Lean Manufacturing

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Introduction

Many people think that Lean Manufacturing means coordinating schedules so that parts and materials arrive at their point of use "just in time" to avoid inventory and the space it consumes.

Indeed, that is part of Lean Manufacturing – an important part. But there is considerably more than that to Lean Manufacturing. That's because Lean Manufacturing is a strategy for achieving significant, continuous improvement in performance through elimination of all waste of time and resources in the total business process.

For most companies, improving performance means change – dramatic change – in the way they do business. Change can be unsettling as people face new roles, new risks, and new standards of achievement.

Yet, the change to Lean Manufacturing can be orderly and organized for rapid success if a company follows the Seven Steps to Lean Manufacturing. Before introducing these steps, it is important to understand Lean Manufacturing strategy … its tactics, performance standards and philosophy.

Even more important, companies need to understand the attitude and commitment – "the mindset" – that must be adopted by every member of the company if the Lean Manufacturing strategy is to succeed. This attitude and commitment, when adopted right from the start, can provide immediate payback before most of the individual Lean Manufacturing tactics are in place.

First, an overview of Lean Manufacturing to relate how these seven steps chart the course for Lean Manufacturing success.

LEAN MANUFACTURING

Lean Manufacturing is a strategy for achieving significant, continuous improvement in performance through the elimination of all waste of time and resources in the total business process.

Figure 1: Leam Manufacturing Definition

The Fundamentals of Lean Manufacturing

To accomplish the Lean Manufacturing strategy, a company must envision the business as composed of three business management areas: technology management, people management and systems management. These work together in the manufacturing and business management process to achieve three ultimate goals: short manufacturing cycles, total quality and continuous improvement. (See Figure 2: Lean Manufacturing Anchor Chart)

Each of the three business areas contains four elements – or tactics – for achieving the Lean Manufacturing strategy.

