Synchronized Production & Material

Beyond MRP With AIMS/ERP

Synchronizing

Your Production With Your Material - Finally!

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White Paper

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Executive Summary/Abstract

This paper reviews business and technical issues relating to MRP II software and the degree to which it supports business operations in the 1990's and beyond. A more advanced business model is articulated. The approach and functions provided by the AIMS/ERP software toolset are described and contrasted. In most respects, the AIMS/ERP approach will be found superior to the MRP II model and toolsets, as will its more powerful, more comprehensive functionality. AIMS/ERP eliminates most problems inherent with the traditional MRP II approach, while not introducing new, replacement problems. The complete AIMS/ERP system includes all ERP modules and functions, with a great deal of detailed functionality. However, the scope of this paper is largely confined to the Production and Material Scheduling/Management functions.

Quick Reading Tip - if you only have a few minutes and want to "cut to the chase" read the MRP/AIMS/ERP Comparison table starting on page 14. To quickly review how AIMS/ERP works, refer to the chart that follows page 11

Overview

"WHY?" our friend asked, "would you want to create a completely new enterprise and manufacturing system from scratch? Why not buy one? Aren't they essentially all the same?"

Both AIMS/ERP and this paper are largely in answer to our friend's well-meaning questions. The need for AIMS grew from a rapidly growing, "21st Century oriented" company that needed a system that would help them be a "lean, mean, profit machine." We focused on creating a system that would provide management tools for achieving this objective for the initial AIMS/ERP site and other, similar discrete manufacturers. To achieve this a company's management needed to be able to:

- Schedule and track complex internal and external manufacturing (outside contact manufacturers) flows, using both domestic and foreign partners.
- Handle "the crunch," i.e., the inside lead time production, constantly fluctuating last-minute schedule changes, late vendor deliveries, etc., that are now normal to any manufacturing company.
- Dramatically reduce/constrain indirect manufacturing cost, i.e., the cost of coordinating material and production.
- Put significant new system functionality into use shortly after its need is identified, and at reasonable (read "low") cost, including "bells and whistles" and major new functions identified as the business evolves, including linking to other "best of breed" software systems in other areas.
- Not have the resulting system maintenance cost become an indirect cost factor.
- Improve indirect and administrative productivity by having manufacturing/material functions smoothly integrated into all other business operational functions, ranging from prospective customer data, order processing, repair of defective products, handling of discrepant material, managing credit/receivables and other functions.

Both our twenty years+ of experience and that of the company that originally funded the development of AIMS/ERP, taught us that none of the commercially available software packages met these general requirements. Indeed, it is in these areas where they provide almost no help at all. Just where you need help the most, the tools fall short!

We are not the only ones on the scene who sees the inadequacy of the MRP II model. There have been many papers, much talk and complaining by executives and users about how much work they require in exchange for limited improvement capability.

The purpose of this paper is to clarify and illuminate a number of business and technical issues pertaining to MRP II, explain its inherent assumptions, illustrate its limitations and shortcomings as clearly as possible. We'll articulate are more appropriate business model, one that clearly applies to companies operating in the competitive, global environment of the '90's and beyond. Next, we'll show how the methods used in AIMS/ERP better ***support this model far better than MRP II***, comparing and contrasting the two approaches on a point-by-point basis. This comparison shows how the architecture used in AIMS/ERP virtually eliminates the problems that are inherent to MRP II without introducing new problems. This paper includes the following sections:

The AIMS/ERP software includes a complete set of fully featured modules with richly detailed functionality for areas in addition to just manufacturing and material management. It includes over 900 windows and popup screens, over 6,000 active data fields, and hundreds of reports, and a full set of main-frame style IS system management and administrative tools. These are described in more detail in Product description information includes functions for:

- Contacts and Customers - multiple customer types, contact history/log subsystem
- Sales Orders - multiple functional order types
- Billing/Credit/Accounts Receivable - integrated customer financial management
- Return/Repairs - integrated return/repair order subsystem
- Inventory - multi-warehouse stocking, shipping
- Scheduling - production and material scheduling
- Purchasing - multiple demand, supply management
- Work in Process - on and off site production and material management
- Engineering data - Bills of Manufacture, exception oriented routings
- Product costing - standard cost, actual production, job cost
- Quality - integrated discrepant material subsystem; other related functions
- Job/quote - integrated job management, quotation, production, cost
- System - group oriented security, deferred processing, option controls, reports

However, the scope of this paper is focused on <u>the production/material scheduling areas and how these core areas of a manufacturing company are to be managed</u>. Please refer to the appendix for a major feature/function summary of these other areas, and/or call for additional information, or to arrange for an in depth demonstration of this unusually powerful system.

