

Lean Six Sigma - Black Belt

Course Description:

The course will be customized to the Client's processes to assure optimal relevance to its culture and needs.

This course is designed to provide the student with a higher understanding of the **Lean Sigma DMAIC methodology** for improving critical processes to achieve measureable business impact and customer value. The Black Belt course focuses on Six Sigma improvement methodologies. As with the Green Belt course, key principles and tool usage are the core of this approach, as real projects are used with a proven "hands-on" approach that results in measureable real world process improvements. Differences between the Green Belt tools and methods will be highlighted as necessary.

Course Format:

8-10 days class-room training focusing hands-on usage of the thought process maps and tools necessary to improve key processes using Six Sigma tools.

The course follows the **DMAIC (Define-Measure-Analyze-Improve-Control)** methodology, introducing relevant methods and tools to and prepares the student for completing their project with their identified coach / mentor.

Further, a survey of additional methods such as Quality by Design is presented.

Attendee Profile:

- Green Belts who want to proceed to the Black Belt level.
- End-to-end Process Owners who want to learn how to continuously improve their process quality output.
- Professionals identified as Black Belt Candidates for their functional area
- Lean Sigma deployment leaders who guide Green Belts and Black Belts implementing a portfolio of improvement initiatives in a "silo-busting" process centric environment.
- IT Professionals who want to learn about the end-to-end business processes and how they can enable better process management with technology.
- Business Process Management professional who need to learn about the Continuous Process Improvement method of choice.
- Quality professionals who want to learn how processes can be improved to meet tighter quality requirements.

Prerequisites:

- Completion of the Company's 4 day Green Belt Course
- Completion of the "What is Lean Six Sigma?", George, Rowlands, Kastle
- Review of "The Lean Enterprise Memory Jogger", Richard L. MacInnes
- Review of "The Black Belt Memory Jogger", Six Sigma Academy
- Minitab or equivalent Statistical Analysis tool
- Intermediate Microsoft Excel and PowerPoint skills
- Intermediate Project Management skills
- Optional: "Implementing Six Sigma: Smarter Solutions Using Statistical Methods", Forrest W. Breyfogle III

Course Goals:

This course is designed to provide the student continuing with Lean Sigma training with a deeper understanding of the Lean Sigma DMAIC methodology for improving critical processes to achieve measureable business impact and Customer value. Key principles and tool usage are the core of this approach, as real projects are used in a proven “hands-on” approach the result in real world business results. This Black Belt course focuses more on the larger improvement opportunities, and uses statistical methods as compared to the emphasis in the Green Belt course, the Lean improvement methods and tools.

Course Outline:

Week 1, Day 1:

- Lean Six Sigma Black Belt Course Overview
 - Including roles descriptions
- Review of Week 1, Green Belt course
- Black Belt Roadmap
- Change Management

Week 1, Day 2:

- **Define** Activities:
 - Defining the business case
 - Mapping the process
 - Voice of the Customer
 - Voice of the Business
 - Project management
 - Project Approval
 - Review of DMAIC methodology
- Define Stage Gate

Week 1, Day 3:

- **Measure:**
 - Value Stream Mapping
 - Cause & Effect Matrix
 - Process Measurements, Operational definitions
 - Collecting process data
 - Sampling plans
 - Measurement System Analysis

Week 1, Day 4:

- **Measure (Continued):**
 - Process Performance, control charts, Lean measurements, Little’s Law
 - As-is process capability measurements
 - Week 1 Wrap Up

Week 2, Day 1:

- Analyze:
 - Review the As-is process map, pain points
 - Takt Time
 - FMEA for improvement opportunities
 - Process Cycle Efficiency
 - NVA/VA Analysis, charts

Week 2, Day 2:

- Analyze (continued):
 - Root Causes, review C&E diagram (Ishikawa), brainstorming
 - Analyzing the data:
 - 1. Graphical techniques
 - 2. Confidence intervals
 - 3. Hypothesis testing
 - Verifying Root Causes
 - Verifying Root Causes:
 - 1. Regression Analysis
 - 2. Correlation
 - 3. Overview of Design of Experiments

Week 2, Day 3:

- Improve:
 - Generating solutions:
 - 1. Brainstorming
 - 2. Benchmarking
 - 3. Lean process flow techniques
 - 4. Balancing
 - 5. Other Lean Methods
 - Selecting the best solutions;
 - 1. Prioritization
 - 2. Benefit & Effort review
 - Piloting
 - Baseline vs. Pilot gap analysis

Week 2, Day 4:

- Control:
 - Standardizing the solution
 - 1. SPC II
 - 2. Process performance metrics and dashboard
 - 3. SOPs, training plan
 - Quantifying the improvement
 - 1. Capability
 - 2. SPC
 - Close Project

Day 5: (Optional)

- Special Topics:
 - Design for Six Sigma
 - Quality by Design
 - Quality Function Deployment
 - Mistake Proofing
 - Portfolio Building
 - Process Management
 - Understanding Variation / Components of Variation
 - Applied Logistic Regression
 - DMADV/DMEDI

Overview of Exercise Flow

Students will be provided information for their projects that they will build through the course. The exercises will utilize material covered in the training modules to build a complete DMAIC improvement project.

