Six Ways To Make Your Lean Operation More Lean

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Introduction

Do you want more out of your lean manufacturing investment? Does there seem to be something missing? Have the results fallen short of expectations? Are you searching for the path to realizing your initial expectations? If you answered 'yes' to any of these questions, there is an excellent chance that your company's next significant opportunity is to clearly understand the difference between "lean planning" and "lean execution" activities, and the roles of each in a high performance manufacturing operation.

Almost all lean manufacturing initiatives focus on execution activities. These include factory layout (line flow and cellularization), pull systems, small lot production, setup reduction, 5S, kanban systems, visual controls, preventative maintenance, and quality improvement (many times using 6σ methods). All are focused on reducing cost, increasing speed/flexibility, lowering inventory, and improving on-time shipment performance. All of these are good things to do.

Almost no lean manufacturing initiatives focus on planning activities. These include balancing supply and demand for making future resource decisions, prioritizing the business using valid dates, promising shipments using Rate-Based Due-Date-Driven Production™ methods, engineering the strategic use of shrinking inventories, relying on flawless data for planning and execution, and applying line item budget accountability for in terms of fixed and variable categories for focusing on cost reduction.

Making lean operations more lean requires the integration of execution activities with planning activities. Planning and execution must work together to achieve a synergistic affect on overall operational performance. Ignoring one or the other leaves a void in the business process. For example, there isn't a kanban pull system in the world that can deal with the question, "how much steel will we need over the next 12 months?" To minimize the cost of steel and ensure availability in the supply chain, this question must be dealt with. This is a planning question that can be handled with Sales and Operation Planning. On the other hand, a valid question for a lean production cell first thing in the morning is, "what are we going to run in the next four hours?" To prioritize operations, this question must be dealt with. This is an execution question that can be handled with a kanban system.

Planning and execution work together. They are not mutually exclusive, even though this is something that many companies believe. Quite the contrary is true. By doing planning activities correctly, resources are positioned and managed in a way that the benefits of lean execution can be fully realized.

This article assumes that the reader has studied the execution side of lean in terms of the subject matter areas described earlier. So no further discussion of these principles is offered here. However, many lean implementations have ignored or inappropriately

discounted the importance and the proper design of lean planning. In fact, our surveys show some interesting facts. Based on a survey of 200 companies from a wide variety of industries, the following was found:

- Percentage currently implementing, have implemented, or are planning to implement lean manufacturing: 85%
- Percentage currently implementing, have implemented, or are planning to implement an ERP system: 95%
- Percentage of companies that have determined how these two popular improvement strategies will work together: less than 10%

By focusing on how planning and execution can work together, full benefits become possible. This objective of this article is to point out six key ways to make your lean operation more lean by focusing on these key lean planning areas:

- Sales and Operations Planning
- Date Management
- Rate-Based Due-Date-Driven Production™
- Inventory Engineering
- Flawless Data
- Line Item Budget Accountability

The Six Ways

Sales and Operations Planning

Most lean manufacturing factory designs result in some form of structured line flows or cells dedicated to specific product groups. These lines or cells produce an item from start to finish without any significant amount of WIP … possibly in an hour or two. Materials are stored at the point-of-use and come directly from suppliers or from feeder departments via kanban execution replenishment.

To achieve the desired line balance, equipment configuration, and staffing, a "run rate" by line or cell is needed. This run rate is expressed in daily terms of either dollars, units, earned hours, or equivalent units. Examples of run rates would be 1,000 units per day or 500 equivalent units per day. The run rate is the pace at with the line or cell operates. It is the drumbeat of production. This rate must be projected for several weeks or months into the future to accommodated needed changes to this rate in terms of equipment, people, and materials. Forward visibility is necessary because of the time generally associated with making these changes. Sometimes the rate is level, sometimes it is increasing over time, and sometimes it is decreasing.

The production run rate is a function of the desired shipping rate and changes in the finished goods inventory position. For a make-to-stock product, if the shipping rate is anticipated at 600/day over the next 100 days, and an inventory decrease of 10,000 units is desired, the daily production run rate must be 500/day. If more units are shipped than produced, inventory will go down. In the case of a make-to-order business (no finished goods) the shipping rate will equal the production rate.

The business process for determining the production run rate by line or cell is called Sales and Operations Planning. The objective of S&OP is for the top management team to reach agreement on the following:

- Booking, shipment, and production rates
- Backlog and inventory levels
- Capacity requirements

These are stated in terms of dollars, units, earned hours, and/or equivalent units by line or cell on a monthly basis through an appropriate planning horizon. All detailed planning must derive and flow seamlessly from this plan.

