items and calculated Time to Shipment targets for sell items. See the Inflated Allocations section in the previous chapter, Planning Mistakes to Avoid, for details.

Delivery Inquiry

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

Mass entry by supplier

Within a given supplier, Lead Days allocations 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 allocations 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. You can then use the Data Import - Stock Items - MRP Settings - P Items screen to import the Lead Days values.

2. Assign a Run Size and Job Days allocation to all M items

Assign each and every M item a Run Size, which represents a typical larger-size job quantity, and a Job Days allocation, which is the number of shop days planned for job scheduling.

Run Size Purpose

The Run Size is used to calculate an estimated Job Days amount in the Job Days Inquiry. It is also used by the cost rollup to amortize total fixed setup cost and fixed quantity component cost into a unit cost.

Run Size Entry

Enter a Run Size amount that represents a typical larger-size job quantity. A larger-size quantity ensures that the calculated Job Days Inquiry is sufficient to cover most quantity scenarios.

Production Inquiry

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

Job Days Purpose
The Job Days allocation helps establish the item’s action window for job generation, establishes Job Finish dates, and contributes to higher-level M item Lead Days allocations when the item has a To Order policy.

Job Days Entry

Enter the number of shop days you wish to allocate for the scheduling “spread” between the job start date and job finish date.

Guidelines

- The Job Days allocation must be realistic and plausible. An approximate “ball park” allocation based on judgment and past experience is sufficient for good results. Allocations will be refined over time as you gain more experience with the system.

- The Job Days allocation should be sufficient to cover production time, work center queue times, and work center move times. Bear in mind that jobs often spend more time waiting at work centers than in actual production.

- Many M items have similar or identical production processes, so in many cases the same Job Days allocation can be applied to multiple items.

- Never adjust Job Days allocations on a situational basis to accommodate a particular requirement or order quantity. The system automatically adjusts job priorities to accommodate unusual quantities.

- Never artificially inflate Job Days allocations because it will corrupt the calculated Lead Days of higher-level M items and calculated Time to Shipment targets for sell items. See the Inflated Allocations section in the previous chapter, Planning Mistakes to Avoid, for details.

Job Days Inquiry

For assistance in establishing the Job Days allocation, 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 Run Size to current work center capacity settings and routing cycle times.

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

Production Inquiry

For additional assistance in establishing the Job Days allocation, click the Production tab to reference actual shop days for past jobs.

3. Assign a Stocking order policy to appropriate P items
Assign a *Stocking* order policy to appropriate P items to reduce contributions to higher-level M item *Lead Days* calculations and to achieve more efficient PO quantities.

**Purpose**

A *Stocking* order policy means that stock is planned to be on hand for immediate issuing to jobs, which removes the delay to job start dates that would otherwise be required to purchase the item to order. PO quantities will be larger and more consistent compared to purchasing the item to order.

**When is Stocking appropriate?**

A *Stocking* order policy is appropriate for P items under any of these conditions:

- When the P item has consistent and predictable demand, in which case it can be more efficient to generate consistent PO quantities at demand-driven *Supply Days* intervals.
- When the P item has a lengthy *Lead Days* allocation where purchasing the item to order would cause an unacceptable delay to job start dates.
- When the P item’s default supplier requires a minimum order quantity that results in stock on hand.
- When you already have been stocking the item in actual practice, always assign the item a *Stocking* order policy. Stocking an item that has a *To Order* policy wrongfully causes the item to contribute to higher-level M item *Lead Days* calculations. See the *Hybrid Planning* section in the previous chapter, *Planning Mistakes to Avoid*, for details.

**Order Policy Selection**

To change the item’s order policy, click the button in the *Order Policy* field to launch the *Order Policy* screen. In the *Order Policy* panel, select *Stocking (Monthly Demand)* or *Stocking (Safety Factor)*. See the next chapter, 2. *Lean Inventory Planning*, for guidance on which stocking order policy to use and how to enter accompanying settings.

**4. Assign a Stocking order policy to appropriate lower-level M items**

Assign a *Stocking* order policy to appropriate lower-level M items to eliminate their contribution to higher-level M item *Lead Days* calculations.

**Purpose**
For lower-level M items, a *Stocking* order policy means that stock is planned to be on hand for immediate issuing to jobs, which removes the delay to higher-level job start dates that would otherwise be required to make the item to order.

**When is Stocking appropriate?**

A *Stocking* order policy is appropriate for lower-level M items under any of these conditions:

- When a lower-level M item has consistent and predictable demand, it can be more efficient to generate consistent job quantities at demand-driven *Supply Days* intervals.
- When a lower-level M item has *Lead Days* plus *Job Days* allocations where making the item to order would cause an unacceptable delay to higher-level job start dates.
- When you already have been stocking the item in actual practice, always assign the item a *Stocking* order policy. Stocking an item that has a *To Order* policy wrongfully causes the item to contribute to higher-level M item *Lead Days* calculations. See the *Hybrid Planning* section in the previous chapter, *Planning Mistakes to Avoid*, for details.

**Order Policy Selection**

Select the *Display - M Items - Lower Levels* checkbox in the upper panel to limit the screen to lower-level M items.

To change the item’s order policy, click the button in the *Order Policy* field to launch the *Order Policy* screen. In the *Order Policy* panel, select *Stocking (Monthly Demand)* or *Stocking (Safety Factor)*. See the next chapter, 2. *Lean Inventory Planning*, for guidance on which stocking order policy to use and how to enter accompanying settings.

**5. Assign a Stocking order policy to appropriate top-level M items**

Assign a *Stocking* order policy to eliminate or minimize the *Time to Shipment* target for appropriate top-level M items.

**Purpose**

For top-level M items, a *Stocking* order policy means that stock is planned to be on hand for immediate shipment to customers, which removes the delay that would otherwise be required to make the item to order.

