

# BREAKTHROUGH

Lean Implementation & Training Resource Publication  
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## 6σ SIX SIGMA BASICS

By Harold Chapman

### PINPOINT DEVIATION

Last issue, we focused on the “D” in the DMAIC cycle for Six Sigma. We discussed the processes and tools used to DEFINE the project. This month, we will focus on the “M” in the DMAIC cycle, which is the MEASURE phase. In this phase, we discuss the process and tools used to pin point the location or source of deviation. By doing this, we will build a factual understanding of the existing process condition and problems. The knowledge gained in this phase will help the team narrow a range of potential causes that need to be investigated in the ANALYZE phase, which we will cover in next month’s newsletter. Although the intent of this newsletter is not to completely teach you how to perform the MEASURE phase, it can get you started in the right direction. As you know, the complete process of Six Sigma is very data intensive; therefore, this newsletter series on Six Sigma creates a guided introduction and does not cover the topic entirely.

### MEASUREMENT TOOL BOX

The general output of the MEASURE phase is a baseline capability of the process and a list of potential measurable causes for the problem whether it be variable or attribute. The tools used in the MEASURE phase are: Data Collection Plan, Data Collection Forms, Control Charts, Frequency Plots, Gage R&R, Isoplots, Pareto Charts, Prioritization Matrix, FMEA, Process Capability, Process Sigma, Sampling, Stratification and Time Series Plots. We will discuss a few of these tools in the following paragraphs. Detailed explanations of all tools used in the MEASURE phase are available in book form.

Data collection is used in all phases of the DMAIC process, so it is important to plan the collection of data. This is done by developing a “Data Collection Plan” for the project. The data collection plan ensures that we consider the WHO, WHAT, WHEN, WHERE and HOW of the data collection process. We should also consider the stratification of the data desired to ensure all families of variation are considered (i.e. time to time, line to line, product family to product family, etc...) A detailed data collection plan is then easily translated into a usable data collection form.

The Prioritization Matrix is used to identify the critical few variables that need to be measured and analyzed. It helps focus the data collection effort. It also allows the team to formulate theories about possible causes and effects.

The Failure Mode Effects Analysis is another funneling tool. While it is most commonly used in the design of new products and processes, it can be an effective tool to focus data collection efforts on current input and output variables in the process. This tool is also used in the CONTROL phase of the DMAIC cycle.

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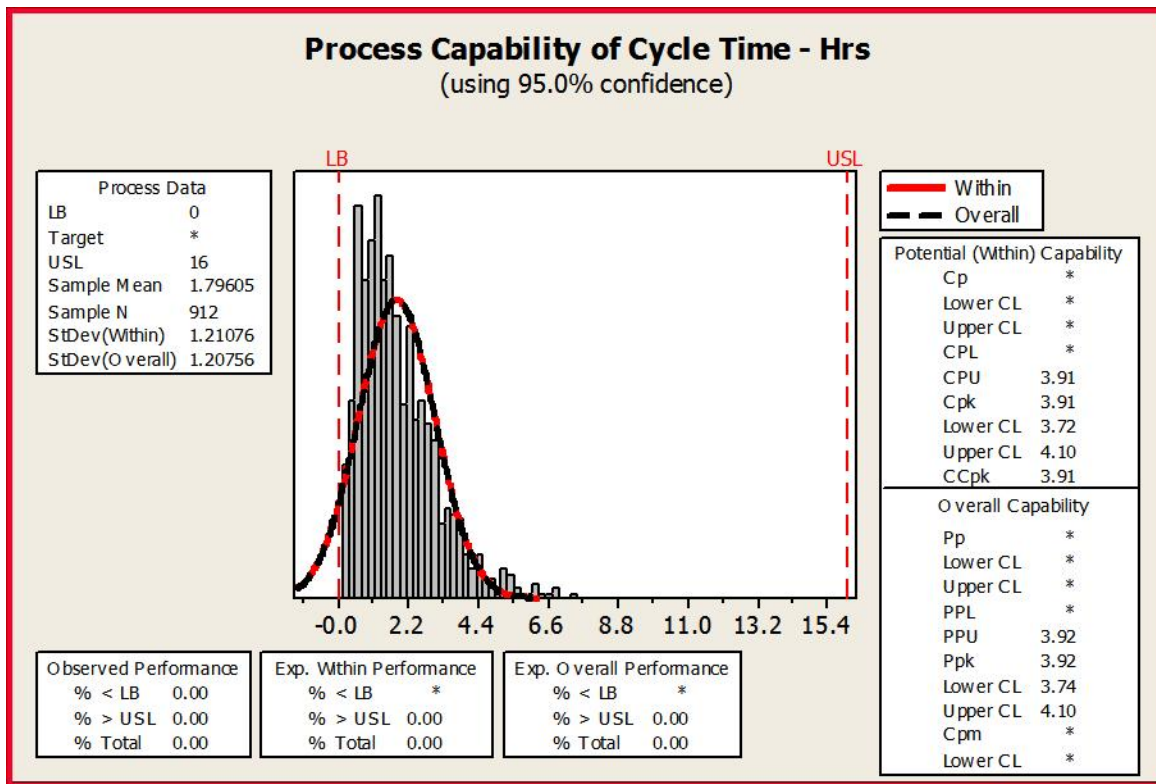
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### MEASUREMENT TOOL BOX - HISTOGRAM

Stratification is a means of dividing data into groups (strata) based on key characteristics. A "key characteristic" is some aspect of the data that could help explain when, where, and why a problem exists. The purpose of dividing the data into groups is to detect a pattern that localizes a problem or explains why the frequency of impact varies between time, locations, or conditions.

