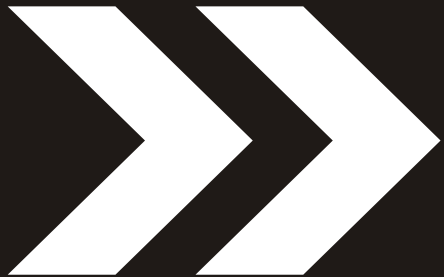
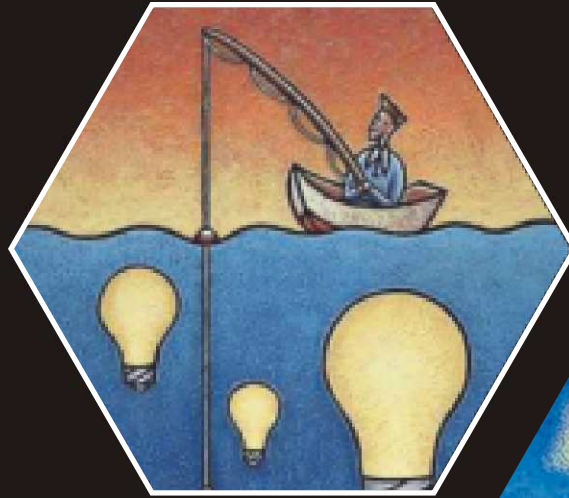


# SIX SIGMA BLACK BELT PROGRAM

competency  
building



**SKIL**<sup>TM</sup>  
evolving thoughts... changing mindsets<sup>TM</sup>

## CERTIFIED SIX SIGMA BLACK BELT

### What is six sigma?

Six sigma is a comprehensive and flexible system for achieving, sustaining and maximising business success. Six Sigma approach seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and variation. The approach is independent of the nature and type of industry and can be applied to any process, be it manufacturing or services. It uses a set of quality management methods including statistical methods and creates a special infrastructure of people within the organisation (Black Belts, Green Belts, etc.), who are experts in these methods. Six Sigma projects carried out within an organisation follow a defined sequence of steps and have quantified financial targets (cost reduction or profit increase).

### Who is a six sigma black belt?

Black belts in an organisation are individuals who are expected to dedicate 100% of their time towards achieving breakthrough improvements in business results. They are perceived to be the future leaders in an organisation.

A Certified Six Sigma Black Belt is a professional who can explain Six Sigma philosophies and principles, including supporting systems and tools, to various levels of the organisation, with ease. A Black Belt should demonstrate team leadership, understand team dynamics and should be well equipped to lead improvement teams. Black Belts have a thorough understanding of all aspects of the DMAIC model in accordance with Six Sigma principles. They have basic knowledge of Lean enterprise concepts, and use specific tools to identify non-value-added elements and activities.

### Why opt for this certification?

- ▶ It helps you climb the professional ladder at a faster pace.
- ▶ It provides professional recognition which is acclaimed by organisations world over.
- ▶ In a competitive work place, it will help you deliver better results at a faster pace.



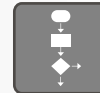
### WHO SHOULD ATTEND?

This program is suitable for professionals belonging to middle & senior management - like Business Heads, Manager, Senior Team Leads and Project Leads with at least a graduation level of education and 4 years of minimum work experience.



### PROGRAM DURATION

The program is spread across 18 sessions. Each session is designed with an objective to link concepts covered with the participants' own work area and the project/s they are working on.



### CERTIFICATION PROCESS

Participants, on successful completion of the training program, have to submit a project affidavit, for one successfully completed project, as a proof of demonstration of application of Six Sigma concepts. The submitted affidavit will be reviewed by the Exam Board. Upon acceptance of the affidavit, participants will be allowed to take the Certification Exam.



