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Six Sigma: A Definition

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It is a common misconception that the difference between Six Sigma and LeanSigma rests on a single word. Both terms contain sigma, the eighteenth letter of the Greek alphabet that also refers to standard deviation. After that, one is six and the other's got lean; what's the difference?

Recently, a team at an automotive supplier plant in Indiana discovered the distinction in a Sigma Kaizen event.

Simply put, Six Sigma refers to a quality goal, in which any process has just 3.4 defects per million opportunities. Six Sigma programs evolved around that single goal, applying statistical tools to find the source of variation and defects. The main thrust of Six Sigma is detective work and discovery.

LeanSigma is less about pure detective work – although it applies many of the same tools in order to find the root cause of abnormalities – than it is about action and correction. LeanSigma is concerned first with taking time and waste out of processes and making sure that standard work for operators and machine set-up are in place. Only then does it guide us to use statistical tools to find unseen root causes.

A better way to define this, however, is to revisit the LeanSigma work at our Indiana supplier during a Sigma Keizen event.

Our focus was on a barrier line, where a mixer puts together and heats the various ingredients for a manufactured rubber barrier. The hot rubber is dropped continuously onto a calendar, comprised of two steel drums rotating in opposite directions. The rubber comes out in a sheet of uniform thickness, which then goes along a conveyor submerged in chilled water. Next, the sheet might get treated with anti-block, flame retardant or a hot melt application before being die cut.

There were a few problems with the process, however, and the scrap rate was more than 12 percent. To understand the issues, we began the Sigma Kaizen, as usual, with a week-long measure phase in late October to gather fresh data and observe.

We found that the rollers were inadequately cooled, the conveyor-speeds were too variable and difficult to set, which resulted in material shrinkage problems, and there was just too much human error in shrinkage measurement.

Here is the sometimes-controversial aspect to Sigma Kaizen: while the team performed a number of 'quick kills' during the kaizen week, the team also compiled a list of action items to be completed before the analyze/improve stage. These were steps the team could take immediately to improve the process before the next event, which, due to scheduling issues, was set for three months later.

During the hiatus between Sigma Kaizen weeks, the team raised the water level in the tanks that cooled the calendar rolls to ensure good contact. The four water-spray bars, which also served a cooling function when working correctly, were replaced with properly functioning nozzles. Digital speed indicators were installed on the conveyors so that operators could keep everything running at a steady pace. By January, the scrap rate on the line dropped to 2.8 percent.

In early February, the team began the analyze/improve week by taking new measurements, crunching the numbers and finding that the original defect – shrinkage – was all but nonexistant and two areas needed to be attacked in order to address the 3 percent remaining defects. In that week, the team worked on the anti-block application and established the optimal settings for the hot melt application. With these ideas implemented, a further 50 percent reduction in scrap rate , to 1.4 percent, is expected.

The cost savings in this critical process is estimated at $1 million annually and was another success in our push to increase the overall equipment effectiveness at the plant. ■