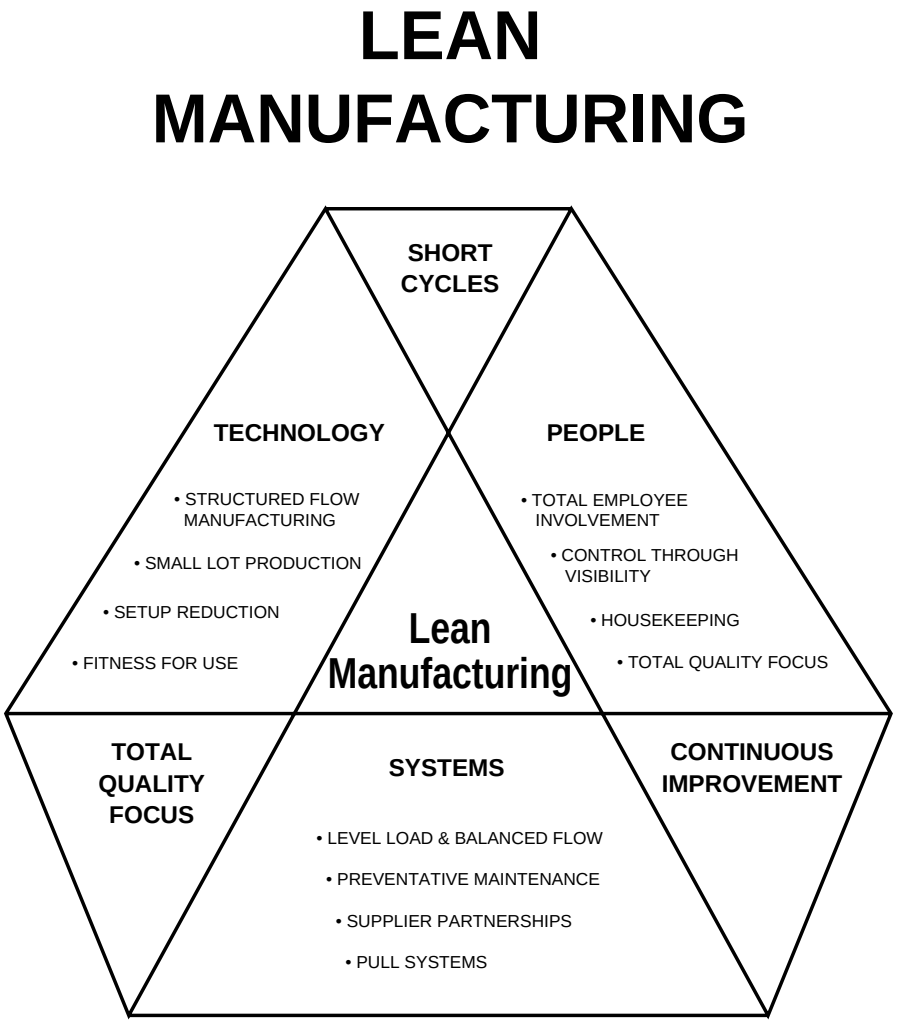

Figure 2: The Lean Manufacturing Anchor Chart

Technology Management

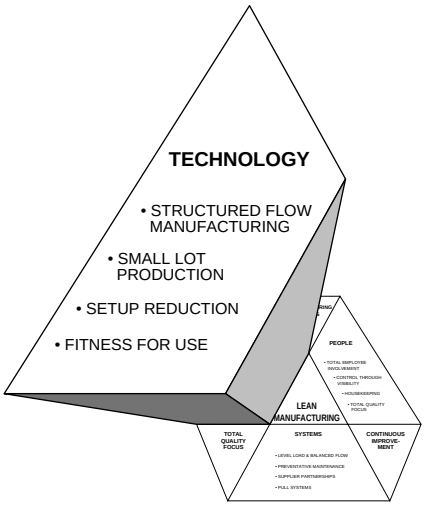

Figure 3: Lean Manufacturing Technology Management Elements

The Lean Manufacturing technology management objective is to establish a responsive production environment. This requires shortening the timeline from customer order to cash by shortening the total business throughput time.

The following are the four Lean Manufacturing elements for creating a responsive production environment.

1. *Structured Flow Manufacturing* entails arranging and defining manufacturing resources so that products flow most efficiently through the manufacturing process. Most companies are organized for functional manufacturing, where like machines are grouped together and products are transported to machine groups in batches during the manufacturing process. In functional manufacturing the ratio of work to motion is low because products usually require a lot of transportation and other movement during the manufacturing cycle. The manufacturing throughput time or cycle time is typically measured in days or weeks. However, in Structured Flow Manufacturing, resources such as work centers and machines are aligned to conform to the manufacturing process so transportation and movement is reduced to a minimum, and throughput time or cycle time can be measured in days, hours … even minutes and seconds.

2. *Small Lot Production* is simply decreasing order quantities and lot sizes to the smallest quantity practically possible – ideally a lot size of one, or at the very least, equal to the customer's order. This lot size reduction is made possible by using structured flow and reducing setup time.

3. *Setup Reduction* requires reducing the amount of time it takes to prepare machines or production lines for new work. It is measured as the time (and cost) from the last good piece of the previous job or run to the first good piece of the new job or run. Short setups enable greater production flexibility, less inventory, and more capacity.

4. *Fitness for Use* means meeting the customer's precise needs – "passing the baton correctly." The customer can be the person who buys your product, the person at the next manufacturing operation or the person in the Planning Department who receives the paperwork from Order Entry. In other words, each next step in the total business throughput process is the previous step's customer, and the results of one work center must meet the needs or requirements of the next work center … precisely.

People Management

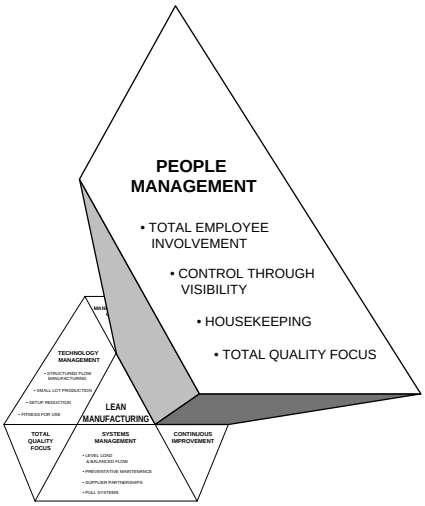

Figure 4: Lean Manufacturing People Management

The Lean Manufacturing people management objective is a capability for rapid improvement. This requires creating an environment where all levels, both management and hourly workers, are given the responsibility and authority to suggest improvements and implement them – a risk-taking environment that makes rapid improvement possible.

The following are the four Lean Manufacturing elements for educating, involving and motivating people.

1. *Total Employee Involvement* is recognizing that all of the people in the company are valuable resources who can provide many, if not all, of the solutions for improving performance. Lean Manufacturing requires that everyone be involved in improvements and their implementation through Small Group Improvement Activities (SGIA).

2. *Control Through Visibility* is achieved by structuring operations so that control of the process is possible through simple visual means. Examples include progress charts and flashing lights when a problem occurs so fast and decisive action can be taken. Control Through Visibility is then used for communicating goals and attacking waste using simple and straightforward signals to highlight problems or processes out of control.

3. *Housekeeping* focuses on the physical organization of the work space. Simplification, cleanliness, discipline and organization eliminate potential confusion, promote a safer environment, and reduce waste of time, motion and resources. In other words, a place for everything and everything in its place … no exceptions.

