Lean Six Sigma Black Belt – (13 days)

Overview -

ProgressivEdge Lean Six Sigma Black Belt (LSS BB) training and certification develops LSS BB practitioners that are prepared to apply the LSS tools and deliver results. The ProgressivEdge LSS BB's receive a balance of management skills (project/team/change management) and tool application to achieve the desired process improvements.

Who Should Attend? –

Anyone interested in improving processes by way of structured methodology, statistics and team work. This can be in any industry on any process by someone in any position. The ideal candidate would be a full-time Continuous Improvement Specialist.

Course Objectives –

- Learn the combined Lean Six Sigma tools at a Black Belt level
- Acquire the ability to select projects, develop teams and deliver results
- Apply concepts to a project impacting the bottom line
- Prepare the LSS BB to deploy LSS to other individuals in their organizations
- Begin developing abilities to teach LSS White, Yellow, and Green Belt

Certification –

Certification requires individuals to attend all training, pass an assessment, complete 1 project, facilitate 2 kaizen events, deliver results of at least $100,000 annual savings and present the project.

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Prerequisites –

- Identify at least two possible projects (processes in your business to improve)
- Desire to learn and apply the tools. Bring a laptop to the first day of class.
- Basic knowledge of PowerPoint® and Excel®.
- Green Belt training is not a prerequisite for this Black Belt course.

Course Includes –

- Face-to-face live Instructor class room training
- Well organized workbooks, software (SPC XL and DOE Pro), and text books
- Public sessions include drinks, morning snacks, lunch, and afternoon snacks
- References, glossary, case studies, examples
- Certification after requirements are met
- Mentoring from beginning to end of successful project

Support-

Learning and applying Lean Six Sigma requires the support of a mentor. All Black Belts will receive a Master Black Belt (MBB) mentor that is available throughout the project. Support can be achieved by:

1. Phone or e-mail – for free, "real-time" MBB support via e-mail or cell phone direct
2. On-site support – for a fee, the MBB can meet with you for face-to-face project work

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Why Choose ProgressivEdge?–

ProgressivEdge has many years of experience applying Lean Six Sigma obtaining quantifiable results on real problems with real solutions. There are many reasons to choose ProgressivEdge for your training and implementation needs:

Learning Format	Start with the basics and grow from there. Training is fun and interactive.
Application	Years of experience are provided as ProgressivEdge Instructor/Consultants have applied Continuous Improvement in a variety of industries. Very practical and immediate application.
Complete Program	Utilize DMAIC model with integrated Lean Six Sigma; many additional Continuous Improvement skills are taught, as well as a variety of tools (files and concepts).
Instructors	Friendly, welcoming, understanding, good listeners, helpful and effective. Individual Instructors can work strategically and tactically.
Materials	Work books are easy to understand, easy to reference when needed later, and well organized. Simple and user friendly software.
CEU's	Continuing Education Units can be provided on request
ETP Funding	In California, ETP state funding is available for some industries
Flexibility	On-site training can be tailored to meet your timing and content

Lean Six Sigma Black Belt

Week 1 = 5 days, Week 2 = 4 days, Week 3 = 3 days, 1 day of presentation approximately 5 months after first day of training.

	Week 1 - LSS Green Belt and Black Belt
Week 1	Project Charter/Project Selection
Week 1	Lean Six Sigma Introduction
Week 1	Deployment of Lean Six Sigma
Week 1	Cost Savings Analysis
Week 1	5 Lean Principles and 8 Wastes
Week 1	Value Steam Mapping
Week 1	5S and Visual Management
Week 1	Process Flow
Week 1	Introduction to Variation
Week 1	Performance Measurement
Week 1	Quality Concepts and the 7 Quality Tools
Week 1	Control Charts
Week 1	Measurement System Analysis
Week 1	Failure Modes Effects Analysis
Week 1	Cause and Effect
Week 1	Kaizen
Week 1	Flow and Pull
Week 1	Set-up Reduction
Week 1	Design of Experiments Introduction
Week 1	Mistake Proofing
Week 1	Standard Work
Week 1	Control Plans

