

Course Content for Lean Six Sigma Black Belt certification

WHO SHOULD ATTEND:

Supervisors / Managers in Manufacturing / Services / Software development companies. Any Higher Secondary / Diploma / Under Graduate degree holder

PROGRAM DELIVERABLES:

- You will learn from a trainer with 3 decades of experience in Lean and Six Sigma
- Copy of the presentation used during training.

1.0 Define Phase

1.1 The Basics of Six Sigma

- 1.1.1 Meanings of Six Sigma
- 1.1.2 General History of Six Sigma & Continuous Improvement
- 1.1.3 Deliverables of a Lean Six Sigma Project
- 1.1.4 The Problem Solving Strategy $Y = f(x)$
- 1.1.5 Voice of the Customer, Business and Employee
- 1.1.6 Six Sigma Roles & Responsibilities

1.2 The Fundamentals of Six Sigma

- 1.2.1 Defining a Process
- 1.2.2 Critical to Quality Characteristics (CTQ's)
- 1.2.3 Cost of Poor Quality (COPQ)
- 1.2.4 Pareto Analysis (80:20 rule)
- 1.2.5 Basic Six Sigma Metrics
 - a. including DPU, DPMO, FTY, RTY Cycle Time, deriving these metrics and these metrics

1.3 Selecting Lean Six Sigma Projects

- 1.3.1 Building a Business Case & Project Charter
- 1.3.2 Developing Project Metrics
- 1.3.3 Financial Evaluation & Benefits Capture

1.4 The Lean Enterprise

- 1.4.1 Understanding Lean
- 1.4.2 The History of Lean
- 1.4.3 Lean & Six Sigma

- 1.4.4 The Seven Elements of Waste
 - a. Over-production, Correction, Inventory, Motion, Over-processing, Conveyance, Waiting.
- 1.4.5 5S. Straighten, Shine, Standardize, Self-Discipline, Sort

2.0 Measure Phase

2.1 Process Definition

- 2.1.1 Cause & Effect / Fishbone Diagrams
- 2.1.2 Process Mapping, SIPOC, Value Stream Map
- 2.1.3 X-Y Diagram
- 2.1.4 Failure Modes & Effects Analysis (FMEA)

2.2 Six Sigma Statistics

- 2.2.1 Basic Statistics
- 2.2.2 Descriptive Statistics
- 2.2.3 Normal Distributions & Normality
- 2.2.4 Graphical Analysis

2.3 Measurement System Analysis

- 2.3.1 Precision & Accuracy
- 2.3.2 Bias, Linearity & Stability
- 2.3.3 Gage Repeatability & Reproducibility
- 2.3.4 Variable & Attribute MSA

3.0 Analyze Phase

3.1 Process Capability

- 3.1.1 Capability Analysis
- 3.1.2 Concept of Stability
- 3.1.3 Attribute & Discrete Capability
- 3.1.4 Monitoring Techniques

3.2 Patterns of Variation

- 3.2.1 Multi-Vari Analysis
- 3.2.2 Classes of Distributions

3.3 Inferential Statistics

- 3.3.1 Understanding Inference
- 3.3.2 Sampling Techniques & Uses
- 3.3.3 Central Limit Theorem

3.4 Hypothesis Testing

- 3.4.1 General Concepts & Goals of Hypothesis Testing
- 3.4.2 Significance; Practical vs. Statistical
- 3.4.3 Risk; Alpha & Beta
- 3.4.4 Types of Hypothesis Test

3.5 Hypothesis Testing with Normal Data

- 3.5.1 1 & 2 sample t-tests
- 3.5.2 1 sample variance
- 3.5.3 One Way ANOVA
 - a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

3.6 Hypothesis Testing with Non-Normal Data

- 3.6.1 Mann-Whitney
- 3.6.2 Kruskal-Wallis
- 3.6.3 Mood's Median
- 3.6.4 Friedman
- 3.6.5 1 Sample Sign
- 3.6.6 1 Sample Wilcoxon
- 3.6.7 One and Two Sample Proportion
- 3.6.8 Chi-Squared (Contingency Tables)
 - a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

4.0 Improve Phase

4.1 Simple Linear Regression

- 4.1.1 Correlation
- 4.1.2 Regression Equations
- 4.1.3 Residuals Analysis

4.2 Multiple Regression Analysis

- 4.2.1 Non- Linear Regression
- 4.2.2 Multiple Linear Regression
- 4.2.3 Confidence & Prediction Intervals
- 4.2.4 Residuals Analysis
- 4.2.5 Data Transformation, Box Cox

4.3 Designed Experiments

- 4.3.1 Experiment Objectives
- 4.3.2 Experimental Methods
- 4.3.3 Experiment Design Considerations

- 4.4 Full Factorial Experiments
 - 4.4.1 2k Full Factorial Designs
 - 4.4.2 Linear & Quadratic Mathematical Models
 - 4.4.3 Balanced & Orthogonal Designs
 - 4.4.4 Fit, Diagnose Model and Center Points
- 4.5 Fractional Factorial Experiments
 - 4.5.1 Designs
 - 4.5.2 Confounding Effects
 - 4.5.3 Experimental Resolution

5.0 Control Phase

- 5.1 Lean Controls
 - 5.1.1 Control Methods for 5S
 - 5.1.2 Kanban
 - 5.1.3 Poka-Yoke (Mistake Proofing)
- 5.2 Statistical Process Control (SPC)
 - 5.2.1 Data Collection for SPC
 - 5.2.2 I-MR Chart
 - 5.2.3 Xbar-R Chart
 - 5.2.4 U Chart
 - 5.2.5 P Chart
 - 5.2.6 NP Chart
 - 5.2.7 Xbar-S Chart
 - 5.2.8 CuSum Chart
 - 5.2.9 EWMA Chart5
 - 5.2.10 Control Methods
 - 5.2.11 Control Chart Anatomy
 - 5.2.12 Subgroups, Impact of Variation, Frequency of Sampling
 - 5.2.13 Center Line & Control Limit Calculations
- 5.3 Six Sigma Control Plans
 - 5.3.1 Cost Benefit Analysis
 - 5.3.2 Elements of the Control Plan
 - 5.3.3 Elements of the Response Plan