Key MRP II Business Issues

Essentially what has happened since MRP was originally conceived in the late 1960's/early 1970's is a series of global, massive changes in the business environment, including:

From (1970-1985 period)	**To (1985 to 2000+ period)**
Long lead time production cycles	Short, market driven lead times
Mass production	Small lot with much variation
Large corporation dominated	Agile company dominates
Vertical integration	"Virtual Business" with partners
Internal production	Extensive outsourcing, contract work
Easy capital sources	Difficult capital sources
Larger margins (cost + markup = price)	Tremendous margin pressure
Slow technical, market changes	Rapid technical, market changes
Production centered	Customer-centered
Domestic production	Offshore production partners
Large, costly middle management	Pressure toward flat organization
Inventory control focus	Customer response, cost focus
Low trust of computers	High trust of computers
Limited, costly computer power	Abundant, low cost computing power

The business problems associated with the MRP model include:

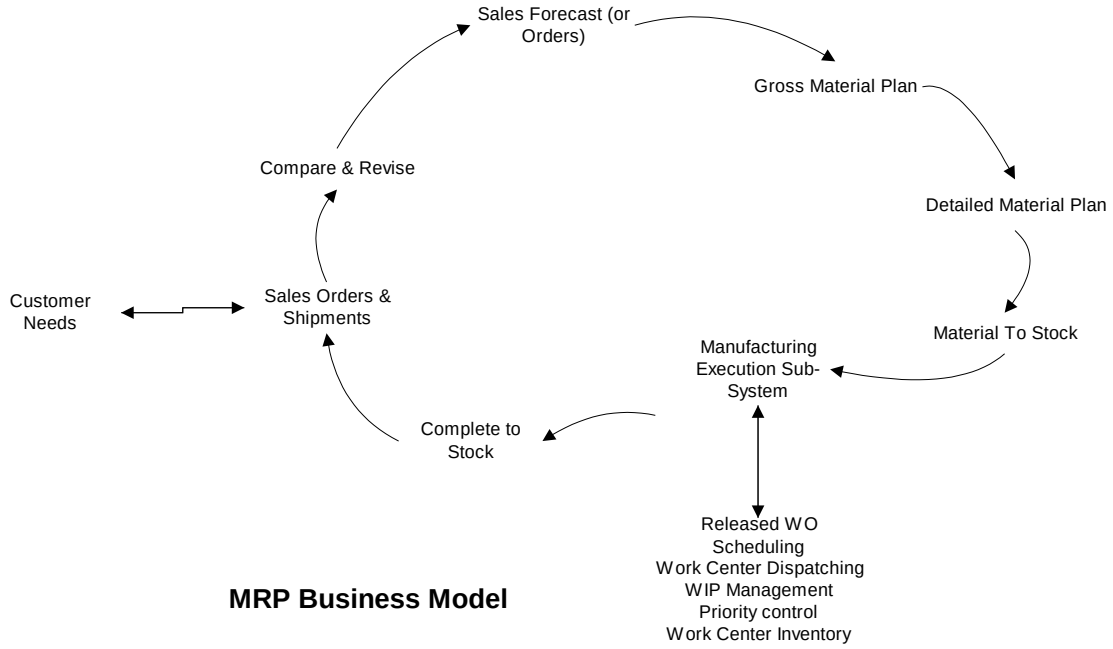
- Not built for rapid changes - Handling rapid, frequent changes to plans and schedules is not really a part of how theses systems are designed to work.
- Costly to run - Lots of manual data entry, "control points", and steps are required to operate these systems effectively.
- Complex, bureaucratic feel - They are big, ponderous, cumbersome toolsets.
- Major education, training required - Significant education and training of a "critical mass" of skilled (costly) people at a company is required even for just barely acceptable implementation; with turnover (common these days), this critical mass quickly erodes and system effectiveness tumbles as needed knowledge fails to be passed on to replacements.
- Assume stable organization - Businesses must go through continual, frequent reorganization in attempts to stay or lead the competitive challenge; systems aren't easy to change.
- No "Crunch Zone" support - Little or no support where it is needed the most - in the "crunch" zone, of *inside calculated lead time* schedule changes, ECO's, vendor non-delivery, etc.

These are not technical problems. They are real-world business situations, challenges and difficulties. If these are not handled well they cause businesses to either fail outright, simply struggle for survival, or never really succeed . Most truly successful manufacturing companies I have encountered in the last ten years have done so by working around MRP II concepts, not by successfully implementing the model.

This includes the 230 person operation we ran for a time. The great success we enjoyed was largely due to gutting the entire WIP portion of the MRP model, substituting the continuous flow, visual, manual signaling concept for traditional work order shop floor control, dispatching, etc.

