Lean Implementation Steps, Plan, Roadmap, Timeline

Critical to any initiative is to have a vision and detailed plan to achieve the vision. In lean manufacturing, so often companies fail to fully implement lean because they generally don't understand all facets of lean. Often companies lack a good strategy and plan to implement lean manufacturing. Below we outline a lean implementation plan and with the associated lean tools to develop a lean implementation timeline or roadmap with detailed lean implementation steps. Use it as a guide to lead your company through a successful lean implementation.

The basic steps to implement lean are:

1. Leadership Engagement & 5 year plan
2. Total Employee Lean Training
3. Daily Performance Walkthroughs
4. Kaizen Event Process
5. Value Stream Mapping
6. 5S & Visual Workplace
7. Total Productive Maintenance
8. Quality Improvement & Mistake Proofing
9. Work Cell Balance & Redesign
10. Reduce Changeover Times
11. Connect Processes To Flow Material
12. Kanban & Kitting Processes
13. Lean – Enterprise Wide

Leadership Engagement & 5 year plan

Definition – This step involves getting top leadership's full commitment to giving their time and support to the lean implementation. This step involves assigning a full time lean leader that will develop and own a 5 year lean implementation plan.

Benefits – This step is the most important of all. The primary reason that lean implementations fail is top leaders are not fully supporting and driving the process. If top management is not fully engaged, a lean implementation should not be pursued.

Implementation Steps – Top leaders need to participate in a kaizen at lean manufacturing companies with a strong lean foundation and 10 years of experience in their lean journey to get an introduction to lean. Shingo prize companies are recommended as they have been recognized for results and progress toward implementing lean manufacturing. Lean Consultants are a good resource to connect you to a company engaged in lean at a high level. Once leadership is engaged, contact a lean recruiter and hire an experienced lean leader. Ideally candidates are lean certified and have experience as a Lean Manager, Continuous Improvement Manager, or Lean Engineering role. It is recommended that companies partner with a lean consulting company. Interview prospective consultants and select a partner that has experiences and backgrounds that fit your company's processes and total size. Consultants will give guidance and bring in outside ideas from experiences at other companies. Then the Lean Manager, company leadership and the Consultants should put together a 5 year plan with the steps below and lean measurements to measure effectiveness of the plan. The 1st year of any lean implementation should focus on a simple model value stream. This model value stream should have all the elements implemented below to a world class manufacturing level. Years 2-5 should be focused on spreading the best practices throughout the entire organization. The 5 year plan should be reviewed quarterly with the annual value stream plans to review progress, engagement, and adjustments. This will help make sure the company stays on track in executing the 5 year plan.

Total Employee Lean Training

Definition - Before starting a lean implementation all employees should be given higher level lean training. This training should include a mixture of Lean PowerPoints, factory lean simulation kits, Tom D Wip (7 wastes), definition of key terms e.g. muda, a lean video giving testimonials by all levels of an organization, an overview of the lean manufacturing tools, and the lean manufacturing definition.

Benefits - At the end of the training, employees should be able to give an overview to the question "What is lean manufacturing?". For employees that will be heavily involved in the lean effort such as engineers and supervisors they should be enrolled in a lean course and be working toward a lean certification program.

Implementation Steps - Training should be given to large groups of 20-30 employees using a lean factory simulation kit and a video giving an overview of lean manufacturing. Training centered around lean employee suggestion system should be given to get more better ideas. The training should be given to all employees from top to bottom of the organization. The Lean Manager should be the primary trainer and be capable of answering questions employees may have. Once the training is completed, employees will have a foundation to become lean thinkers and start looking for a better way every day in their areas of responsibility.

Daily Performance Walkthroughs

Definition - Each day the leadership team or lean management team assigned to a value stream should complete a walkthrough of the gemba (factory floor). Each area should have a performance board that is reviewed to understand quality, cost, delivery, and safety results for the area. Most importantly, an hour by hour chart should be reviewed and discussed to understand the reasons an area missed target each hour. The top reasons should be tracked and pareto charted. Tasks should be completed for the daily abnormalities and kaizens/projects should be used to address the repetitive issues on a downtime pareto chart. Completing these activities on a daily basis is the definition of lean manufacturing management.

