

## **Driving Effective Ergonomic Improvements through Kaizen Events**

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### **Abstract**

Many Fortune 500 companies are finding that ergonomics is a fundamental component to a successful lean business strategy. They are achieving lower production costs while dramatically impacting their health & safety metrics. Ergonomics is an **enabling approach** that can accelerate the lean business agenda with low cost/high impact improvements to work cells through the deployment of Kaizen Events.

### **The Problem**

Lean is a strategy to reduce production costs, improve product quality, and better utilize resources through process improvements. One such resource is the contribution of human capital to the workplace.

Manufacturers are finding that Ergonomics is a critical factor in the complete success of their lean agendas. Many companies that do not take ergonomics into consideration when making job changes and have not trained personnel in applying ergonomics are experiencing increased injuries after they “lean out” a work cell. Companies that do consider ergonomics as part of their lean agenda are finding that ergonomic improvements result in new opportunities to find additional time savings and quality enhancements as well as reduced injuries.

### **The Opportunity**

Ergonomics is a basic understanding that people have limits to what they can and cannot do. When human limits are considered – such as reduced reaching, less bending, twisting and walking – the price is often shorter cycle times, more efficient processes, and fewer workplace injuries.

While many methods are used to implement Lean, one of the most popular is the Kaizen Event. Kaizen events are focused workshops to identify and implement low cost, high impact improvements. Using the principles of Ergonomics and basic Lean approaches, these Ergo-based

workshops combine training, analysis, and real-time changes using a task force of employees to deliver immediate business value and employee safety.

## The Outcome

Events have generated significant outcomes in companies such as Alcoa, Rock-Tenn, John Deere, Federal Mogul, and DS Water. Steve Rogers, a Federal Mogul Plant Manager, sums up the Events perfectly, stating that “the visibility of the Ergo Events has prompted other projects and Kaizen events to incorporate ergonomics into shop floor improvement. We have achieved success in worker safety and production efficiency.”

On average, **125** workplace improvements are identified, with **53** improvements made during an Event with the remaining **62** improvements added to the Action Plan and implemented over the following 30, 60, and 90 day timeframe.

Results vary by client, but some typical work station examples include:

1. Cycle time improvements of 6% - 14%.
2. Eliminated 100% of all back bending.
3. Eliminated overhead reaching.
4. Stopped double and triple handling.
5. Reduced push forces by up to 86%.
6. Cut rework by as much as 20%.
7. Shortened walking distance by 71%.
8. Improved work cell layout and reduced work cell space needs by 40%.

## Anatomy of the Ergo-based Kaizen Event

### What is a Kaizen Event?

A kaizen event is a highly specialized, action-oriented event in which an empowered team takes immediate action to improve a specific process. Any process—whether it involves physically making the product or providing a service—can be improved utilizing the kaizen event approach. The overall goal is to identify and make simple changes to control common ergonomic risk exposure and wasteful activities.

### What is the Approach?

Events typically last two to four days based on the complexity of the processes and the speed with which the team can implement. The event will lead a team through education, identification and improvement of ergonomic and lean items. The ideal team consists of ten to twelve employees that cross represent company, including key leads and critical process owners, including safety, engineering, maintenance, and line employees.

Risk Management Group has developed the M.A.I.N. (Making Active Improvements Now!) Event, which includes awareness education and application of a Find It/Fix It approach to address common workplace challenges. The M.A.I.N. approach and tools are simple, quick methods and tools to drive rapid improvements of simple issues.

**DATA COLLECTION FORM**  
**M.A.I.N. EVENT**  
**MAKING ACTIVE IMPROVEMENTS NOW!**

Evaluated for: \_\_\_\_\_ Evaluation date: \_\_\_\_\_  
 Job information: \_\_\_\_\_  
 Job name: \_\_\_\_\_ Plant: \_\_\_\_\_ Station: \_\_\_\_\_  
 Dept: \_\_\_\_\_ Line: \_\_\_\_\_ Shift: \_\_\_\_\_  
 Cycle time/job: \_\_\_\_\_  
 Designated lead name: \_\_\_\_\_

**DATA COLLECTION PROCESSES**

- 1) Introduction yourself and other team.
- 2) Describe to the standards, the reason for your visit and the measured outcomes.
  - Do not compromise what will be fixed.
- 3) Describe the activities and problems.
  - Interview
  - Observation of work process
  - Pictures of the work area
  - Measurements
- 4) Complete the Data Collection Form.
- 5) Clear any obstacles on the job from the operator.
- 6) Thank the operator for their help.

Operator input:  
 1) What is the worst part of this job?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 2) What suggestions do you have to improve the work area?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Summary of problem(s)/time(s)?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

On a 1-5 scale:  Pictures on file  Measurements on file  
 Job is currently collected with:  
 Operator  Quality Control  Production Operator  Ergonomics team

Total number of improvements made: \_\_\_\_\_

**WORKING TOGETHER TO BE BETTER**

**Find It: Housekeeping/5S**  
 Order - Placement - Upkeep  
 Cluttered  
 Disorganized  
 Dirty  
 Unscheduled  
 Not scored

**Fix It: Housekeeping/5S**  
 Order - Placement - Upkeep  
 Sort  
 Straighten  
 Shine  
 Standardize  
 Sustain

**Find It: Ergonomics**  
 Posture - Force - Frequency  
 Bent Wrist  
 Up too high  
 Down too low  
 Out of reach  
 Just too much

**Fix It: Ergonomics**  
 Posture - Force - Frequency  
 Keep it straight  
 Bring it down  
 Raise it up  
 Put it closer  
 Lighten the load  
 Reduce the force  
 Only handle it once