The Frequency Plot (Histogram) is a way to show the number of times a certain value is achieved. It is a pictorial of the data being studied. An example of a frequency plot is shown below.



Anytime there is data being collected by a test device or human, there must be confidence in the test to ensure proper data is gathered. If the data being gathered is erroneous, all of the conclusions drawn from the data will mean nothing. There are a couple of ways to test your measurement system to ensure the data is meaningful. Gage R&R and ISOPLOT are two great ways to ensure your test is properly gathering data and/or making the proper decision for good and bad product.

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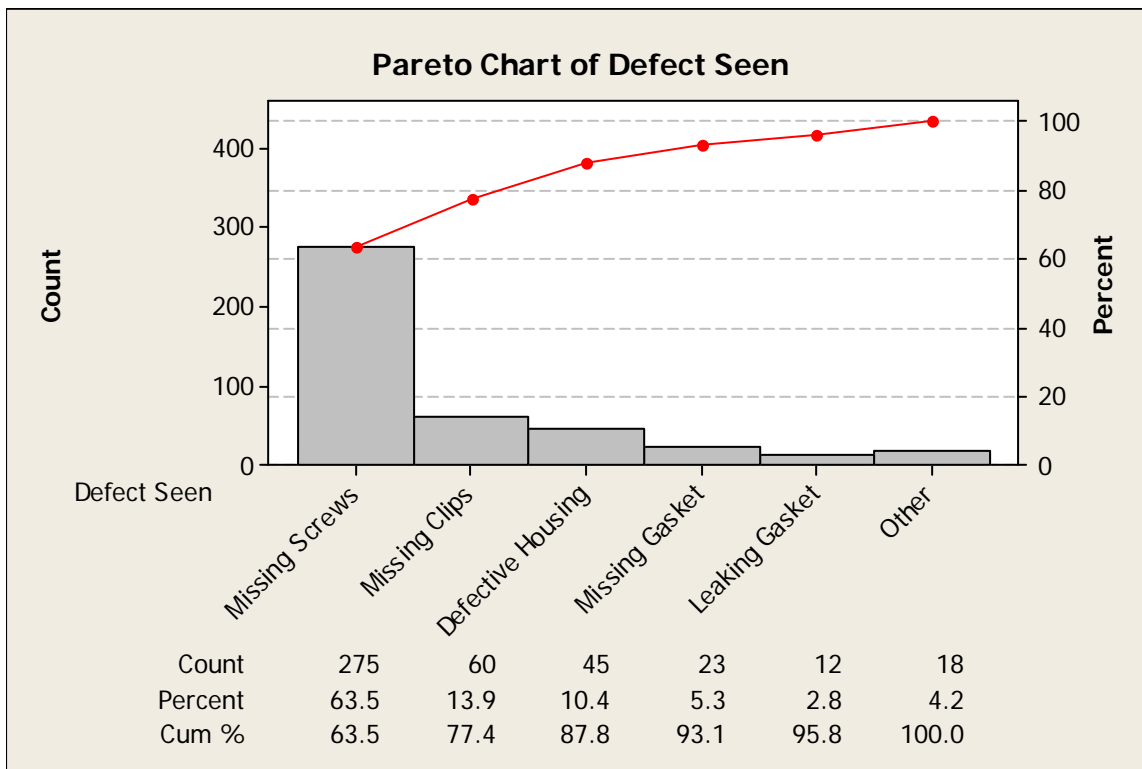
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### MEASUREMENT TOOL BOX, PARETO CHART

Sometimes there are many potential causes that can be narrowed by using a tool called a Pareto Analysis. The Pareto Chart is based on the idea that 80% of the effect is being driven by 20% of the potential causes. This can be shown graphically by charting the magnitude of the effect per cause and sorting them from greatest to least. An example of a Pareto Chart is shown below:



There are many tools and methods used in the MEASURE phase of the DMAIC cycle. Deciding on what tools to use and when to use them comes with experienced execution of projects over time. The good news is that anyone can begin using the tools one step at a time. Is it time to take your second step in Six Sigma? Stay tuned as we cover the ANALYZE phase in next month's newsletter. 3/3



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**Stay tuned!**

This series will continue highlighting each phase in the DMAIC process. To review the entire FREE Insider Archive now [just click here](#) or visit [www.Lean-Results.com](http://www.Lean-Results.com) today!