Benefits - Too often managers try to manage issues through reports and employee e-mails/communications from their desks on a daily basis. Seeing the issues first hand on the Gemba daily gives leaders a good understanding of the true condition of the shopfloor, actions are taken immediately to address issues, and plans can be made for projects and kaizens to address larger issues and opportunities based on pareto charts. Once a pulse of the shopfloor is well understood, leadership understands the true opportunities in the area and can build in improvement plans to take the area to the next level.

Implementation Steps – The 1st step is to identify all the major work centers in the value stream. Next the critical metrics for the area should be posted on a rotating kiosk or magnetic white board with quick grids listing safety, quality, cost, and delivery metrics. An hour by hour sheet should be developed using an 11X17 form. It is recommended to use paper and graph the output hour by hour. This makes the process more visual and the paper copies can be stored for future reference. Resources should be identified that need to be involved – Managers, Supervisors, Engineers, Maintenance, and Quality. Then standard work for holding the walkthrough should be developed and every representative at the meeting should be assigned responsibility to report on a performance aspect of the area. The floor supervisor should lead the discussion for the work centers under their area of responsibility. The materials needed to implement daily walkthroughs are magnetic whiteboards, task cards, document holders, and magnetic strips.

Kaizen Event Process

Definition - What is kaizen? A kaizen lean event (sometimes misspelled as kaizan) is a lean manufacturing process where a team of individuals focus for multiple days at a time and make improvements to a focused area. Kaizen events are also called a kaizen blitz or kaizen team. Kaizens range from 3-15 people and can last 2-10 days. Kaizens include employees from all levels and functions in an organization. Kaizens have a scope, targeted results, and specific actions to be completed.

Benefits - The benefits of a lean manufacturing kaizen event are: all employees including floor workers are engaged in making improvements and multiple minds work together from differing perspectives to develop the best possible solutions. Most importantly, the kaizen manufacturing process is fast and delivers results.

Implementation Steps - complete the prework - includes a team charter listing team members, goals, measurements, and objectives. The event week starts with kaizen training including PowerPoint training, training kits, and videos. The next step is to move to the shopfloor and hold the gemba kaizen for 2-10 days depending on the scope of the project. Tools needed will be pedometer/step counter, egg timer, and stop watch. At the end of the kaizen a report out should be held where company leadership and affected stakeholders comment and celebrate the kaizen team's success. Then kaizen homework and measuring results should take place until a kaizen closing meeting is held 30 days after the kaizen presentation.

Value Stream Mapping

Definition - Lean value stream mapping is a process used to analyze material and information flow for the value stream of a product from the supplier to the customer. Value stream maps give leaders a graphical view of how their operation flows with the critical performance metrics for each step of the process. Having this high level view enables leaders to make significant changes to the operation that has a significant impact that can be seen by the customer.

Benefits – Taking a macro view of an operation will result in significant change. It has a much higher impact than traditional operational optimization because the changes can be leveraged as a competitive advantage in the eyes of the customer in terms of lead time, cost, and quality. This high level view, and focus on the operation will ensure resources are working on the top projects that will matter most to the business and drive optimal improvement.

Implementation Steps – It is recommended to use the kaizen process to complete the value stream mapping process. First complete a team charter with employees from all functions including floor workers. Then prior to the kaizen gather all safety, quality, productivity, and customer information to bring to the kaizen. Once the kaizen starts, begin with training including kits, PowerPoint training, and a video. Once complete begin posting all data using value stream mapping data boxes and kaizen burst forms for the value stream – safety, quality, productivity, customer, material flow maps, people maps, current state value stream map, and the ideal state map(value stream mapping icons). Then the team reviews all the information and brainstorms projects, kaizens, and tasks to make improvements to the value stream ultimately trying to reach the ideal state. Using lean software the current, ideal, and future state of the value stream should be documented including key metrics and the 12 month improvement plan. The 12 month improvement plan should be rolled into the quarterly review of the 5 year plan to measure progress to the plan and results in the key metrics.

