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WHITE PAPER / **MANUFACTURING LEAN ASSESSMENT**

LEAN ASSESSMENT TO OPTIMIZE YOUR OPERATIONS

BY Chris Williams AND **Michael Glavin**

To pinpoint operational challenges and identify optimal solutions for manufacturers, lean assessments may be the right approach. A Lean Six Sigma evaluation of current processes takes a holistic view of a business in order to build efficiencies now and in the future with shorter lead times, better on-time delivery, faster cash conversion and greater product control.

When faced with operational challenges, manufacturers need a way to properly identify problem areas and their optimal solutions. The optimal solution may be rightsizing the facility, addressing capacity challenges, introducing automation, improving worker skills or making other operational improvements. Sometimes existing metrics will point you in the right direction, but many times they do not.

While your instinct may be to expand your building or add new resources to increase production, there may be a more effective solution to meet this need. The same is true for operational challenges in logistics, operations, procurement or any other aspect of your business.

Accordingly, the right approach to improving efficiency in your operation is to begin with a lean assessment of your overall business. By systematically evaluating all processes, from the receipt of raw materials to the shipping of finished goods, you can identify improvement opportunities that can transform your business. Ultimately, these improvements translate into shorter lead times, better on-time delivery, faster cash conversion and greater product quality.

CASH-TO-CASH CONVERSION

Throughout the manufacturing process, time is money. Whenever you can shorten the length of time between the purchase of raw materials and the sale of finished goods, you can improve overall profitability. The cash-to-cash cycle time (C2C) is the time it takes for a company to convert its raw materials into a finished good and receive its payment from customers. This conversion is one of the best measures of overall process efficiency.

The shorter the conversion cycle, the quicker cash changes hands. If you have to spend cash to purchase inventory, you want a return on that investment as quickly as possible. More importantly, you never want to hold inventory past your net 30 or net 60 pay requirement without having started the conversion of raw materials to finished goods.

All of this begs the question, "How can I reduce my C2C?" The right way is to follow the money and map the processes from cash-out to cash-in. This can be accomplished with a broad-based assessment of your entire operation. Once that evaluation is complete, you can calculate your "cost per day." Knowing your cost per day allows you to make decisions based on cost versus return for improvements.

Your assessment results can then be turned into a 30-60-90-day action plan to improve your processing time. After you have implemented improvements, you can calculate your savings based on the results of those improvements.

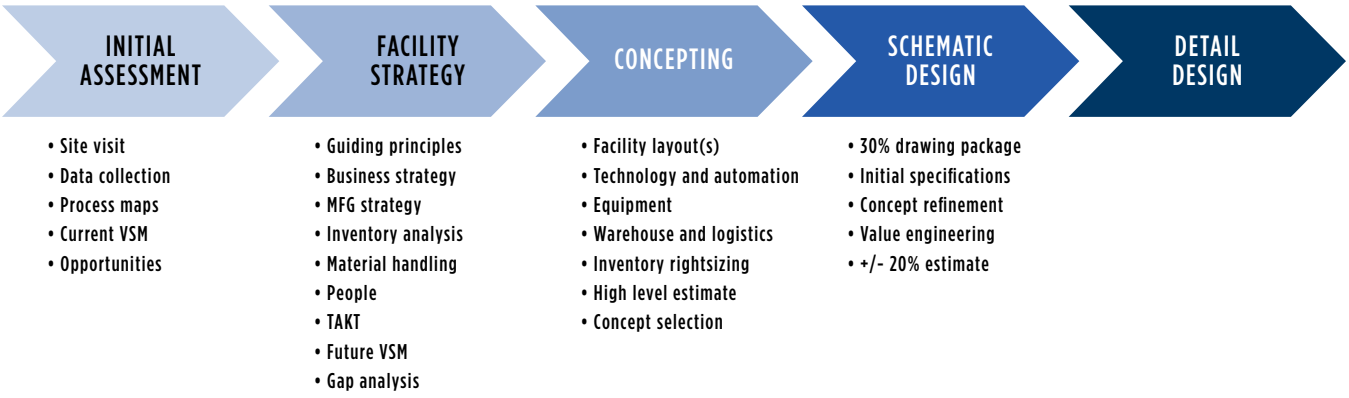

FIGURE 1: *The Lean Assessment and Design Process.*

THE LEAN ASSESSMENT AND DESIGN PROCESS

The lean assessment process is based on a data-driven, gated approach that takes a holistic view of the business. Each assessment should begin by asking what the end goal is for the business: Are you trying to improve quality or on-time delivery? Reduce inventory or increase market share? If the project includes building a new facility or renovating a large portion of an existing facility, you should also consider how the business and/or product may change over the next five, 10 or 15 years and how the facility will need to adapt to those new requirements.

The lean assessment road map, illustrated below, will guide you from these big-picture questions to a manufacturing process that yields favorable financial and operational outcomes.

Every lean assessment begins with an initial assessment, which is conducted through site visits, meetings with subject matter experts, walking the manufacturing floor and data collection on key metrics. Typical metrics include on-time delivery, days of raw materials and finished goods on hand, process cycle time, amount of work in process, safety, and defect rate. Each of these metrics is evaluated to establish a detailed understanding of the current, overall operational efficiency of your facility. Development of key process maps assists with identifying areas for potential improvements that feed into the next stage of the process.

