IASSC® Certified Lean Six Sigma Black Belt™

Course Overview:

The IASSC® Certified Lean Six Sigma Black Belt™ course is an advanced training program designed for professionals who want to master the Lean Six Sigma methodology and lead complex process improvement projects. It provides in-depth instruction on the DMAIC (Define, Measure, Analyze, Improve, Control) phases, advanced statistical analysis, Lean principles, project selection, experimental design, and change management. Candidates learn to apply and interpret sophisticated Lean Six Sigma tools and techniques to solve critical business challenges and drive organizational excellence, managing teams and mentoring Green and Yellow Belts. The Black Belt curriculum prepares participants for the IASSC Black Belt certification exam, a rigorous assessment validating advanced proficiency and ability to lead high-impact improvement initiatives across diverse functions.

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

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. Overproduction, Correction, Inventory, Motion, Overprocessing, Conveyance, Waiting.

1.4.5 5S

a. Sort, Straighten, Shine, Standardize, Self-Discipline

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

2.4 Process Capability

2.4.1 Capability Analysis

2.4.2 Concept of Stability

2.4.3 Attribute & Discrete Capability

2.4.4 Monitoring Techniques

3.0 Analyze Phase

3.1 Patterns of Variation

3.1.1 Multi-Vari Analysis

3.1.2 Classes of Distributions

3.2 Inferential Statistics

3.2.1 Understanding Inference

3.2.2 Sampling Techniques & Uses

3.2.3 Central Limit Theorem

3.3 Hypothesis Testing

3.3.1 General Concepts & Goals of Hypothesis Testing

3.3.2 Significance; Practical vs. Statistical

3.3.3 Risk; Alpha & Beta

3.3.4 Types of Hypothesis Test

3.4 Hypothesis Testing with Normal Data

3.4.1 1 & 2 sample t-tests

3.4.2 1 sample variance

3.4.3 One Way ANOVA

a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

3.5 Hypothesis Testing with Non-Normal Data

3.5.1 Mann-Whitney

3.5.2 Kruskal-Wallis

3.5.3 Mood's Median

3.5.4 Friedman

3.5.5 1 Sample Sign

3.5.6 1 Sample Wilcoxon

3.5.7 One and Two Sample Proportion

3.5.8 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 Chart

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