

Continental Automotive Assures BMW Remains the “Ultimate Driving Machine”

By Melissa Stanz

BMW automobiles are advertised as the “ultimate driving machine” for good reason. These vehicles are built with care and great attention to detail. Continental Automotive in Fletcher plays a part in assuring these “ultimate driving machines” stop safely. Continental manufactures brake systems for the BMW X5 series, a new SUV, in their 264,000 square foot facility close to Asheville.

Continental Automotive, a tier one supplier to BMW, has a passion for continuous improvement that includes using Six Sigma, a philosophy for quality improvement that uses statistical analysis and scientific problem solving methods to standardize processes and reduce rework or mistakes. Many Continental Automotive employees have studied Six Sigma processes with NC State University professionals. Part of the Six Sigma Green Belt training requires that team members complete a project showing quantifiable results.



Steve Morgan, John Payne and Bill Adams completed their Green Belt certification process recently, and their project involved an element of the BMW X5 brake system—a seemingly innocuous dust boot that attaches to the caliper.

During a three month period earlier this year the team noted a 16.06 percent failure rate (loss of first time thru put) in the BMW assembly, a rate that added up to \$29,834 in scrap and labor waste per year. They decided to reduce that failure rate, establishing these goals: to reduce this waste by 50 percent by year end, yielding \$14,917 in annual savings, and to apply the lessons they learned to all similar product families.

Early Culprit

As they began the project the team quickly learned that 95 percent of the failures were caused by unseated dust boots—a small rubber component fitted with a steel ring. This dust boot is small but important; if the boot doesn't fit properly, rust can accumulate, eventually causing piston seizure, leading to brake failure.

Using the DMAIC (define, measure, analyze, improve, control) process integral to Six Sigma, they looked at other potential causes for the failure rate, noting issues with alignment and plating. Working with the housing alignment, they added a centering pin and created a new tool used to push the dust boot on. The failure rate improved but the dust boots were still not staying on correctly. Further analysis revealed an issue with

rough surface finish on the plated housings, so they corrected this too. Using this process, the team exceeded their goals; they reduced waste by 62 percent, saving \$18,500 annually.

"I think this team did a great job of experimenting with the DMAIC process. They were very thorough and I was impressed," said Chris McGraw, manufacturing specialist with NC State University.

Savings Top \$1 million

Potential savings on this project exceed \$1 million annually; and most importantly, none of the defective parts ever reached the customer. The problem was identified and solved at the plant, and this improved process has now been implemented on another BMW caliper.

The three person team received significant assistance from other employees, including Sandy Bodaky, programmer, Carl Worley, designer, and Six Sigma Black Belt Steve Gormley, who earned his certificate in NC State's program, too.

"Steve was our main go-to guy to keep us on track, and he really helped us with our presentation," said Steve Morgan, a Green Belt team member.

Kevin Grayson, an NC State Six Sigma expert, was the lead trainer in this Green Belt program. "I almost never am able to approve a project the first time I see it, but this one I did," he said. "It was quite good. I really think these smaller dollar projects are more challenging because they make people use the process more intensively. Saving a small amount means you are already doing things well. This one was tough to investigate, and this team did a great job. This project's success now means the company can meet customer demand, and that is what it's all about."