

Six Sigma Case Study:

Reducing Equipment Downtime with a Lean Six Sigma DMAIC Approach

BACKGROUND:

A self-serve beverage equipment manufacturer was in trouble. Their blender, deployed in thousands of convenience stores, was experiencing critical reliability issues: water leaks, firmware crashes, and hardware faults that caused downtime and customer frustration.

Stores reported blenders arriving with defects straight out of the box and quickly running into problems: auto-sanitization timeout issues, a faulty operating system and critical leaks leaving stores with overnight water damage.

Every breakdown meant lost sales – covering costly service calls, shipping out spare parts for free, extending warranty periods, and customers deciding against upgrading to the company's newer model. For the manufacturer, the damage was an estimated \$2.4 million in annual sales losses.

Ready to make meaningful changes, a cross-functional team was mobilized to identify root causes and implement lasting improvements across design, production, and support.



OBJECTIVES:

To reduce downtime and restore customer confidence, we applied Lean Six Sigma DMAIC methodology to structure the work into smaller tasks:

- **Define:** Validating the problem through Voice of the Customer insights – rising service calls, store damage from leaks, warranty claims, inventory costs, and blender error data.
- **Measure:** Mapping manufacturing and QC processes, reviewing and standard operating procedures (SOPs), and uncovering flaws in assembly, packaging, and design.
- **Analyze:** Using error data to categorize failures, create Pareto charts, and identify top contributors including firmware bugs, water leaks and poor out-of-box performance.
- **Improve:** Reengineer tubing with a more flexible, EU-compliant material to prevent kinks and leaks.
 - Redesign frame routing and solenoid valve nut with torque specs to eliminate high-pressure failure points.
 - Address top firmware errors and upgrade system hardware for better software stability.
 - Introduce validated leak pressure testing in final QC to catch issues before shipping.
- **Control:** Track trends in out-of-box failures and blender-related downtime, using increased milkshake cup sales as a proxy for improved uptime.

Our challenge was to quickly identify root causes amid limited data and inconsistent quality controls, while aligning cross-functional teams to implement lasting solutions – without disrupting production.



RESULTS:

The DMAIC approach provided the structure to deliver improvements quickly. We used FMEA, fishbone diagrams, and VoC gap assessments to prioritize improvements aligned with customer needs. We implemented targeted design updates and manufacturing process improvement without exceeding the target cost of goods sold.

Key results included:

- **62% reduction in water leaks** in existing units
- **14% drop in out-of-box failures** (near the 15% goal)
- **\$350,000 in cost savings** in the first year
- More robust SOPs for quality control and data monitoring, and a knowledge base of failure modes and solutions to expedite future troubleshooting
- Newly established culture of continuous improvement and data-driven decision making

CONCLUSION:

This project demonstrated how a structured Six Sigma DMAIC approach, combined with cross-functional collaboration and data-driven decisions, can deliver transformative improvements. By applying a structured DMAIC approach driven by VoC insights, we empowered this manufacturer to uncover root causes across both design and manufacturing, implement targeted fixes, and drastically reduce the biggest problem: downtime.

The result was recovered revenue, improved reliability, and a culture of continuous improvement that would position the company for sustained success and growth.

IMPACT:

\$1.27 MM

In recovered revenue from improved uptime

↓53%

Reduction in overall downtime, exceeding target

100%

Elimination of out-of-box water leak failures

These outcomes not only improved product reliability and customer satisfaction, but also boosted employee morale, reduced service and warranty costs, and strengthened the company's competitive position in the market.