**When is Stocking appropriate?**
A *Stocking* order policy is appropriate for top-level M items under any of these conditions:

- When an item has consistent and predictable orders, it is often more beneficial to stock the item for immediate shipment instead of making it to order. Not only does this boost sales through greater customer satisfaction, you get paid much faster so that the extra cash flow often exceeds the carrying cost of the inventory. You also benefit from more efficient job quantities generated in consistent *Supply Days* intervals.

- When making an item to order requires a *Time to Shipment* target that is unacceptable to the marketplace, the item must be planned for stock.

- Do not apply the CTO (custom to order) flag against standard products that meet either of the above conditions and would benefit from being planned for stock. The CTO flag, which is only intended for items that are customized with each order, is quite restrictive because it limits the item to a *To Order* policy and forces the job quantity to equal the sales order quantity without any flexibility to account for leftover stock on hand or to plan extra stock for spares or exchanges.

**Order Policy Selection**

Select the *Display - M Items - Top Level* checkbox in the upper panel to limit the screen to top level M items.

To change the item’s order policy, click the button in the *Order Policy* field to launch the *Order Policy* screen. In the *Order Policy* panel, select *Stocking (Monthly Demand)* or *Stocking (Safety Factor)*. See the next chapter, 2. *Lean Inventory Planning*, for guidance on which stocking order policy to use and how to enter accompanying settings.

**6. Review SO Required Dates settings**

Go to the *Sales - Sales Setup - SO Required Dates* screen and review the extra *Shop Days* setting against the *To Order* and *Stocking* order policies.

**To Order Policy Items**

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

**NOTE:** If you specify any extra shop days, all jobs for *To Order* policy items will be delayed by that number of days. Unless you purposely want a widespread delay to all such jobs, we do not recommend using this setting.

**Stocking Order Policy Items**
With Stocking order policy items the extra Shop Days enables you to extend SO line item Required Dates by an extra day or two to account for orders that are received today, but can’t be shipped until tomorrow or the next day.

7. Refine Time to Shipment targets

After all the previous tasks have been completed, the final task is to review and refine your Time to Shipment targets.

Time to Shipment targets establish SO Required Dates

Your planned Time to Shipment targets establish sales order Required Dates, which in turn drive job generation and job and shipping prioritization.

Enables a company-wide time to shipment strategy

Planned 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 scheduling allocations 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.

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 limited to any extra Shop Days specified in the SO Required Dates screen, plus a Non-Shop Days factor to account for weekends and holidays.

To Order Policy Items

When the item has a To Order policy, it is planned to be made to order. In this case Time to Shipment is comprised of the item’s Lead Days allocation, Job Days allocation, any extra Shop Days specified in the SO Required Dates screen, plus a Non-Shop Days factor to account for weekends and holidays.

Review your Time to Shipment targets

In this task you will review all your Time to Shipment targets to make sure that they meet your marketing objectives.

Reduce Time to Shipment where needed
When you encounter a *Time to Shipment* target that does not meet your marketing objectives, you can reduce the calculated value by taking any of the following measures:

**Stocking Order Policy Items**
- You can reduce the extra *Shop Days* specified in the *SO Required Dates* screen.

**To Order Policy Items**
- You can eliminate or minimize *Time to Shipment* by assigning the item a *Stocking* order policy so that it is planned for immediate shipment from stock. This removes the *Lead Days* and *Job Days* variables from the calculation. See task 5 above, *Assign a Stocking order policy to appropriate top-level M items*, for details.
- You can reduce the item’s *Job Days* allocation over time as you get more efficient in the shop.
- You can reduce the item’s *Lead Days* allocation 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 to the *Lead Days* allocation. To remove that component as a contributor, assign it a *Stocking* order policy. After doing so, examine the effect on the *Lead Days* allocation. Continue removing contributor components until the item’s *Lead Days* allocation is reduced to your satisfaction.
- You can reduce the extra *Shop Days* specified in the *SO Required Dates* screen.
2. Lean Inventory Planning

The second MRP workflow process is to plan lean inventory settings for items with a Stocking order policy.

**Order Policy Screen**

*(MRP - MRP Settings)*

M and P items are assigned a Stocking order policy and given lean inventory planning settings in the Order Policy screen within the MRP Settings screen. Click the button to the right of the Order Policy field to launch the Order Policy screen.

1. **Choose a Stocking policy and calculate a Reorder Point**

   In the previous chapter, selected items were to be assigned a Stocking order policy to remove their contributions to higher-level M item Lead Days calculations and Time to Shipment targets.

   For each such item, in this task you will assign the item either a Stocking (Monthly Demand) order policy or a Stocking (Safety Factor) order policy and accompanying monthly demand settings to calculate a Reorder Point.

**Option A - Stocking (Monthly Demand)**

The first Stocking order policy option is Stocking (Monthly Demand), which dynamically calculates the item’s Reorder Point based on a Monthly Demand rate.

**How it works**

A planned Monthly Demand rate is used to calculate the Reorder Point. When actual net demand within the item’s action window falls below the Reorder Point, a job or PO is triggered “just in time” to cover new demand over the time it takes to replenish stock. “Just in time” planning keeps inventory lean because it prevents over-stocking and minimizes the duration of shortages.

**Ideally suited for high value items with predictable demand**

The Stocking (Monthly Demand) order policy is ideally suited for items with relatively high inventory value and predictable monthly demand.

- When an item has high inventory value, avoiding over-stocking is essential to preserve scarce working capital.
- When an item has a predictable monthly demand rate, using it to calculate a Reorder Point triggers jobs “just in time” for efficient scheduling. Combine the calculated Reorder Point with a lean Supply Days interval (see below) and
jobs are started only a short time earlier than they would be if the item was made to order.

