

Six Sigma – Black Belt

Course Summary

Description

Six Sigma - Black Belt is an activity-based workshop to teach the Six Sigma Black Belt Body of Knowledge. Participants will learn advanced tools and techniques and apply them to an actual work-related project. Facilitation and coaching skills will be studied and applied to prepare participants for their role in facilitating and coaching Six Sigma Green Belts.

Objectives

By the end of this course, students will be able to:

- Describe Six Sigma and explain how it is used as a business improvement strategy
- Describe the various roles & responsibilities as it relates to Six Sigma
- Identify and use appropriate Six Sigma tools and techniques
- Complete a Black Belt project using the DMAIC approach to Six Sigma
- Facilitate and coach a Six Sigma Green Belt team through the completion of a project

Topics

- Enterprise-Wide Deployment
- Business Process Management
- Project Management
- Six Sigma Improvement Methodology and Tools - Define
- Six Sigma Improvement Methodology and Tools - Measure
- Six Sigma Improvement Methodology and Tools - Analyze
- Six Sigma Improvement Methodology and Tools - Analyze
- Six Sigma Improvement Methodology and Tools - Control
- Lean Enterprise
- Design for Six Sigma (DFSS)

Duration

5 Days

Six Sigma – Black Belt

Course Outline

I. Enterprise-Wide Deployment

- A. Enterprise view
 - 1. Value of six sigma
 - 2. Business systems and processes
 - 3. Process inputs, outputs, and feedback
- B. Leadership
 - 1. Enterprise leadership
 - 2. Six sigma roles and responsibilities
- C. Organizational goals and objectives
 - 1. Linking projects to organizational goals
 - 2. Risk analysis
 - 3. Closed-loop assessment / knowledge management
- D. History of organizational improvement/foundations of six sigma

II. Business Process Management

- A. Process vs. functional view
 - 1. Process elements
 - 2. Owners and stakeholders
 - 3. Project management and benefits
 - 4. Project measures
- B. Voice of the customer
 - 1. Identify customer
 - 2. Collect customer data
 - 3. Analyze customer data
 - 4. Determine critical customer requirements
- C. Business results
 - 1. Process performance metrics
 - 2. Benchmarking
 - 3. Financial benefits

III. Project Management

- A. Project charter and plan
 - 1. Charter/plan elements
 - 2. Planning
 - 3. Project documentation
 - 4. Charter negotiation
- B. Team leadership
 - 1. Initiating teams
 - 2. Selecting team members
 - 3. Team stages
- C. Team dynamics and performance
 - 1. Team-building techniques
 - 2. Team facilitation techniques
 - 3. Team performance evaluation
 - 4. Team tools
- D. Change agent
 - 1. Managing change
 - 2. Organizational roadblocks
 - 3. Negotiation and conflict resolution techniques
 - 4. Motivation techniques
 - 5. Communication
- E. Management and Planning

IV. Six Sigma Improvement Methodology and Tools - Define

- A. Project scope
- B. Metrics
- C. Problem statement

Six Sigma – Black Belt

Course Outline (cont.)

V. Six Sigma Improvement Methodology and Tools - Measure

- A. Process analysis and documentation
 1. Tools
 2. Process inputs and outputs
- B. Probability and statistics
 1. Drawing valid statistical conclusions
 2. Central limit theorem and sampling distribution of the mean
 3. Basic probability concepts
- C. Collecting and summarizing data
 1. Types of data
 2. Measurement scales
 3. Methods for collecting data
 4. Techniques for assuring data accuracy and integrity
 5. Descriptive statistics
 6. Graphical methods
- D. Properties and applications of probability distributions
 1. Distributions commonly used by black belts
 2. Other distributions
- E. Measurement systems
 1. Measurement methods
 2. Measurement system analysis
 3. Metrology
- F. Analyzing process capability
 1. Designing and conducting process capability studies
 2. Calculating process performance vs. specification
 3. Process capability indices
 4. Process performance indices
 5. Short-term vs. long-term capability

6. Non-normal data transformations (process capability for non-normal data)
7. Process capability for attributes data

VI. Six Sigma Improvement Methodology and Tools - Analyze

- A. Exploratory data analysis
 1. Multi-vari studies
 2. Measuring and modeling relationships between variables
 - a. Simple and multiple least-squares linear
 - b. Simple linear correlation
 - c. Diagnostics
- B. Hypothesis testing
 1. Fundamental concepts of hypothesis testing
 - a. Statistical vs. practical significance
 - b. Significance level, power, type I and type II errors
 - c. Sample Size
 2. Point and interval estimation
 3. Tests for means, variances, and proportions
 4. Paired-comparison tests
 5. Goodness-of-fit tests
 6. Analysis of variance (ANOVA)
 7. Contingency tables
 8. Non-parametric tests

Six Sigma – Black Belt

Course Outline (cont.)

VII. Six Sigma Improvement Methodology and Tools - *Improve*

- A. Design of experiments (DOE)
 - 1. Terminology
 - 2. Planning and organizing experiments
 - 3. Design principles
 - 4. Design and analysis of one-factor experiments
 - 5. Design and analysis of full-factorial experiments
 - 6. Design and analysis of two-level fractional factorial experiments
 - 7. Taguchi robustness concepts
 - 8. Mixture experiments
- B. Response surface methodology
 - 1. Steepest ascent/descent experiments
 - 2. Higher-order experiments
- C. Evolutionary operations (EVOP)

VIII. Six Sigma Improvement Methodology and Tools - *Control*

- A. Statistical process control
 - 1. Objectives and
 - 2. Selection of variable
 - 3. Rational subgrouping
 - 4. Selection and application of control
 - 5. Analysis of control
 - 6. PRE-control
- B. Advanced statistical process control
- C. Lean tools for control
- D. Measurement system re-analysis

IX. Lean Enterprise

- A. Lean concepts
 - 1. Theory of constraints
 - 2. Lean thinking
 - 3. Continuous flow manufacturing (CFM)
 - 4. Non-value-added
 - 5. Cycle-time reduction
- B. Lean tools
- C. Total productive maintenance (TPM)

X. Design for Six Sigma (DFSS)

- A. Quality function deployment (QFD)
- B. Robust design and process
 - 1. Functional requirements
 - 2. Noise strategies
 - 3. Tolerance design
 - 4. Tolerance and process capability
- C. Failure mode and effects analysis (FMEA)
- D. Design for X (DFX)
- E. Special design tools