

Integrating Lean and Ergonomics for Continuous Improvement

Risk Control from Liberty Mutual Insurance



Highlights:

- Lean and safety; is there a difference?
- Four steps to ensure safety and Lean are properly integrated
- A success story; integration of safety and continuous improvement

Lean Manufacturing evolved from Toyota's post-WWII efforts to close the productivity gap with American automakers. They refined earlier Just-in-Time manufacturing systems to increase productivity and quality and focused their efforts on cutting waste at all levels.

In 1990, a group of MIT academics, reporting on Toyota's successes, coined the term "Lean Manufacturing." Embraced immediately by other manufacturers, Lean Manufacturing became the catch-all phrase for a variety of new strategies aimed at "cutting the fat" out of production processes.

Three widely used Lean Manufacturing approaches include:

1. **Kaizen:** A series of highly focused events dedicated to cutting the waste out of production operations.
2. **Six Sigma:** A process change methodology based on defining and measuring the problem, then analyzing, improving, and controlling it.
3. **5-S:** The five S's are Japanese terms, loosely translated as Sort, Set-in-order, Shine, Standardize and Sustain. Once unnecessary mess and clutter are reduced, tools, parts, and inventory are then organized for maximum efficiency.

Used separately or in combination, the strategies empower companies to continuously identify and reduce the seven "deadly" forms of waste: overproduction, waiting, transportation, processing, inventory, motion and defective units.

You're Lean, but are You Safe?

Unfortunately, Lean doesn't necessarily mean safe even though the two should go hand in hand. After all, a poorly designed task that requires a worker to reach excessively is not only inefficient, requiring more time and motion than needed, but is also likely to cause injury. Similarly, a worker lifting materials beyond his or her strength capabilities takes more time and energy to perform the task and runs the risk of overexertion.

On another level, the lost time and productivity following workplace injury are indicative of the waste that Lean strategies aim to avoid. When an injury occurs, production halts. Managers spend valuable time on administrative tasks, such as locating replacement workers, and line workers are distracted and perform less efficiently. Remedying these problems can take a few hours or a few weeks, and the bottom line impact from direct and indirect costs is significant.

In the worst case scenario, an overzealous company may implement extreme Lean Manufacturing strategies where safety is not merely overlooked, it is compromised. Process shortcuts and streamlining can end up sabotaging the ultimate goal when high risks lead to accidents. In the end, increasing efficiency without incorporating safety will cost you far more than it saves.

Make Lean and Safe Work Together

As a safety professional, what can you do to ensure that safety and Lean are properly integrated at your company?

Step One: Get Involved

Too often managers perceive Lean events as only production-oriented. You may be inclined or even advised to stay out of the continuous improvement process. But it's your job to take the initiative and become part of the process. To do this you need to

familiarize yourself with your company's Lean methodologies and learn the lingo. If you can speak the language and explain the value of safety interventions in productivity terms, management will listen. Better safety means less waste: let that become your mantra.

Step Two: Identify Links between Unsafe Practices and Waste

All Lean philosophies have their roots in reducing or eliminating one of the seven “deadly” forms of waste, making it easy to incorporate safety. Look at your operations and identify the safety issues that need attention in each of these areas.

1. **Overproduction:** Excess production indicates that workers may be working faster than necessary, which can increase the risk of a repetitive strain injury. A well-paced line reduces this risk and decreases the likelihood of the next “deadly” form of waste (below).
2. **Inventory or Work In Process (WIP):** Excess material between operations due to large lot production or processes with long cycle times impedes movement, increases the risk of trip hazards, distractions, blind spots for pedestrians and fork lifts, and manual handling injuries.
3. **Transportation:** Excessive product movement increases exposure to materials handling and industrial truck injuries.
4. **Processing waste:** Inefficient work flow and extra processing steps, like avoidable reaching, twisting, and materials handling tasks increase overexertion risk.
5. **Motion:** An unnecessary motion, such as reaching over the head for a tool instead of having it within normal reaching distance, is wasteful and hazardous.
6. **Waiting:** Delays and time wasted due to a poorly designed materials flow system can impact employee motivation and can increase the risk of falls and overexertion as workers rush to catch up with materials. Design tasks that do not physically or mentally overload or under-load employees.
7. **Making defective products:** Defect prevention requires less work and involves fewer injury exposures than defect discovery and repair. High levels of defects may also signal poor housekeeping and/or lighting, which can create other safety issues such as distraction and eye strain.

Step 3: Incorporate Ergonomics Analyses into Your Company's Lean Processes

When you integrate ergonomic analyses and design principles into your Lean Manufacturing, productivity and profits rise, and injury and waste plummet. Here's how to sell it:

- Conduct Loss Source Analyses to see where accidents/incidents are happening. Communicate the problem areas to management and relate the problem to production and efficiency rather than OSHA requirements.
- Describe the problem using visuals in a way that will get their attention.
- Analyze the production process from an ergonomics perspective and find the root cause of the injuries.
- Apply ergonomic design principles to reduce or eliminate the sources of injury.

Step 4: Ask Questions

When all else fails, asking questions *the right way* may be the best way for safety directors to get management's attention. Instead of focusing squarely on the safety issue, incorporate Lean concepts and terminology into your questions.

Here are some basic questions that will help your safety recommendations get the management attention they deserve:

- Is there repetitive bending/reaching that is making the process less efficient?
- Is poor housekeeping or excessive material leading to slip and fall injuries?
- Are there machine-guarding initiatives you would like to address as part of your Total Productive Maintenance (TPM) process?
- Are there mechanical issues that compromise safety and create bottlenecks in the production line?

A Lean, Mean Success Story

One company learned the hard way that Lean without safety doesn't work. Read how they finally reduced waste by integrating ergonomics.

An outdoor power equipment manufacturer, who strongly adhered to Lean Manufacturing with the 5S and Kaizen methods, still experienced a high number of ergonomic-related injuries.

- The reason: The company failed to incorporate safety into the continuous improvement process.
- The cost: \$300,000 in medical payments and wages over a 24-month period on just one line.

With help from their insurer, the company identified the problem and integrated safety into their Lean system. A Loss Source Analysis identified where the injuries were happening and created a visual management piece (commonly used in Lean processes) to illustrate the findings.

- The problem: Excessive reaching on a single speed transmission assembly line was causing a high number of shoulder injuries.
- The cost: Injuries comprised more than half the company's total injury frequency and loss dollars.

The company performed an ergonomic analysis to determine what percentage of the employees could perform the task safely and found that only a very small percentage of women could do so. A Workstation adjustment made a significant difference since more than half of the workers on the line were female.

Speaking the language of productivity and waste reduction, the company's safety director presented these findings as part of the fact finding session of the Kaizen event. Together with the continuous process improvement group, the safety director identified other simple and effective ergonomic solutions to eliminate hazards and reduce waste. Solutions included adding more than 20 lift devices to reduce overexertion from materials handling (processing waste), and adjusting workstations and conveyor system heights to optimal work heights to reduce excessive reaching (unnecessary motion).

In the eight months since the ergonomic changes were implemented, the company has had no shoulder injuries on the line. Based on this success, they expanded their 5S Lean approach to include a sixth "S" in the continuous improvement process dedicated to safety.

The net result of these changes was quality improvements, productivity gains, better safety awareness and a safer workplace.

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