Ideally suited for P items with extremely long Lead Days

The Stocking (Monthly Demand) order policy is ideally suited for P items with extremely long Lead Days allocations. With such items it is highly important to incorporate expected monthly Usage and a monthly Safety Factor into the calculated Reorder Point. When the Reorder Point is combined with a Supply Days interval, a pipeline of staggered POs gets generated, each spaced apart by the Supply Days interval. See The PO Pipeline Effect at the end of the next task for details.

Order Policy selection

In the Order Policy panel, select the Stocking (Monthly Demand) option. After doing so, the Sales, Usage, and Safety Factor fields become visible in the Monthly Demand panel at left.

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.

Enter a monthly Sales or Usage rate

Enter a monthly Sales or Usage rate in the Monthly Demand panel at left, which is your assumption of probable average 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.

Enter a Safety Factor to cover potential monthly variance

The Reorder Point calculation should also account for potential variance above the average monthly demand rate. The monthly Sales or Usage rate should therefore be augmented with a Safety Factor to cover potential monthly variance.

Establishing the Safety Factor

- One method for establishing the Safety Factor is to use the Sales and Usage history in the lower panel to determine a monthly amount that would cover all or most past demand scenarios. Subtract the quarterly or annual monthly average from that amount to calculate the monthly variance and enter that as the Safety Factor.
Another method for establishing the Safety Factor is to use the Std Deviation, which is displayed in the Average Monthly Trend panel at left. The Std Deviation is a statistical measure of variability in a data set, so only use this method when the item has a complete history profile. Statistically, the Std 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 Deviation can be used as the Safety Factor because it covers the majority of likely monthly variance scenarios.

If the item does not have historical data, apply a common sense percentage to the monthly Sales or Usage rate to account for potential monthly variance.

Total Monthly Demand is not a literal forecast

The Safety Factor is added to Sales and Usage to calculate total Monthly Demand, which is displayed in the upper panel. Total Monthly Demand is not a literal forecast because it accounts for potential monthly variance above the average and is often significantly higher than a monthly forecast would be.

The Reorder Point is dynamically calculated

All the above settings contribute to the item’s Reorder Point, which is 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.

Review Monthly Demand settings on a periodic basis

Monthly Demand settings should be reviewed on a periodic basis to ensure that monthly rates and safety factors are still valid. You can use the MRP - MRP Analysis Codes screen to assign and schedule sets of items for periodic review. See the Using MRP Analysis Codes chapter for more details.

Settings provide planning logic transparency

The big benefit of a calculated Reorder Point is that the settings from which it is derived – the item’s monthly Sales, Usage, and Safety Factor and the items Lead Days and Job Days allocations – are visible and transparent. This enables the
planner and others in the company to be fully aware of the logic being used for inventory planning.

**Option B - Stocking (Safety Factor)**

The second Stocking order policy option is Stocking (Safety Factor), which dynamically calculates the item’s Reorder Point based on a fixed monthly Safety Factor that covers all or most potential monthly demand scenarios.

**How it works**

A planned monthly Safety Factor, which covers all or most likely monthly demand scenarios, is used to calculate the Reorder Point. When actual net demand within the item’s action window falls below the Reorder Point, a job or PO is triggered “just in time” to cover new demand over the time it takes to replenish stock. “Just in time” planning keeps inventory lean because it prevents over-stocking and minimizes the duration of shortages.

**Ideally suited for low value items**

The Stocking (Safety Factor) order policy is ideally suited for relatively low inventory value items where the carrying cost of inventory is of little or minimal significance. You simply establish a fixed monthly Safety Factor sufficient to cover all or most potential monthly demand scenarios.

**Also suited for highly unpredictable items**

The Stocking (Safety Factor) order policy is also suited for items that have highly unpredictable and sporadic demand where it is not feasible to determine a monthly Sales or Usage rate.

**Order Policy selection**

In the Order Policy panel, select the Stocking (Safety Factor) option. After doing so, the Safety Factor field becomes visible in the Monthly Demand panel at left.

**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.

**Safety Factor entry**
In the *Monthly Demand* panel, enter a *Safety Factor* amount sufficient to cover all or most potential monthly demand scenarios. To help establish this amount you can examine highest monthly amounts in the *Sales* and *Usage* history in the lower panel.

**“Set it and forget it”**

Once it is established, the item’s *Safety Factor* should be left as is without periodic review and adjustment. It is meant to be a “set it and forget it” order policy.

**The Safety Factor is not a stocking level**

The *Safety Factor* is not a stocking level and will not function as one. Instead, it is a monthly demand rate sufficiently high enough to cover all or most potential monthly demand scenarios.

**The Reorder Point is dynamically calculated**

The item’s *Reorder Point* is 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.

**Settings provide planning logic transparency**

The big benefit of a calculated *Reorder Point* is that the settings from which it is derived – the item’s monthly *Safety Factor* and its *Lead Days* and *Job Days* allocations – are visible and transparent. This enables the planner and others in the company to be fully aware of the logic being used for inventory planning.

**Option C - Stocking (Manual)**

The third *Stocking* order policy option is *Stocking (Manual)*, which enables manual entry of a fixed *Reorder Point*.

**Manual Reorder Point entry is not recommended**

Manual *Reorder Point* entry is not recommended for these reasons:

- A manual *Reorder Point* is an opaque setting with no visible logical basis for its origination. By contrast, a calculated *Reorder Point* (see options A and B
above) is derived from logical planning settings that are visible and transparent to the planner and others in the company.

- A manual Reorder Point remains fixed and never adjusts to changes in monthly demand or replenish time. By contrast, a calculated Reorder Point (see options A and B above) is dynamically recalculated if any change occurs to the item’s Sales, Usage, Safety Factor, Lead Days, or Job Days.