4. *Total Quality Focus* requires conformance to standards. The quality of a product indicates the quality of the process. If there are product quality problems, there are unacceptable variations in the manufacturing or business process. Thus, Total Quality Focus encompasses the entire product chain from suppliers to customers and includes all functions of the business.

Systems Management

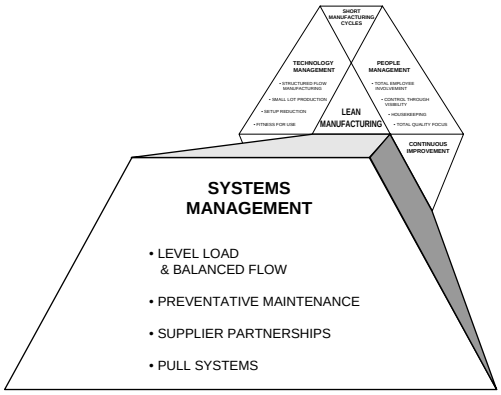

Figure 5: Lean Manufacturing Systems Management

The Lean Manufacturing systems management objective is to carefully apply the limited resources of the business: equipment, material, people, money and time. This may require reorganization from traditional functional disciplines to a more cooperative and integrated style of organization that stresses flow approaches in order to maximize the efficient use of resources.

The following are the four Lean Manufacturing elements that support this integrated approach.

1. *Level Load and Balanced Flow* involves arranging work so it creates effective utilization of manufacturing resources. Level Load is scheduling products to be manufactured in equal quantities during a given time period, such as a week or month. Balanced Flow is providing a continuous flow of products through the manufacturing process for the most effective application of manufacturing resources.

2. *Preventative Maintenance* aims at reducing machine downtime due to equipment failure. It requires maintaining manufacturing equipment at a high level of operating performance – to have equipment that does not fail and always operates within the required tolerance specifications. Preventative Maintenance plays a major role in structured flow manufacturing and is essential for total quality. The goal is to eliminate the equipment as a source of process defects.

3. *Supplier Partnerships* place their emphasis on "partner" that implies long-term, stable relationships with vendors. Supplier Partnerships focus on reducing costs for everyone through shared quality goals, shared design responsibility, frequent deliveries, long-term relationships and a total cost perspective.

4. *Pull Systems* is a detailed scheduling method whereby materials are pulled only when they are needed. It means keeping the time of producing parts as close as possible to the time when parts are used, rather than making parts when capacity is available and pushing them through the process. Parts are made when they are needed. The Pull System is, in a sense, a confirming mechanism which demonstrates the success of all the other elements of Lean Manufacturing production. It reveals any "weak links" that need attention.

Lean Manufacturing Anchor Chart

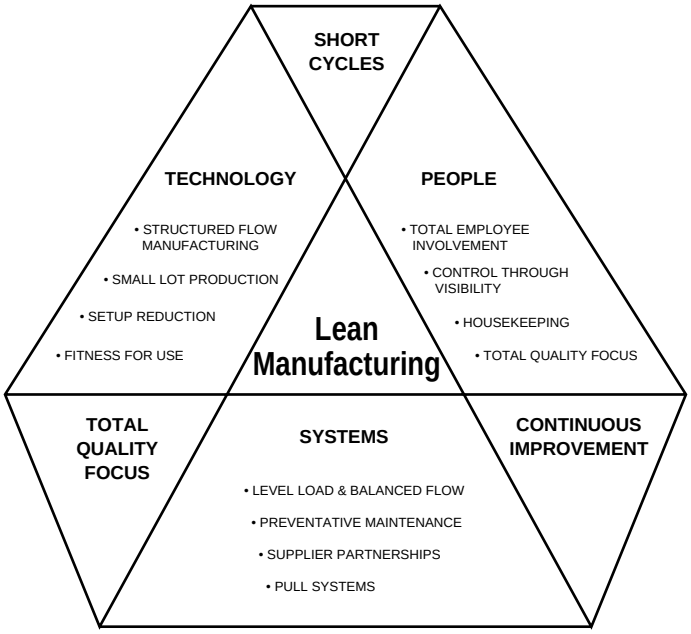

Figure 6: Lean Manaufacturing Anchor Chart

When these three business areas – technology management, people management, and systems management – are in balance and Lean Manufacturing elements are in place in a manufacturing company, the result is a company that has accomplished major performance improvements and arrived at significantly lower costs and shortened lead times. (See Figure 7: Average Lean Manufacturing Performance Improvements).

