



# Lean Six Sigma Black Belt – EngineRoom®

## Course Content and Outline

**Course Estimated Hours: 136.10**

### Session 1: Introduction to Lean Six Sigma (4.65 Hours)

- Introduction
- Higher Standards for Higher Performance
- Input Determines Output
- Lean Six Sigma Defined
- What's In a Name?
- The 5 Lean Principles
- The 8 Forms of Waste
- Success Stories
- The Sigma Level
- The 99.9% Problem
- DNA of a Champion
- Lean Six Sigma Framework
- DMAIC - The Improvement Process
- Lean and DMAIC
- Thought Process Mapping - Toolset
- Organizing for Success
- Working Relationships
- Critical Success Factors
- Introduction to EngineRoom®
- Exercises and Quiz

### Session 2: Define I – Starting A Project and Leading Teams (8.80 Hours)

- Getting Started – Project Initiation
- Balanced Scorecard Toolset
- Project Selection Toolset
- Project Charter Toolset
- Project Planning & Tracking Toolset
- Leadership Thinking
- Robot Leadership
- Fueling The Improvement Engine
- Leadership Characteristics
- Practice, Study and Reflection - Learning by Modeling
- Leading Teams
- Developing an Effective Team
- Improving Team Development
- 4 Conversations Toolset
- Leading Change
- Leading Change – Continued
- Success Factors For Effective Change Management
- Leader Standard Work Toolset
- Stakeholder Analysis – RACI Matrix
- Leadership Reflection
- Exercises and Quiz

### Session 3: Define II – Voice of the Customer (8.05 Hours)

- Voice of The Customer
- Focus on The Customer
- Understanding Customer Requirements

### Session 3: Define II – Voice of the Customer (Continued)

- Where to Go For Customer Requirements
- Conducting Surveys
- Survey Considerations
- Surveys – Sampling Frame
- Structuring Survey Questions
- The Degree of Uncertainty in Sampling
- Guideline for Margin of Error
- Affinity Diagram Toolset
- CTQC Tree Diagram Toolset
- Operational Definition Toolset
- Voice Of The Customer As Specifications
- QFD Toolset
- Exercises and Quiz

### Session 4: Define III – Mapping the Process (5.40 Hours)

- Drawing a Process Picture
- Process Thinking
- The Source of Value
- The Source of Value: Gemba
- Process Mapping - Overview
- Process Mapping (SIPOC)Toolset
- Flow Charts
- Value-Added Flow Charts
- Spaghetti Charts
- Takt Time
- Value Stream Mapping Toolset
- Define Tollgate – Progress Review
- Exercises and Quiz

### Session 5: Measure I – Measurements and Basic Statistics (6.00 Hours)

- Measurements and Basic Statistics
- Business Problem Solving
- Basic Statistical Terms
- Descriptive and Inferential Statistics
- Measurements
- Discrete vs. Continuous Measurements
- Measurement Subjects
- Graphical Summaries
- Pareto Chart Toolset
- Histogram Toolset
- Understanding Variation
- Measuring Central Tendency
- Quantifying Process Variability
- The Normal Distribution
- Exercises and Quiz

### Session 6: Measure II – Measurement System Analysis (8.55 Hours)

- Measurement System Analysis – Introduction
- Measurement as a Process
- Cause & Effect Matrix Toolset
- The Analysis of Measurement Systems
- The Requirements of Measurement Systems
- Variable MSA – Gage R & R
- MSA Graphing
- Attribute Measurement System Analysis

## Session 6: Measure II – Measurement System Analysis (Continued)

- Calibration of Measurement Systems
- Collecting Data
- Developing a Sampling Plan
- Baseline Performance
- Derivative Performance Metrics – Throughput Yield
- Derivative Performance Metrics – Rolled Throughput Yield
- Calculating the Sigma Level – Toolset
- Exercises and Quiz

