

# Statistical Process Control

GoSkills online course syllabus

Tuesday, July 5, 2022

<b>Skill level</b>	<b>Lessons</b>	<b>Accredited by</b>
Intermediate	27	CPD
<b>Pre-requisites</b>	<b>Video duration</b>	<b>Estimated study time</b>
None	2h 31m	14.5h for all materials
<b>Instructor</b>		
Ray Sheen		

## Statistical Control Principles

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- ### 1 Variation and Control

All processes have variation. A portion of management's responsibility is to control that variation to be within acceptable levels. This lesson provides a background in the management discipline of SPC, with a focus on the role of Shewhart and Deming.
- ### 2 Normal Variation

All processes experience normal random variation. This is often modeled with a bell-shaped curve. This lesson discusses the characteristics of normal variation and defines basic terms used to statistically describe a data set such as mean, median, and standard deviation.
- ### 3 Non-normal Data

Many processes have non-normal variation. This lesson describes what is meant by non-normal data and gives a list of examples that will cause this condition. In addition, the Central Limit Theorem is presented as a tool to normalize non-normal data.
- ### 4 Basic Statistics in Excel

This course will illustrate how to create control charts in several applications, including Microsoft Excel. This lesson shows how to install the Data Analysis Add-in to the Data Ribbon and how to use the this add-in to calculate descriptive statistics for a data set. The Data Analysis add-in will be used in future lessons.
- ### 5 Basic Statistics in Minitab

Minitab is the most commonly used statistical application within the Lean Six Sigma community. This lesson provides a brief orientation concerning how to navigate through Minitab and shows how to use Minitab to calculate descriptive statistics for a data set. Minitab will be used in future lessons.

## Process Capability

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- ### 6 Common Cause - Special Cause

SPC Control Charts are designed to differentiate between special cause variation and common cause variation. In order to understand the importance of this and the implication for control, this lesson explains and illustrates the differences.

## 7 Process Capability

Process Capability consists of comparing the Voice of the Customer to the Voice of the Process. SPC Control Charts provide a quantitative measure of the Voice of the Process. This lesson explains the principle of process capability and the role of SPC in achieving and maintaining it.

## 8 Process Capability with Variable Data

Process Capability is often correlated with process Sigma. The calculation of process capability is quite different depending upon whether the data is variable or attribute data. This lesson will present the technique and practice using the variable data process capability ratios.

## 9 Process Capability with Attribute Data

Six Sigma projects strive to achieve a process capability that represents Six Sigma quality. The calculation of process capability is quite different depending upon whether the data is variable or attribute. This lesson will present the technique used for determining process capability with attribute data.

# SPC Control

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## 10 Control Chart Design

This lesson explains how a control chart works. The various elements of a control chart are described and the correlation between the data shown on Control Charts and process stability is discussed.

## 11 Statistical Control Strategies

In this lesson the strategy for how to use Control Charts is discussed. In addition to monitoring the process, the charts can be used to set performance baselines, validate the impact of improvement, and identify sources of variation.

## 12 Control Limits

This lesson explains the principles behind how control limits are calculated. The lesson also discusses when to establish limits and how to use those limits to detect special cause variation. Finally, the lesson will show how to set the threshold criteria for use with control limits in Minitab.

## 13 Control Charting Process

This lesson introduces the eight step approach to be used with establishing control charts for a process. In addition, it provides a decision tree for selecting which control chart to use based upon the nature of the data being monitored.

## 14 Subgroups and Samples

Some of the most important decisions with respect to control charting are the decisions about subgroups and samples. These decisions will dictate the type of control chart that should be used. They also will determine the number of data points in a subgroup. The decisions should be made based upon the characteristics of the process that is being control charted.

## 15 SPC Corrective Actions

This class reviews the appropriate and inappropriate response to be taken based upon the data found on a control chart. It reviews what steps to follow when there is special cause variation and what steps to follow with common cause variation.

# SPC Control Charts

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## 16 Variable Data Control Charts

This lesson discusses the principles of using control charts with variable data and provides ground rules for data sampling. The differences between the variable data SPC control charts are explained.

## 17 I-MR Chart

The Individual and Moving Range chart is the simplest of the variable data control chart. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 18 Xbar-R Chart

The X-bar and Range chart is the most commonly used variable data control chart. When discussing SPC, this is always the example. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 19 Xbar-S Chart

The X-bar and Standard Deviation chart is the variable data control chart used when the subgroup is large. This lesson explains how the data is recorded and interpreted on the pair of control charts. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the charts.

## 20 Attribute Data Control Charts

This lesson discusses the unique considerations associated with monitoring attribute data with control charts. It compares and contrasts the various attribute data control charts and provides some ground rules for subgroups selection.

## 21 C Chart

The C chart (plots Counts) is the simplest of the attribute data control charts. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 22 U Chart

The U chart relies on counting both defects and units and is appropriate if the process has erratic flow. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 23 NP Chart

The NP Chart tracks defective units rather than actual defects. It provides a more macro perspective for the organization. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 24 P Chart

The P chart is closely related to the NP Chart. It also tracks units but tracks the percentage of defective units. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

## 25 Time Weighted Control Charts

This lesson introduces the concept of weighting the data being tracked in a control chart based upon other recent data values. The advantages and disadvantages of this approach are discussed as the weighting principles are introduced.

## 26 CUSUM Chart

The Cumulative Sum (CUSUM) Chart is more sensitive to subtle shifts in the process than the traditional variable data charts. The look of this control chart is unique among the commonly used control charts. This lesson explains how the data is calculated and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

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## EWMA Chart

The Exponentially Weighted Moving Average Chart uses both the current data point and recent data points. It is also very sensitive to small shifts in the data. This lesson explains how the data is recorded and interpreted on the chart. The lesson describes how to create this control chart in both Microsoft Excel and using Minitab. The lesson will include practice creating the chart.

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