MRP Functional Overview - A Brief Review

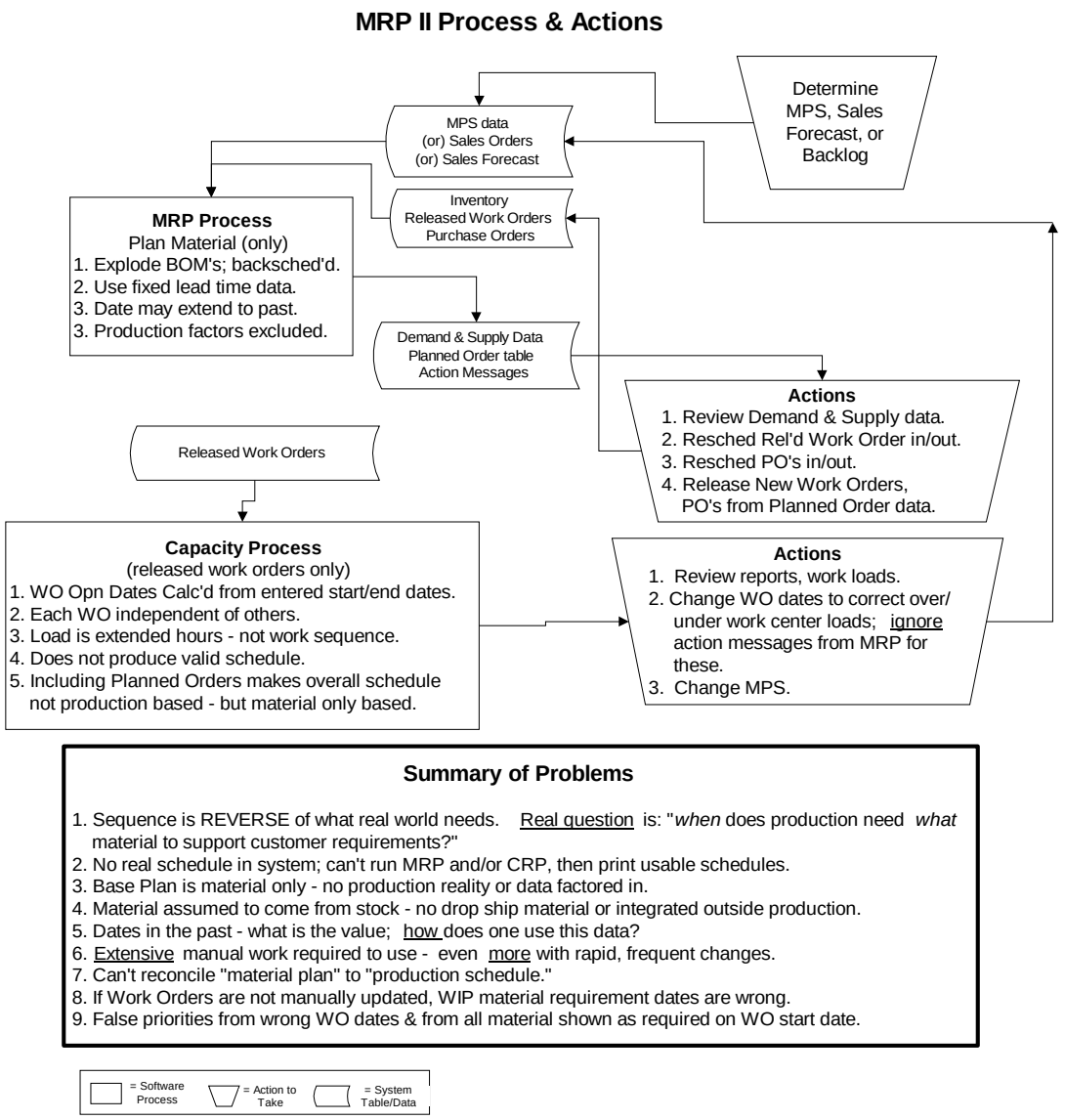
When viewed from the executive's point of view, the MRP II model tends to resemble the following simple sequence of events.



MRP Business Model

Notice where the Customer's Needs interfaces the general flow of the business - sort of off to the side of the main flow, definitely not in the "driver's seat." Regardless of where the system oriented people would place the customer, most senior (especially marketing and sales managers) executives, see this orientation simply because the company has to struggle so hard to satisfy the customer's needs, especially in the "crunch" zone. The ponderous, cumbersome nature of MRP II makes it very hard to manage things in the time-frame that the customer needs them to be managed. The word "workaround" is common-place these days, as is "outside the system." These are not hallmarks of tools that are really well-suited to the task.

The following chart is an abbreviated version that includes actions required by planners and buyers to show how and where these actions link to what the software does, or doesn't do. While there are some variations between software packages, this flow is suprisingly standard.



The following comments amplify the key points of this flow:

Independent Demand (MPS data) — May be from sales orders, sales forecast data, or manually entered (Master Production Scheduling) data, or mixtures of these. Problem is that in the practical world, there is often no concrete way to provide a solid management handle on operations due to the many ways demand can get into the system. Also “rogue”, unupdated released work orders will show demand for material, even if they aren’t needed - another form of independent demand.

Develop Material Plan (MRP Process) — Explosion of independent demand against the bills of material, using either fixed or lot quantity variable lead times. No factory or logistics factors are considered. All other references such as work order or PO reschedule messages are in reference to this material only plan. This is critical as it defines the work order to work order schedule relationships of released work orders in WIP

Perform Capacity Requirements Plan/Explosion (Capacity Process)	In practice, there are very few companies that actually implement the standard CRP functions in any MRP II package. CRP process is normally,(at least in concept) the explosion of open ("real") work orders, plus planned work orders against routing/operation data to get a work center load. This is supposed to identify, on reports or screens, unrealistic portions of the Material Plan.
Modify the Material Plan For Capacity (Actions)	In the conventional concepts, planners are supposed to review CRP and other reports, feeding the problems back to the master scheduler, who modifies independent demand to account for these problems, or unrealistic aspects of the Plan. Variations of this involve use of Rough-Cut Capacity Planning (a short-version of CRP to help the MPS function short-circuit this process I have also never seen this done on an organized basis - its just too much work, the cycle time is too long, and events moving much too fast.