### CERTIFICATION EXAM

Exam Duration: 4 hours ,  
Total No. Questions: 150,  
Exam Type: Open book, multiple choice questions

## WHY CHOOSE SKIL OVER OTHERS ?

We asked this question to our participants and all of them say that our coaching program significantly impacts their ability to think and communicate ideas/viewpoints, professional skills and confidence levels. If you wonder how we achieve this, the reasons could be:

- ▶ Internationally acclaimed syllabus for CSSBB.
- ▶ Individual attention.
- ▶ Facilitation of implementation (guiding participants to link the subject matter to their own work area or project).
- ▶ Ensure subject matter is well understood by conducting several assessment tests, quizzes and exams.
- ▶ Class room sessions are carried out by qualified and experienced faculty who are presently engaged in designing and deploying Lean and Six Sigma strategies in diversified companies.
- ▶ Discuss case studies to ensure application oriented understanding by the participants.
- ▶ Calculations in basic and advanced statistics are carried out manually to ensure comprehensive understanding of statistical fundamentals.
- ▶ Live video recording for backups. Participants who miss any sessions can go through the live recorded session at his/ her own convenient time. *(for public programs only).*



## PROGRAM OUTCOMES/ HIGHLIGHTS

- ▶ Gain expertise in problem solving using Six Sigma (DMAIC) methodology.
- ▶ Lead improvement initiatives focused on voice of business and its customer.
- ▶ Use an approach which is based on data for analysis and judgement.
- ▶ Manage routine activities more efficiently.
- ▶ Gain ability to teach, train and transfer the improvement methodology.



## SYLLABUS

Syllabus prescribed for this program is covered under the following topics :-

1. Six Sigma & Lean - Overview & Philosophy
2. Six Sigma approach - Define
3. Six Sigma approach - Measure
4. Six Sigma approach - Analyse
5. Six Sigma approach - Improve
6. Six Sigma approach - Control
7. Six Sigma approach - DFSS

## I. SIX SIGMA & LEAN - OVERVIEW & PHILOSOPHY

### **Continuous Improvement:**

- ▶ Origin of continuous improvement.
- ▶ Value of Six Sigma, its philosophy, history and goals
- ▶ Value of Lean, its philosophy, history and goals.
- ▶ Relationship b/w. Lean and Six Sigma.
- ▶ Relationship b/w. various business processes & its impact.
- ▶ Application of Six Sigma and Lean tools in various industry segments like manufacturing, service, etc.

### **Top Management:**

- ▶ Responsibilities of Executive Leaders in deployment of Six Sigma in the organization in terms of providing resources, managing change etc.
- ▶ Identify and apply various techniques to overcome these barriers.
- ▶ Techniques for facilitating and managing organizational change.
- ▶ When to use Six Sigma instead of other problem solving approaches.
- ▶ Roles and responsibilities of Six Sigma Master Black Belt, Black Belt, Green Belt, Yellow Belt, Champions, Process Owners and Project Sponsors

### **Process Management & Measures:**

- ▶ Impact of Six Sigma Projects on customers, suppliers and stakeholders.
- ▶ Identify CTQs within a project.
- ▶ Understand various business performance measures including Balance Scorecard, KPIs, etc.
- ▶ Understand and use financial measures, including revenue growth, market share, margin, COPQ, NPV, ROI and Cost-benefit analysis of a project.

### **Team Dynamics**

- ▶ Understand & explain various types of teams and determine which team model works best for a given situation .
- ▶ Understand & explain various team roles and responsibilities.
- ▶ Understand & explain factors influencing team selection, including expertise, availability etc.
- ▶ Identify and describe the elements of launching a team, including having management support, establishing clear goals, ground rules etc.

### **Team Development & Motivation**

- ▶ Stages of team development.

### **Team Facilitation**

- ▶ Communication methods, reporting and milestone reviews.
- ▶ Techniques to overcome team performance challenges like over-bearing, dominant or reluctant team members etc.
- ▶ Brainstorming, Nominal Group Technique, Multi-voting. Affinity Diagram, Tree Diagrams, PDPC, Matrix Diagrams, Interrelationship Digraphs, Prioritisation Matrix, Activity Network Diagram.
- ▶ Team progress in relation to goals & objectives.

