



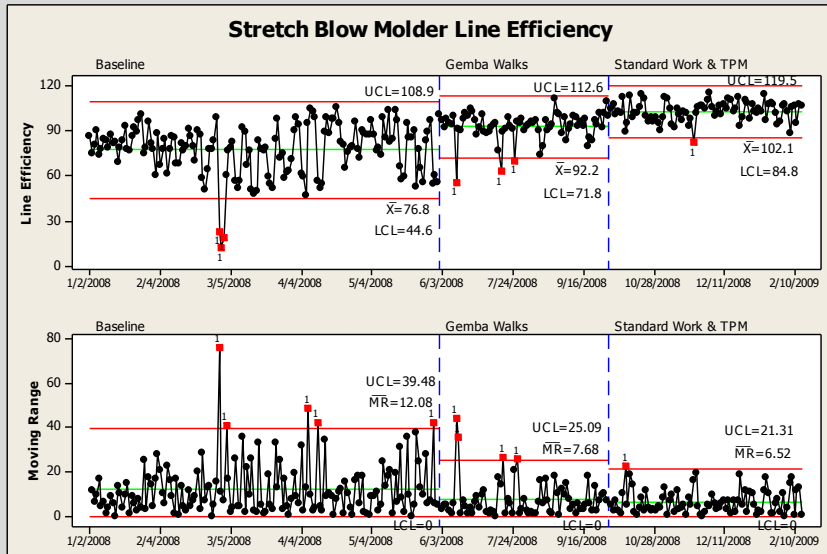
Packaging – Plant Turnaround

A plastic bottle manufacturer for the beverage and food industries was running nearly 25 percent below the expected rate and waste was forcing them to carry excess finished goods inventory

Improvement Initiative

The baseline efficiency data from January 2008 through May 2008 was 76.8 percent. Additionally, the plant had a customer defect rate of 1,300 ppm and was using a combination of internal and external warehousing to store 14 days of finished goods inventory.

Lean six sigma and TPM projects were chartered to raise the efficiency, eliminate the customer defects, eliminate the outside warehouse need, and instill operational discipline.



Improvements

- Gemba walks, equipment restoration, and 5S were used to increase the efficiency from 76.8% to 92.2%
- SMED kaizens were conducted to reduce the changeover time from 4 hours to 1.5 hours
- Standard work, standard work for leaders, and visual controls were used to drive day-to-day consistency
- TPM tools were used to reduce speed losses and minor stops increasing the efficiency to 102.2 percent

Breakthrough Results

- The stretch blow molder line efficiency improved by 33 percent
- The day-to-day efficiency variation was reduced by 46 percent
- Defective units shipped to the customer was reduced from 1,300 ppm to 0 ppm
- Customer complaints were reduced by 80 percent
- Internal scrap was reduced by 18 percent
- Zero lost time injury rate was maintained
- The finished goods inventory was reduced from 14 days to 3 days



Packaging – Low Cost CI Deployment

A five plant continuous improvement deployment, with only one full time resource, delivers \$2.48M in annual savings in just eight months

Improvement Initiative

Between 2008 and 2010, a plastic bottle manufacturer lost 25 percent of their sales due to the slow economy. In response, four plants were closed going from a total of nine plants to five. Even with the plant closings, they were not earning their cost of capital. This was due to production inefficiencies and the resulting inventory levels required to compensate for the poor performance.

Deployment plan:

