Course Description

Lean Six Sigma Green Belt

This 2-week hands-on workshop provides participants with the detailed methodology and tools of Lean Six Sigma to lead their organization toward "World Class" status. The workshop combines the proven and powerful elements of both traditional Lean and traditional Six Sigma into a blended approach. The emphasis is on 1) gaining process and product knowledge with critical thinking 2) reducing variability and non-value added activities and 3) developing leaders in the organization who are focused on enhancing customer value, decreasing defect rates and wasted efforts, reducing cost and cycle time, and generating business growth and breakthrough improvements. The Lean Six Sigma methodology is taught with a "Keep It Simple Statistically" (KISS) approach and makes use of many in-class examples, simulations, and hands-on exercises to ensure that participants have a practical, working knowledge of the tools.

Participants in the Lean Six Sigma Green Belt Training learn the basics of the Define, Measure, Analyze, Improve and Control (DMAIC) methodology and tools for achieving better, faster, and lower cost products and processes. We use a knowledge-based approach to "pull" the use of Lean and Six Sigma tools, not push them. Participants learn to select and apply the right tools for a particular problem or question. The intended audience is anyone who desires to become a practitioner of the Lean Six Sigma methodology and tool set and who will be leading Lean Six Sigma projects within an organization. Participants who complete the Green Belt training and later wish to expand their knowledge of the DMAIC methodology and tools may continue by enrolling in a 2-week Black Belt workshop.

As a part of the course, it is expected that participants come with a project to work on so that they can immediately apply their knowledge and realize return on investment on a specific business issue. The course is taught in two one-week sessions, with each week separated by a month. The time between weeks is designed to facilitate project work. Our Lean Six Sigma Green Belt Training uses the "Present/Practice/Apply/Review" strategy. That is, we present tools and methods, give participants the opportunity to practice them in class, and then apply the tools to their project, and finally review the results of the application to the projects.

Course Agenda

Lean Six Sigma Green Belt

Detailed Course Content, by week

Week 1:

Lean Six Sigma: The Journey Begins

- The What and Why of Lean Six Sigma
- Key Elements and Infrastructure
- Roles and Responsibilities
- Lean Six Sigma Project Master Strategy
- Factors Critical to the Implementation of Lean Six Sigma
- Importance of Knowledge and the Role of Questions

Lean Six Sigma Fundamentals

- Core Lean Six Sigma Principles
- Concepts of Value and Value Stream
- Defining Processes Using IPO Diagrams
- Key Terminology (Distribution, Mean, Median, Standard Deviation, Cp, Cpk, sigma level, first pass yield, defects)
- PF/CE/CNX/SOP (the first line of defense against variation)
- Measuring and Understanding the Cost of Poor Quality/Cost of Waste

Defining the Project and Managing Change

- Elements of the Define Phase of DMAIC
- Selecting and Defining a Lean Six Sigma Project
- Elements of the Project Charter
- Problem Statements, Project Goals, and Measures
- Stakeholder Analysis
- Importance of Good Project Management
- Teamwork
- Understanding Change and Ingredients for Successful Change

Understanding the Voice of the Customer (VOC) and Defining a Process

- Understanding the Voice of the Customer
- Managing the Customer Experience
- Kano's Model
- Introduction to Quality Function Deployment (QFD)
- Building a Simple House of Quality
- Creating a High Level Process Map using a SIPOC Diagram

Measure…Making Sense out of Data using Graphical and Measurement Tools

- Detailed Process Mapping (process flow, simple value stream maps, spaghetti diagrams, time value maps)
- Planning for Data Collection
- Graphical Analysis of Data
  - Pareto charts
  - Histograms
  - Box plots
  - Run charts
  - Scatter diagrams
- Numerical measures
  - Measures of Location and Dispersion
  - Measures of Quality for Variables Data
  - Measures of Quality for Attribute Data
  - Measuring Correlation
- Using SPC XL software and Interpreting Output

Measurement System Analysis

- Properties of a Good Measurement System
- Impact of Measurement System Variation
- How to Set Up, Conduct, and Perform a Measurement System Analysis
  - Variables Data
  - Attribute Data
- Interpretation of MSA Results and Metrics
  - Repeatability
  - Reproducibility
  - P/Tol ratio
  - Discrimination (resolution)
  - Effectiveness, Probability of False Rejects, Probability of False Accepts

Week 2:

Analyzing the Causes of Poor Performance

- Techniques for Identifying Potential Causes of Variation
- Identifying Waste and the Seven Classic Types of Waste
- Evaluating the Cost of Poor Quality
- Value and Non-Value Added Activities
- Analyzing Work
  - Takt time

- Cycle Time
- Operator Loading

Techniques for Narrowing the Focus

- Data Collection and Sampling Considerations
- Confidence Intervals and Sample Size Calculations using SPC XL software
- Techniques for Narrowing the Focus when Data is Limited
  - Voting
  - Nominal Group Technique
  - Effort / Impact Analysis
  - Pairwise Comparisons
  - Prioritization matrix
  - Five Why's

Drawing Conclusions From Sampled Data

- Elements of the Analyze and Improve Phases of DMAIC
- Using Hypothesis Tests for Comparing Data Sets
- How to Conduct and Interpret Hypothesis Tests
- How to Apply rules of Thumb (ROT) When Comparing Data Sets
- Using SPC XL for Hypothesis Testing

Improving the Process and Work Flow

- Elements of the Improve Phase of DMAIC
- Reducing Setup and Changeover Times using SMED
- Comparison of Batch vs. Single Piece Flow
- Cellular Manufacturing and Principles of Cell Design / Layout
- Applying the Principles to Improve a Simulated Process
- Mistake Proofing the Process Using FMEA and Error-Proofing (Poka Yoke)

Controlling Process Performance / Realizing and Holding the Gains

- Basic Concepts of Statistical Process Control (SPC)
- Difference Between Process Control and Process Capability
- Construction, Interpretation, and Application of Control Charts
  - Types of Charts
  - Control Limits
  - Out of Control Symptoms
  - Subgrouping Strategy
- Elements of an Effective Control Strategy
- Visual Control and 5S for Workplace Organization

- Project Documentation

DMAIC Summary – Putting it All Together

- Review of the Lean Six Sigma Master Strategy and Key Principles
- DMAIC Phase Tollgates and Completion Checklists
- Building a DMAIC Tools Memory Jogger

References, Glossary of Terms and Course Evaluation Forms

Course Materials

Participants receive the following materials which are integrated and used throughout the class:

Participant Guide

Textbooks:

- Knowledge-Based Management by Kiemele, Murrow and Pollock (Air Academy Press and Associates)
- Basic Statistics: Tools for Continuous Improvement by Kiemele, Schmidt, and Berdine (Air Academy Press and Associates)
- Lean Six Sigma: A Tools Guide by Adams, Kiemele, Pollock, and Quan (Air Academy Press and Associates)

Software:

- SPC XL

Prerequisites

Participants are expected to have management sponsorship and a project selected prior to attending the training. Projects will be worked on over the duration of the course and should be completed within a reasonable timeframe, typically near the end of the training but no longer than 6 months after the start of the training.

Participants are strongly encouraged to bring a laptop computer to class with Excel 2000 (or above) so that they can install the supplied software and practice using it during many in-class exercises. A basic working knowledge of Windows and Excel is helpful. Basic math and algebra skills are also desirable.