The Future of ERP and Manufacturing Management

J. E. Boyer Company, Inc.
John E. Boyer, Jr., President

The Future of ERP and Manufacturing Management

by John E. Boyer, Jr., President, J. E. Boyer Company, Inc

Introduction

The gap between ERP functionality and the system needs of a typical manufacturing company is getting wider … not narrower! As technology advances, users expect simpler systems that address the needs of lean manufacturing operations, but just the opposite in occurring. The objective of this paper is to address several specific examples of this gap and suggest opportunities for aligning manufacturing management needs with future ERP system functionality.

Background

In the early 1980's, Just-In-Time manufacturing presented a set of tools and manufacturing philosophies for eliminating waste in all aspects of the operation. These techniques include cellular manufacturing, demand flow, set-up reduction, small lots, preventative maintenance, error proofing, pull systems, kanban replenishment, 5S housekeeping, and others. The 1990's presented Lean Manufacturing concepts of value stream alignment and process perfection. Total Quality in its various forms provided other methods for reducing variation, providing repeatability, and lowering costs.

Over the past 20 years, many manufacturing companies have studied and applied these principles in a variety of ways. The general result has been very positive in terms of dramatically reducing throughput times, significantly lowering inventory, and adequately reducing the cost base. Most will testify that all of this improvement was made possible by using these techniques to SIMPLIFY the operation. Shorter travel distances, faster set-ups, visual controls, fewer transactions, collocation of operations, cross-trained employees, rate based due-date-driven production, and smarter costing all contributed to this major movement toward simplification.

Manufacturing systems have also evolved over the past two decades. In the early 1980's, MRP type systems were being used extensively. The late 1980's saw increased functionality in terms of advanced planning systems, manufacturing execution systems, and increased financial capability. Focus in the early 1990's was on supply chain management and enterprise resource planning. Moving into this century, the new focus is on e-business and e-commerce functionality. Most development today is outside the four walls of the operation. Internally, operations are advancing/simplifying while systems are the same.

While the evolution of these systems has brought good functionality, it has also brought complexity. APS and MES require huge amounts of data and extensive assumptions about how the factory really operates. Order entry set-up requires huge amounts of customer and sales data. Material planning and scheduling generate tremendous amounts of information for making operational decisions.

Interestingly, with all of this development, many (actually most) ERP type systems today still expect many of the practices that JIT/Lean principles have demonstrated are not necessary. These include: 1) SKU level forecasting, 2) SKU level scheduling, 3) work order creation, 4) dispatch lists by operation, 5) inventory transactions by location, 6) MRP for all parts, 7) time stagnant finished goods replenishment parameters, and 7) many others. Actually, in many respects, not a lot has changed over the past 20 years!

The basic problem is this: in general, while manufacturing has become much simpler, ERP systems have become more complex. Many ERP systems have retained traditional functionality and have not kept pace with the internal workings high performing manufacturing operations.

To combat this problem, many companies who have state-of-the art ERP systems have embraced other tools to provide the information needed for day-to-day operations. Spreadsheets are used to post-process information (or worse, as the primary disconnected source of information). Off-line databases are used for backlogs and shipping requirements. People are employed to put information in a fit-for-use condition simply because the ERP system can't do it. If you don't believe this, see what document is presented to your factory floor on a daily basis as the production schedule. Is a fit-for-use untouched document taken directly from your ERP system, or is it a disconnected spreadsheet? Surveys suggest that in 9 out of 10 companies it is the latter!

Specific Examples

Here are several specific examples of the ERP/Operations gap that occurs frequently in many manufacturing operations. These are not in any particular order of importance but are very typical.

Sales and Operations Planning

This is not the place to have a detailed discussion about Sales and Operations Planning (S&OP). However, in brief, it is defined as top management's regular and formal methodology for balancing supply and demand on an aggregate basis. The output is typically rates of production by line/cell in the factory from which people, material, equipment, and cash resource decisions are made.

The nature of S&OP requires a considerable amount of "actual" performance data expressed in several ways depending on your point of view … marketing groups for the sales people and manufacturing groups for the operations people. It also requires forward visibility at various levels of aggregation, planning horizon, and other groupings. The six planning elements generally include bookings, shipments, backlog, inventory, production, and capacity.

While S&OP is the top level planning process from which all detailed planning derives, alarmingly most ERP systems today DO NOT have this functionality! The best that most ERP systems can do is expect that a forecast (usually end items) be entered without any real opportunity to assess the interrelationship between bookings, shipments, and backlog, nor assess the interrelationship between shipments, inventory, and production.

Consequently, companies doing S&OP almost without exception do it on a spreadsheet or have written custom software. Ether way, it is a costly experience to close a gap that any good ERP type business system should readily accommodate.

Date Management Practices

Companies will testify that the most popular customer question is "WHEN". When can they get product and when will they get product. "When" leads to three very basic questions:

1. Did we do what the customer wanted?
2. Did we do what we said we would do?
3. Is our schedule/order date valid?

All high performing companies know the answers to these questions via a systemic method for communicating "when" … a due date. However, due dates come in different varieties. The four dates needed are: 1) the request date, 2) the commit date, 3) the current schedule date, and 4) the actual ship date.