The problems that result are summarized at the bottom of the chart. Many of them are the result of assumptions inherent in the MRP model. As is the case with any logical model, the MRP model is built on a set of assumptions about how the world it is attempting to model actually works. If these were universally correct, then the MRP concepts would work as designed. But in almost all businesses, forcing the procedures to conform to these assumptions drives material handling costs, move times, and therefore inventory costs up, not down as they must go. The list below is included for reference. You can add your own comments about how appropriate these assumptions are to the manufacturing operations you have personal experience of.

- Work orders normally close to stock, at least for planning purposes
- Material normally comes from stock, at least for planning purposes
- Most deliveries go to stock, normally after inspection (for planning purposes).
- Fixed lead times, or semi-expandable (fixed + variable portion LT) reflect reality.
- Plan material first, get it in, then schedule production; release work orders.
- Production planning cycle is mostly manual input, review results, revise as needed.
- If work orders are released to WIP, and worked according to the "material plan" then work order to work order schedule validity will not be a problem.
- WIP cycles are long enough to have significant queue times, enabling/requiring dispatching type procedures, constant resequencing of WIP, priority revisions, etc.,
- Handling exceptions "outside the system" is not a problem.
- Overlapped production operations are the exception, not the rule and can be handled informally, "outside the system."
- "Control" is achieved by manual entry of work/purchase order dates.

Making it Work - The effort to force-fit these assumptions into a modern company that intends to be seriously competitive in this era appears ridiculous when one actually examines these assumptions and sees how poorly they fit. The only thing to do is to become very "creative" in implementing these tools, and to develop a variety of "workarounds."

"Complexifier" - this is a word we coined a long time ago in one of our many implementation battles. It describes something that adds considerable complexity to a procedure or process, but with no visible benefit. A companion addition to your glossary is "confuserator," something that people have to do but that primarily leaves them puzzled as to what its real purpose is, or how it is supposed to help, i.e., a

complexifier that is also hard to understand. Systems oriented people are very good at coming up with complexifiers and confuserators. We came up with these terms after hearing feedback to our own clever workarounds, as you may have guessed.

ALL workarounds are complexifiers. Many are also confuserators. NONE help the business, except to patch up what is basically a poorly conceived set of business management tools. Imagine where the airlines, car rental agencies, or hotels would be if their systems required the usual significant workarounds and outside the system patches found in most MRP II implementations! And none of these systems has a GUI interface or uses a mouse. Yet they totally operate their respective businesses very successfully.

To summarize, the standard MRP II model's major problems include the following:

- Reverse Logic - Sequence is the reverse of what is needed - production schedule should drive material, not the other way around; if performance to production schedule is critical (to the customer it is), then IT should be the driver.
- No Scheduling - No real scheduling logic is used to develop the foundation level material plan which is the reference point for all released work order action messages.
- Dates in the past - try teaching planner/buyers how to handle these, especially action messages that tell him/her to expedite the PO from 2 months in the past to 3 months.
- Major manual work - on-going, manual effort required to simply operate the system and keep dates accurate in it is substantial.

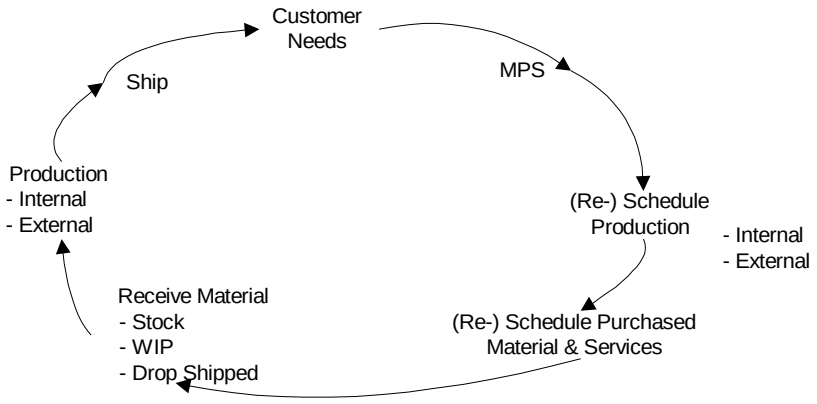
There has to be a better way, many have said, and there is. As with all system development, it helps if one clearly articulates the reality one is attempting to model, which is what we are talking about here.

21st Century Business Model

For software tools to be truly effective for companies that want to be setting competitive levels, not merely following/responding to others, the tools must support a fast moving, rapidly changing environment and operational style, and must assume:

- Customer 1st - Customer focused, including rapid, frequent, close-in changes to schedules, and product configuration; more product variety, short life cycles.
- "Crunch" - Must explicitly handle the "crunch" as a normal course of business operations, not to consider its presence as a sign of mistakes or mismanagement.
- Operation complexity - Mixed mode operations, some make to stock, some job quotation, etc.
- Production complexity - Mixed mode production, discrete lot-sized work orders mixed with continuous flow, both on and off-site; complex logistics involving global transportation and operations.
- Lower Indirect Costs - Operate successfully with fewer and lower-skilled people.
- "Soft walls" - Seamless information flow between customer, company and vendors via EDI links.