Average Lean Manufacturing Performance Improvements

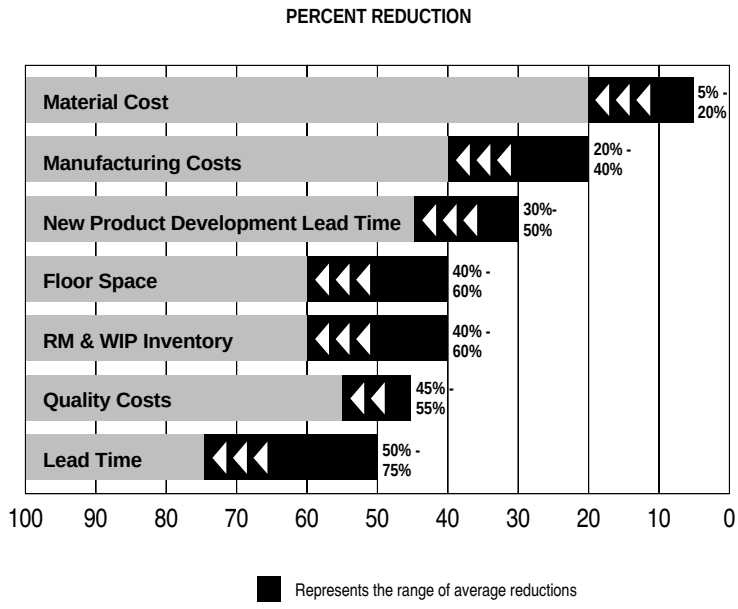

Figure 7: Lean Manaufacturing Performance Improvements

Developing The Lean Manufacturing Mind-set

For most companies, implementing the Lean Manufacturing strategy means developing an updated World Class company culture that adopts startling new attitudes. For example, adopt the new rule, "Problems are good news," because by acknowledging them they can be solved and improvement achieved.

These new attitudes that make up the Lean Manufacturing mindset are grounded in skills that everyone must possess and should practice if the company is to succeed at Lean Manufacturing. These skills - Watchfulness, Assertiveness, Commitment – must be applied in every area of the company to search out and eliminate all waste of time and resources from the total business process.

The concept of eliminating waste is central to Lean Manufacturing. It is both the motivation and objective of undertaking the Lean Manufacturing strategy effort. Elimination of waste means eliminating all activities that do not add value to the process.

Cost-Added vs. Value-Added

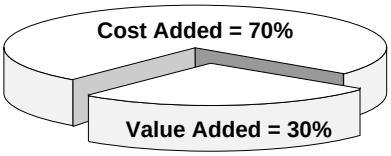

Figure 8: Cost Added = Waste

The first step toward eliminating waste – or cost-added activity –is to be able to distinguish cost-added from value-added. In most traditionally organized manufacturing companies, cost-added activities account for approximately 70 percent of the total cost of the product. (See Figure 8: Value-Added vs. Cost-Added) In a Lean Manufacturing environment, the goal is to reduce the cost-added so that the value-added becomes 90 percent of the total cost – a strategy that lowers total cost significantly, enhancing competitiveness and profitability. (See Figure 9: Changing Cost-Added to Value-Added Ratios)

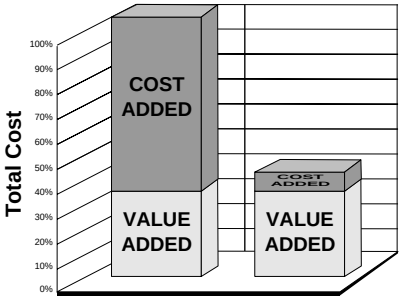

Figure 9: Changing Cost-Added to Value-Added Rations

But before attacking cost-added activities, companies must be able to recognize the enemy. And this is not easy because, over the years, the cost-added activities in a business have become taken for granted – become invisible – and are now assumed to be the way to do business. This is the mind-set that must change.

One method of restoring the cost-added focus in a company is to perform a short mental exercise. Imagine taking a can of red spray paint and walking through the business. Anywhere an activity is found that does not directly add value to the product, mark it with an X. Each red "X" signifies cost-added.

- It's inventory sitting before or between operations.
- It's material handling required to move material to and from operations.
- It's material inspection and reworking rejected material.

Seven Types of Waste

- PROCESSING
- DELAY & WAITING
- OVER PRODUCTION
- MOTION
- TRANSPORTATION
- INVENTORY
- SCRAP & REWORK

Figure 10: Types of Waste

There are basically seven wastes hidden in commonly accepted operations within a manufacturing company. (See Figure 10: Seven Wastes)

1. Processing Waste How efficient are manufacturing operations? What is the purpose and value of each operation? Is there a better, more efficient way to produce the product?

2. Delay and Waiting There are two categories of delay and wait time – those caused by schedules and plans, and those caused by manufacturing procedures. Both must be investigated for potential improvement. Are there delays and wait time in the company for materials and people as products are produced? If there are, how can they be eliminated?

3. Over Production Is production exactly what is needed, or is extra being produced in an attempt to avoid manufacturing costs such as additional setup? Remember, the Lean Manufacturing objective is to produce exactly what is needed, even down to a quantity of one.