	Week 2 - LSS Black Belt
Week 2	Project Management
Week 2	Change Management
Week 2	Team Building
Week 2	Champion Development
Week 2	Train-the-Trainer
Week 2	Benchmarking
Week 2	Voice of the Customer
Week 2	Theory of Constraints
Week 2	Total Productive Maintenance
Week 2	Data Collection
Week 2	MSA - Advanced
Week 3	Variation - Advanced
Week 2	DFSS Introduction
Week 2	Training Plans
Week 2	Control Plans - Advanced
	Week 3 - LSS Black Belt
Week 3	SPC for Attribute
Week 3	Inferential Statistics
Week 3	Hypothesis Testing - normal and non-normal data
Week 3	Process Modeling Regression
Week 3	DOE Planning
Week 3	DOE - Full Factorial
Week 3	DOE - Fractional Factorial
Week 3	Capability Analysis
Week 3	Historical Data Analysis

Lean Six Sigma Black Belt – Week 1 (same as GB)

Define	Module 1 Project Charter / Project Selection	Day1
	Module 2 Lean Six Sigma Introduction	
	Module 3 Deployment of Lean Six Sigma	
	Module 4 Cost Savings Analysis	
Measure	Module 5 5 Lean Principles and 8 Wastes	
	Module 6 Value Stream Mapping	Day2
	Module 7 5S and Visual Management	
	Module 8 Process Flow	
	Module 9 Introduction to Variation	
Analyze	Module 10 Performance Measurements	Day3
	Module 11 Quality Concepts and the 7 Quality Tools	
	Module 12 Control Charts	
	Module 13 Measurement System Analysis	
	Project reviews / updates and mentoring	
Improve	Module 14 Failure Modes Effects Analysis	Day4
	Module 15 Cause and Effect	
	Module 16 Kaizen	
	Module 17 Flow and Pull (kanban, level load…)	
	Module 18 Set-up Time Reduction	
	Module 19 Design of Experiments Introduction	
Control	Module 20 Mistake Proofing	Day5
	Module 21 Standardization	
	Module 22 Controls	
	Next Steps and Assessment (Green Belt Assessment)	

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Lean Six Sigma Black Belt – Week 2 and 3

Week 2	
Project reviews / updates and mentoring	Day 6
Module 23 Project Management	
Module 24 Change Management	
Module 25 Team Building	
Module 26 Champion Development	Day 7
Module 27 Train-the-trainer	
Module 28 Benchmarking	
Module 29 Voice of the Customer	
Module 30 Theory of Constraints	Day 8
Module 31 Total Productive Maintenance	
Module 32 Data Collection	
Module 33 Measurement System – Advanced	
Module 34 Variation – Advanced	Day 9
Module 35 Design for Six Sigma Introduction	
Module 36 Training Plans	
Module 37 Control Plans - Advanced	
Week 3	
Module 38 SPC for Attribute	Day 10
Module 39 Inferential Statistics	
Module 40 Hypothesis Testing	
Module 41 Process Modeling Regression	
Module 42 Design of Experiments (DOE) Planning	Day 11
Module 43 DOE – Full Factorial	
Module 44 DOE – Fractional Factorial	
Module 45 Capability Analysis	Day 12
Module 46 Historical Data Analysis	
Next Steps and Assessment	
Final Project Presentations and Certification	Day 13

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Module Content – Week 1 BB (a.k.a GB)

Modules may contain: examples, simulations, videos, project application

Module 1 Project Charter / Project Selection
Goal tree, PACE chart, prioritization matrix, project charter, SMART, project kick-off

Module 2 Lean Six Sigma Introduction
Basic into to: why LSS, benefits of LSS, basic rules, descriptions, history, 5 Lean principles, value, 8 wastes, VSM, takt, push vs. pull, batching, 5S, kaizen, action results summary, Six Sigma concepts, 3 generations of Six Sigma, variation, DMAIC, normal distribution, standard deviation, similarities and differences of LSS, applications

Module 3 Deployment of Lean Six Sigma
10 steps to deployment, LSS maturity, roles of LSS, skills and attributes, responsibilities, Leaders roles, change model, quality questions, LSS metrics, incentives, training, project identification and selection, project reviews, notebooks, Lean score card, certification, lessons learned, application to organization

Module 4 Cost Savings Analysis
Waste walk, value lever tree, finding savings, cost of poor quality, cost savings calculations, analyzing payback

