

## Lean Six Sigma Training/Certification

This training will cover the Six Sigma green belt training/certification topics (please see <u>Green Belt Training and Certification</u> to see the details). In addition, the training will address other issues related to Lean and Six Sigma.

## Lean Six Sigma

- Lean is an approach that seeks to improve flow in the value stream and eliminate waste. It is about doing things quickly.
- Six Sigma uses a powerful framework (DMAIC) and simple to advanced statistical tools to uncover root causes of the problem to understand and reduce variation. *It is about doing things right (defect free)*
- Lean is an approach that seeks to improve flow in the value stream and eliminate waste. It is about doing things quickly.
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	Lean	Six Sigma				
Theory	Reduce waste	Reduce variation				
Application guidelines	Identify value Identify value stream Flow Pull Perfection	Define Measure Analyze Improve Control				
Focus	Flow	Problem				
Assumptions	Waste removal will improve performance. Many small improvements are better than systems analysis	A problem exists  Figures and numbers are valued  System output improves if variation in all process is reduced				

## Integrating Lean and Six Sigma

- Companies have reported that bringing the two concepts- Lean and Six Sigma together delivers faster results.
- While the objective of Lean is to create flow and eliminate waste from the process, Six Sigma
  improves process capability and reduces variation thereby improving quality and reducing cost. If
  a company just applies Six Sigma, it cannot maximize the potential of the organization. Lean is
  really an enabler for Six Sigma.
- More and more companies are realizing that it is possible to achieve dramatic improvements in cost, quality, and time by using the above techniques.
- Several companies including Toyota, General Electric, Motorola, and many others have accomplished impressive results using one or the other technique. However, using only one of the above techniques- Lean, Six Sigma, or Design for Six Sigma has limitations.

## Limitations of Lean and Six Sigma

Six Sigma does not address the question of how to optimize the process flow, and the Lean principles do not address the use of advanced statistical tools required to achieve the process capabilities needed to be truly 'lean'.

## **Achieving Overall Objectives**

- A combination of these methodologies (Six sigma, Lean Six Sigma, and DFSS) is needed as an
  integrated approach to achieve the overall objectives of improving quality, reducing defect and
  becoming a Six Sigma company, reducing cost, eliminating waste, providing speed and reliability
  of delivery, incorporating flexibility and innovation in products and services, and meeting or
  exceeding customer expectations.
- In many cases, it is difficult for companies to select and initiate the right project.

This training will focus on the following Lean and Six Sigma Tools (see the figure below) and how to integrate Lean and Six Sigma to achieve the desired results.

# **LEAN and SIX-SIGMA TOOLS**How they can achieve enterprise excellence?

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**Seven Types of Wastes** 

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Standardize Work

**Work Flow Analysis** 

**Single Piece Flow** 

Workplace Layout and Organization

**Value Stream Mapping** 

**Root Cause Analysis** 

Re-engineering

Integrated Product and Process
Development

Kaizen (continuous improvement)

Jidoka (Quality at source)

Just-in-time

Cellular manufacturing

One-piece flow

**Cycle Time Reduction** 

**Setup Time Reduction** 

Pull System (Kanban)

Production Smoothing

**Balanced work flow** 

(Total Productive Maintenance)

**Visual Manufacturing** 

Visual Management

**Inventory Reduction** 

Achieve Enterprise Excellence

**Customer Focus** 

Reduced Cycle Time and Fast Response Time

Process Capability and Maturity

Continuous Process Improvement

Optimized Flow Across the Enterprise

Leadership Involved in Improvement

Optimization of Human Resources and Capabilities

Seamless Flow of Information

**High Quality** 

**Low Cost** 

**Efficient Allocation and Optimal use of Resources** 

SIX-SIGMA TOOLS

DMAIC

(Define, Measure, Analyze, Improve, Control)

**Statistical Thinking** 

Variation (Measurement and Reduction)

Project Focus
(1-3 months or more)

**Process Mapping** 

Basic Statistical Tools
Descriptive and Inferential

Graphical and Visual Tools using MINITAB

Simple Graphical Tools to solve Quality Problems

Fundamentals of Control Chart

Process Capability (Cp, Cpk)

Measurement system
Analysis
(Gage R &R)

Hypothesis Testing (Different Cases)

Control Charts using Computer

Statistical Process Control

Analysis of Variance (ANOVA)

Regression Analysis and Modeling

Design of Experiments (DOE)

Response Surface Methodology (RSM)

Failue Modes and Effects Analysis (FEMA)

Others as needed

# Additional Six Sigma Topics Covered

### • Six Sigma: Overview and Business Success

Six Sigma Quality and Reducing Variation in Products and Services Six Sigma Project Team/ Project Selection and Key Factors Why use Lean and Six Sigma Cost of Poor Quality (COPQ) and Cost Classification Cost of Quality in Services/ Prevention vs. Detection System

## • Statistical Basis of Six Sigma

Percent Nonconforming in Parts per Million in Six Sigma Process Improvement in Quality from 3-sigma to 6-sigma Six Sigma Metrics used in Industry

## • Lean Sigma and Six Sigma in Industry and Success

Lean Sigma and Six Sigma Emphasis in Industry

### Cases and Examples

- Details of DMAIC Process: Flow Charts
- Case Study and Examples on Define, Measure, Analyze, Improve, and Control Phases of Six Sigma
- Tools used in Lean and Six Sigma