4. Motion Are there unnecessary, cost-added motions in the manufacturing process? An example of unnecessary motion is moving work-in-process from one fixture to another for a manufacturing operation. Can such motions be reduced or eliminated from the manufacturing process?

5. Transportation How effectively are materials and products transported through the manufacturing facility? In a Lean Manufacturing environment, raw material is moved from the supplier's truck to the manufacturing line where it is continuously transformed into finished product. At the end of the line, it is packaged and shipped to the waiting customer. In a Lean Manufacturing environment, travel time and distance traveled by the product are minimized.

6. Inventory Some inventory is required. However, in the past, inventory was used to cover up underlying problems. In a Lean Manufacturing environment, inventory can be greatly reduced as problems and inefficiencies are identified and eliminated. As the continuous improvement philosophy takes hold, inventory turn rates of 50 to 100 times become possible and desirable.

7. Scrap and Rework Scrap and rework confirm that manufacturing processes are not under tight control. As the manufacturing process improves, reliability and repeatability increase and scrap and rework decrease.

Three-Step Rule to Eliminating Waste

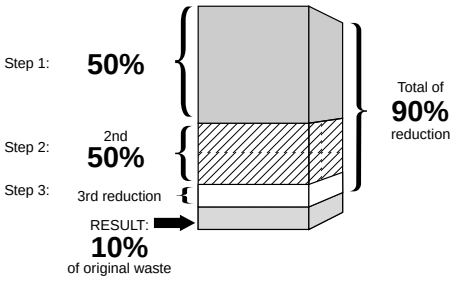

Figure 11: Three Step Rule to Eliminating Waste

Step 1: Reduce by 50%

Step 2: Reduce again by 50%

Step 3: Make it 10% of Original

Once wastes have been identified – the question becomes, how do you attack it? The recommended method involves three steps. (See Figure 11: Three Step Rule to Eliminate Waste)

The first step is to reduce the traditional 70 percent cost-added activities by 50 percent. This step is usually easy to implement because the first 50 percent is easy to find. Taking corrective action to achieve the improvement is accomplished by implementing Lean Manufacturing tactics.

But don't stop there. The next step is to reduce the remaining cost-added activities by another 50 percent. This step will be more difficult than the first, but use the experience and results from the first step to perfect the second step.

Finally, reduce waste to 10 percent of its initial value. This third step will take continuous effort over a longer period of time and will require involvement of the people most experienced and skilled at the process and activities.

Throughout the improvement process, a company must avoid settling for superficial solutions to cut waste. These usually present themselves in the guise of purchases rather than hard work.

For example, a factory is using a forklift to transport material in batches. Seeking an improvement and wishing to eliminate the waste in this operation, management invests in linking the equipment together with a conveyor system.

With the conveyor in place, the forklift is eliminated and transportation may have become quicker, But, they are still doing transportation, they still have work-in-process inventory, and they still are producing work in batches.

In this instance, a conveyor is a superficial improvement. A fundamental improvement would have been to bring the equipment closer together and eliminate transportation – developing a structured flow. When working the Three-Step Rule, adhere to the discipline of attacking waste fundamentally. Fundamental improvement only comes from eliminating waste.

The Seven Steps

- Education and Leadership
- Company Assessment of Lean Manufacturing Elements
- Implementation Plan
- Pilot Implementation
- SGIA Organization
- Performance Evaluation
- Company-Wide Transition and Internalization

Figure 12: Steps to Lean Manufacturing Implementation

Step 1: Education and Leadership

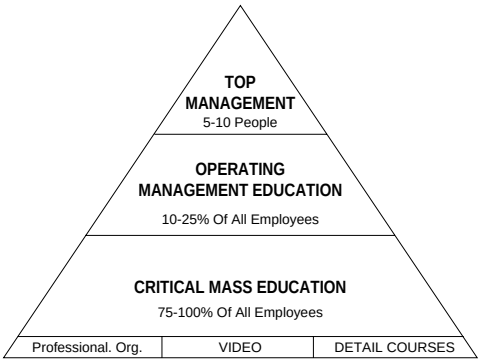

Figure 13: The Education Pyramid

In short, implementing Lean Manufacturing is hard work. But by taking the seven steps it can be an exciting, creative and ultimately rewarding process for everyone in the company. Each step builds upon the preceding step, and each must be completed successfully in order to receive full Lean Manufacturing benefits and results.

The journey to Lean Manufacturing begins with top management education which develops the leadership so that Lean Manufacturing education can flow to everyone in the company. Without an effective education program, people cannot be expected to learn and adopt the Lean Manufacturing philosophy and procedures or to develop the Lean Manufacturing commitment and mindset. Education is the mandatory first step.