Some lean manufacturing companies are tempted to dismiss S&OP as not needed since kanban signals prescribe what to build daily for customer requirements. Don't fall into this trap! Kanban signals are part of the execution process. S&OP is part of the planning process that is critical to properly balancing demand and supply on a regular and formal basis to properly resource the business. And having the proper ERP systems tools to accommodate the S&OP process in terms of data retrieval and presentation of fit-for-use information is critical for S&OP to work properly.

However, given proper functionality, the ERP system should have the ability to resize kanban execution parameters. These changes can be tied to the output of the S&OP process. As rates of output change, the number of kanban signals in the system may need to change to accommodate new production rates and/or inventory levels. Using the system to identify these changes helps keep the whole process fully integrated.

Date Management

What is the most popular question that your customers ask every day? The answer is probably "when". When can we get shipments? When can you promise a shipment? When can we get more? The same is true of the most popular question a company asks its suppliers. When can we get delivery? When … when … when.

How is 'when' articulated? The answer is by telling them a 'date'. A due date. Your product will ship on May 15, 2004. You tell them a date. The whole business is essentially prioritized on dates. Even the most carefully worked out lean manufacturing kanban replenishment systems are date sensitive. For example, when a kanban signal arrives, replenishment must occur within five days … the due date is five days from today.

A lean organization should have a lean customer service department to deal with the customer's 'when' question. Imagine fielding the call, pulling up the order on a computer screen, and telling the customer the ship date based on the information on the screen. This is possible when the dates in the system are absolutely valid. No chasing, no calling back, no guesswork, no 'fibbing'. Just the date.

To achieve this vision, the lean operation must make a fundamental decision to operate the business from valid dates. Valid means a couple of things. First, no 'current date' is ever past due. If today is April 15th and the current ship date in the system says April

4th, the date is not valid. You can't ship in the past. The date has changed. The only outstanding question is whether to formally deal with it or not. The lean organization will keep it valid by changing it to the date that represents the current best estimate of the truth. Second, future dates that are suspected to be invalid due to material or capacity problems must be updated when a change is suspected.

Most companies, however, still want to know performance based on customer needs and original promises. This is easily accomplished by having three dates associated with each order line: request, original promise, and current. The current date is the system positioner and must be kept valid. The others are used to assess performance.

This concept of data management applies not only to customer orders, but also to work orders or schedules, and to purchase orders to the extent that they are used. In all cases, dates must be valid. It is the only way to make crisp and fast priority decisions for answering the 'when' question.

It is important to ensure your formal business system is capable of accommodating the three dates for each type of order. It is also critical to have management processes, expectations, and disciplines in place to keep dates valid.

Rate-Based Due-Date-Driven Production™

Now that a run rate by line or cell has been established via the S&OP process and since the business is operating from valid dates, Rate-Based Due-Date-Driven Production™ is possible. The concept here is to sequence production needs in due date sequence for each line or cell. Within each day, only an amount of work equal to the run rate is scheduled.

In a lean operation where a kanban pull system is used to authorize production, the cards or signals are sequenced in accordance with the run rate. Only so much can get done in a day, and prioritization by date must be done … even in a lean operation. When a kanban is slotted for production, many companies actually make a system transaction to show when the item is scheduled for completion, even if it is in the next few hours or days.

Using Rate-Based Due-Date-Driven Production™ allows an age-old order promising practice to be significantly rethought. The popular (but highly ineffective) practice of using a standard lead-time to establish a shipping or production promise date can be discontinued. Done. No more! It doesn’t work well. The truth is, from the production line or cell's point of view, the promised completion date is a function of how much work is already queued (scheduled). The next date is the next available slot at the end of the queue. So in very busy times, the lead-time may be longer than in slower times. The promised date will move in and out depending on line or cell's workload.

This concept works for make-to-order and make-to-stock strategies, or a combination of both. In the first case, capacity is promised to the external customer. In the second case, capacity is promised to replenish finished goods inventory … an internal customer.

To expand this thinking to the ERP system, order promising logic (either customer or finished goods replenishment) must work like this: 1) check material on-hand, and if enough is available, promise the order today or tomorrow, 2) if none is available, check the next scheduled completion, 3) if none is on order, determine the next available slot for production. This is called entering the order at the SKU level and assessing available-to-promise at the line/cell rate level. This is the lean way to load the line or cell, and provide a valid date at the time of order entry.