- Because a manual Reorder Point is not calculated from any planning settings, it is often mistakenly used as a stocking level target that typically results in needless and costly over-stocking.

- A manual Reorder Point cannot be used with the Supply Days interval (see next task), which is multiplied by planned Daily Demand to calculate the item’s Min Order quantity. Consequently, the Min Order quantity must be manually entered without a visible logical basis for its origination.

For high value items, use Stocking (Monthly Demand)

For items with relatively high inventory value and predictable demand, it is difficult to achieve lean inventory planning with a manual Reorder Point. The far more efficient alternative is to use the Stocking (Monthly Demand) order policy.

A planned Monthly Demand rate is used to calculate the Reorder Point so that jobs and POs are triggered “just in time” to cover new demand over the time it takes to replenish stock. “Just in time” planning keeps inventory lean because it prevents over-stocking and minimizes the duration of shortages.

For P items with long Lead Days, use Stocking (Monthly Demand)

For P items with extremely long Lead Days allocations, it is almost impossible to plan for efficient PO generation using a manual Reorder Point. The only way to plan for such items is to use the Stocking (Monthly Demand) order policy.

With extremely long Lead Days items it is highly important to incorporate expected monthly Usage and a monthly Safety Factor into the calculated Reorder Point. When the Reorder Point is combined with a Supply Days interval, a pipeline of staggered POs gets generated, each spaced apart by the Supply Days interval. See the next task, Enter a Supply Days interval, for details.

For low value items, use Stocking (Safety Factor)

For items with relatively low inventory value where the carrying cost of inventory is of little or minimal significance, a more transparent and meaningful alternative to a manual Reorder Point is to use the Stocking (Safety Factor) order policy. You simply establish a fixed monthly Safety Factor sufficient to cover all or most potential monthly demand scenarios. The Reorder Point has a logical basis for its origination and is dynamically recalculated if any changes occur to the item’s Lead Days or Job Days allocations.
Use the Stocking (Safety Factor) order policy if your objective is to “set it and forget it.” Once it is established, the item’s Safety Factor is left as is without need for periodic review and adjustment.

2. Enter a Supply Days interval

For each item with a Stocking (Monthly Demand) or Stocking (Safety Factor) order policy, enter a Supply Days interval in the Min Order panel to calculate a Min Order quantity.

Calculates the Min Order quantity

When an item is assigned to the Stocking (Monthly Demand) or Stocking (Safety Factor) order policy, a Supply Days interval is entered, which is the planned number of days between each replenishment job or PO. The Supply Days interval is multiplied by planned Daily Demand to calculate a Min Order quantity.

Whenever the item’s Reorder Point triggers a job or PO, the job quantity or PO quantity will be equal or greater than the Min Order quantity to cover new demand for the number of planned Supply Days.

Generates a PO pipeline for P items with extremely long Lead Days

The Supply Days interval is ideally suited for P items with extremely long Lead Days allocations. Such items are assigned the Stocking (Monthly Demand) order policy so that expected monthly Usage and a monthly Safety Factor are incorporated into the calculated Reorder Point. When the Reorder Point is combined with a Supply Days interval, a pipeline of staggered POs gets generated, each spaced apart by the Supply Days interval. See The PO Pipeline Effect below for details.

Supply Days entry

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 Min Order quantity is dynamically calculated
The item’s *Min Order* quantity is 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.

**Settings provide planning logic transparency**

The big benefit of a calculated *Min Order* quantity is that the settings from which it is derived – the item’s monthly *Sales, Usage, and Safety Factor* and its *Supply Days* interval – are visible and transparent. This enables the planner and others in the company to be fully aware of the logic being used for inventory planning.

**The PO Pipeline Effect**

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 after stock is replenished 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 complete standstill.

Instead of deploying one PO at a time, the ideal planning method for long lead time items is to generate a pipeline of multiple POs in progress, each due to arrive at staggered intervals. That way if a shortage occurs, it will be relatively short in duration because the next PO is likely to arrive soon, and delays to dependent jobs will be tolerable.

**PO pipeline setup**

A PO pipeline is achieved by assigning the item a *Stocking (Monthly Demand)* order policy and entering expected monthly *Usage* and a monthly *Safety Factor* to calculate a *Reorder Point*. Accompany the *Reorder Point* with a *Supply Days* interval to establish the desired number of days between POs.

**The Reorder Point will have a relatively high value**

The item’s *Lead Days* allocation is one of the variables used in the *Reorder Point* calculation. An extremely long *Lead Days* allocation will cause the *Reorder Point* to have a relatively high value compared to items with short *Lead Days*. Do not be alarmed by this because the *Reorder Point* is a “trigger point”, not a stocking level.
Net Supply will have a relatively high value

When a PO pipeline is implemented, the item will have a relatively high Net Supply value, which is calculated as follows:

\[ \text{Net Supply} = \text{Stock on Hand} + \text{POs in Progress} - \text{Actual Demand} \]

Take note that POs in progress are counted as current supply, which causes Net Demand to have a relatively higher value than would be indicated by stock on hand alone.

NOTE: “Net supply” and “net demand” are interchangeable terms.

Actual demand triggers the next PO

The next PO gets triggered when Net Supply falls below the item’s Reorder Point. So even though the item has high Net Supply and Reorder Point values, it is only the difference between the two values that matters. A very small amount of actual demand can easily cause Net Supply to fall below the Reorder Point and trigger the next PO.

PO intervals are self-adjusting

The intervals between POs are self-adjusting according to actual demand. For example, if actual demand happens to be less than planned, the next PO gets delayed and interval time is increased. Conversely, if actual demand happens to be greater than planned, the next PO is triggered earlier and interval time is decreased.

Example

A simple example illustrates how a 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 will be 600.