5S & Visual Workplace

Definition – Lean manufacturing 5S (sometimes misspelled as 5 S) is a process for maintaining a clean, optimized, organized, and standardized workplace. 5S applies to all areas of a business – supply base, manufacturing, distribution, information/file systems, and office areas. The 5S's were originally created in Japan using the Japanese words seiri, seiton, seiso, seiketsu, and shitsuke. As the process moved into the United States English terms were created - sort, set, shine, standardize, and sustain. The basic concept in 5S is: "There is a place for everything and everything is in its place." The ultimate goal of 5S is that the workplace does not get dirty – this should be a focus for all 5S implementations.

Benefits – The 1st benefit of 5S is quality improvement due to a clean environment reducing the risk of dirt and grime contamination and reducing aesthetic quality defects such as marks or scratches. Safety is impacted as clutter is eliminated and tools are placed at the optimum point of use from an ergonomic standpoint. Productivity is impacted because employees are not looking for materials or tools, tools are placed at the optimum position to reduce cycle time, and cycle time is reduced due to standardization - repeating the cycle the same way every time. Sales can be impacted as prospective and current customers visit the operation and gain confidence that the operation is well run. Floor workers will be filled with pride as visitors complement their efforts and they will enjoy the daily satisfaction of working in a clean organized environment. As corporate leaders visit the site they will be positively impacted by the operations. This impression will weigh heavily towards site selection in future expansions.

Implementation Steps – As with any of the lean tools, a 5S kaizen is recommended to implement the 5S lean process. Begin the 5S implementation with 5S training including a training kit , PowerPoint training , and a 5S manufacturing video. Then the process starts with sort – remove all unnecessary items, red tag them, and move to a red tag holding area. The red tag holding area should be reviewed weekly by the leadership team and items should be disposed of or placed in the stockroom. Unnecessary items are items that are not used within the last 6 months. Set – remaining items should be placed in optimum locations for reduced cycle time and ergonomic consideration. Then label or shadow to identify the location using colored tape, labels, signs, shadowing material, pegboard, portable hand held labeler, or floor paint. All visuals should be reprinted and laminated using a heat free laminator. Shine – Establish a process to clean daily. Standardize – Standard work should be created to ensure that daily unnecessary items are removed, labels and shadows are kept in good condition, daily cleaning occurs, and that all items are put back in their place. The last step Sustain – is the process of completing a 5S audit to ensure the 5S workplace is maintained. The audit results should be posted on a performance board and reviewed with the employees in the area.

Total Productive Maintenance

Definition – TPM or Total Productive Maintenance is a maintenance management lean process for improving equipment to eliminate defects and downtime. The two primary efforts around TPM are TPM events and equipment abnormality reduction events (sometimes called Focused Equipment Improvement Teams). TPM events are focused around tearing down equipment, replacing broken or worn components, and modifying machines for ease of lubrication for maintenance and operators. TPM events bring equipment to like new condition. An important part of sustaining TPM event improvements are preventative maintenance activities completed by maintenance and production operators to ensure the equipment maintains its like new condition. After the machine has been brought to like new condition the machine will still produce defects and have downtime due to design flaws. These design flaws should be eliminated through equipment reliability kaizens. Equipment abnormality kaizens are focused on specific machine abnormalities not resolved by TPM kaizens. The basic process for these kaizen is to identify the specific issue, complete a 5 why analysis to determine the root cause, brainstorm ways to address the issue, trystorm the top ideas, then modify the machine.

Benefits – Implementing TPM in operations increases reliability in equipment and reduces downtime and defects caused by equipment. Productivity increases, quality improves, on time delivery improves, operator morale increases as they are more involved and spend less time fighting equipment issues. TPM also affects safety as operators and maintenance find safety issues in guarding and safety devices as they complete equipment inspections. Implementing TPM at this point in the lean implementation before reducing inventories is essential because poor machine reliability can have disastrous effects on customer service and hurt the success of the lean implementation. Leaders can lose their confidence in lean and reduce their support of the effort.

Implementation Steps – Step 1 is to create a new position to manage the TPM process and be the primary leader for TPM kaizens. It is recommended that this position reside in plant maintenance but report to the Lean Manager to ensure focus remains on the TPM implementation across the plant. Once this position is in place, hold a kaizen event. In preparation for the event gather the needed training kits, books, PowerPoint training, gauge marking sheets, and TPM videos. A part of this training should involve teaching operators to use their senses when operating equipment. They can use their sense of smell, sight, hearing, and touch to find noises, vibrations, or temperature rises in equipment operation. Flagging these issues early will prevent defects or downtime. After training tear the equipment down and bringing equipment to like new condition, develop tasks for operators to lubricate, clean, and replace consumable parts. Maintenance should have PM tasks as well to keep the equipment in like new condition. Following the kaizen measure results, and audit maintenance activities to ensure the ongoing tasks by maintenance and operators are being completed.