Leadership results from top management education by getting management actively engaged in the process of implementing a proactive program of continuous improvement. Through this engagement, management develops the understanding, the vision, and the commitment to authorize the required resources.

A good Lean Manufacturing education program includes a variety of educational offerings that are matched to the appropriate levels of the company – from senior management to people on the production line. (See Figure 13: The Education Pyramid)

The first stage of education must be for top management and is best accomplished through a two-day Lean course. The objective of the course should be to provide a working overview of Lean Manufacturing and establish a comfort with the changes ahead.

The second stage of education is for operations management down to first-line supervisors and support staff. Experience has shown that the most effective way to begin education of the operating management is through in-house education in at least two-day formats.

The third stage of education must extend the vision to include everyone in the company, as everyone will be involved in the program. This education is best accomplished through video education programs, where smaller groups of people can learn and interact with the concepts of Lean Manufacturing as they relate to

their own job environments. Video is cost-effective and flexible, allowing education to extend over a period of weeks, so people have time to absorb the concepts and internalize methods into their own environment. Instructors or facilitators for this stage must come from within the company.

The fourth stage of education must be presented to focused groups of people on "how to" apply the Lean Manufacturing concepts to their specific jobs. For example, setup reduction techniques are taught to those specifically involved in setups. Total quality focus practices are taught to people specifically involved in the quality program. The recommended vehicle for this education is individual video modules, supplemented by instructors with materials that add details specific to the company. Employees may even be asked to help develop these materials.

Reeducation is essential to reinforce concepts and practices learned and to refresh memories periodically on the fundamentals and total vision of the Lean Manufacturing philosophy. New employees must also receive education so that they have a common understanding of the vision and practices of their colleagues. Thus, the education program must be planned, developed and invested in as an ongoing, permanent program – not a one-stop activity that can start and end in a matter of days. Continuous improvement means making a commitment to continuous education.

Step 2: Company Assessment of Lean Manufacturing Elements

Before a company introduces any element of Lean Manufacturing into its manufacturing process, it should begin by assessing its readiness for Lean Manufacturing through a rigorous assessment process. This formal assessment is organized into five sections and looks to define current performance levels, areas of opportunity for improvement and areas of superior performance. The five sections are:

1. Cultural awareness
2. Technology management issues
3. People management issues
4. Systems management issues
5. Education and training

The primary purpose of the assessment is to define the current priorities that will have the most positive impact on the company, product and operational method – the priorities that will bring the quickest payback in improvement.

Sample Lean Manufacturing Assessment Questions:

The assessment process is a comprehensive review that requires each company to answer individual questions about each of the 12 Lean Manufacturing elements. Thus, the company emerges from the process with not only knowledge of where it now stands, but a Lean Manufacturing action plan for the business.

Company: _____

Location: _____

Audit Date: _____

3.2 Workplace Organization and Visual Management

Expectation		Evidence	Evaluation		
3.2.8	**There is good, effective communication between production shifts in the plant. *(E.g. Equipment, quality problems, production schedules, etc. are communicated daily, and production areas are left "ready to go" by the previous shift.)***	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.1	**The plant is generally clear of all unnecessary materials or scrap and isles are clear of obstructions.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Figure 14a: Sample Lean Manufacturing Assessment Questions

Sample Lean Manufacturing Assessment Questions:

Expectation		Evidence	Evaluation		
3.2.2	**Lines on the floor clearly distinguish work areas, paths, and material handling isles. Signs clearly identify production, inventory staging, and material drop areas.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.3	**A daily checklist exists in each work center that identifies housekeeping activities to be performed.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.4	**There is "a place for everything and everything in its place: "every container, tool and part rack is clearly labeled and easily accessible to the user. People using tools, parts, fixtures, quality gages, etc. know where to find them.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.5	**Updated display boards containing job training, safety, operating measureables, production data, quality problem and counter-measure information are readily visible throughout the plant.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.6	**A radar chart/spider diagram chart displays each area's workplace organization performance.**	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Expectation		Evidence	Evaluation		
3.2.7	**Check-sheets describing and tracking the top defects are posted and up to date at each workstation. *(E.g., Each operator is aware of the key quality points and defect history of the process they are doing.)***	•	A	RI	F

	Observation	Action	Responsibility	Date
Site	•	•	•	•

Figure 14b: Sample Lean Manufacturing Assessment Questions

Step 3: The Implementation Plan

Once the assessment is complete, an implementation plan must be established to schedule detailed actions. The plan should state activities, the status of each activity, the person responsible for each activity, the start date, and the expected completion date. The resources required to complete each task should also be specified. (See Figure 15: Lean Manufacturing Implementation Plan)

Lean Manufacturing Implementation Plan

Activity	Status	Person Responsible	Start Date	Completion Date

Figure 15: The Lean Manufacturing Implementation Plan

In structure, the implementation plan should consist of sections that parallel the sections of the assessment. Beyond this, each company's implementation is highly individualized – like a map charting its terrain and indicating its specific path of continuous improvement.