This example illustrates the point:

A customer calls and says 'I want product on October 17th'. The supplier says 'can't do that, but can ship on October 24th'. Customer says 'OK'. Suppose the shipment goes out on October 24th. Here are the answers to the questions:

1. **Did we do what the customer wanted? October 17th - NO**
2. **Did we do what we said we would do? October 24th - YES**
3. **Is our schedule/order date valid? - October 24th - YES**

But what if a problem occurred and the supplier had to delay the shipment until October 30th? Now the questions look like this:

1. **Did we do what the customer wanted? October 17th - NO**
2. **Did we do what we said we would do? October 24th - NO**
3. **Is our schedule/order date valid? - October 30th - YES**

This is a customer order example. The same applies to purchase orders and internal work orders for companies using them.

What does this have to do with ERP? Quite simply … can the system support the dates needed to answer the questions? Most system cannot. So either the manufacturer goes without knowing or creates a disconnected spreadsheet to get the data. This is one piece of functionality that must be available and used correctly for fundamental understanding of customer delivery performance and due date validity.

Order Promising - How

For years, available-to-promise logic/capability has been available in ERP systems to help answer the "when" question. The popular approach is to assess "how much INVENTORY is available for a given SKU". Think about that … finished goods inventory and individual end item sku's. This methodology essentially makes the assumption that the manufacturing strategy is make-to-stock and that each end item will have a forecast.

Interestingly, high performing manufacturers today are attempting (and are in many cases) to move away from make-to-stock and shift to make-to-order or assemble-to-order. In doing this, factories are organized into flow lines and/or cells to match product groups, and forecasting is done at an aggregate level. The issue then shifts from an inventory/sku concern to a capacity/line concern. The question then becomes "how much CAPACITY is available on the LINE that makes this sku"?

The technique for promising delivery this way is called: "entering orders at the sku level and assessing delivery at the line rate level". At the point of order entry the manufacturer should know where the next available slot of capacity is available on the line, not how much inventory is available for the sku. This assumes that an ATO or MTO strategy is in place. It also applies to a MTS strategy if the item is out-of-stock. The type of order is also expanded for MTS businesses. Orders presented to the line are for finished goods inventory replenishment and for special customer orders.

This example illustrates the point:

A production line has been designed to produce 200 different (but similar) sku's and the line rate is set at 2,000 per day. Current orders in summary are positioned like this:

Date	Quantity	Number of SKU's
Monday	1,975	6
Tuesday	2,025	14
Wednesday	2,000	12
Thursday	2,010	10
Friday	1,522	8

When can an order for 350 of sku 143256 be produced? The answer is obviously Friday.

The challenge for the ERP systems is to have functionality to assess the next available line slot. This DOES NOT mean amassing a huge amount of data for an MES or APS system to grind through. This DOES mean identifying the next open slot. The message: since most systems won't do this let's develop one that will!

You could argue that there is more to it than that … and sometimes there is. There are material issues, tooling issues, scheduling rules and others. However, in many operations, the above type of logic is all that is needed!

Order Promising - Who, Where, and When

Continuing on with the most popular question "when", consider who should answer the question and where it should be answered. The vision of high performing companies is that the person dealing directly with the customer (who) at the order desk (where) provides delivery information immediately at the time of order entry (when). Then why is it that a common practice is for a scheduler (who) in the scheduling department (where) to provide delivery information several hour or days after the inquiry (when)?

The reason generally is that the person in order entry (or sales for that matter) does not have the information in a fit-for-use condition to make the necessary decision. The reason the information is absent is quite often because the ERP system is not designed to provide fit-for-use information or it was not set up right. There is no way to find the next line slot, no way to even know on which line it is made, and no way to know if the item is MTS, ATO, MTO, or ETO. Each of these strategies will trigger a different order promising process. Here is what I mean in a simple form:

1. MTS: ship within one day of order receipt.
2. ATO: find the next line slot.
3. MTO: find the earliest purchased material availability and the next line slot.
4. ETO: find out when the order can complete engineering and then reassess the date.

Given the proper information in a fit-for-use condition engineered to complement the simplified operation, 95+% of all orders should be promised at the order desk by order/sales people precisely at the time of order receipt. The ERP system must be able to accommodate this activity.

The Daily Schedule

Almost without exception, the schedule presented to the production lines or cells in today's day and age is a hand written list or an off-line post-processed spreadsheet. Unbelievable. With more information processing power and manufacturing knowledge that ever before, why in the world do we pay people (often many people) to sit all day long and create/update scheduling spreadsheets? Why doesn't the schedule come directly form the ERP system in a fit-for-use condition on a daily, shift, or hourly basis? Here are some of the reasons:

1. No way to "map" items to lines.

2. No recognition of the right "scheduling rules".
3. No way to split days into shifts.
4. No way to sequence within the shift.
5. No way to balance the line (in real time) on one screen as the schedule is being created.
6. No way to present input (finished goods replenishment and customer orders) to the scheduler in a fit-for-use condition.
7. Too much attached functionality (releasing, kitting, picking, issuing, reserving, and others).
8. Transactionally too complicated, and triggers too many transactions.
9. And so forth.