This is not the same as traditional ATP (available-to-promise) logic. It is significantly different. Traditionally, ATP focuses on how much inventory is available at the SKU (stock keeping unit) or end item level. Sometimes, an APS (advanced planning and scheduling) system is used to explode through bills of material and routings to enable complicated scheduling rules for synchronizing all the dates. Let's face it. This is only needed in a very traditional functional factory … an 'unlean' factory. Plus, the data intensity at times is overwhelming.

Rate-Based Due-Date-Driven Production™ focuses on how much capacity is available at the line or cell level. Once the run rate (positioned capacity) from S&OP is known, orders (both customer and finished goods replenishment) are slotted in due date sequence. The complexity is removed. The enabling strategy for this technique is establishing cells and line flows by implementing lean execution practices. In this way lean planning and lean execution are working together.

Inventory Engineering

Anytime a lean manufacturing implementation specifies a kanban position, a 'stock item' has been created. Anytime materials are procured in anticipation of future usage, a 'stock item' has been created. Anytime finished goods are positioned for future sales, you've got it, a 'stock item' has been created. By definition, any item used in production is either 'stock' or 'non-stock'. Even in the most lean environments, stock material exists. The only way to eliminate it completely is to have production exactly match customer demand, and the time to respond to this demand is instantaneous. Short of this, some inventory will exist, even though it may be a very small amount.

Recognizing that even the leanest operations will have some inventory, the challenge is to make inventory strategically beneficial. Classic ABC analysis is a good tool for separating the critical few from the trivial many. For example, for small inexpensive parts, it may not make sense to build/buy them daily or weekly. These are called "C" items. On the other hand it may be desirable to build/buy large, high-volume, expensive parts daily or hourly. These are called "A" items. The principle of sizing inventory positions based on ABC principles is as follows:

- A items - run smaller lots (in terms of days supply) more frequently
- C items - run larger lots (in terms of days supply) less frequently
- B items - are in the middle

These principles are very useful in establishing kanban sizes in lean pull production execution environments. Contrary to some beliefs, not all items are run every day!

However, reducing setup times (a key lean execution component) allows all lot sizes to be reduced thus reducing overall inventory levels.

But the inventory engineering job is not complete. There are numerous data elements that describe the 'personality' of each part (both purchased and manufactured) used in the product. Each data element must be properly designed to enable planning and executing the management of the part. A partial list of these data elements include:

- Planner
- Buyer
- Replenisher (kanban watcher)
- Where the item is used … this is a factory line/cell, not a product reference
- Where the item is made (producing line/cell)
- Fixed storage location
- Identification codes (product group, market group, manufacturing group, material group, commodity code)
- Inventory management parameters:
  - Stock vs. non stock
  - Manufacturing strategy
  - MRP vs. order point
  - Computer report vs. visual replenishment
  - Type of visual replenishment: kanban, company surveillance, supplier surveillance
  - ABC inventory classification
  - Safety stock (minimum) with a time dimension
  - Reorder point (if used)
  - Reorder quantity (lot size)
  - Maximum quantity (safety stock + reorder quantity)
  - Type of material (finished goods, WIP, raw material)
- Ability to assign an item to a customer
- Item status (active, obsolete, inactive)
- Item types: purchased, manufactured, customer supplied

Correctly engineering these data elements enables very efficient 'data mining' for reporting and analysis. In fact, many lean planning and execution initiatives fall short of expectations simply because the proper information is unavailable.

It is important to ensure your business system can accommodate all of the data elements required for lean inventory engineering, and that they are all designed and populate lean planning and execution.

Flawless Data

Imagine an environment where all information used for making decisions was absolutely flawless: on-hand inventory balances, bills of material, routings, work centers, customer orders, vendor masters, customer masters, costing, due dates, and others. Many companies believe this level of accuracy is not possible. But it is. Here is some proof. There is one system in most companies that contains essentially flawless data … the

payroll system! Why is the data so good? Imagine a person getting a paycheck that was short some money … overtime missed, a new pay rate not recognized, or an incorrect deduction could be some of the reasons. If this occurred: 1) feedback is immediate and clear, 2) there is no confusion as to who is accountable for the flawed data, 3) the user would not tolerate the mistake.

In a lean world, the same thought process must hold true for all of the other data used for making day-to-day production, inventory, customer order, and other management decisions. The data must be flawless. Information for answering simple questions must have one answer. If the data is not flawless, waste appears in terms of: 1) duplicate systems, 2) data chasing, 3) refiguring, 4) unnecessary communication, and 5) debates about who has the right number.

