

Add Seventh Sigma Tools to Six Sigma® for Faster Results

In a number of studies of human intervention in complex situations, those who performed the best did several things consistently.¹

- They gathered information before acting,
- Thought systematically,
- Reviewed progress, and
- Corrected their course often.

Some companies have begun improving their Six Sigma processes by making changes consistent with these observations, especially by adding tools that gather information up front, tools that find root causes faster and accelerate improvement. Instead of beginning with test hypotheses, these innovators now begin by “listening to the process”. They use the Seventh Sigma Tools to compare performance extremes, looking for consistent differences.

Case Study Plant Turnaround Situation

A manufacturing plant employed about 800 people and generated \$100 million per year in sales, but was losing money. Management terminated 300 workers to cut costs, but the plant was still losing \$15 million per year. The company considered shutting down the operation.

In one last effort to improve performance, the plant introduced the Seventh Sigma Tools to 40 of the technical staff, who began using them on 3 projects immediately. These were successful, so they quickly started 12 more, and then 30 more after that.

At this point, plant management decided to begin teaching the tools to line workers, who formed their own problem solving teams with supervisors as facilitators. Momentum built until 75% of the line workers were trained. The line workers solved 70% of all the problems they addressed all by themselves, using just 3 of the Seventh Sigma tools. Engineers were free to develop new products that contributed to top line growth.

Quality improvement ranged from 2:1 to 100:1. (50-99% defect reduction) The median was 15:1, and the average was 28:1. (94% and 97% defect reduction, respectively)

Bottom line impact: in less than two years, the plant went from a 15% loss as a percent of sales revenue, to 4% profit, a swing of \$20 million!

Some Other Case Studies

Heat Seal – Plastic bags of lettuce had leaking heat seals 12% of the time, and the company was on the verge of losing the business. One experiment found the root cause in just days. Now they have 0% leakers, a savings of \$350,000/yr, and they retained the business.

Paint Oven – An operation that historically averaged 18% scrap went to less than 1% scrap in only 2 weeks, saving \$900,000/yr.

Receivables – One hospital reduced an average AR of >65 days outstanding to 45 days in 9 months, and it continues to drop. A second hospital went from 45 days to 29 days in 6 months, and revenue improved by \$1.2 million per year.

Soldering – A circuit board soldering operation decreased from an average of 3000 ppm defects to 100 ppm in only 4 days by using the Seventh Sigma Tools, which saved \$500,000/yr. Subsequent Six Sigma testing further reduced the level to 10 ppm, establishing the new state-of-the-art performance level at that time.

Dome Tweeter –40% of automotive sound system speakers had required rework for as long as they had been in production. A series of Seventh Sigma Tool experiments over several weeks found the two root causes and established tighter control of the critical parameters. This established a new standard of acoustic performance that exceeded the existing specification, while saving \$100,000/year. The company became the #1 supplier and increased its market share by 4.5x.

Sources of Infection – A supplier of cleaning chemicals identified sources of bacterial contamination on dairy farms in just 2-3 months. They developed an audit service for their customers that enabled them to capture 60% of their competitors’ business.

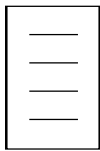
Control Module – During the prototyping process, the Seventh Sigma Tools identified the critical parts and established optimum tolerances for them, in just 1 week, which saved \$450,000/yr.¹

¹ The Logic of Failure: Recognizing and Avoiding Error in Complex Situations, Dietrich Dörner.

® Six Sigma is a registered trademark and service mark of Motorola, Inc.

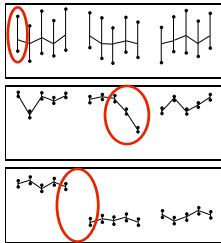
The Seventh Sigma Tools – Become Effective, Then Efficient

Document the Problem



Start with the biggest problems. To document a problem, briefly describe what is known about the problem, including why it is one of the biggest problems.

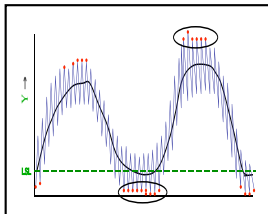
Identify Patterns of Variation



Next, observe the current process to discover patterns of variation. In manufacturing, the categories are often Within-unit variation, Unit-to-unit variation, and Time-to-time variation. In transactional or administrative operations, different categories may be appropriate. This sampling technique indicates

where to look for root causes of the defective output, and where not to look for them.

Compare Performance Extremes



The most powerful of the Seventh Sigma Tools compare extremes of output. They examine only the very best and very worst outputs, looking for consistent differences. If an operation usually produces acceptable

output, but occasionally does not, then something inside the process has changed when the defective output occurs. These straightforward techniques reveal which variables are Unimportant, and which ones potentially are Important, so subsequent MAIC activities are better focused, and therefore faster.

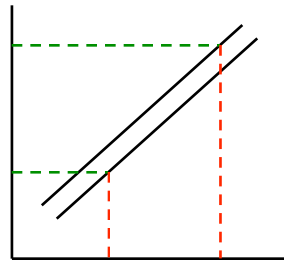
Validate Causes by Turning Problems On and Off



Validating the root causes means proving that the problem really has been solved. The supposedly Important variables are switched

from good to supposedly bad settings in order to turn the defective output on and off. If the Important variables have been identified correctly, then the quality of the output will respond as anticipated.

Optimize Important Variables



After the Important variables have been validated, their Target Values and Tolerances must be optimized. Gather data from the full range of values for each Important variable. This tool quickly verifies the importance of

each variable, identifies the correct Target Value of the variable, and identifies the Tolerance necessary to become defect-free.

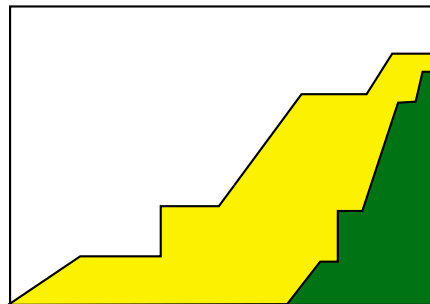
Lock In Correct Target Values and Tolerances

What	Value	Who	How	Where	When

Create Positive Control Sheets and Tracking Logs for

each Important variable to prevent reoccurrence of defective output in the future. Do this for the Important variables only.

Reduce Cycle Time



After the process has become Effective by achieving defect-free status, begin to make the process Efficient by addressing

cycle time. Map the process and create a Cost-Time profile to identify cycle time reduction opportunities. Focus on removing dead time with the goal of reducing total process time to no more than twice the active time in the process.

Historically, about 70% of chronic performance problems are solved in just days to weeks using only these tools. The other 30% of problems require further analysis using factorials. The Seventh Sigma Tools initially narrow the number of possible variables, so subsequent Six Sigma techniques are more effective, more quickly.