The simple chart below illustrates the general flow of events in a company operating in this environment. Its chief attributes are that the customer's needs are driven straight into the scheduling process, and that the scheduling process itself is designed to synchronize ALL events needed to meet the customer's needs, not just a portion. Critical to this model also is that all activities/events may be either internal or external, involving vendor partners. This includes both production, material flow and the purchasing of services.



21st Century Business Model

One of the key features of this model is the elimination of a separate manufacturing execution subsystem by synchronizing all events in one or two processes that work together and tying them tightly back to company-wide priority controls (the MPS). These relatively unintegrated, multi-tier arrangements are just too cumbersome to allow the rapid handling of daily/hourly changes that is needed. Many companies now need multiple schedule updates per day, not just daily, weekly or monthly.

These are not major "runs" but an on-going process of "tweaking" and adjusting things in accordance with constantly changing realities and priorities. The very concept of a stable "plan" that holds constant for some period of time is in itself obsolete. Even today, the method of the plan regeneration in itself implicitly admits that the plan progressively becomes more and more out of date as time passes during the plan's period.

A single set of well-integrated priority management tools keeps everyone in the operation, both internal and external, working to the same "sheet of music." Software techies will tell you that up and download programs that run in the background, etc., can solve these problems, but in actual practice with these arrangements there are always problems that users just live with (and pay for).

In clear terms, what is needed is logic that works as shown in the steps below:

1.	Set Deliverable target dates and quantities.	May involve a "when can I have it by" logic.
2.	Update Derivative schedules:	Including:
	- End item (deliverable itself)	- Internal or external production
	- Subassemblies	- Purchased:
	- Components	- Material (on-site or drop-shipped)
		- Services

3. Example Schedule for Part Number "A":

Work Order No.	Date	Quantity	Status
123	7/15	999	Open (WIP)
124	7/25	999	Open (WIP)
125	8/2	999	Released (ready to pick 1st operation material)
126	8/9	999	Planned*
127	8/14	999	Planned
128	9/1	999	Planned
etc.	etc.		all Planned Status

4.	Revise, adjust 1+ times/day, or weekly as needed	All derivative schedules adjust together in a single, synchronized process.

* Planned Status Work Order Rules:

- Dates (as with other statuses) change as needed per schedule.
- Same Work Order Number for a schedule increment is retained as long as demand requires it, based on order rules, demand, etc., This allows services and drop ship PO's to be placed that supply material and services to a Planned status work order. Subsequent date and quantity changes flow to vendor via PO Changes "automatically."
- If demand disappears for a schedule increment, the work order is automatically deleted.
- If demand appears for a new schedule increment, a new work order is created automatically.

Our experience with this method of scheduling production and material is that it is "intuitively" apparent to most people and therefore much easier to work with on a fast-moving daily basis. The basic idea is that for every item or activity, there is a single schedule with "degrees of softness" (planned status and time-horizon). It is revised as often as the business cycle needs. The concept of a derivative schedule, linked to another is not hard to understand either.

Terminology Note

The word "Schedule" is an obviously key term in manufacturing. One excellent definition is that a schedule is a "document that relates work to time and resources required to accomplish it." By synchronizing all resources that comprise the work of manufacturing, AIMS/ERP Scheduling logic is an attempt to have the "schedule" be completely in

the system, i.e., run it then view or print out the schedule document directly. The extent to which this can be made a reality depends on how accurately the scheduling logic models how the resources are to be synchronized.

High degrees of precision may not be required for success as long as relationships between events are accurate. Experience with sophisticated constraint oriented scheduling systems suggests that the effort to produce a high degree of precision in scheduling may require a substantial price in terms of the complexity (and cost) of the software itself, of the on-going cost of maintaining the data variables it uses and of the cost of simply running it.

On the other hand, many people use the word "schedule" to identify what we wished we had done at some time in the past or hope to happen in the future. Hence, "Item X is past due on the schedule." This meaning implies that we really don't know when something is actually going to be done. The word "schedule," of course may also refer to when the thing is now going to be completed according to some plan.

The word "Schedule," in a sense then, refers to both meanings in a production scheduling context. The first is when we really need(ed) it, and the second is when it is now currently calculated to be completed, based on run times, setup times, and the amount of work remaining. In AIMS/ERP, clearly defined terminology is used to separate these two meanings. These terms are defined by the way they are used in the system:

"Demand Date" - In every work order AIMS/ERP maintains two separate demand dates:

- Next Higher Assembly Demand - when the work order is needed, based on next higher assembly scheduling, which may be "in between" this work order's level and the MPS.
- MPS Demand - independent demand pegging data carried down by the Scheduler and stored in each work order linked back to the MPS, regardless of assembly level or scheduling of items at levels in between.

"Scheduled Completion Date" - When the Scheduler calculates that a given operation is to be completed. If the operation is the last in a work order's routing sequence, this is also the work order's scheduled completion date.