Module Content – Week 1 BB (a.k.a GB)

Module 5 5 Lean Principles and 8 Wastes

Video, lead-time, cycle time, TPS, elements, 8 wastes, simulation, Lean principles

Module 6 Value Stream Mapping

Benefits of VSM, objectives, bull whip effect, traditional vs. VSM, samples, case study to create a VSM, video, 5 steps, VSM levels, product family matrix, Value Stream Managers, mapping details and icons, data slips, barriers to flow, 8 questions, takt calculation and application, balancing, delivery method, FIFO lane, supermarket, kanban, action plan, follow up

Module 7 5S and Visual Management

5S kaizen event approach, 5 S's defined, red tag, audits, standards, video, examples, visual display vs. visual controls

Module 8 Process Flow

Flow chart, IPO, linked IPO, SIPOC, process mapping, swim lane, VSM

Module 9 Introduction to Variation

Rules, simulation, types of data, converting data, histogram, box and whisker, run chart, control chart, scatter plot, pareto, mean/median/mode, range variance, standard deviation, normality, z-score, sigma score, population vs. sample, sigma shift, hypothesis testing

Module Content – Week 1 BB (a.k.a GB)

Module 10 Performance Measurements

What and Why, making money, planning, approaches to, 6 performance categories, traditional vs. new, video, scorecards, metrics, open book, system application

Module 11 Quality Concepts and the 7 Quality Tools

Yield, rolled throughput yield, RTY vs. sigma score, PPM, DPMO, Cp and Cpk, pareto, cause & effect, stratification, check sheets, histogram, scatter plot, control chart, case study

Module 12 Control Charts

Control chart related to histogram, common vs. special cause, ImR and Xbar R charts, out of control rules, zones, patterns, recalculating limits, rational sub grouping, variable and attribute defined

Module 13 Measurement System Analysis

Sources of variation, accuracy/precision/bias, measurement discrimination, types of MSA, analysis methods, terminology, gage R&R, Kappa, ICC, exercises

Project Updates (present to class)

Project update form

Module Content – Week 1 BB (a.k.a GB)

Module 14 Failure Modes Effects Analysis

Defined, types of FMEA, applications, when to apply, steps to create, sample

Module 15 Cause and Effect

Root cause analysis, 5 why's, cause & effect diagram (fish bone), cause & effect matrix

Module 16 Kaizen

Kaizen vs. kaizen events, steps to kaizen events, video, Managements roles, project application, strategic application

Module 17 Flow and Pull (kanban, level load…)

Barriers to flow, tests for flow capability, balance, one piece flow, supermarket, cells, monuments, FIFO lane, waterspider, point of use, admin flow, kanban rules, kanban types, kanban cards, calculations, load smoothing, heijunka

Module 18 Set-up Time Reduction

Defined, examples, related to wastes, elements of changeover, batch size, economic order quantity, ICE, using video, documenting, awareness video, checklists, functional checklists, transportation

Module Content – Week 1 BB (a.k.a GB)

Module 19 Design of Experiments Introduction
Defined, interactions, benefits of, 3 phases, full and fractional factorial explained, empirical model, when not to do DOE, DOE questions

Module 20 Mistake Proofing
What and why, related to COPQ, types of errors and sources of defects, 3 levels, applications, simulation, 7 steps, video

Module 21 Standardization
Simulation/activity, standardization related to sustained results, standardization, standards, standard work sheet, videos

Module 22 Controls
Control and reaction plan, control charts, assessments, standards, mistake proofing

Module 22 is the last module of LSS Green Belt and concludes week 1 of LSS Black Belt.

Module Content – Week 2 BB

Module 23 Project Management (PM)
Project discussions and reviews, LSS BB roles, project characteristics, traditional project management, PMI, effective PM's, PM groups, PM phases, action plans, A3, gantt charts, CPM, PERT, project closure, documentation, post audit, PM video

Module 24 Change Management (CM)
CM videos, why change, how we see change, successful and unsuccessful change exercise, benefits/risks matrix, 5 components of change (detailed), readiness for change and actions for change exercise, motivators, traits, ladder of accountability, culture of change, time vs. culture, tips, quotes

