High Performance Learning
On-Demand Performance Improvement

Lean Improvement
Lean Six Sigma

Summary
Lean Six Sigma is a disciplined, data-driven approach for eliminating waste and defects and can be used to create a better quality product and/or service. HPL's Lean Six Sigma training programs and consulting services are designed for manufacturing, service, hi-tech, healthcare and government organizations that want to improve processes, reduce errors and waste, and increase quality and productivity. Each program is customized to meet the unique needs of your organization.

Who Should Attend
Managers, supervisors and employees at all levels of your organization.

Workshop Objectives
By the end of this multi-day training program, participants will be able to:

- Understand the purpose, history, and critical tools and principles of Lean Six Sigma.
- Use tools to identify and validate their improvement project, e.g., SIPOC, Process Mapping, Kano Analysis.
- Employ tools to determine critical measures necessary to satisfy customer requirements and develop a measurement plan to document process performance, i.e. Input, Process and Output Measurement, Sampling, Statistics, Calculating Six Sigma.
- To analyze the performance data to further refine the opportunity to improve, e.g., Data Stratification, Pareto Analysis, Determining Root Causes, Brainstorming.
- Generate creative solutions that eliminate the root cause.
- Examine and improve cross-functional team dynamics.
- Execute against the plan by determining the approach to ensure achievement of the targeted result.
- Obtain yellow, green or black belt certification.

Structure
This Lean Six Sigma training will rely on instructor-led presentations by a senior HPL consultant, group discussions and real life application examples and scenarios to highlight and reinforce the key concepts and skills. Separate programs are also available for just Lean Improvement and Six Sigma training. The six units are as follows:

Unit #1: Understanding Lean Six Sigma

- The role of measurement in process improvement and quality.
- Process variation and the statistical definition of quality (i.e. Six Sigma)
- Reducing variation as the primary strategy for improving organizational performance.
- Creating value and driving out waste
- DMAIC: the Six Sigma methodology of Define, Measure, Analyze, Improve and Control
- Discussion: How can Lean Six Sigma benefit your organization?

Unit #2: Define

- How to define Lean Six Sigma type problems
- Use customer criteria to define what's critical
- Clarify the problem
- Set improvement goals
- Finalize your action plan (stakeholders, influencers, charter, communication plan, etc.)
- Understand and meet exit criteria

Unit #3: **Measure**

Section #1: What is Variation?

- Variation: A Natural Element in All Processes
- *Exercise*: Sources of variation
- Causes of variation in work processes.
- Plotting a Frequency Distribution.
- *Exercise*: Using the catapult to plot a normal frequency distribution. Understanding why the catapult generally produces an even frequency distribution (normal vs. skewed). Report out to the class.
- "Normal" distributions vs. "Skewed" distributions. The causes of normal distributions.
- Understanding Common vs. Special Causes of variation.
- *Exercise*: Using the catapult to demonstrate the origins of Common and Special Causes.

Section #2: What to Improve and How to Measure?

- Discussion: How do you know what to improve?
- Validate and improve current measures
- Discussion: Sources of measurement error
- Validate customer requirements
- Describe the process
- Key tools: Run Chart, Trend Chart, Control Chart
- Understand and meet exit criteria

Unit #4: **Analyze**

- The importance of "Why?"
- Identify potential causes
- Examining process efficiency
- Math Review: depending on the class make up, the instructor will do a basic review of mathematic techniques including division, fractions, averages, etc.
- Control Charts: turning the frequency distribution on its side.
- Run Charts: value and weaknesses.
- Basic Control Charts – X Bar and Range Charts – Combined as X Bar R charts. ($\bar{X}R$ Charts.)
- X Bar: Sampling techniques, the benefit of using averages, the X Bar and the power of averaging averages, the important and interpretation of the Range Chart.
- Calculating Control Limits: What a control limit is, how it's calculated, the benefits of validity and repeatability, and the difference between Statistical Control Limit and Specification Limits.
- *Exercise*: Using the catapult to calculate a Control Chart. The minimum number of samples for a valid control chart. Report out to the class.
- Determine improvement opportunities
- Understand and meet exit criteria for Analyze Phase

Unit #5: **Improve**

- Prioritize improvement opportunities
- Design of Experiments: test key causal variables
- Review of the scientific method of experimental investigation, including holding all but one variable constant and blind experimental techniques.
- Create future state roadmap
- Generate and evaluate solutions

- Develop detailed implementation plan
- Implement solutions
- Key Tools: Design of experiments, Analysis of variance, Simulation/Pilot, etc
- Understand and meet exit criteria for Improve phase

Unit #6: Control

- Discussion: How difficult is it to hold the gains?
- Develop control and monitoring plans
- Establish control charts
- Define responsibilities for holding the gains
- Understand and meet exit criteria

Participant Materials and Toolkit: In addition to 180-plus pages included in the participant manual, the following is a list of tools that are typically provided in HPL's Lean Six Sigma program:

- Process mapping
- Blueprinting
- Frequency Diagram
- Value Stream Mapping
- Brainstorming
- Pareto Analysis
- Root Cause Analysis
- 5S
- Charts: trend, run, X Bar and control techniques
- Trend Chart
- Run Chart
- X Bar Chart (XR)
- SIPOC
- XY matrix
- Measurement Systems Analysis
- Kano Analysis
- Process Capability Tool
- Multivariate Study
- Hypothesis Testing
- Failure Mode Effect Analysis
- Design of Experiments
- Control Plan
- Multi-voting
- Selection Matrix