The implementation plan becomes a working document for the project team and senior management. It should be brought to every project team meeting, and progress should be recorded, dates revised, completed items marked off, new items added … it becomes a living, breathing document of the Lean Manufacturing project.

Step 4: Pilot Implementation

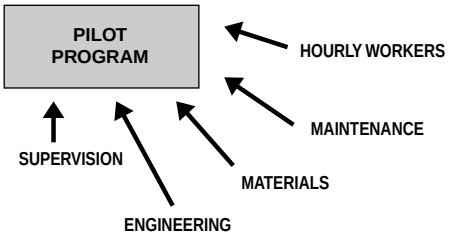

Figure 16: Ideal Pilot Program

A pilot implementation is usually required to begin a Lean Manufacturing effort. This process permits careful analysis and management of new activities before company-wide changes are initiated. Hidden problems often surface when new plans are put into place, and a pilot implementation leads to quick identification of problems and development of effective solutions before they impact company-wide production conditions.

The pilot must be a carefully planned "tryout" of any one of a number of Lean Manufacturing activities – establishing a new line flow in manufacturing, introducing a new setup reduction procedure, or trying a different approach to shorten the new product design cycle. The objective is to test the new activity under controlled operating conditions to make sure it works as expected.

One of the most successful Lean Manufacturing pilot situations is to set up a "factory within a factory," focusing on a product line that can stand alone in the shop – one that occupies a relatively small amount of floor space, uses materials that are not shared with other product lines, and has processes and work centers that do not see demand from other product lines. This potential pilot may even have dedicated supervision and support services; as many companies find, dedicated supervision and support may be required in the pilot effort. In the isolation of this pilot situation, Lean Manufacturing concepts can be implemented without the risk of disrupting all production operations. (See Figure 16: Ideal Lean Manufacturing Pilot Program)

Once the success of the pilot is secure, it can be shared with the remainder of the plant. Participants in the pilot can be temporarily or permanently transferred to other departments to help speed the evolutionary expansion of the Lean Manufacturing principles. Like seeds nurtured in the pilot project, they can be planted throughout the company to make Lean Manufacturing success grow.

Additional tips for implementing a pilot program include the following:

1. Limit the scope of the pilot so problems and unexpected conditions can be easily identified and corrected.

2. Limit the pilot to a short, first phase (60 to 90 days) and test solutions to the identified problems as a second phase.

3. Develop written expectations, goals and objectives for the pilot, record daily results and measure them against expectations.

4. Try to identify and experience all operating conditions before implementing the pilot.

5. Use a combination of people from production, management, engineering and other required specialties, creating teams with a mixture from these groups. The objective is to train line people in new methods while operating in the new environment.

6. Fix all of the problems as quickly as possible and integrate the solutions into standard operating procedures.

7. Get commitment from the line people and management that the new process will work, then implement the new process into mainstream operations.

8. The pilot program should be supported fully to insure its success.

   Caution: If the pilot program is insignificant, then the results and improvements will be considered insignificant. Pick something significant.

Step 5: SGIA Organization

Small Group Improvement Activities (SGIA) are the vehicle for getting everyone involved in the Lean Manufacturing continuous improvement process. Most problems can be uncovered, and the most effective solutions to those problems can be designed by employees in the work area. SGIA groups channel the brainpower of the people into a powerful problem solving tool. They also promote the basic change in mind-set – watchfulness, assertiveness, commitment – that must take place for the Lean Manufacturing strategy to work. The changes must grow slowly, reinforced by that steady stream of small successes that will be experienced by the group.

The following are steps for developing and managing SGIA:

1. Provide the required leadership and education in the beginning, from the beginning.

2. Limit the scope, objectives and time of each group meeting to a focused topic or process and aim at achieving targeted results.

3. Develop a formal method of measuring SGIA performance. Results or resolution of group problems must be identified early in the life of each group.

4. Make sure every group is successful. Do not let groups tackle the most difficult problem as their first assignment. Let them work on a useful and straightforward project. The important thing initially is success. Measure performance improvements carefully the first few weeks and provide additional resources and support to help get past initial problems.