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

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

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

If actual monthly demand exactly equals planned monthly demand, a PO would 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 Supply falls below the Reorder Point and the next PO is triggered.
100 Stock on Hand + 500 POs in Progress - 10 Job Demand Qty = 590 Net Supply
590 Net Demand < 600 Reorder Point
Triggers PO = 100 Qty (Min Order = 100)
3. SO Required Dates

The third MRP workflow process is to generate required dates during sales order entry.

Purpose

Time to Shipment MRP’s “just in time” architecture uses sales order demand to trigger top-level job generation. When a sales order line item is entered, the line item Required Date is populated by the item’s planned Time to Shipment and is a target ship date that determines job and shipping priority.

Consistent time to shipment is the objective

The objective of Time to Shipment MRP is to provide each sell item with a consistent and reliable time to shipment from one order to the next. This is achieved by establishing a realistic and stable planned Time to Shipment target for each sell item and allowing it to populate sales order Required Dates without interference.

Leave the default Required Date as is

During sales order line item entry, leave the default Required Date as is except in cases where the customer requests a scheduled order (see below).

Guidelines

- Never use the Required Date as a “wish date” by salespeople. The Required Date 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. 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 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, the “just in time” architecture leaves 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 when a relatively small order is received for an item with a To Order policy that can be covered by stock on hand (due to spare stock or an order cancellation) instead of being made to order as planned. Instead of moving the Required Date in, the “just in time” architecture leaves 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.

**Override the date for scheduled order entry**

When the customer requests a scheduled order with one or more future ship dates, as in the case of a blanket order, only then should the default *Required Date* be manually overridden. MRP will take no action on the sales order line item until the *Required Date* eventually falls into the item’s action window.

**Pick sales orders using the Shipment Planner**

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.
9 4. Job and PO Generation

The fourth MRP workflow process is to generate jobs and POs on a daily basis.

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 action windows.

MRP generation can involve two or more people

It is not uncommon for MRP generation to be shared by two or more people.

- The production planner who manages M item Lead Days and Job Days allocations typically generates planned jobs and converts them to live jobs.
- The production planner also typically generates planned POs, but does not convert them to live POs.
- Planned POs are converted into live POs by the buyer who manages P item Lead Days allocations, supplier selection, and item pricing. POs are converted after prices, suppliers, and manufacturer part numbers are reviewed and confirmed.
- It is also possible for PO conversion to be handled by multiple buyers whereby each buyer handles his or her own suppliers.

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

**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 planned *Time to Shipment* and is within the item’s 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 plus all inbound jobs less actual demand within the item’s action window) 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 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. See the Using Review Notes chapter for details.

**PO Generation**

**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 plus all inbound POs less actual demand within the item’s action window) 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 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 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 often tentative, incomplete, and subject to scheduling and specification changes and order cancellations.

**Interdependent demand is consolidated into single jobs**

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. See the *Using Review Notes* chapter for details.

**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.
5. PO Tracking

The fifth MRP workflow process is to track POs in progress and expedite late POs to minimize delays to dependent jobs.

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.
11 6. Job Release

The sixth MRP workflow process is to release jobs to live production 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.

   **NOTE:** For convenience 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 Newt 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.
7. Job Prioritization

The seventh and final MRP workflow process is to run work centers in job priority order to enable all jobs to 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:

\[
\text{Days to Required Date} - \text{Remaining Sequence Days} \over \text{Job Priority} = \text{Remaining Sequence Days}
\]

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.
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.
13 Using Review Notes

MRP is driven entirely by item settings

Time to Shipment MRP with its “just in time” architecture 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.
14 Using MRP Analysis Codes

MRP analysis codes can help you maintain your MRP settings for critical items. They are setup and used in the 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.

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.

Use to maintain forecast settings against critical items

MRP analysis codes are best used to maintain monthly forecast settings against critical items where precise Reorder Points can minimize the probability of shortages or over-supply. Critical items are assigned to the Forecast RP order policy and are defined as follows:

- **Items with high strategic value**
  
  Items with high strategic value are considered critical when the impact of a shortage would cause unacceptable delays to dependent jobs and sales orders.

- **Items with high inventory value**
  
  Items with high inventory value are considered critical when the impact of over-supply would be financially or logistically unacceptable.

The objective with critical items is to maintain Reorder Point precision so that jobs and POs get generated in a timely manner that minimizes the probability of shortages or over-supply. Each item’s Reorder Point is calculated from the monthly forecast applied
to replenish time and therefore benefits from an accurate estimate of monthly Sales, Usage, and an appropriate Safety Factor to account for monthly variance.

We recommend that you assign appropriate MRP analysis codes to your critical Forecast RP items as defined above. Critical items are typically a small percentage of overall items. This enables you to schedule periodic reviews of monthly forecast settings for related sets of items.

**Forecast settings for non-critical items can be spot checked**

Maintaining Reorder Point precision is important with critical items, but much less so with non-critical items. For non-critical items, you can adjust monthly forecast settings on a spot check basis instead of by mass review using MRP analysis codes. We recommend reviewing an item's monthly forecast settings under these circumstances:

**Unexpected shortage during MRP generation**

Whenever an unexpected shortage against a Forecast RP item is encountered during MRP job or PO generation as indicated by a Days Past Req value, check its monthly Sales, Usage, and Safety Factor settings and make adjustments if needed.

**Significant over-supply detected**

Whenever a significant over-supply for a Forecast RP item is detected on the Inventory Value report, check its monthly Sales, Usage, and Safety Factor settings and make adjustments if needed.

**Major change in actual or anticipated demand**

Whenever a major change in demand occurs or is anticipated for an item, adjust its monthly Sales, Usage, and Safety Factor settings as needed.