**Find It: Motion Waste**  
 Simplify - Eliminate - Combine  
 Down to low

**Fix It: Motion Waste**  
 Simplify - Eliminate - Combine  
 Raise it up  
 Put it closer  
 Bring it back

**Punch List**

**M.A.I.N. EVENT**  
 MAKING ACTIVE IMPROVEMENTS NOW!

**Figure 1. This is an example of the identification tools used during a Kaizen Event.**

Events are led by a board-certified Ergonomist, with the following timeframe:

Day 1	Goal Setting and Event Preparation Class Room Training and Problem Solving (Improve) Problem Identification (20%)
Day 2	Shop Floor Identification (80%)
Day 3	Shop Floor Implementation (80%)
Day 4	Implementation (Improve) Documentation Presentation to Management

## How Do We Measure Kaizen Event Success?

Successful kaizen events result in improvements in the following areas.

*Bottom-Line Impact* yields a significant, quantifiable improvement in the process. The improvement can be quantified at the end of the event and verified through a formal follow-up and review process. Past Events yield a range of 25 to 153 improvements, with an average of 43 simple, effective, high-impact, immediate workplace improvements. Additional improvements are identified in an Action Plan and implemented over the next 90 days.

This can be observed by leading indicator changes such as:

- Reduction in ergo risk exposure
- Reduction in housekeeping and safety “deficiencies”
- Reduction in cycle time
- Increase in operator rest time
- Increase in first time quality (less defects)
- Reduction in reported discomfort (using a Borg scale)
- Increase in workplace “ownership” (per interviews)
- Simplification of processing steps and/or sequence.
- Elimination of non-value added (wasteful) processing steps
- Combination of processing steps



*Team Member Impact* is an observable improvement in the engagement level of the team members. This can be observed by behaviors such as:

- Ongoing continual improvement in the process beyond the completion of the event
- Willingness to participate in team activities during the event
- Willingness to participate in final report presentation
- Sense of urgency to implement solutions – get it done today
- Willingness to accept ongoing responsibility following the event
- Willingness to share experience with their peers and employees from other areas
- Willingness to participate on future process improvement teams



*Work Culture Impact* is an observable improvement in the engagement level of the employees not actually part of the team. This can be observed by many of the same behaviors noted above for team members. Many employees begin to ask “When’s the next Event?”

## **Examples of Kaizen Improvements**

Below are several Before/After examples of improvements made during recent Kaizen Events.

Rebuilding Molds	
Before	After
	
<ul style="list-style-type: none"> <li>➤ Extensive back bending</li> <li>➤ Long arm reaching</li> <li>➤ Lost time to retrieve tools</li> </ul>	<ul style="list-style-type: none"> <li>➤ Installed tray eliminates back bending and arm reaching</li> <li>➤ Time savings = 2.4 seconds/cycle</li> </ul>



**Figure 2. This is a kaizen improvement during Rebuilding Molds.**

Clip Welder	
Before	After
	
<ul style="list-style-type: none"> <li>➤ Operator had to lift up and place a heavy, locating arm for each part.</li> <li>➤ The procedure was repeated hundreds of times per day.</li> </ul>	<ul style="list-style-type: none"> <li>➤ A pneumatic clamp, operated by a foot control, was installed.</li> <li>➤ No more lifting is necessary, the cycle time was reduced 3% and quality improved by</li> </ul>


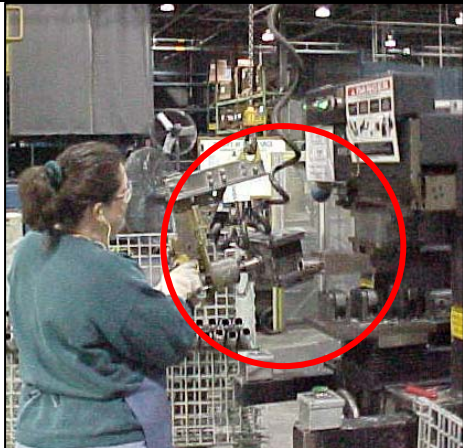


7%.

**Figure 3. This is a kaizen improvement of the Clip Welder operation.**

Die Setup Operator	
Before	After
	
<ul style="list-style-type: none"><li>➤ Operator had to work off the floor to setup and tear down about 60 extrusion dies per shift.</li></ul>	<ul style="list-style-type: none"><li>➤ Using an existing table, back bending was significantly reduced.</li><li>➤ Cycle time was reduced by 14%.</li></ul>

**Figure 4. This is a kaizen improvement from a Die Setup operation.**

Stamper Operator	
Before	After
	
<ul style="list-style-type: none"><li>➤ Operator had to lift, hold, and manipulate a 32-pound spacer block into the Stamper about 30 times/day.</li><li>➤ There is a shoulder injury as a result of performing this job.</li></ul>	<ul style="list-style-type: none"><li>➤ An attachment was welded to the spacer block, eliminating the need to manually lift and hold the block.</li><li>➤ Operator commented, "This is awesome."</li></ul>

**Figure 5. This is a kaizen improvement from a Stamper Operation.**

## **Summary**

Lean initiatives drive accelerated workplace changes. When ergonomics is taken into consideration for these changes, work cells are designed to optimize human performance and injury rates can drop. When ergonomics is not part of workplace changes, companies may experience improved efficiency, but may also experience an increase in injuries. In addition, they sacrifice opportunities to dramatically reduce motion waste. Kaizen Events are effective tools to help drive and ensure employee safety and process efficiency.