

By Art Smalley

The lean transformation of your supply chain begins at home. The first — and often missed — step in extending lean beyond the four walls of your facility is to segment your facility into one of three categories, based on the complexity of your operations and supply chain. Getting this step right will guide the implementation sequence at your facility and at suppliers.

Companies in the first — and simplest — category typically are final assembly operations, using purchased parts. They have little in the way of internal parts processing. In this case, setting up your parts market for purchased parts is critical. Basically, the key steps are:

- Develop a plan for every part (PFEP), a basic database containing all the key data on parts such as supplier names and locations, order frequencies, container types and dimensions, shipment sizes, transit times, etc.
- Organize the purchased-parts market to hold a controlled level of every part purchased from suppliers.
- Design delivery routes to get parts from the market to operators when needed and in the quantities needed.
- Implement pull signals with suppliers to keep inventory under control.
- Coordinate the logistics of the delivery from the supplier to maximize efficiency in transportation.
- Continuously strive to lower inventory and improve the system.

Companies in the second category must deal with more complexity. (For an in-depth case study of a company in this category, see the *Creating Level Pull* workbook; Lean Enterprise Institute, 2004.) You are in this category, if you have multiple internal processes making parts in addition to some purchased components. In this case, you want to create the most efficient level and pull- based production system in conjunction with your internal supplying processes and your external supplier processes. The situation becomes even more complicated if you have a mix of standard as well as unique items to build to satisfy customer demand.

To implement this type of system you must master each of the four main types of kanban: in-process kanban for scheduling flow processes; signal kanban for scheduling batch processes; interprocess kanban for internal parts withdrawal; and supplier kanban for external parts withdrawal.

Replenishment occurs in very small quantities (preferably), or larger batches, depending on the nature of the process and how good your changeover times are. Driving down changeover time earns you the right to reduce inventory and build closer to customer demand. The overall key items to focus on include:

- Segment your demand into high runner, medium runner, and low runner items
- Establish a finished goods market if you have high-runner standard products and your lead-time to manufacture them is too long to make them to order.
- Level the daily build at the pacemaker process in terms of both quantity and type produced. (The pacemaker, which is usually near the customer end of a value stream, sets the pace or schedule for the stream. Don't confuse it with a bottleneck, which constrains downstream process due to a lack of capacity.)

- Create the discipline of building the medium and low-runner items consistently in addition to the high runners to satisfy customer demand.
- Calculate the frequency with which different part numbers will be produced for all your internal processes and set the size of your internal supply markets based on this replenishment timing. (This recurring frequency is called EPE — every product, every interval. If a machine is changed over to make a part every three days, then the part’s EPE is three days.)
- Be sure to adequately factor in safety and buffer stock margins unless you have very high process uptime and consistently smooth customer demand.
- Use the appropriate kanban types to signal replenishment when material has been consumed from a market location.
- Standardize conveyance routes to get material from the market to the operators when needed and in the right quantities.
- Establish clear rules and priorities for processes that are shared and build standard product as well as custom items.
- Organize the purchased-parts market to hold a controlled level of every part purchased from suppliers.
- Implement some type of replenishment signal with the supplier to keep inventory under control.
- Work with suppliers and logistics providers to optimize the total efficiency of the supplier parts delivery chain.

Lastly, if you primarily make low-volume, highly engineered custom products, you fall into the third and most complex category. Most likely, you’ll have a mix of parts with short and long lead times from suppliers, as well as internally manufactured parts from shared assets.

The first place to begin is typically to draw a value-stream map of the entire customer order to delivery process across the company. Frequently, companies with long lead-times and custom products, for example, use up to four or five weeks of a hypothetical six-week delivery period getting the order finalized before manufacturing ever “sees” the order and starts building. In worst-case scenarios, manufacturing goes straight into expedite and catch-up mode, which drives up cost beyond planned levels. Overall keys in this type of complex environment include:

- Map your internal processes, especially nonproduction activities such as purchasing, order entry, engineering, planning, etc. Very often, orders are delayed in these processes before they reach manufacturing.
- Improve the quality of the information output from these non-production areas and shorten the lead-time as much as possible.
- Ensure that basic items like the bill of material, routings, engineering drawings, and lead-time assumptions are very accurate.
- Monitor long lead time items to ensure they will arrive to production on time for processing.
- Set up internal markets for standard components and build these through replenishment if you can.
- For internal special items create very clear staffing plans, and production flow plans to ensure FIFO and timely production.
- Set up purchased parts markets for high usage items delivered from the outside sources.

Lastly, in all three cases you should develop supplier score cards and report back to the suppliers their monthly performance on relevant metrics like quality, cost, and on-time delivery. Work with your suppliers to improve their performance and reward your best vendors with continued business. You may also have to educate your purchasing department about the principle of total cost of ownership and not just procurement based upon lowest piece price. Most companies don't measure or recognize the tremendous amount of extra cost and waste that are the direct result of constantly dealing with problem suppliers. Improving supplier's performance and rationalizing your supply base over time is a critical enabler for long term success in manufacturing.

Art Smalley is the author of *Creating Level Pull*, the latest workbook from the Lean Enterprise Institute. The workbook describes step-by-step how to create a lean production control system for all the product families within a facility by implementing pull between processes and a leveled schedule at the pacemaker process. Smalley was one of the first foreigners made a permanent employee of the Toyota Motor Corp. in Japan and played a number of roles in production operations at Toyota, such as assisting with the start-up of many of their overseas manufacturing facilities in the U.S. and other countries. He subsequently served as Director of Lean Production Operations at Donnelly Corp., and manager of the Production System Design Center at McKinsey & Co. He is a member of the LEI faculty and works directly with firms pursuing lean transformations.