**Forecast settings can remain fixed for non-critical items**

Periodic forecast adjustments are not needed against non-critical items. Monthly forecast settings can be left as is for non-critical items because their primary purpose is to furnish reasonable assumptions for establishing logical and valid Reorder Point and Min Order quantities. With non-critical items the impact of a shortage or over-supply is minimal.

If the monthly forecast is less than actual demand, the worst case scenario is to experience a shortage, but it will be brief in duration because stock will soon be replenished by a job or PO already in progress.

If the monthly forecast is greater than actual demand, the worst case scenario is to experience some over-supply, but no further jobs or POs will get generated until the over-supply is consumed by actual demand.
Summary

In general, we recommend limiting your use of MRP analysis codes to critical Forecast RP items where monthly forecast accuracy can minimize unacceptable shortages or over-supply. For all your non-critical items, however, we recommend leaving monthly forecast settings as is and to make adjustments on a spot check basis when an unexpected shortage is encountered or over-supply is detected.
15  **MRP Guidelines**

This chapter lists 13 basic guidelines that should be followed for MRP to work properly and provide good results.

1. **Maintain a Lead Days allocation against all P items**

   A *Lead Days* allocation must be maintained against all your P (purchased) items. The *Lead Days* is the number of calendar days allocated by MRP for procuring the item. Make sure sufficient days are allocated to cover the entire procurement process, including potential variations in supplier delivery time and receipt processing time. Among items assigned to the same default supplier, apply consistent allocations to achieve uniform due dates on multi-line POs.

2. **Maintain a Job Days allocation and Run Size against all M items**

   A *Job Days* allocation, along with a *Run Size* that represents a typical large-size job quantity, must be maintained against all your M (manufactured) items. The *Job Days* is the number of shop days allocated by MRP for manufacturing the item. For guidance on making this allocation, you can use the *Job Days Inquiry*, which provides a *Calculated Job Days* amount derived from current routing and work center settings.

3. **Do not inflate allocation settings**

   Do not artificially inflate item *Lead Days* and *Job Days* allocations because all dates are inter-connected. Inflated allocations will push out other dates in a cascading fashion that corrupts the master schedule and makes it nonsensical.

4. **Do not assign the CTO setting**

   The CTO setting is not suitable for standard items listed in the *MRP Settings* screen, for which it is inherently inefficient. CTO jobs never take into account any stock on hand, never consolidate shared demand from multiple orders, and never permit the job quantity to differ from the sales order quantity, all of which are common occurrences with standard items.

   **Use one-off items for custom manufacturing**

   The CTO setting, which means “custom to order”, is only suitable for one-off custom items. If you make customized products to order, always use a one-off item and BOM generated during quote entry, which can now be originated from a “model” BOM. The one-off item is automatically flagged as CTO for custom job generation. This process workflow is fully documented in our new *Custom Manufacturing Guide*.

5. **Plan a strategic inventory to reduce times to shipment**
“Strategic inventory” is a plan for reducing times to shipment using the least amount of inventory to do so. Strategic inventory is achieved by applying a Stocking order policy against any item you wish to make or buy to stock, accompanied by a Monthly Demand rate and Supply Days interval. In general, whenever an item has consistent and predictable demand, it should be made or purchased to stock so that it is available for immediate shipment or issuing to jobs. For items with inconsistent and unpredictable demand, stocking policy is a judgment call based on weighing your time to shipment objectives against the inventory investment required to meet them.

6. Do not use the SO Required date as a “wish date”

Never use the Required Date as a “wish date” by salespeople. The Required Date 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.

7. Never bypass MRP with manual jobs and POs

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

Proper use of manual jobs and POs

This rule does not mean that you never create a manual job or PO line. What it does mean is that all jobs and POs related to actual or anticipated demand must always be generated by MRP. If you need to create a job or PO line for other purposes, you are free to do so.

For example, you may wish to create a manual job to remanufacture, refurbish, or repair a used item for which there currently is no actual or forecasted demand.

In the case of purchase items, each set of POs generated by MRP represents a minimum action profile of the items that must be ordered immediately to meet item required dates. After a PO has been generated by MRP, you may wish to augment the PO manually within the Purchase Orders screen to accommodate special situations. If you wish to fill a truck or container to reduce unit shipping costs, you may wish to increase item quantities or add items that will be needed in the future. If you have a minimum volume level commitment with a supplier, you may wish to increase quantities or add items to meet your volume level.

8. Do not create future jobs

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

9. **Do not create blanket or future POs**

Do not create blanket or future supply POs where a series of future quantities and due dates are scheduled for an item or a group of items. This is a crude form of forecasting that is not compatible with just in time planning and the master schedule. The correct way to purchase against anticipated demand for an item is to enter a monthly demand rate and *Supply Days* interval so that future POs will be generated by MRP in demand-driven intervals.

**If open blanket POs exist**

If open blanket POs exist, each such PO should be closed out and canceled. Indicate to your supplier that the blanket PO will be replaced by individual POs from this point forward. Establish a *Monthly Demand* rate and *Supply Days* interval against the item so that future POs will be generated by MRP in demand-driven intervals.

**How to manage contract purchasing**

If you contract with a supplier for a long term volume commitment in exchange for a fixed price, it is not necessary to manage this process with blanket POs. Instead, use the *Order Policy* screen to enter an actual *Monthly Demand* rate and *Supply Days* interval so that future POs will be generated by MRP in demand-driven intervals.

The supplier price table, which is accessed from the *Sources* tab within the *Stock Items* screen, enables you to establish the fixed price along with from and thru dates that define the duration of the price contract. You can use the price notes to indicate the volume commitment associated with the price.

If there is a contract reference number, we suggest you build that number into the supplier description for the item, which is the description that prints on the PO.

To monitor actual purchases against a price contract, you can use the *PO Lines Summary* or *PO Receipts* data view, which can be filtered for a given item, supplier, and date range.