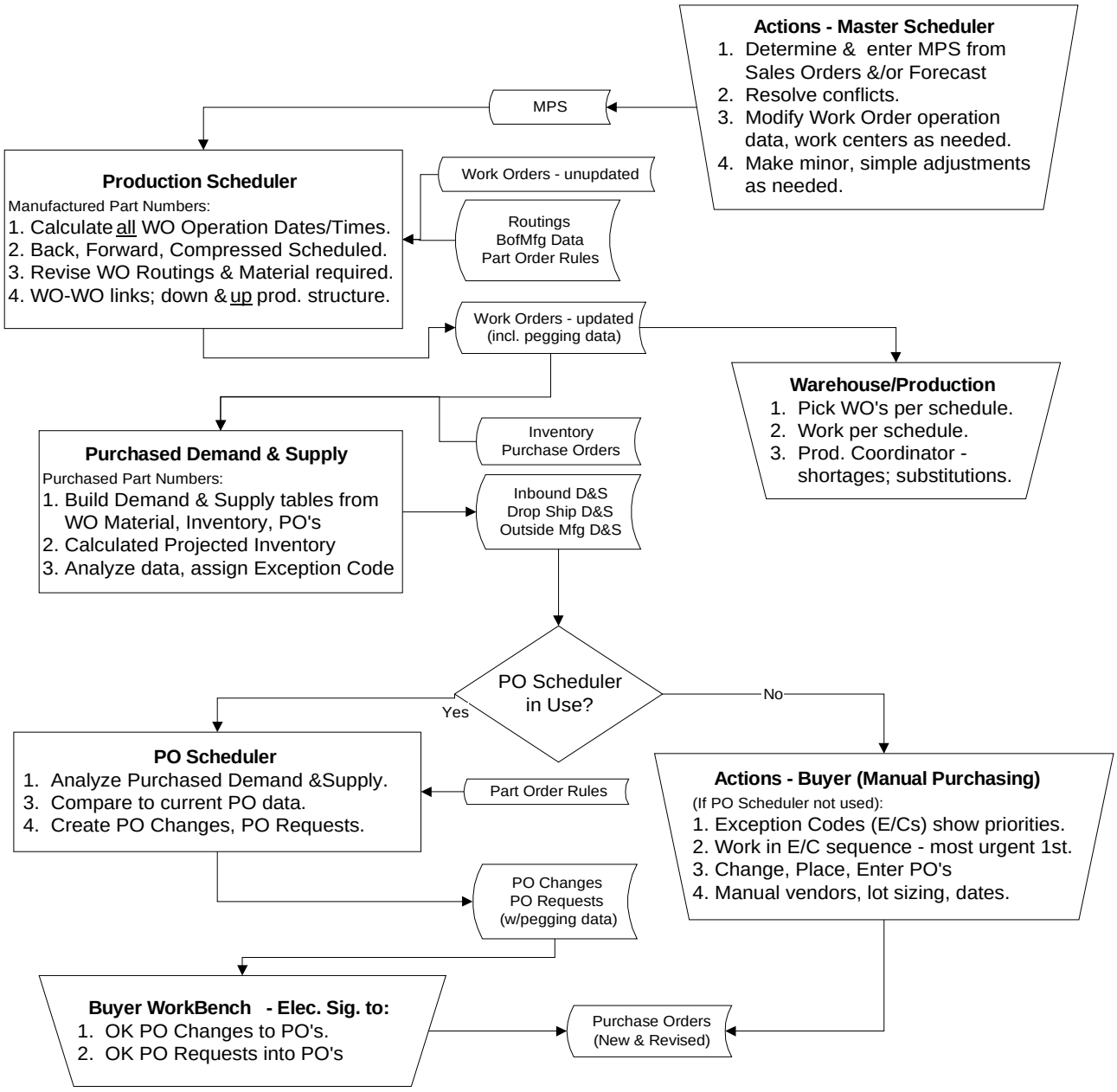
AIMS/ERP Scheduling is in decimal hours (not dates only), and uses a work center specific calendar which includes the specific working hours available on each working day. This prevents "day rounding" errors, besides giving an actual calculated Start and Completion Times for each operation, as well as Start and Completion Dates.

How AIMS/ERP Supports The 21st Century Business Model

Since AIMS/ERP is designed around the idea that rapid change and a degree of unhandled changes is normal, it allows driving the customer's rapidly changing needs much deeper through the business cycle, and at much more frequent update intervals. A key objective in AIMS/ERP's design was to simplify the business management process while amplifying the power of the tools considerably. This enables fewer, lower-skilled people to successfully operate the company and its systems. This can only be accomplished by concentrating the tools into a small number of very powerful functions, coupled with a very straightforward approach and logic. This enables a small, medium-skilled staff to use these powerful tools to synchronize the thousands of events needed during a typical production month.

The flow chart below depicts the production and material scheduling processes and actions, showing how these objectives are supported.

AIM/ERP Production & Material Scheduling



Summary of Advantages

1. Customer-oriented flow - schedule production 1st, know material needed to support schedule.
2. Eliminates most "planning" - system schedules production, material, services; minimal data entry.
3. Synchronizes ALL events, activities to MPS - detail schedules link to master.
4. System does most of the work - greatly increased scheduler, buyer, coordinator productivity.