When the machine is brought to like new condition, many of the defects and downtime created by the machine will be eliminated. The remaining issues are a result of design flaws of the machine. To address these flaws machine abnormality events should be held for each machine. These events are typically short in length and smaller in terms of team size. The kaizen team members should be diverse in organizational roles and diverse in machine knowledge. The basic steps are to complete a 5 why analysis, brainstorm as many ways as possible to modify the design of the machine, trystorm, and implement the best solution. We recommend the book *Focused Equipment Improvement for TPM Teams* for detailed steps to hold these kaizens.

Quality Improvement & Mistake Proofing

Definition – Over the past 10 years six sigma and lean have been combined to create lean sigma, lean 6 sigma, or sometimes lean six sigma. Lean requires high levels of quality because when inventories are removed between processes significant quality issues can shut down entire value streams. Lean experts over the past 50 years in the US and Japan have been quoted many times saying that companies not willing to address these significant quality issues should not adopt lean. As a result, solving these issues with six sigma variation reduction tools and poka yokes needs to take place before removing work in process inventories. Examples of six sigma tools are fishbone diagrams, five why process, and design of experiments. A poka yoke is a Japanese term for a mistake proofing device. There are 3 levels of a poka yoke. Level 1 poka yokes do not allow a defect to be produced. A level 2 poka yoke detects the defect and stops the process. A level 3 poka yoke detect defects. Level 1 poka yokes are ideal because it is impossible to create a defect.

Benefits – The benefits of improving quality are well known. Productivity improves due to reduced rework, reduced quality inspectors (in a lean environment every employee is an inspector), reduced line stoppages, reduced handling of defective product, reduced waste, reduced landfill costs, and reduced field repairs. The improved quality reputation in the marketplace will drive increased sales. A better reputation in the marketplace will improve long term security. The inventories used to minimize the effects of quality issues and production stoppages can also be eliminated.

Implementation Steps – The top quality issues should be identified and kaizens should be planned. Each

kaizen should start with lean six sigma training, including training kits, PowerPoint presentations, quality videos, and poka yoke videos. Kaizens should begin analyzing the defects using fishbone diagrams, 5 whys, bandaid charts, and variation measurement. More complex issues may require a DOE to understand the root cause. Once the root cause of the quality issue is resolved the kaizen team should brainstorm as many ways as possible to address the root cause. Then trystorm the various ideas and implement the best solutions. These kaizen should be held as many times as necessary to eliminate the significant quality issues in the value stream. As kaizens are held in each area, the poka yokes and other quality checks should be driven in the hands of the operators in the production areas and made part of the production process. Traditional quality checks (go/no go) completed by quality inspectors should be minimized and the quality organization should be sized down appropriately.

Work Cell Balance & Redesign

Definition – Each workstation in the value stream should setup in a U shape when possible. The design of the cell should facilitate materials being delivered from the outside of the U to the operators fingertips with a reasonable amount of material stocked at each workstation. The amount of material stored in the workstation ranges from 1-8 hours depending on the volume and physical size of the parts. Material is typically delivered in totes or small containers that will fit in the operator's workstation. If the volume of material dictates pallet quantities, pallets are acceptable but should be presented to the operator's fingertips on a pallet stand. Another aspect of redesigning a work cell is to complete cycle time observations and balance work between operators at or slightly below takt time (the pace that customers are ordering product). The workstation redesign should also be designed with staffing flexibility and minimal operator movement in mind for all staffing levels. Extra operators removed from the operation should be used in other areas of the plant or for covering absences. If there are no available positions or absences to fill, the excess operators should be used to participate in kaizens and drive further lean improvement. Employees freed up due to work cell balance should never be terminated.

