CASE STUDY | ROSTAR - A Beverage Can Manufacturing Company

Here is how one company reduced variation in lacquer application and generated over $100,000 in annual savings

If you've ever tasted a spoiled soft drink, you'll agree it's an experience that could put you off a beverage altogether. Beverage can manufacturers typically spray the inside of cans with lacquer to maintain product taste and prevent product leakage due to corrosion. A company can typically find ways to reduce its costs and remain within the confines of safety requirements by reducing variation and streamlining processes. When it comes to improving these types of processes, the DMAIC methodology and Six Sigma tools can help. Here is how one company used Six Sigma to reduce variation in lacquer application and generate over $100,000 in annual savings.

The Challenge

The international aluminum can manufacturer ROSTAR maintains a Moscow area factory that produces 50-55 million beverage cans every month. During the manufacturing process, each can is sprayed on the inside with lacquer. While the company packages soda, beer and fruit juice, fruit juice is particularly corrosive due to its naturally high citric acid content.

Initial reviews of the lacquer coating process revealed that the amount of lacquer sprayed on each can varied considerably. Many cans were coated with more lacquer than required, wasting expensive materials in the process. ROSTAR's management determined that if they could reduce the variability in their spraying process, they could reduce production costs and ensure that enough lacquer was applied to prevent corrosion.

ROSTAR's Gennady Tkachenko, a BMGI trained Six Sigma Black Belt, was tasked with running a Six Sigma project to find a way to safely reduce the variation in lacquer usage.

The Process

The project team began its evaluation by looking at the amount of lacquer applied to each type of can (beer, soda or fruit juice), and the various sizes of cans. Pareto tools showed that 500ml beer cans were by far the biggest contributors to over-lacquering, so the team decided to focus on this type of can.

Initially the team voiced suspicions that the measurement system used to weigh the lacquer prior to application was unreliable, but a Gauge R&R study using ANOVA demonstrated that these suspicions were incorrect. As it turned out, the measuring system was sufficiently reliable and repeatable, as well as accurate and precise.

Next the team undertook a Process Capability study (Figure 1). This study confirmed that the process variation was much too high for the specification limits the company was targeting.

Summary

Organization
A beverage can manufacturing company.

Industry
Manufacturing

Business Problem
High variability in lacquer application creating waste and causing potential for corrosion and bad drink taste.

Methodology
DMAIC

Solution
Reduce variability in process causing overapplication of lacquer.

Benefits/Results
$100,000 annually

From here, the team sought to identify the possible sources of variation. Using tools such as fishbone diagrams and process maps, they listed the potential problem areas. The first theory they investigated was whether any performance difference existed amongst the six spraying machines.

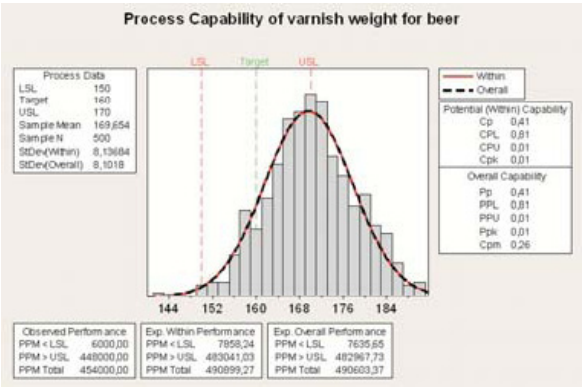

Figure 1—Process Capability—Before Project

The test results indicated that the machines did spray different amounts of lacquer, but did not provide a clear answer as to whether the differences were due to natural variation or a systematic variation that could be corrected (Figure 2). The team used a number of methods to further test hypotheses. The results this time suggested that a particular spraying machine, number five, was more likely to be significantly different from the others.

This led the team to re-engage the factory's engineers to look more closely at the exact differences between the machines. Digging deeper into the variances, the team conducted designed experiments (DOE) to determine if any relationships existed between other inputs and the lacquer spray variability.

To fully analyze the possibilities, the team looked at several variables including spray pressure, spray time, lacquer viscosity, nozzle type and operator shift. The team used regression, correlation and ANOVA tools and discovered several relationships between the variables, which the team mapped and then attempted to prove.

By investigating the relationships between the possible causes of variation—one of the main tenets of Six Sigma—the team pinpointed multiple sources of variation.

The Solution

In the end, the Six Sigma team proposed that ROSTAR standardize the settings on the six spraying machines to reduce the number of machine set-up and operation changes made by operators between shifts.

In addition, the team identified the ideal lacquer settings for the spray nozzle, spray time, lacquer viscosity and nozzle type variables. It also determined standards for how each operator should set-up and operate the machinery to provide the optimal amount of lacquer. To ensure the correct settings remained in place, allowing the process to achieve the desired outputs, the team implemented a statistical process control (SPC) system and control charts to monitor the process.

The Results

The standardization changes had a significant impact on reducing variation in the lacquer application process. In the end, ROSTAR was able to target a lower lacquer standard and reduced material costs by over $ 100,000 per year.

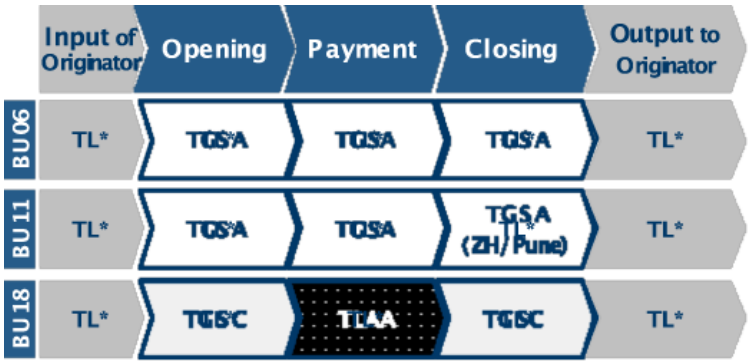

Figure 2—Lacquer application variance—by coating machine

Key Tools Used

Measure

- Process Maps
- Pareto
- Fishbone
- Gauge R&R

Analyze

- Hypothesis Test

Improve

- DOE Planning Sheet
- DOE

Control

- Control Plan
- SPC System

About ROSTAR

ROSTAR is the leading Russian aluminum beverage can maker with production facilities in the city of Dmitrov, Moscow region, and in the St. Petersburg region. ROSTAR was launched in 1998 as the first beverage can making facility in Russia at that time.

Since its launch, ROSTAR has grown to operate multiple production facilities and is now producing over 1.3 billion cans and 3 billion can ends annually.

ROSTAR prides itself on maintaining theleading market position in Russia as a result of the superior quality of its products, its longterm partnerships with clients, comprehensive technical and marketing support, and ongoing investment in the development of Russia'scanned beverage market.

BMGI

BMGI enables companies throughout the world to identify and solve their most important business problems, with a strong emphasis on sustainable results. During its long history, BMGI has developed solutions for a broad spectrum of businesses across many industries, driving the success of process-improvement, design and innovation initiatives. Just a few of BMGI's clients are General Dynamics, TNT Express, Avis Budget Group, China Chemical, Graphic Packaging, Siemens, Hitachi and Philips Electronics. For more information, please visit the BMGI website at **www.bmgi.com**