# Lean Six Sigma Black Belt for Manufacturing

## Course Overview

This 16-day course teaches participants how to lead and support projects aimed at improving processes in a manufacturing business environment. State-of-the-art tools for the application of the Lean Six Sigma DMAIC (*D*efine-*M*easure-*A*nalyze-*I*mprove-*C*ontrol) improvement strategy will be introduced with hands-on exercises and tutorials to ensure rapid learning and knowledge retention. Participants will learn the theory and application of advanced statistical methods, how to facilitate the team-based activities and apply the quantitative tools required for successful completion of improvement projects. The training style is tell-show-do, with a strong emphasis on individual hands-on exercises and team-based activities. The instructors bring both theoretical knowledge and practical experience. Training workbooks are comprehensive, self-contained, and serve as excellent references for learning and review. On completion of this program participants will be able to:

- *Apply benefit-feasibility analysis to identify improvement projects aligned with your organization's priorities for quality, delivery, customer satisfaction, and profitability.*

- *Facilitate other team-based activities, including process mapping, cause-and-effect analysis, and root cause analysis.*

- *Perform basic statistical analyses using Excel.*

- *Understand advanced statistical methods, including Design of Experiments and use JMP statistical software to correctly apply these advanced methods.*

- *Use JMP to produce statistical graphics that are virtually impossible to produce in Excel.*

## Who Should Attend

This course is designed for Engineers, Quality Analysts, Process Improvement Specialists, Program Managers, Project Leaders, and others who want to learn the Lean Six Sigma Black Belt methodology and apply it to make breakthrough improvements in performance within their organization.

## Course Duration

This course will take 128 -hours (16-days) to complete. Training sessions are delivered in eight, 2-day sessions over a 4 month time frame. A training schedule and outline is provided on the page below.

## Course Prerequisites

Black Belt trainees should be assigned a Lean Six Sigma improvement project to work on during and between the training sessions. Improvement project selection information will be sent to you before the program commences. The instructor will be available to assist in improvement project selection and to consult on challenges presented by this project during the training sessions. Trainees should have experience with team leadership, process improvement, and knowledge of Excel to learn new things quickly. They should have a working knowledge of high school algebra and prior experience with statistical methods would be beneficial.

G R O U P

For manufacturing organizations looking to dramatically reduce scrap, rework, complexity, defects, delays, and other forms of waste in business and transactional processes

## Lean Six Sigma Black Belt Training Schedule and Outline

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| Day 1 | Overview | Lean overview, Six Sigma overview, combining lean and Six Sigma, relation to other initiatives, deployment, overview of DMAIC project roadmap, DMAIC case studies, DMAIC project reporting, requirements for ETI Green Belt certification. |
| Day 2 | Define Phase | Identifying potential improvement projects, prioritizing potential improvement projects, developing a project charter, establishing boundaries for the in-scope process or workflow (part of SIPOC analysis). |
| Day 3 | Measure Phase | Mapping the current-state process, observing the current-state process, identifying opportunities for improvement, types of data, Y and X variables, process sampling, sample size calculation, data formatting, data collection, Excel preliminaries, calculating current-state project metrics for continuous and nominal Y variables, Pareto analysis of defect types or failure reasons, Value-stream data collection and analysis, calculating mean time before/between failure using life data, measurement system analysis. |
| Day 4 | | |
| Day 5 | | |
| Day 6 | Analyze Phase | Hypothesis testing, comparison and correlation hypotheses with continuous and nominal Y variables, P values, standards of evidence, stratification and before-after analysis with continuous and nominal Y variables, Five Whys, affinity analysis, prioritizing root causes. |
| Day 7 | | |
| Day 8 | Improve Phase | Identifying potential solutions, ranking solutions—team process, ranking solutions—DOE (Design of Experiments) method, evaluating the future state with Failure Modes and Effects Analysis), piloting the future state. |
| Day 9 | Control Phase | Standardizing and documenting, concepts of statistical monitoring, response plans, control plans, calculating control limits for the control plan, calculating control limits based on short-term variation. |
| Day 10 | | |
| Day 11 | DMAIC Measure Using JMP | Fitting statistical distributions, Normal and non-Normal distributions, assessing goodness of fit, process capability analysis, distributions and baseline analysis for life (reliability) data, statistical graphics for continuous measurement system analysis, nominal measurement system analysis when there are no standards, tools for formatting data matrices. |
| Day 12 | | |
| Day 13 | DMAIC Analyze Using JMP | Comparison analysis, correlation analysis, simple linear regression, least-squares modeling, testing for nonlinearity, nonlinear regression, multiple regression, data transformations, interactive effects, developing predictive models, confidence intervals, testing process performance . |
| Day 14 | | |
| Day 15 | DMAIC Improve Using JMP | Intro to design of experiments (DOE), DOE terminology, design principles, process and product optimization, sample size calculation, multiple-response optimization, robust optimization, screening experiments. |
| Day 16 | | |

## Black Belt Certification

Participants who complete the Black Belt training and pass the Black Belt Exam will be awarded a Black Belt Certification of Completion. On completion of one improvement project for their company participants will be awarded a Certified Black Belt certificate. Details of this improvement project must be reviewed and approved by the instructor prior to the Certified Black Belt award. Participants who wish to become ASQ certified must pass the ASQ examination and complete two improvement projects. Further information on the ASQ certification process may be found at *asq.com*.

## Computing Requirements

Personal computing skills are essential to every Lean Six Sigma Black Belt. Every participant in the program must be equipped with a laptop computer loaded with MS Excel (version 2003 or later). They will need to add in the **Analysis ToolPak**, a statistical package that comes with MS Excel. Participants must also possess the following skills:

- Using the Windows operating system, especially file management.
- Creating and modifying line and column charts in Excel.
- Creating and modify simple cell formulas in Excel

## Training Course Materials

Participants in the Black Belt training program will be provided with all necessary texts, workbooks, electronic copies of data sets and temporary licenses to use the appropriate software programs.

## Training Course Fees

ETI Group can present this training program at your facility. Your cost, including workbooks, materials and software for up to twelve participants is $42,000. Additional participants, up to a maximum of eighteen people will cost an additional $750 per person. The training program can also be "tailored" to meet the specific learning needs of your organization.

**For more information please contact:**

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