Module 25 Team Building
SPACER, ice breaker, project charter details, charter videos, team selection, team composition, team size, team roles, stages of development, team development vs. leadership style, motivations and rewards, effective meetings, communication, conflict resolution, video, team building exercises

Module 26 Champion Development
LSS Champion roles, Hoshin planning, PDCA, DMAIC strategy, VSM strategy, TQM strategy, SWOT analysis, x-matrix to action plan, leadership vs. management, types of leadership, LSS staffing, resource involvement impact, champion and project selection tool, project tracking, toll gate review, tracking systems, case study review

Module Content – Week 2 BB

Module 27 Train-the-trainer
Characteristics of learning, tips for instructor, laws of learning, class becomes trainers, psychology rules of learning, personal preparation, co-training, confidence, greetings, ice breakers, ground rules, leading vs. directing, answering questions, listening skills, dealing with difficult situations, concluding

Module 28 Benchmarking
Competitive vs. comparative benchmarking, as a project, published sources, videos, resources

Module 29 Voice of the Customer
Defined, videos, IPO and VOC, critical to quality, quality function deployment, Kano model, team exercise, VOC quantified

Module 30 Theory of Constraints
Defined, types of constraints, simulation, drum-buffer-rope, video, rules

Module 31 Total Productive Maintenance
Defined, breakdown, preventive, productive, 6 big losses, OEE measurement, TPM calculations, predictive methods, proactive vs. reactive, operator involvement, 5S, video

Module 32 Data Collection
Why collect, data plans, effective surveys, methods of gathering VOC, sampling methods, data on projects

Module Content – Week 2 BB

Module 33 Measurement System – Advanced
Extended look from GB, precision, accuracy, class exercises, what and when, repeatability, reproducibility, measurement discrimination, bias, stability, linearity, crossed and nested, MSA process and guidelines, gage R&R ANOVA exercise

Module 34 Variation – Advanced
X-Y matrix, software applications: summary stats, probability for binomial, probability for poisson, probability for normal, scatter diagram, multi-vari with box plots

Module 35 Design for Six Sigma Introduction
Defined, exercise, phases, framework, steps, CTQ and Kano, QFD, display of advanced tools (sigma score prediction, DOE, robust designs, Weibull, reliability testing, reliability predictions, design for reliability, taguchi

Module 36 Training Plans
Who to complete, when/what/how..., training plan form, cross training matrix, training within industry – relations/instruction/methods, project application

Module 37 Control Plans – Advanced
Defined, who to create, control and reaction plan, considerations – impact/cost/time, solutions, rankings, inputs and outputs, implementing, documenting, monitoring, response, aligning systems and structures, sign off

Module 37 concludes week 2 of LSS Black Belt

Module Content – Week 3 BB

Module 38 SPC for Attribute
Project updates, common vs special, attribute defined, c chart, u chart, p chart, np chart, converting attribute to variable, project application

Module 39 Inferential Statistics
Sample vs population, central limit theorem, software application: confidence interval for mean/standard deviation/proportion, sample size, confidence level

Module 40 Hypothesis Testing
Terminology, p value, example application, one sample t-test, two sample t-test, paired t-test, nonparametric

Module 41 Process Modeling Regression
Scatter plot correlation coefficient r value, linear regression, residuals, prediction, goodness of fit (Anderson-Darling and Kolmogorov – Smirnov), non-normal distribution, skewness, kurtosis, data transformation for non-normal

Module 42 Design of Experiments (DOE) Planning
DOE defined, history, when not to DOE, march of science, DOE worksheet, planning, three phases, types of DOE: single factor, multi-factor, fixed effect, random effect, mixed model, interpreting experiment

Module 43 DOE – Full Factorial
Why and when full factorial, examples, nomenclature, runs, levels, factors, responses, ANOVA, empirical model, models, software training

Module Content – Week 3 BB

Module 44 DOE – Fractional Factorial
Factorial designs, screening/characterizing/optimizing, nomenclature, aliasing/confounding, resolution, DOE methodology, examples, graphics, interpretation, class experiment with software, project application

Module 45 Capability Analysis
Capability indices, within/between, data, Cp/Cpk – long and short term

Module 46 Historical Data Analysis
Purpose of, graphical analysis (multiple graphical tools), change over time: Change Point Analysis, point estimates of mean, statistical tolerance interval