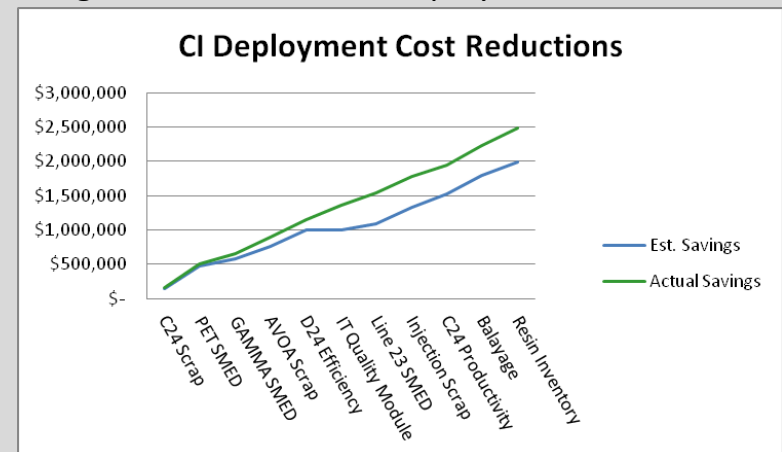
- Corporate Director of Continuous Improvement named to develop and execute a CI strategic plan
- The plan focused on reducing inventory levels by eliminating waste
- Execution of the plan completed through an infrastructure consisting of twelve green belt training candidates
 - Each plant had at least one green belt candidate
 - Four green belts were assigned to corporate functions
- The Director was the only full time resource.

Improvements

- Eight of the twelve green belt candidates were certified within one week of completing training
- As part of the training, each candidate participated in two value stream mapping events and two rapid improvement kaizens
- A TPM based maintenance management system was developed

Breakthrough Results

- Green belt projects deliver over \$2.4M in annual savings. Twenty five percent higher than the projected savings at the start of the deployment.





Packaging – Scrap & Downtime Reduction

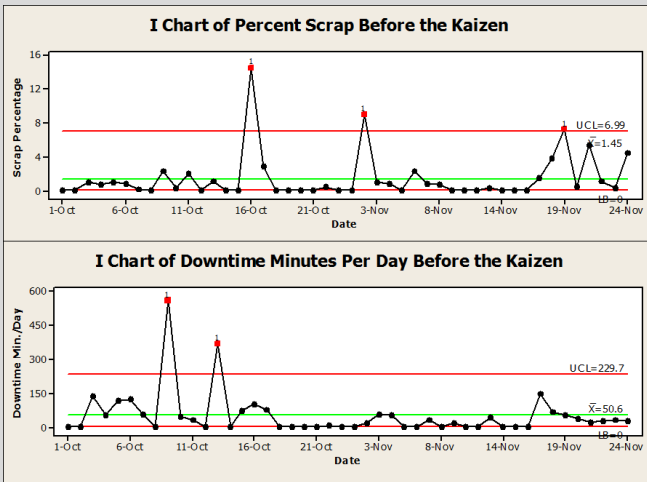
An Autonomous Maintenance Kaizen restores an injection molding machine to condition and results in an annual savings of \$128k

Improvement Initiative

A single injection molding machine producing 1.45 % scrap and 50.6 minutes of downtime each day was costing a plastic packaging manufacturer \$159k annually.

During a week long kaizen, Autonomous Maintenance tools were utilized to restore the machine to condition.

After receiving training on AM and TPM, the team conducted an initial cleaning and inspection. Red tagged broken components and sources of contamination were then repaired and modifications made to improve accessibility and ease of cleaning.

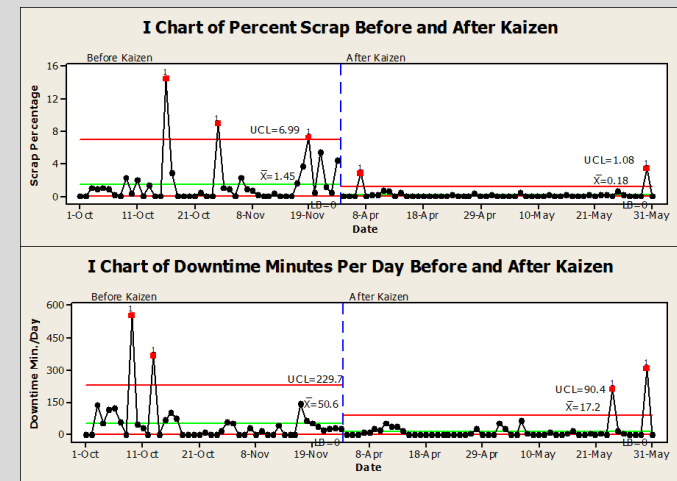


Improvements

- Cleaning & Inspection Standards – SOPs and visual controls were developed to sustain the improvement
- Restore to Condition – Primary restoration activities:
 1. Leaking hydraulic pump and accumulators repaired
 2. Robot cam followers replaced (forced deterioration)
 3. Eliminate the source of temposonic rod damage
 4. Replaced leaking clamp stroke hydraulic cylinder (forced deterioration)