The next step is developing a facility strategy customized to your business and manufacturing objectives. This is accomplished by defining the guiding principles for the business based on an analysis of the overall manufacturing and business strategies, as well as a gap analysis between the current and proposed future state. Typical manufacturing strategies include the desire to add automation in key areas of the operations or limit the amount of fork truck activity in the facility. On the business side, common goals include increasing market share or introducing a new line of products or services. Each of these examples drives specific requirements that must be addressed during the concepting phase.

Concepting is an iterative, data-driven process that moves systematically from an initial design to concept simulation and, finally, validation. During this phase, all the information that has been developed in the strategic analysis is incorporated into the design of the facility.

One example of a strategic objective is the reduction of fork truck activity in the facility. Meeting this objective will drive specific design requirements that might involve the addition of automation, such as conveyors or automated manufacturing cells.

Another example might be reducing the need for a large warehouse by developing a plan that minimizes inventory levels at every stage. Many times this is accomplished by doing a thorough analysis of raw and finished goods inventory. In addition, implementing key process improvements often frees up floor space, which can then be used for new production lines for new products.

The final deliverable is a schematic design and general arrangement outlining the initial specifications for your project. This will include an estimate of costs, a milestone schedule and other key parameters. A Lean Six Sigma specialist will also support your design team throughout the remainder of the process.

ASSESSMENTS ON A SPECIFIC AREA

Efficiencies can be achieved through either a broad-based or focused assessment on a specific area. While a full dock-to-dock assessment is ideal and returns the clearest results, it may not always be feasible. If you've already identified a specific area for improvement — such as receiving, warehousing, manufacturing, quality or capacity — your data collection can focus on that area alone. As long as you recognize you may be suboptimizing a single area, you can use your data as a metric for that area and plan ahead to get the biggest bang for your buck.

OPPORTUNITIES FOR IMPROVED EFFICIENCY

At the end of the design process, you will have a high-level strategy for improving operational efficiency in the long term, as well as clearly defined next steps for implementing that strategy. In many cases, the lean assessment will uncover new and unexpected solutions. For example, improving the runtime or usage of key pieces of equipment may increase your output, thus reducing the need for additional square footage or machines.

Or, your assessment might reveal ways to reduce the amount of raw materials or finished goods stored. If the time needed to purchase and receive raw materials is shortened or the cycle time to produce finished goods is reduced, then the space needed to store them will also decrease.

Many times, a lean assessment will identify multiple opportunities for improvement, as well as highlight how they can work together most efficiently. For instance, excessive material movement often can be decreased by increasing the overall connectivity of process or process synchronization. This typically leads to a reduction in fork truck activity in the production area, which increases safety while also reducing the process cycle time by removing movement and waiting.

WHEN TO AUTOMATE

Automation is becoming much more prevalent in industry and many clients want to incorporate it into their operations. However, doing so doesn't always generate a return on investment. Due either to the cost of automating the process or the complexity of the task, manpower is sometimes still a better solution. This is definitely the case in many high-mix, low-volume manufacturing operations.

During a lean assessment, a Lean Six Sigma specialist will evaluate your entire process to determine what should and shouldn't be automated. The initial goal of automation is to identify operations that are dangerous, dirty or very repetitive. For example, highly repetitive tasks like painting can lead to soft tissue injuries such as carpal tunnel syndrome. Automating such tasks typically improves safety by removing the individual from the operation, while also increasing quality and improving cycle time.

Another example is incorporating automated material storage directly into the manufacturing process to manage sequencing and scheduling of work in process. Specifically, connecting an automated storage and retrieval system (ASRS) directly into automated machining centers decreases the travel time of materials to the machining centers, reduces the opportunity for handling damage and allows operators to manage multiple machines.

Automating raw goods and material warehouses is another way to significantly increase floor space and efficiency. Automated warehousing systems such as ASRS systems can be up to 120 feet tall, while manned systems are typically limited to around 45 feet. Taking advantage of the cube allows you to store much more in a smaller footprint. These systems also bring the goods to the person instead of requiring someone to move up and down aisles looking for the right materials. As a result, pick times can be reduced by up to 95 percent and pick rates can be increased by up to 400 percent.

CONCLUSION

Evaluation of your current processes is the first step in optimizing your operations. Many traditional metrics do not evaluate overall cycle time or the single-day cost to do business, but a comprehensive lean assessment can get you started down that path.

When completed by a Lean Six Sigma specialist, such an assessment can help you reduce cycle time, rightsize inventory, optimize capacity and balance utilization of resources. Moreover, conducting an annual or biannual assessment introduces the opportunity for continuous improvement, helping you set a vision for going forward and achieve new goals.

BIOGRAPHIES

CHRIS WILLIAMS is a project manager for the Lean Six Sigma & Manufacturing Process Group in the Global Facilities Group at Burns & McDonnell. He has broad-based knowledge of Lean Six Sigma processes and techniques and is a certified Master Black Belt. In his current role, Chris leads continuous improvement projects for a variety of clients across a wide range of industries, including ammunition, armaments, aerospace, consumer products, oil and gas equipment, and medical devices. Chris also has experience in designing and specifying a variety of automated material handling solutions that include automated storage and retrieval systems, automated guided vehicles, various conveyance solutions and robotic material handling. Chris has a Bachelor of Arts in geology and a Master of Science in environmental science from Texas Christian University.

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