= Software Process = Action to Take = System Table/Data

Key points about the logic and flow used in AIMS/ERP, as illustrated above:

Customer/Production Schedule oriented	• The Production Scheduler synchronizes all manufacturing events, by when each occurs, and where (work center), internal or external, • All are tied back to the MPS's independent demand. • Unneeded WIP is scheduled out to either the date when it is needed, or to the end of the scheduling horizon if demand disappears completely.
"Release-less" Work Orders	• AIMS/ERP generates a population of fully functional work orders in its scheduling process. • There is no separate Planned Order table that may confuse some and require extra work. • Status code, automatically changed when the first material issue transaction is performed, indicates WIP or non-WIP status. • Eliminates MRP's Plan vs. Schedule reconciliation problem. • Eliminates labor-intensive work order release process • Production, including material picking, is started according to the schedule. All upcoming work can be easily identified on work center level schedules.
Material Tied to Production Schedule	• Material demand, linked to operations and thereby to work centers, can be identified at exactly when the production process needs it, and where it is needed.
Forward Scheduling	• Compression and forward scheduling algorithms, including up the product structure, keep all activities in synchronization, • Compresses planned lead time values to the absolute minimum, • Simulating expedited handling that late production receives.
"Crunch" Support	• The "crunch" is automatically handled; any uncompleted work is simply forward scheduled. • Both Demand and Scheduled Dates are always maintained. • Behind schedule is clear, simple (Scheduled Completion Date minus Demand Date = Days Late).
Work Order to Work Order Schedule Validity	• Dependencies between assembly levels are always maintained by the Scheduler, whether back or forward scheduled • Forward schedule includes up work order structure.
WIP Activity	• Purchased Demand & Supply logic is automatically tied to the

Updates Material Needs	production schedule, to WIP status, shop floor moves, etc. • Shortages are not only which work order, but where.
Prioritized Purchasing	• Exception Codes assigned to purchased items based on demand & supply analysis show Buyers where to start working, which parts are truly "hot" and which are not.
PO Scheduling & Buyer WorkBenches	• Purchasing can buy from demand and supply data directly, OR • PO Scheduler can calculate PO Changes and Requests. • PO Changes/Requests can be used or discarded as needed. • Each run recreates new PO Changes & Requests. • Use high-productivity Electronic Signature Buyer WorkBenches to approve new PO Requests (linked to Vendor Quotes), and PO Changes • Automatic updating/creation of PO's from WorkBenches

MRP/AIMS/ERP Comparison

AIMS/ERP's design and processes incorporate revolutionary new, powerful logic to dramatically streamline and simplify the traditional MRP process as shown above, while eliminating MRP's inherent weaknesses, gaps, and labor intensive management. The table below illustrates in summary form a number of comparison points between MRP/MRP II and AIMS/ERP functionality, and illustrates how the AIMS/ERP approach to production and material management systems provides a clearly superior architecture to MRP II for companies that want to be the competitive standard in the 21st century.

MRP Problem/Function	**AIMS/ERP Solution**
MPS - usually doesn't control all demand	MPS controls all independent and dependent demand, at all assembly levels; production is scheduled first; operations with material linked then have material required dates.
Few or no tools to handle changes inside lead time - where it is needed the most, except cumbersome "Demand/Plan Time Fence" discipline.	No time fences - MPS changes inside lead time, or behind schedule production is automatically handled; separate work order demand and current schedule dates are maintained; easy to identify differences, and effective expediting actions; inside lead time work orders are forward/compressed scheduled.
Real production schedule not in system (it's on spreadsheets).	AIMS/ERP produces a ready-to-use, valid production schedule for all operations on all work orders each run.
Material only "plan" separate from "schedule"; planned order table is	Single work order table; stable work order numbers for horizon; work orders simply change status;

difficult to reconcile to released/open work orders.	scheduling rules vary with status; planned status work orders quantities, dates, material required updated each schedule run.
"Schedule" Dates in the past.	Demand pegging linked (up product structure) forward scheduling logic eliminates meaningless dates in the past; keeps dependencies valid.
Action messages to guide manual work; if not done, MRP data is wrong.	No messages "suggesting" what a planner should do; software goes ahead and does what planner would do: • Work orders - rescheduled automatically. • Demand & Supply - Exception code method identifies part numbers needing action according to degree of urgency (priority). • Purchasing - PO Scheduler analyzes demand & supply data and generates PO change and PO Request records, ready to use.
Weak or no relationship between work orders or assembly levels during "scheduling"; extensive manual updating required.	Automatically maintained at all times; includes subassembly higher level assembly validity. Single, simple, global scheduling process; no manual updates. All schedule data is either in the MPS (independent demand) or derived from the Bill of Manufacture data structure.
Material usually assumed (during planning) to be issued from stock; no off-site (drop ship) scheduling support	Separate demand & supply data flows for internally used material and drop shipped; neither type of demand or supply are commingled.
Usually poor or no integration of outside processing; no scheduling, no planning of need for services, may not have direct cost standards	Outside manufacturing fully integrated into work center, routing, scheduling, and cost planning; separate demand & supply data flow for purchased manufacturing services (non-material PO's); can plan purchase of services to a planned work order months in advance.
Usually can't schedule alternate production sources well in advance.	Can modify and freeze routing for work orders in planned status, locking in alternate plans, still allowing changes in dates, quantities.
Usually can't lock in alternate or substitute material & still have automatic rescheduling.	Released Not Picked status locks in material required and lot size; dates continue to be (re) scheduled as needed. Planned is a Freeze Material function for Planned status which will lock in work order material, but allow extended quantities to