Benefits – Labor costs are reduced significantly as excessive staffing is removed from operations. Inventory is reduced as excessive inventory in work cells are removed. Space and operator walking is reduced through workstation redesign. Ergonomics is improved as materials are placed at optimal positions for operator reach. Output is increased as cycle time is balanced and flow is established in the work cell. Cycle time is reduced due to reduced walking and time in reaching for material in the lean production work cell.

Implementation Steps – Kaizens should be planned for every work cell in the value stream. The kaizen should have diverse team members and be focused for a week long activity. The kaizen should start with training including training kits, PowerPoint training, and training videos. The 1st step is to observe the cycle time at each workstation. Using a clipboard with stopwatch, the cycle times should be measured and charted on a cycle time takt time chart. Then the team should begin redesigning the layout so that work can be shared between operators and so that cycle times are leveled to takt time for various levels of customer demand. The layout should also include redesigning the material flow to place the material at the operator's fingertips. The delivery cycle should be established for material handlers and standard work for delivering material with material delivery carts. Once the workstations are modified takt time countdown timers should be installed on each assembly area for use in counting down takt time and synchronizing all operators. All operators should start their cycle at the same time and the countdown timer in the workcenter should countdown from takt time. Once all operators complete their cycle the countdown timer should be reset and all operators should start the next cycle in sync again – also known as pacing assembly lines. Andon lights are recommended as a visual means to call for maintenance, material handlers, or supervision. Once all the physical changes are made, the kaizen team should monitor the process for 2 days, work out issues, and then hand off the new process to Supervision.

Reduce Changeover Times

Definition – Reducing changeover times falls under many terms - setup reduction, changeover reduction, SMED – single minute exchange of die. They are all defined as reducing the time to change over from the last good part to the next good part. Setup times are separated into internal steps and external steps. The internal steps must be done when the machine is shut down. The external steps can be done while the machine is running. The 6 basic steps of implementing changeover reduction are to separate internals from externals, convert internals to externals, eliminate the adjustments, implement quick change devices, streamline the process, and implement a pit crew system involving multiple operators to complete the changeovers. Changeover kaizens for a single machine should be repeated multiple times until the ultimate goal is reached - zero changeover time. Companies with this philosophy have seen 3 hour changeovers turn into 3 minute changeovers after years of changeover reduction kaizen efforts. Reducing changeover is critical prior to reducing inventories in the value stream as changeover times determine process flexibility - the primary factor in determining work in process and finished goods inventories.

Benefits – Reduced capital costs and increased available operating time due to increased capacity. Product quality improves and waste is reduced as kaizen teams find ways to have the first part produced be a quality part. There is a potential to eliminate inventory as the reduced changeover times enable production cells to changeover more often reducing inventory and freeing up cash. Increased flexibility from changeover reduction efforts enables companies to offer higher product variety at a lower cost than the competition. This flexibility can be a game changer in the marketplace and take a company to new levels of growth and profitability.

Implementation Steps – Setup a kaizen team made up of diverse team members - operators, engineers, technicians, and supervisors. Start the kaizen with training – training kits, PowerPoint training, and changeover reduction videos. Observe the current process, video the steps, record cycle times for each step with a clipboard with stopwatch, and trace the movements of the operators creating a spaghetti map. Then the data should be reviewed by the kaizen team and the cycle time tasks should be put on a pareto chart. Brainstorm the best ways to reduce cycle time, convert internals to externals, eliminate adjustments, implement quick change devices, and ideas for zero changeover time. Procure a adjustable die cart for quick change of dies. Typical quick change devices are adjustable roller carts, push button clamping levers, C-washers, swing washers, half turn screws, flip bolts, tilt knobs, and push button nuts. Next trystorm the top ideas and implement the best solutions. Once the improvements are implemented, new procedures should be written in standard work to streamline the process and ensure internals are separated from externals. Once all improvements are implemented and procedures are finalized the pit crew process should be implemented along with a changeover countdown timer. This involves using as many operators as practical to complete the setup and reducing the time. This process should be implemented in all parts of the value stream with long changeover times.