10. **Do not create manual POs for long Lead Days items**

Do not create manual POs to anticipate demand for items with extremely long *Lead Days* allocations. Instead, assign such items a *Stocking* order policy along with a *Monthly Demand* rate and *Supply Days* interval so that MRP can generate a steady pipeline of staggered POs at consistent intervals. Staggered POs eliminate large fluctuations in supply and mitigate the risk of major shortages because any shortages that happen to occur will be of short duration.
Example

Let's say you have an item with a 6-month Lead Days allocation, which equates to a 180 day planning period. Forecasted demand is 100 units per month. The program will calculate a Reorder Point of ‘600’, which is the amount required to cover total forecasted demand within the item’s planning period.

If you wish to generate a PO every 30 days, set the Supply Days interval to ‘30’. This will result in POs being generated in approximate 30-day intervals for a quantity of 100 each, which covers 30 days of forecasted demand. At any given time, six POs would be in progress, each due to arrive in approximate 30 day intervals. This insures a steady supply that minimizes the risk of shortages or severe over-stocking. If a shortage does occur, the next PO will arrive shortly, which minimizes the shortage duration.

11. Generate MRP on a daily basis

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

12. Never generate partial or fragmented MRP sessions

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

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

13. Never delay planned job or PO conversion

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

Is manual planning a viable alternative to MRP?

DBA is not designed for manual planning. The master schedule and all its interconnected dates can only be generated by MRP based on item MRP settings and cannot be replicated manually. Job release, which adjusts the schedule based on material availability, and job prioritization, which governs shop control, are dependent on the integrity of the master schedule. The Release Jobs, Shop Control Panel, Job Schedule, and PO Schedule will not make sense unless they interact with an MRP-generated master schedule.

Can MRP be used without an accurate inventory?

MRP cannot work without an accurate inventory to apply to net demand calculations. In fact, no manufacturing system, with or without MRP, can function without an accurate inventory. If you are operating with an unreliable inventory, you will be unable to use DBA with any success. There are two key practices you can implement to correct this problem:

- Make BOM accuracy an absolute requirement in your company culture. Whenever BOM errors are encountered during the course of a job, make sure the parent BOM gets corrected for the benefit of future jobs. BOM errors are the source of many inventory problems.
- Issue material in real time within the Shop Control Panel at the work center level instead of after the fact at time of job closing. This takes no extra time because it must be done at some point anyway. It eliminates potential delays to job receipts and will give your personnel confidence that inventory numbers have reliable meaning.

Is MRP impractical to upkeep with many thousands of items?

MRP, as designed in DBA, is an incredible time saver and should never be looked at as an upkeep burden. At a minimum, only two settings are needed to drive the system—the item Lead Days and Job Days. Significant efficiency gains can be made by entering a monthly demand rate or fixed safety factor and Supply Days interval against items with predictable demand. That is MRP setup in a nutshell.

Daily MRP generation takes very little time and is largely automatic. Manual planning is vastly more complicated and time consuming and must use similar settings and logic to make any sense. So it is much easier to use the formal settings supplied by MRP and let the software do all the work and provide superior results.

MRP works for any company, no matter the size. In fact, the more items you have, the more you need MRP to automate the process.

Is it safer to add padding to all my settings to beat the schedule?
Do not “pad” or “trick” system settings in an attempt to somehow beat the schedule. All dates are inter-connected, so padding your settings causes unintended consequences that corrupt the master schedule. Instead, strive to enter reasonably accurate settings and you will get good results.

**Does MRP provide a multi-level BOM explosion?**

MRP is generated in a multi-level progression, but not for one BOM at a time. MRP responds to the total net demand that currently exists against each of your sell items, subassembly items, and purchased items, in that order. Net demand includes total demand from all sales orders and jobs and is not isolated to particular BOM structures. This reflects the interdependent nature of manufacturing whereby subassembly and purchased item usage is shared across multiple products.

By contrast, manual planners typically use multi-level BOM explosions to isolate planning to one product structure at a time. This results in the creation of multi-level “job chains” where subassembly jobs are made to order, one level at a time, with quantities that correspond to the top level job quantity. Job chains are problematic and inefficient for the following reasons:

- Job chains generate an excessive number of fragmented jobs and POs that needlessly expand and complicate the master schedule.
- Ship dates for job chains can never be less than the sum of the longest procurement or production time among each of the levels that comprise the chain.
- Job chains have no flexibility to provide for efficient job run sizes or purchased item order quantities.
- Job chains encourage excessive expediting to meet ship dates, which favors some jobs at the expense of all other jobs, which fall behind schedule and then require expediting as well, plunging the shop into an endless expediting cycle.

Using job chains seems logical because they are easy to understand and follow and are a necessity with non-MRP systems. Attempting to use job chains in DBA by means of manual job creation is the single worst planning mistake you can make.

MRP liberates you from the constraints of job chains with a simpler and easier to manage master schedule that consists of fewer jobs and POs with more efficient run sizes and order quantities. The master schedule is self-prioritizing and self-adjusting and thus eliminates the need for expediting. MRP also enables you to shorten or eliminate time to shipment by using a *Stocking* order policy against selected items.

**Is there any harm in using the CTO setting for standard products?**

The CTO setting is not suitable for standard items listed in the *MRP Settings* screen, for which it is inherently inefficient. CTO jobs never take into account any stock on hand, never consolidate shared demand from multiple orders, and never permit the job quantity to differ from the sales order quantity, all of which are common occurrences with standard items.
Here are some other points to consider:

- The CTO setting, which means “custom to order”, is only suitable for one-off custom items. If you make customized products to order, always use a one-off item and BOM generated during quote entry, which can be originated from a “model” BOM. The one-off item is automatically flagged as CTO for custom job generation. This process workflow is fully documented in the *Custom Manufacturing Guide*.

