

8 Ways Lean Six Sigma Can Reduce Environmental Impacts by 50%



Students at the University of Michigan School of Natural Resources & Environment perform a waste audit. Photo by Dave Brenner.

Learn how Lean and Six Sigma tools and methodology have been used to reduce environmental impacts in business and communities



Earth Consultants

<http://www.LeanSixSigmaEnvironment.org>

1 Reduce chemicals through just-in-time inventory (Lockheed Martin)

Lockheed Martin sought to move toward a just-in-time chemical management system, with chemicals delivered three times a week in “right-sized” containers to meet real-time demand. The Lean events reduced chemical inventories, freed capital tied up in inventory, increased chemical inventory turns and chemical utilization rates, and eliminated the chemical warehouse and chemicals expiring on the shelf.

Source: <http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/leanenvirotoolkit.pdf>

SPOTLIGHT

2 Use 5S and visual controls to reduce spills and material waste (Robins Air Force Base)

Reorganized its hazardous waste management facility using 5S and visual controls to enhance the monitoring of waste management processes and decrease the chance of accidents and spills. The C-130 Aircraft Paint Shop used 5S to improve its paint system, which increased productivity, improved worker safety, and decreased volatile organic compound (VOC) emissions, chemical use (materials), and storage space.



Source: <http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/leanenvirotoolkit.pdf>



3

Use Value Stream Mapping (VSM) to see the waste and identify improvement opportunities (Baxter Healthcare)

One plant developed a VSM and implementation plans by walking through the production process and highlighting water usage and major processing steps. In the VSM, 96 opportunities were prioritized with many graphically represented by starbursts; these opportunities were also included in three future state VSMs. Through the VSM event, Baxter developed an action plan that should save \$17,000 over three months and 170,000 gallons of water per day.

Source: <http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/leanenvirotoolkit.pdf>

4

Use statistical analysis to optimize processes to reduce material waste (ROSTAR)

Statistical analysis showed that certain cans were being over-sprayed on one of the six machines. They calculated the ideal lacquer settings, and determined standards for how each operator should set-up and operate the machines to provide the optimal amount of lacquer. They were able to target a lower lacquer standard and reduced material costs by over \$100,000 per year.

Source: <http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/leanenvirotoolkit.pdf>

5

Use kaizen events to dramatically reduce application process backlogs (Idaho Department of Environmental Quality)

Economic development could be hindered by an inefficient air pollution control permitting process. The process took over 300 days, with a backlog of 50 applications. They conducted a Kaizen event, and identified multiple approval or sign-off steps, rework loops, document and information handoffs. They reduced the number of hand-offs from 71 to 2, and decreased the permitting cycle time from 325 hours to 116 hours.

Source: http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/EPA_Lean_In_Air_Permitting_Guide_Supplement.pdf

6

Implement process controls to reduce material waste (Kahiki Foods)

Had an excessive amount of waste (9.7%), which correlates to a loss of \$600K annually. A system for capturing lost nuggets on the z-conveyer, a cart to capture waste at the freezer and other process controls resulted in a 24% reduction in daily waste percentage and a yearly savings of \$178K.

Source: <http://www.isixsigma.com/methodology/dmaic-methodology/reducing-waste-on-chicken-nugget-line-part-1-of-2/>



7

Use Gemba Walks to identify opportunities for improved recycling (Kirkland Air Force Base)

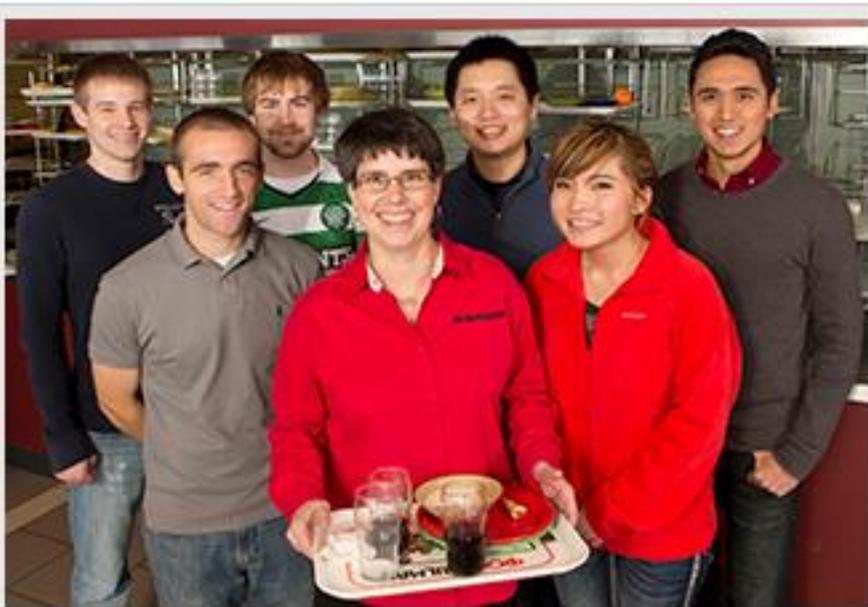
Performed leak-detection gemba walks, in which teams walked water lines with acoustic listening devices to find leaks, surveying 90 percent of water distribution lines on the base. The teams found that 31 leaks were dripping away nearly 16 percent of the base's water at a rate of 333 gallons lost per minute. Repairs after the survey saved over 179 million gallons per year.

Source: <http://leansixsigmaenvironment.org/wp-content/uploads/2019/09/EPA-lean-water-toolkit.pdf>

SPOTLIGHT

8

Use DMAIC framework to methodically reduce food waste (Rose-Hulman Institute of Technology)



Applying Math To Sustainability: Mathematics professor Diane Evans, PhD, (front) supervised a student Lean Six Sigma project that examined the cost savings of reduced food waste in Rose-Hulman's Hulman Memorial Student Union dining services. (Photo by Shawn Spence)

Students conducted a DMAIC project to address food waste in the cafeteria. They developed process maps, Critical To Quality tree, Fishbone diagram, capability analysis, control charts, C&E matrix and FMEA. Reduction of 2.66 ounces per meal, which saved 145.4 pounds of food during one lunch period, with a potential \$11,781 in savings per quarter.

Source: <https://blog.minitab.com/blog/real-world-quality-improvement/how-lean-six-sigma-students-at-rose-hulman-reduced-food-waste>



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