## Session 7: Measure III – Charting Process Behavior (9.45 Hours)

- Introduction – Charting Process Behavior
- Trend Chart Toolset
- SPC - Introduction and Background
- SPC - Introduction to Control Charts
- SPC - Control Chart Limits
- SPC - More On Control Limits
- Implementing SPC
- SPC Chart Selection
- Rational Subgrouping Toolset
- X and Moving Range Charts - Toolset
- Attribute Control Chart Toolset
- X-bar and R Chart Toolset
- Process Capability Toolset
- The Sigma Level Revisited
- Measure Tollgate - Progress Review
- Exercises and Quiz

## Session 8: Analyze I – Identifying Potential Root Causes (10.15 Hours)

- Analyze I - Introduction
- Finding The Root Cause
- Cause & Effect Diagram Toolset
- Alternative To The Cause & Effect Diagram
- 5-Why, 1-How
- A Combination of 5-Why, Pareto, and Trend Charts
- Box Plots Toolset
- Scatter Plot Toolset
- Correlation and Regression Analysis
- Multiple Regression Toolset
- Binary Logistic Regression Toolset
- Factors In Determining Sample Size
- Estimating Population Mean
- Exercises and Quiz

## Session 9: Analyze II – Hypothesis Testing (22.40 Hours)

- Analyze II - Introduction
- Introduction to Hypothesis Testing
- The Process On Trial
- The Hypothesis - Accept or Reject?
- Types of Error
- Power Analysis
- Power Analysis - Factors
- Hypothesis Testing
- Confidence Intervals
- Treatment Comparisons – Control Charts

## Session 9: Analyze II – Hypothesis Testing (Continued)

- Comparing One Proportion to a Standard
- Comparing Two Proportions Toolset
- Comparing Multiple Proportions - Chi-Square
- Comparing One Mean to a Standard - t-test
- Comparing Two Means - t-test Toolset
- Comparing Multiple Means - ANOVA /F-test Toolset
- Comparing One Variance to a Std. - Chi-Square
- Comparing Two Variances - F-test Toolset
- Parametric vs. Non Parametric Tests
- Non Parametric Toolset
- Hypothesis Testing Learning Lab
- Exercises and Quiz

## Session 10: Analyze III – Design of Experiments (33.20 Hours)

- Design of Experiments - Introduction
- Design of Experiments - History
- Design of Experiments - Components
- Design of Experiments - Principles
- Design of Experiments - Purpose
- Design of Experiments - Process
- Design of Experiments – Guidelines
- Selecting the Right Design
- Blocking
- Blocking and Tackling
- Faster Deliveries Through Experimentation
- Beyond One-Factor Experiments
- Two Level Full Factorial Toolset
- Two Level Fractional Factorial Toolset
- General Factorial toolset
- DOE Power and Sample Size
- Designing An Experiment To Save The Kingdom
- Better Pizza Through Design of Experiments
- Designing Experiments to Sell More Coffee
- Additional Subjects
- Analyze Tollgate - Progress Review
- Design of Experiments Exercises and Quiz

## Session 11: Improve (12.75 Hours)

- Improve
- Design for Six Sigma (DFSS)
- Benchmarking
- Brainstorming
- Narrowing Down The List of Ideas
- FMEA Toolset
- Error-proofing
- Prioritizing and Selecting a Solution
- The A3 One-Page Report
- Continuous Flow Toolset
- Quick Changeover Toolset
- Cellular Processing Toolset
- Leveling Production (Heijunks)
- The Theory of Constraints (TOC) Toolset
- Pull System Overview

## Session 11: Improve (Continued)

- Pull Scheduling
- Core Process Pull Toolset
- Replenishment Pull Overview
- Kaizen Toolset
- Corrective Action Matrix
- Piloting a Solution
- System Dynamics Toolset
- Improve Tollgate – Progress Review
- Exercises and Quiz

## Session 12: Control (6.70 Hours)

- Control
- Control Charts Revisited
- The Process Control Plan
- More On FMEA
- Visual Management
- 5-S Approach
- CHECK Process
- Total Productive Maintenance
- TPM Objectives & Benefits
- TPM Metrics
- TPM Core Elements
- TPM Maintenance Activities
- Best Practices and Lessons Learned
- Standardized Work - Documenting Process Change
- Ending the Project
- Control Tollgate– Progress Review
- Exercises and Quiz
- Course Completion
- The Lean Six Sigma Journey

Updated on: 2/14/2019