- If you wish to make a standard item to order, clear the CTO setting and use the ‘To Order’ Order Policy, in which case MRP will generate a job whenever new sales order demand materializes. This provides an efficient and flexible means for generating make to order jobs. If you receive two orders for the same item on the same day, MRP will generate a single job to fulfill both orders instead of cluttering the master schedule with excessive jobs for the same item. You also are free to increase job quantities where desired without being restricted to the sales order quantity.

- When a selling item has frequent and predictable sales demand, it should be made to a forecast instead of to order so that it is available for immediate shipment without any delay. To do so, give the item a Stocking order policy along with a Monthly Demand rate and Supply Days interval. If you have many repetitive selling items and you make them to stock instead of to order, you can experience a dramatic and profound increase in your manufacturing efficiency, customer satisfaction, and cash flow from faster payment cycles.

**Why can't my salespeople establish their own required dates?**

The sales order line Required date is solely for manufacturing purposes and is not designed to be used as a “wish date” by salespeople. It uses MRP logic to establish a demand date that is synchronized with MRP generation.

**How can I reduce inventory?**

Excessive inventory ties up working capital and occupies limited storage space. MRP can be used to reduce inventory in the following ways:

- Do not reduce inventory by making and buying items to order when it is not necessary. For items with predictable demand, it is more efficient to maintain some stock using a Stocking order policy to reduce times to shipment and boost cash flow and sales.

- For items that you stock (those with a Stocking order policy), use the item Supply Days interval to eliminate the risk of over-stocking. The Supply Days interval limits stock to an amount that covers planned usage for a specified number of days.

- Even if planned usage for an item proves to be wrong and does not materialize, the amount of stock will never exceed the amount triggered by the Supply Days
interval. MRP is demand-driven and will not generate a new job or PO unless it is triggered by actual demand.

The item Supply Days interval is your primary tool for “right sizing” your inventory. It ensures that sufficient stock is provided for shortening times to shipment, but also limits over-stocking. Apply an appropriate Supply Days interval to all your Stocking order policy items and you can dramatically reduce inventory without risk of shortages.

**Can I enter a forecast to drive MRP?**

DBA does not use a multi-bucket item forecast to drive MRP generation. A multi-bucket forecast typically projects monthly usage for an item over several months into the future. Sometimes blanket POs are used as a type of multi-bucket forecast.

Multi-bucket forecasts are inefficient and lead to over-stocking. It is difficult to distinguish actual short term demand from forecasted demand, which means that jobs and POs are often created in response to forecast amounts even when actual demand is less than forecasted. To be useful, multi-bucket forecasts require rigorous and tedious maintenance, which is often not practical when potentially thousands of items are involved.

Instead, DBA offers a Stocking (Monthly Demand) order policy, which uses a single bucket Monthly Demand rate that is used in conjunction with the item’s Replenish Time days to calculate a Reorder Point. A new job or PO only gets generated when actual net demand within the item’s action window falls below the Reorder Point.

A single bucket Monthly Demand rate is much easier to maintain than a multi-bucket forecast. Not only is it limited to a single amount, it also does not require the same degree of accuracy because there is much less risk of over-stocking or significant shortages. If the Monthly Demand rate is higher than actual demand, MRP will not generate additional supply until the Reorder Point gets exceeded. If the Monthly Demand rate is too low, MRP will generate additional supply and any shortage that occurs will likely be of minimal duration.

**Should I continue to use manual planning for blanket POs?**

Most companies that extensively use blanket POs do so out of habit from previous systems because it is a common planning method in non-MRP systems. Blanket POs are incompatible with the master schedule and are not needed with MRP.

Blanket POs are essentially multi-bucket forecasts that are tedious to create and maintain and typically lead to over-stocking. With MRP you can replace blanket POs with a Stocking (Monthly Demand) order policy and Supply Days interval that will trigger POs at regular intervals based on actual net demand.

**Is the Reorder Point the same thing as a stocking level?**

The item Reorder Point is not a fixed value. It is dynamically calculated by the program whenever an item’s monthly forecast, Lead Days, or Job Days value is changed. It is a trigger point for MRP generation that has no relationship to a stocking level. In fact, the
Reorder Point amount has no inherent meaning unless it is in context with the item’s other settings.

If you have been using the Reorder Point as a target stocking level for manual planning, which has never been a recommended practice, this is no longer possible because it is now a calculated value rather than a fixed entry field.

**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.

**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.
Should I run MRP less frequently 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.

Should I use manual planning for extremely long lead day items?

Purchased items with extremely long lead days, meaning several weeks or months, are ideally handled using a monthly demand rate in combination with the item Supply Days interval. This is far superior to any form of manual planning because it enables MRP to generate a pipeline of staggered POs that minimizes the risks of over-stocking or shortages.

You simply assign the item a Stocking (Monthly Demand) order policy and enter a monthly Usage rate. You then enter the number of Supply Days you wish to be covered by each PO. Because the item has such a large planning period because of its long lead days, the program will calculate a relatively large Reorder Point.

For example, let’s say you have an item with a 6-month Lead Days allocation, which equates to a 180 day planning period. Planned usage is 100 units per month. The program will calculate a Reorder Point of ‘600’, which is the amount required to cover total forecast demand within the item’s replenish time.

If you wish to generate a PO every 30 days, set the Supply Days interval to ‘30’. This will result in POs being generated in approximate 30 day intervals for a quantity of 100 each, which covers 30 days of planned usage. At any given time, six POs would be in progress, each due to arrive in 30 day intervals. This insures a steady supply that minimizes the risk of shortages or severe over-stocking. If a shortage does occur, the next PO will arrive shortly, which minimizes the shortage duration.

Can MRP be used for totally 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.