Do a simple assessment in your company. Go to five people: the financial manager, the manufacturing manager, the materials manager, the sales manager, and the general manager and ask: "'what was the total dollar shipments by major product family last month?" There is only one answer to this question, but see how many answers you get! If it is more than one, you probably have meetings where a similar question is asked, and the whole meeting is spent trying to figure out who has the right number. This is waste! In a lean environment, answers to these kinds of questions are carefully engineered and dealt with in a very precise way … usually via reports. After you know the results of this exercise, you will have a good indicator of the opportunity for making your operation more lean in terms of flawless data.

Line Item Budget Accountability

One of the major objectives of lean manufacturing is to reduce cost. Few would argue this point. And quite simply, the way to reduce cost is to spend less relative to sales. This principle sounds overly simple, but is often misunderstood. For example, a person determines a way to be more productive by doing some lean improvement activity such as cutting a setup time in half. This may allow lot sizes to be reduced and inventory to be lower. But has spending decreased? Maybe not. Are the same number of people on the payroll? Has revenue increased? Has the amount of disposable tooling decreased? If the answer is "no", then cost has not changed. If, however, more sales are actually supported with no headcount increase, cost was avoided.

In the above example, people and tooling are essentially fixed costs … at least in the short term (the next few weeks or months). A certain number of people will walk in the door today and will get paid regardless of what is produced or sold. The cost is fixed. Actually, in the short term, most manufacturing costs are fixed to a large degree. Fixed means that the cost does not change as a function of production output. Variable costs, on the other hand, change in direct proportion to production volume. The only true variable cost in the short term is the material that goes into the product. If nothing is produced, no material is used.

Then to make the lean operation more lean in terms of reducing costs, fixed costs must be managed very effectively. One way to manage fixed costs is by using line item budget accountability. Most companies have an operating budget that is updated periodically as a function of changing business conditions. Having line item

accountability means that budget detail exists for every G/L (general ledger) code and that a person's name is attached. This person, and only this person, is accountable for the budget and the spending that occurs for this G/L code. This person has budget line item accountability. The objectives for this person are quite straight forward:

- Create a budget that reflects the lean manufacturing improvements and supports the projected production run rates
- Monitor actual spending against the budget number at least monthly (and probably more often)
- Take action as needed to keep actual spending within budget
- Update the budget as needed to reflect lean improvements and changing business conditions

This process has two primary enablers:

- An expectation and review process by the general manager or president that this budget accountability will happen
- Fit-for-use information that is available directly from the business system as needed

Integrating Lean Planning with Lean Execution

The first step is to ensure the leadership team has a working knowledge of both lean execution and lean planning. This is best accomplished by a variety of educational activities including: 1) in-house seminars that are tailored to a company's specific situation and needs, 2) group discussions, 3) reading, and 4) talking to other companies that are going through a similar business transformation.

The second step is to establish an active top management lean implementation steering team. This team generally contains the company president and most direct reports. If you want your lean implementation to go fast … engage this group. They must make the key resource allocations and approve significant process and practice changes. If you want to be frustrated and be a lean underachiever, ignore this group. It's that simple.

The third step is to assess the current condition of the business to determine: 1) where you are in terms of lean planning and execution, 2) where you want to be in the next three to five years, and 3) what are the missing pieces.

The fourth step is to prioritize and determine the level of effort and resources required to implement each missing piece. Some will be quick, easy, low cost, and high impact. Others will take longer and cost more. The steering team must sort this out and make decisions on where to apply precious resources … both people and cash.

The fifth step is to establish focused task teams to deal with each piece, and go do it! By the way, make sure steering team members are also on appropriate task teams. It doesn't hurt a thing for the top management people to deal with some details and do some work!

Some other tricks of the trade are:

- Establish performance measures that reflect the sought after improvements that the lean implementation is to provide, and then measure performance on a regular basis … daily, weekly, monthly as appropriate
- Make sure there is an overall Gantt chart showing each task team's time frame
- Make sure each task team has an ongoing action plan and decision log for managing and teaching their piece of the implementation
- Have each task team report to the steering team periodically (weekly or monthly as appropriate) for tracking progress and adherence to schedule

Summary

In short, the full lean package is more than execution … it also includes planning. To make your lean operation more lean, complement your lean execution thinking with planning activities. And remember, the planning activities should be done within a fully integrated and functionally complete ERP system. Make sure your ERP system is up to the challenge.

Integrating these six lean planning practices with your existing lean execution initiative will make it possible for your company to realize the full potential of a lean operation. Maximum benefits in terms of reducing cost, increasing speed/flexibility, lowering inventory, and improving on-time shipment performance may finally be within your reach.

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

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