Step 6: Performance Evaluation

Establish Aggressive Early On Objectives:

CYCLE TIMES

OUTPUT TARGETS

PRODUCTIVITY

QUALITY

SETUP REDUCTION

Monthly Norms To Review Progress

Figure 17: Lean Manufacturing or Baseline Performance Measurements

PERFORMANCE EVALUATION LOOP

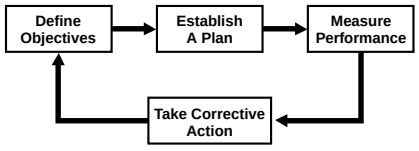

Figure 18: Performance Evaluation Loop

Measuring and communicating improvement is essential to nurturing the growth of commitment to – and the success of – the Lean Manufacturing project. Performance evaluation is the management process for seeing that the improvement plan is working and that the objectives and results are being reached. Performance evaluation can be applied to many levels of the business process – daily operations, the Lean Manufacturing implementation process, specific projects, the project team and the total business operation.

In the Lean Manufacturing implementation environment, first establish the appropriate performance measurements and determine the current performance level of the company on each. (See Figure 17: Lean Manufacturing Performance or Baseline Measurements) Then, post the performance and continue posting it hourly, daily, weekly or monthly – picking the frequency appropriate to the measurement – to observe and communicate improvement in the organization. If expected results do not occur, have a mechanism for analyzing the situation and taking corrective actions to get back on plan. (See Figure 18: Performance Evaluation Loop)

The success of continuous improvement, Lean Manufacturing, and manufacturing excellence depends on how well performance evaluation is constructively put to use.

Step 7: Company-Wide Transition and Internalization

As improvements are achieved, they must be internalized and made part of the normal daily routine … the way the company does business. The focus is on doing things better and more efficiently, constantly, continuously … continuous improvement. Once launched, it is a never-ending process, a forever commitment. There is no turning back.

And everyone must understand that – from top management to each person within the organization. Success depends on repeating many of these steps over and over as new phases of Lean Manufacturing are implemented. As old tasks on the implementation are completed, new tasks are added. As one pilot program or process is accomplished, another is developed to add a new element. As higher performance is reached on one measurement, focus shifts to improving another, and measurements are tightened.

The process can be maximized if the following steps are observed:

1. Provide a clear understanding of the objectives to everyone in the company from the beginning.

2. Communicate results and activities frequently, perhaps like some companies do, in a daily newsletter.

3. Make sure everyone understands that this project has a high management priority. This must be demonstrated with actions, not just words.

4. Involve as many people as possible in the program.

5. Measure performance and progress every day, and when performance falls below expectation, take action to solve the problems.

6. Formally adopt the new way of doing business as the only way to do business, and continue implementing new methods and procedures as rapidly as feasible.

Lean Manufacturing Steps … To Stay In Pace With Today's World

In many businesses, survival now depends on the ability to continuously improve products and manufacturing processes.

Pressure from customers along with domestic and international competitors will continue to intensify. Markets, products and manufacturing methods continue to rapidly change. Companies must constantly investigate innovative ways to manufacture products at lower costs, at consistently higher quality, with more reliable delivery and with ever-increasing responsiveness to their customers' needs.

At Buker, Inc. we see top companies around the world focusing their management resources on eight areas of improvement:

- *Designing for Manufacturability* Design products for the customer that exceed the customer's needs at required quality levels, with ease of manufacturing and assembly as a foremost consideration.

- *Shortening New Product Introduction Cycles* New products must be researched, designed, developed and brought to market in less that half the time it currently takes, and then in half of that time.

- *Increasing Inventory Turnover* World Class inventory turns will be 40 … 70 … 100 times.

- *Shortening Manufacturing Lead Times* The business cycle will be expressed in hours or days, not weeks or months.

- *Focusing on Total Quality* *World Class* quality will be measured in parts per million for components … zero defects for products.

- *Enhancing Customer Service* By increasing flexibility, World Class companies will deliver quality products or services as promised at exactly the time the customer requires it.

- *Eliminating Waste/Cost* Material cost will become a larger component of total product costs: labor cost will continue to be a smaller percentage. All activities that do not add value to the product add cost and will be targeted for elimination.

- *Minimizing Organizational Levels* World Class companies will have fewer layers and broader technical competence.

Conclusion:

The Seven Steps to Lean Manufacturing provide a meaningful way to organize and direct the process of change in a company striving to be World Class. Yes, change can seem threatening, but everyone in the company must learn to recognize it as a healthy and natural process. Just like species, companies that don't change risk extinction – particularly in today's highly competitive, increasingly global marketplace.

Does your company aspire to adopt the Lean Manufacturing strategy to achieve World Class Manufacturing Performance? Are you looking for ways to reduce cost and eliminate waste to become more strategic competitors? Are you ready to assess the current state of your business and create an action plan for change?

If your answer to any or all of these questions is "yes," the professional staff at Buker, Inc. would welcome the opportunity to talk with you about your plans, answer questions and assist you in your pursuit of manufacturing excellence.

Please feel free to call to discuss your situation or to request more information from our company.