Parting Shots

By Bob McClintic
McClintic & Associates

PPM, what is it and is it possible?

"PPM" stands for "parts per million". It has become a commonly used method for measuring quality performance on anything from castings to successful take off and landings by airlines.

Definition: One PPM means one (defect or event) in a million or 1/1,000,000.

Don't confuse this with the volumetric measurement used to record components in gases and liquids. There was a time when you were considered a "pretty good supplier" when your defect rate was less than 1 percent, (10,000 PPM), and then the expectation was increased to 0.1 percent or 1,000 PPM. Now the rate for most automotive components is targeted at 25 PPM or 0.0025 percent.

To calculate: For example, let's say you had 25 pieces defective in a shipment of 1,000 pieces. 25/1000= .025 or 2.5 percent defective. .025 X 1,000,000 = 25,000 PPM.

A vehicle built with thousands of components at 10,000 PPM would be subject to several visits to the repair shop for corrections. Indeed, we have come to expect improved reliability from our vehicles.

So what does this have to do with die castings? 25 PPM or Six Sigma™ is the measure applied to most automotive and commercial suppliers. According to an August 20, 2000 article in Industry Week, Six Sigma™ would only allow 3.4 PPM. In order to accomplish this requires total cooperation of management, engineering, sales and operations. Training and education are essential. For example, let say you are a supplier producing 10,000,000 castings a year. At 25 PPM, that would mean your total acceptable defects for that year would be 250. For the average plant that means one bad part per day. Period!

Some would say this is impossible in the die casting process. To approach this level of quality requires a different approach than the one that produced 5 and 10 percent scrap. What are the benefits to reducing scrap and returns?

I know of at least one company who has taken on the challenge and has a record of 14 PPM on heavily machined castings. This is no small task as they are supplying millions of castings per year. They will agree that it requires constant vigilance and training at all levels. It is the result of a team effort, not a one man show.

Most companies contain a plant within a plant. The second plant produces all the waste. One example of a plant that was producing high scrap also experienced excessive machine down time. Usually they are present and feed on the other. Together they created a situation that required the facility to operate 24/7/365. By correcting the tooling, equipment and infrastructure problems that repeatedly broke down and by training the operators and technical personnel, we were able to eliminate an entire shift and go to five day weeks. The down time and scrap issues were the equivalent of 33 percent of every thing produced. Cash flow took on a new meaning as machines no longer had to run as long to produce the necessary castings. Machine and tool component life seemed to increase as a higher percentage of the product was usable.

As the improvements were implemented, the roving inspection was eliminated and the responsibility was given to the operators. Because they were present at the machine for most of the shift, they could identify problems in a more timely fashion than an inspector who only checked the castings on an hourly basis. Real-time inspection of the process must be associated with process control. Not just measuring scrap, but monitoring the "key" process variables.

According to Philip Crosby, "Insanity is doing things the same way we've always done them and expecting different results".

My approach has been, "If you don't measure it you can not control it."

The monitoring and measurement systems we have today have paved the way for improved quality. We can now control the process in order to control the quality. Quality can not be inspected in after the fact. It is the result of careful planning, design, and execution.

Additional information on mistake proofing, six sigma and related articles are available from the American Society for Quality web site. http://www.asq.org.

Contact information:
Bob McClintic
McClintic & Associates
2544 Almar St.
Jenison, MI 49428
Phone: 616-669-2932
Fax: 616-669-7884
Cellular and voice mail: 616-292-0454
mailto:RMcClintic@DrDieCast.com
Web site: www.DrDieCast.com

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