Connect Processes To Flow Material

Definition – This step is to minimize and eliminate inventories throughout the value stream. In the ideal state value stream map, material flows from a trailer at the receiving dock directly into the 1st process and flows continuously through every process step until it reaches the last process step and conveys directly into the trailer at the shipping dock. Process flexibility, changeover times, volume flexibility, process equipment reliability, and product quality are the critical factors that determine if processes will be directly inlined or if a kanban system will be used. When an upstream process feeds multiple downstream processes a kanban system will need to be used. The most successful companies in implementing this step have developed right sized equipment that matches the capacity of upstream and downstream process one for one enabling processes to be connected.

Benefits – Cash savings result from inventory reduction. Material handling labor and material handling equipment will be eliminated. Material defects will be eliminated as material will not age and when defects

are caught there is little defective inventory in WIP. Reduced material handling by PIV's will reduce product damage and reduced rework in repairing damaged material. Floor space is reduced leaving space open for future growth and expansion. Safety will be improved due to reduced forklift movement and less handling of material throughout the value stream. Fewer material control positions are required as the material is eliminated or a kanban is used. Total process lead time will be reduced significantly as product can freely flow from one process to the next. This shortened lead time can be a powerful competitive weapon as a special order can flow through the factory in a matter of hours and ship to the customer in the same day.

Implementation Steps – The preceding steps of eliminating machine downtime, reducing quality defects, improving flexibility through reduced changeover time, and redesigning the work cells prepare the areas for connecting processes and flowing material through the factory. Using a value stream map, each process step's process data box should be updated to reflect the current state and each inventory point evaluated. Then a future state should be made with inventory eliminated where possible and kanbans planned for areas not flexible enough to inline or where a process feeds multiple downstream processes. Develop a project plan to implement the changes in the future state starting with supplier kanbans in the receiving area.

Kanban Processes

Definition – Kanban systems are an interim step to be used until a breakthrough in process flexibility occurs, or right sized equipment is developed enabling inlining of processes. A kanban is a type of JIT (just in time) pull system. The basic definition of a pull system is - what is consumed is produced or replenished. Kanbans are used as an interim step when process capabilities do not allow processes to be connected or when right sized equipment is not available to connect with downstream processes. A kanban system is a minimized quantity of material established between processes. There are three types of kanbans – material delivery, WIP, and supplier.

- **Material delivery kanbans** are used for parts delivered to assembly areas via tugger cart systems. Each assembly station has a small inventory usually 1-8 hours that needs to be replenished in 1, 2, or 4 hour replenishment cycles. As the material handler delivers material, they will pick up the kanbans pulled since the last delivery and deliver material from their current run.
- **WIP kanbans** are for large amounts of WIP between two process. As the subsequent process pulls from inventory, the kanban is pulled and sent to the upstream process for kanban manufacturing replenishment. Then the material is produced JIT or just in time, and replaced into the WIP inventory. WIP kanbans can also be used for finished goods inventory. As the customers pull material from finished goods the kanban is sent to the upstream process for replenishment.
- **Supplier kanbans** are located on the raw material inventory in the receiving area. Supplier kanban sizes are determined by delivery frequency, consumption rates, and supplier reliability. Efforts should be made to group suppliers in common geographic areas and coordinate a combined shipment from all suppliers on a daily/weekly basis to increase delivery frequency by each supplier without increasing logistics costs. When possible, containers from the vendor should be designed in a way that the container can be delivered via a tugger directly to the operator's fingertips.

The discipline around managing a kanban system is critical to success. The following rules need to be followed to avoid material outages and overproduction:

1. Only produce what is consumed
2. Produce only good quality parts
3. Material handlers should only pull the material needed
4. Efforts should be made to minimize inventory over time
5. Kanban systems should be designed to adapt to small fluctuations in demand
6. The amount of parts on the kanban card should equal the number of parts in the container,

7. The kanban system needs to be kept full
8. Material handlers need to pull from one container at a time
9. Kanban systems should be audited to verify there is the correct number of cards in the system and that the rules above are being followed

Benefits – Kanban systems are designed to hold the minimum material necessary reducing total inventory. Kanban systems are self scheduling. Day to day scheduling is no longer needed as the kanban cards schedule production departments. Kanban boards visually show if inventory is low by the number cards in the board verses the total number in the kanban system. Kanbans react to fluctuation in demand and scrap levels eliminating the need for production control to account for higher or lower levels of scrap or demand. Kanbans reduce transactional waste through fewer transactions. Inventory is more accurate as the material is placed in one visual location and audited periodically to ensure each container has a kanban card and there is the right number of cards in the system.