	vary per extended schedule requirements.
Difficult for planners, buyers to prioritize daily work flow.	Work order schedulers only need to review schedule; release work orders with material available; Buyers use Exception codes to prioritize work and/or use PO Scheduler.
Pegging - only single level readily available; must usually run a process to follow chain to end item.	Independent (MPS) demand & next higher assembly pegging data is maintained in data fields in work orders, PO change and PO Request records for instant, simple retrieval.
Difficult or cumbersome foundation for capacity management; tools workable only with significant on-going effort and discipline.	AIMS/ERP Scheduler synchronizes all production back to the MPS. Work Center schedules and loads are thus more useful. Continuous flow and finite capacity loading algorithms are planned developments for Scheduler.
Need for extensive education & training to "make system work"	Training still required - but for fewer people; training is quicker because logic is easier to grasp.
Material & WIP transactions that often don't match material flow; make sense only to an accountant.	Single function transactions simplify training, data entry, security control; match physical material flow.

Conclusions and Summary

In this White Paper, we have reviewed and analyzed both the traditional, standard MRP II approach to managing production and material and the new, more advanced approach offered by AIMS/ERP, from both a business management and somewhat technical viewpoint. The conclusions and final summary comments we offer include these:

- Tools Suitable for Task - Clearly MRP II is better than no tools at all, and as has been said, "bad MRP is better than no MRP." The truth is that attempting to get all the thousands of events into synch manually in all but the very simplest of environments is hopeless without at least simple MRP-like tools. The next question then, is the degree of suitability for the task at hand. We have made a strong case here that the AIMS/ERP approach is "better than good MRP II."

- Obsolescence of Tools - The case we have made here is not that MRP is "bad", or that MRP II is "badder." It is that these management tools have simply become out of date, made obsolete by the same brutally competitive, global economy pressures that have forced countless companies out of business, eliminates thousands of products from the market-place and introduced still thousands more. MRP II has been left behind by these massive changes.

- Sources of AIMS/ERP Concepts - If you are very well-informed, and have considerable experience with a wide variety of systems, you will probably recognize the pattern of thinking in at least a few other, similar approaches and management toolsets now on the market. While software is copyrightable, concepts are not, and we have made free use of concepts that seem to work better, simply putting them all together in a compact, well-integrated package. There is little that is truly revolutionary in either AIMS/ERP software or its approach. However, there is little on the market at

this time that resembles AIMS/ERP in its complete form, or that can match its combination of ease of use, ease of implementation, functional power and reasonable cost.

- Data and Functionality is Key - At this time, as in earlier times, the latest wave of buzzwords and technical attention getters is affecting software related decision processes. Those who, as in the past, select software based on the color of the box it comes in or runs on, or the look and feel of the interface, rather than on hard-specific functional data and processing logic will fall short of their expectations, as they have in the past. For example, those who have stepped "up" to true client-server applications have discovered a new meaning for the words "expensive," and "complex." No matter how "cool" a piece of software is, if it doesn't do something that your business needs that is critical, it is going to hurt, not help the company.

- AIMS/ERP Functionality Clearer - You probably had little difficulty understanding how the approach to scheduling production and material we have described here works. You can also probably easily visualize how it would be used in your company. This is even though it represents a fundamental paradigm shift from the thinking patterns you have had for many years. Literally every person we have explained the AIMS/ERP approach to has grasped it almost immediately. In spite of its power, it simply makes intuitive sense to do things this way. The fact that the Scheduling software, internally, is quite complex and sophisticated, doesn't alter the fact that what it does is fairly easy to grasp. This simple reality also makes it easy to implement and use on a daily basis.

In conclusion, we believe that we have made a solid case in this paper for the position that the traditional MRP and MRP II approaches have become obsolete, and need to be replaced with a new paradigm. AIMS/ERP represents our effort to develop and implement management tools, which is what software is, in support of these visions and ideas, and to provide industry with fresh, new approaches to help deal with the global, highly-competitive, fast-moving world of the late 1990's and 21st century.

Finally, try this test - if it were your business, and you had your money invested in it, wouldn't you want to investigate an approach and set of management tools that seemed to make so much good sense, and that promised to be a "lean, mean, profit machine?" Wouldn't you want to know about methods that seemed to sidestep or avoid so many of the operational and computer problems and complexities and that promises to provide easy to use, yet powerful ways to operate your company (if you owned it)? Would you really want to invest your money in exotic, complex approaches to essentially do what can be done easier, at far less cost?

If your answers to any or all of these questions is a resounding "YES!" then give AIMS Software, Inc., a call. We can be reached via any of the following channels:

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