- Introduction: The case study concept will be presented to the students and provide an overview of the approach and objective.

Define:

- Thought process mapping: students are to prepare the project framework in a thought process map format, to be used throughout the week to track their progress in their project.
- Chartering: Student is to develop project Problem Statements, the foundation of the project scope and objectives.
- Voice of the Customer / Voice of the Business: Students will develop their data collection plans, and learn how to convert wants / needs to Critical Customer Requirements, within a simple QFD structure.
- Financial Benefits: Student will complete the Financial Benefits statements, and other benefits statements, and be able to complete a simple cash flow analysis and ROI.
- Charter: Student will update the project Problem Statement, Objectives and finalize the Charter, and the concept of "living charter" will be presented. The initial outline of the project plan is included in his exercise.
- SIRPOCR: The student will document using the SIPOC method with input requirements (or Service Level Agreements) and output requirements.
- Gaining Acceptance: Student will prepare a stakeholder analysis and communication plan for the project or portfolio.
- Improvement Event: Students will decide on whether or not to hold a focused improvement event (**Kaizen**) for their project, and begin planning for it, if needed.
- Detailed Project Planning: The plan will be completed in detail, include identification of dependencies and resources, technical requirements and Change Management steps.
- Stage Gate 1 or Define Stage Gate: Student will prepare a Stage Gate 1 for presentation to the Sponsor and Key Stakeholders.

Measure:

- The Student will create spaghetti diagrams, Value Stream Map, Swim Lanes, and others necessary to make the process visible. Visual workplace techniques are to be employed as necessary, and Real Time Control charts, if possible.
- Data Collection: Student will prepare a process map and a data collection plan, as well as identification of process pain points / performance gaps.
- Data presentation: Student will prepare appropriate presentations of data, including MSA, control charts, capability indices, and Sigma score.
- Stage Gate 2 or Measure Stage Gate: Student will update their charter, and prepare a Stage Gate 2 presentation to the Sponsor and Key Stakeholders.

Analyze:

- Root Cause Analysis: The Student will prepare a root cause analysis using one or more methods presented in the material, including Cause & Effect Diagrams, 5-Why, or others. Statistical methods for verifying the root cause is to be presented.
- Benefit-Effort: The Student will build a B-E Matrix for their project, defining the 2 relevant scales, and present a prioritized order of root causes on which to focus improvement solutions brainstorming.
- Stage Gate 3 or Analyze Stage Gate: Student will update their charter, and prepare a Stage Gate 3 presentation to the Sponsor and Key Stakeholders.

Improve:

- Solutions Generation: The Student will use various creativity techniques to generate potential solutions to their project, such as brainstorming-affinity method. Lean tools and defect reduction methods are to be employed to reduce Cycle Time, defect creation, reworks, touch time.
- Solutions Selection: The Student will use Solutions Selection technique to prioritize those solutions that are easiest to implement and have the largest improvement impact per their project objectives. Multi-generational solutions are to be employed where appropriate.
- Solutions Implementation: The student will develop their pilot plan, which includes the data collection plan, and decision criteria, and then the multi-generational implementation project plan. The solutions are to be applied to the As-is process maps, including the SIPOC, Value Stream Map, Swim Lanes Value Stream Map to yield the To-be process maps.
- Failure Modes and Effects Analysis: The student will complete the FMEA and the risk mitigation plan for their project by phases.
- Stage Gate 4 or Improve Stage Gate: Student will update their charter, and prepare and present a Stage Gate 4 presentation to the Sponsor and Key Stakeholders.

Control

- Control Plan: The Student will complete the Control Plan for their project, as well as outline SOP changes needed as well as the Training Plan.
- Visual Work Place: The Student will complete their Visual Work Place for their project.
- Stage Gate 5 or Control Stage Gate: Student will update their charter, and prepare and present a Stage Gate 4 presentation to the Sponsor and Key Stakeholders.

Validation

- Validation Plan: The Student will complete the Validation Plan for their project, as well as set the date for review with the Process Owner.