A manufacturing company spending a seven or eight digit number on ERP software should not have to use a spreadsheet to communicate daily production needs!

Here the challenge is simple: have an ERP system that, in a transactionally simple and easy-to-understand way, is capable of communicating what each line should run this shift and in what sequence. It's that easy, but almost every company does it on a spreadsheet. Go figure.

Part Personality

In the 1960's, material replenishment was handled by reorder point manual kardex systems in many factories. In the 1970's and 1980's many thought that MRP had to be used for all material planning. In the 1990's a variety of additional techniques became popular for planning and controlling material: point-of-use storage, various forms of visual replenishment, simple manual systems, and others. And MRP is still used appropriately for some applications. Moving into this decade, it has become clear that one technique does not fit all applications. We have learned that each component part, raw material, subassembly, and end item in the operation has a unique "personality" that helps determine the proper planning and controlling technique.

The job of the ERP system is to provide the tools, coding, and options to properly describe the personality of each part. Here are several questions that apply:

- Who has "charter part accountability" for the part? This is often the planner code.
- Who buys the part? This is often the buyer code.
- Who is responsible for making the day-to-day replenishment decision? This code usually does not exist.
- How is the part planned? This is either MRP or a version of an order point method. Planning - replenishment - production.
- How is replenishment triggered? This is a computer report, internal kanban, company surveillance, or supplier surveillance.
- Is the part "stock" or "non-stock"?
- Is the part purchased or manufactured?

- For manufactured parts, where is the part made? For finished goods, this is the "map" to the producing line.
- For purchased parts, who is the supplier(s)?
- What is the commodity code? This is useful for purchase groupings. (i.e. steel, cartons, labels)
- Where is the part used?
- What is the order point? This is needed if the planning method is order point.
- What is the order quantity?
- What is the safety stock? Could also have min and max. However, the min is the same as safety stock and the max equals the safety stock plus the order quantity.
- What is the order multiple? This is usually a skid quantity or other lot-sizing requirement.
- What is the tooling group? This is useful for scheduling setups.
- Where is the part stored? This is the fixed kanban location for kanban parts.
- What is the standard cost of the part?
- Is the part active? Obsolete? Slow moving?
- What is the EQ (equivalent unit) for the part? This is often useful for capacity planning.
- Is the part finished goods? Raw material? WIP? Component?

The list could go on. The point is that when these parameters exist, simple questions can be answered. For example:

Which are the kanban parts that are needed on Line A?
Which are the MTS finished goods items stocked in warehouse 3?
Which parts does Joe plan?
Which parts does Sally pull kanban cards for replenishment?
And so on.

Without the proper part personality identifiers, the questions either go unanswered, or are dealt with offline through spreadsheets.

The Challenge

Six examples are shown here. There are many more. In this presentation the point is NOT to identify and solve all of these specific issues, rather the point IS to create an awareness that critical day-to-day functionality in many ERP systems is missing or has not kept pace with operation simplification.

The challenge is that successful ERP systems of the future will not only accommodate the e-business requirements of the present and the future, but also will step up and improve functionality for internal operations. This DOES NOT mean window dressing on existing core functionality. This DOES mean fundamentally rethinking the inner workings of the system to accommodate high performing manufacturing operations. The successful ERP supplier will have profound knowledge of JIT principles, Lean Manufacturing, and Rate Based Due-Date-Driven production. Simplification and proper

functionality is the key … not more data … not more functionality. Actually in many cases, less functionality would be better!

The time has come to stop ignoring internal operations in favor of all the external e-commerce and e-business applications. While these are necessary for the future, fundamental manufacturing basics must be provided to accommodate the new simplified high performing factories.

The Challenge

ERP Suppliers: Develop simple and appropriate ERP system functionally matched to simplified factories. Who is ready to step up?

ERP Users: Learn what to expect in an ERP system that you are using to manage your JIT/Lean Manufacturing based business.

We, the manufacturing/operational community, need simplified tools to support simplified operations. The challenge for the ERP suppliers is to step up to this need. We need suppliers to develop and support simplified architecture that is congruent with simplified operations. We need ERP systems that simplify answering the simple questions!

J. E. Boyer Company, Inc. integrates lean manufacturing with enterprise resource planning to create world-class manufacturing environments where these two improvement strategies work together. We work on-site at your company. We do classroom training, one-on-one coaching, and project work … individually or as part of a team. We work at all levels of the organization from the boardroom to the stockroom! Since 1984, clients from a wide variety of industries have improved their operations in terms of cost management, on-time shipments, inventory investment, people development, operational speed, and overall business performance.

More information is available at: www.jeboyer.com

Please direct your comments and questions to:

John E. Boyer, Jr., President
J. E. Boyer Company, Inc.
3347 North 900 East
North Ogden, Utah 84414
Phone: (801) 721-5284
Fax: (801) 737-0799
e-mail: jeb@jeboyer.com