Breakthrough Results

- Scrap reduced from 1.5% to 0.2%
- Downtime minutes per day reduced from 50.6 to 17.2





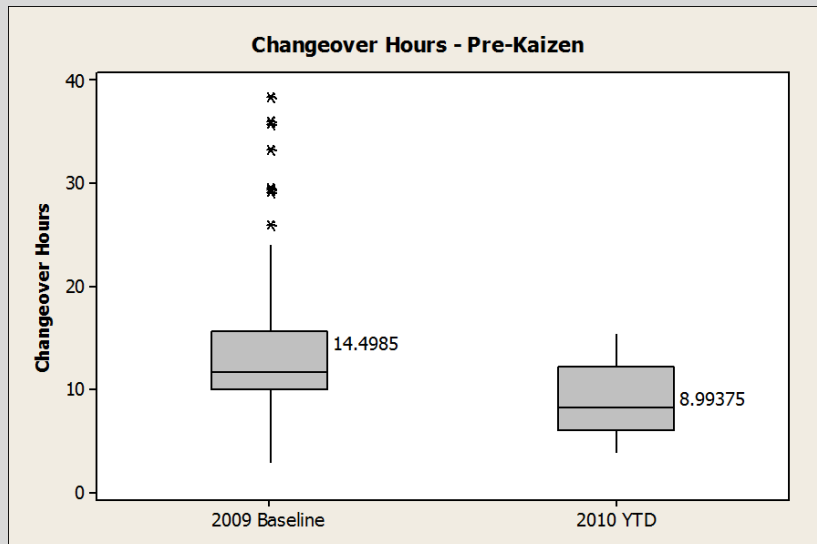
Packaging – Changeover Time & Scrap Reduction

Single minute exchange of die tools are used to drastically reduce the changeover time and scrap rate resulting in an annual cost savings of \$342k

Improvement Initiative

Poorly planned, executed, and staffed changeovers were costing a plastic packaging manufacturer \$491k annually on two blow molding lines.

During 2009, the average changeover time on two blow molding lines was 14.5 hours and the scrap rate was 9.1%. Improvement efforts during the first quarter of 2010 improved the performance to 9 hours and 7.9% scrap. To hit the changeover targets of 6 hours and 3% scrap, a one-week SMED kaizen was conducted.



Improvements

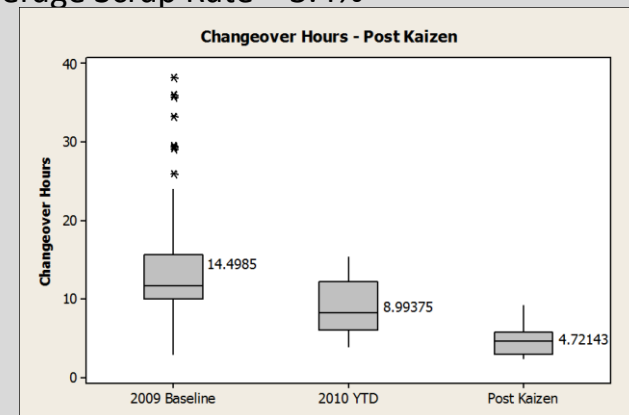
Major kaizen improvements:

1. SOPs were written for simple maintenance activities and these tasks were shifted to production operators
2. Leak test equipment and conveyor rails were modified to allow tool-less changeover
3. Point of use tool stations were setup for the blow molders and palletizers
4. The mold cart was modified to improve access to the blow molder and reduce the travel distance