Implementation Steps – Kanbans can be implemented via the traditional kanban card system or via our kanban lean manufacturing software. We recommend implementing the kanbans using a kaizen team made up of diverse team members - operators, material handlers, material control, and supervisors.

Material delivery kanbans – We recommend the book *Making Materials Flow* and Flexible Material Handling as a guideline and example to implementing material delivery kanban systems. In the previous step of redesigning workstations, the work cells are setup and ready for material delivery from a tugging system. The next step is to purchase a tugger, tugger carts, kanban cards, and kanban posts. Then establish a supermarket for pulling material established at good ergonomic heights organized in the opposite order of material delivery. This will ensure they parts that need to be delivered 1st are loaded last and will be located on the top of the cart. Kanban cards should be made to match the container size and the number of cards should be based on delivery frequency and consumption rates. Kanban posts need to be placed periodically through the delivery route. Standard work and layout of the delivery cycle should be located on the tugger. Tugger routes can be developed in a 1, 2, or 4 hour delivery frequency depending on the rate of material flow and size of parts being delivered to the area. Once the tugging system is in place the kaizen team should monitor the route for several days, make revisions as necessary, and then hand off the supervision.

WIP & Supplier Kanbans - Calculate the number of kanban cards needed for each sku in the kanban system. The calculation is a function of delivery or make frequency, average consumption, consumption variation, and container size. Once the number of kanbans are calculated purchase a kanban board or kanban rack, kanban goal post, and kanban cards. The kanban board may need to be formatted as a heijunka box if product smoothing is necessary. Once the kanban board is setup, locate all the material by sku in a common area and place all the kanban cards on the material. Then monitor the process as kanbans are put in the goal post, then placed into the kanban board. A kanban audit will need to be completed to ensure all kanban cards are accounted for on a weekly basis.

Lean in the Office, Distribution, Supply Base, and Product Development

Definition – In order for lean to be fully leveraged in the eyes of the customer, improvements need to be implemented through the entire value stream and in all administrative processes. This step transforms lean efforts from a cost reduction/streamlining process into a competitive weapon. In the eyes of the customer a fully engaged lean enterprise will satisfy customers better than the competition and market share is taken away from the competition resulting in long-term prosperity.

Benefits – Implementing lean in all parts of the business will drive significant improvement in customer satisfaction, increased sales, reduced cost of quality, reduced administrative costs, reduced material costs from suppliers, reduced shipping and logistics costs, improved reliability and on time delivery, improved overall responsiveness to the marketplace, and finally increased market share. Lean when fully leveraged

across the entire business will be difficult for the competition to duplicate.

Implementation Steps – Lean Manager positions should be created for suppliers, distribution, product development, and business processes. These positions will be charged with implementing the steps listed above always starting with a value stream mapping exercise. The value stream will identify the top opportunities with the largest impact to the customer. Each position should lead kaizen events aimed at achieving the future state value stream. Challenging targets should be established for each function for improvement. From the office to the factory floor all areas should be charged with 5% - 10% improvement expectations in productivity. As a result all areas are stretched and find better ways to do more with less.

Supplier Lean Manager – Focus on the top suppliers and start each supplier down their lean journey. Hold joint kaizens and share reduced costs.

Business Process Lean Manager - This position will implement lean in the office areas of Engineering, Human Resources, Customer Service, Sales, and Marketing. Focus on the areas with the biggest impact to the customer in terms of lead time, cost, and quality. The office 5S process and office value stream mapping process should be implemented.

Distribution Lean Manager – This position focuses on the value stream from the dock door to the customer. Kaizens should be held to streamline the process and ensure all corporate lean improvements are leveraged to have a big impact on the customer.

Product Development Lean Manager - The focus of the position is to streamline product and process development to create better products and processes faster than the competition. The companies that can react to the marketplace the fastest wins because they can deliver the products customers want, at the lowest possible cost, with superior quality, and in a short period of time. As new processes are developed for new products or for added capacity, this position needs to ensure the process development kaizen teams are stretched to produce the maximum level of process innovation. These process innovations can be patented or become trade secrets used as a competitive advantage.