Breakthrough Results

Kaizen results:

- Average Changeover Time = 4.7 hrs
- Average Scrap Rate = 3.4%





Packaging – Label Changeover Time Reduction

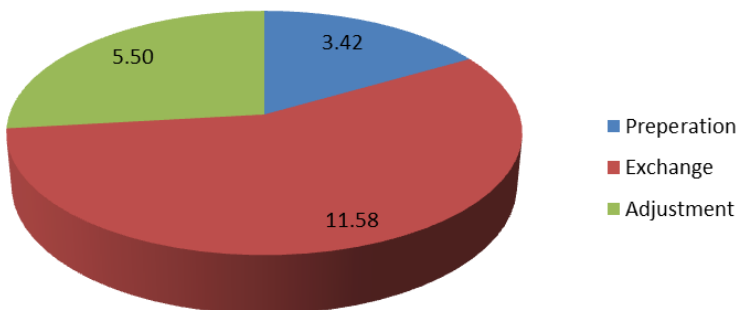
A one-day SMED kaizen reduces a plastic packaging manufacturer's label changeover time by 68 percent resulting in an annual cost savings of \$263k

Improvement Initiative

A plastic packaging manufacturer was struggling to meet their customer's order requirements. After reviewing the plant's performance, the label changeover process was identified as having the greatest quick gain potential. Analysis of the current state process revealed that the label changeover time was twenty two minutes.

The current state process was then video recorded and a cross-functional team was formed to conduct a SMED kaizen. The goal of the kaizen was to reduce the changeover time from twenty two minutes to less than ten minutes.

Waste Chart



Improvements

- Implemented a pre-changeover standup meeting to insure personnel are ready, the correct paperwork is available, and to start the line clearance activities
- Shifted 75 percent of the label loading time from internal to external
- Eliminated the need to reheat the hot runner tips, resulting in a startup time reduction of 3 minutes 48 seconds
- Created a point-of-use staging area for the label being changed to and the label being changed from

Breakthrough Results

- Two internal elements, totaling 46 seconds, were eliminated
- Nine internal elements were shifted from internal to external equaling a total time savings of 7 minutes 35 seconds
- Twelve internal elements were improved for a total time savings of 6 minutes 38 seconds
- The total changeover time was reduced from 21 minutes 58 seconds to 6 minutes 59 seconds, a 68 percent reduction



Safety Kaizen Minimizes Hazards and Risks

Safety Health and Environmental hazard analysis tools were utilized to identify, categorize and address 41 hazards

Improvement Initiative

Poorly designed equipment, work cell layout, and processes for an extrusion blow molding line were putting production operators in high risk situations.

The most serious of the situations was the requirement for production operators to enter a guarded area of the blow molder while it was running; exposing them to unguarded moving parts. Other concerns were slip and trip hazards due to poor housekeeping and excessive packaging materials.

Kaizen Objectives:

- Eliminate the need to go inside the blow molder guards while it is running
- Train the team on hazard recognition, risk reduction, and lockout/tagout
- Identify hazards and the associated risks
- Review and update the current risk assessment
- Identify and eliminate/reduce as many hazards as possible
- Reduce the congestion around the packing area

Improvements

Kaizen improvements:

1. Added interlocks to the blow molder guard doors
2. Modify guard doors to prevent circumvention of guard
3. Moved air and conveyor adjustments outside of guarded area
4. Installed guard for the detabber infeed area
5. Installed electrical interlock on the autopacker guards doors
6. Installed barrier guards on all rotating shafts
7. Packaging material kanban developed and implemented to reduce congestion issues
8. Sort, Straighten, and Shine 5S activities implemented with plans to complete Standardize & Sustain

Breakthrough Results

Risks Levels:

- 15 high risk hazards identified and corrected
- 7 medium risk hazards identified and corrected
- 5 low risk hazards identified and corrected
- 14 5S items identified and corrected that combined to produce a medium risk slip and trip hazard