## II. SIX SIGMA APPROACH - DEFINE

### **Segmentation & Voice of customers**

- ▶ Segment customers for each project and show how the project will impact both internal and external customers.
- ▶ Data collection methods like Surveys, Focus groups, Interviews, Observations, etc.
- ▶ Use CTQ Flow-down, QFD and Kano model.

**Develop Project charter and Project execution plan**

- ▶ Develop and evaluate the problem statement.
- ▶ Develop and review project boundaries.
- ▶ Identify and evaluate performance measurements (e.g. cost, revenue, schedule, etc.) that connect critical elements of process to key outputs.
- ▶ Use project management tools such as Schedules, Gantt charts, Tollgate reviews, etc., to track project progress.

**III. SIX SIGMA APPROACH - MEASURE****Process Documentation**

- ▶ Identify process variables and evaluate their relationships using SIPOC and other tools.
- ▶ Evaluate process flow to identify waste and constraints by analysing WIP, WIQ, Touch time, Takt time, Cycle time, Throughput, etc.
- ▶ Analyse processes using VSM, Process map, Flowcharts, Procedures, Work instructions, Spaghetti diagrams, Circle diagrams, etc.
- ▶ Define and classify Qualitative and Quantitative data, Continuous (variable) and Discrete (attributes) data variables and convert them into variable measures when needed.
- ▶ Scales of measurements, Nominal, Ordinal, Interval and Ratio measurement.

**Collecting & Summarising Data**

- ▶ Sampling concepts (e.g. Representative selection, Homogeneity, Bias, etc). Sampling methods like Random, Stratified, Systematic, Linear Sampling, etc.
- ▶ Define and distinguish between population parameters and sample statistics (e.g., Proportion, Mean, Standard Deviation etc.)

**Measurement Analysis**

- ▶ Use analytical methods (e.g. Repeatability and Reproducibility (R&R), Correlation, Bias, Linearity, Precision to Tolerance, Percent Agreement, etc.) to analyse and interpret measurement system's capability for variables and attributes.
- ▶ Identify how measurement systems can be applied in Marketing, Sales, Engineering, R&D, SCM, Customer Satisfaction and other functional areas.

**Basic Statistical Analysis of Data**

- ▶ Describe and use Central Limit Theorem.
- ▶ Describe Measures of Dispersions and Central Tendency, Construct and Interpret Frequency Distributions and Cumulative Frequency Distributions.
- ▶ Box-and-Whisker plots, Run charts, Scatter diagram, Histograms, Normal probability plots, etc.
- ▶ Define and distinguish between Descriptive and Inferential statistics.
- ▶ Describe and apply Probability concepts.
- ▶ Describe, apply and interpret Normal, Poisson, Binomial, Chi-square, Student's t and F distribution.
- ▶ How and when to use Hypergeometric, Bivariate, Exponential, Lognormal and Weibul.
- ▶ Define, select and calculate Cp and CpK.
- ▶ Define and calculate Pp, Ppk and Cpm to assess process performance.
- ▶ Describe assumptions made for Short term or Long term data is available. Interpret relations between Short Term and Long Term capability.
- ▶ Identify Non-normal data, when to use Box-cox or other transformation techniques.
- ▶ Calculate Process capability and Process sigma level for attribute data.
- ▶ Describe and apply elements of designing and conducting Process capability studies.

- ▶ Distinguish between Natural process limits and Specification limits and calculate process performance metrics such as percent defective, PPM, DPMO, DPU, Process Sigma and RTY.

#### IV. SIX SIGMA APPROACH - ANALYSE

- ▶ Calculate and interpret the correlation coefficient it's confidence interval and describe the difference between correlation and causation.
- ▶ Calculate and interpret Regression Analysis (Linear only), apply and interpret Hypothesis tests for Regression statistics.
- ▶ Use the Regression model for estimation and prediction, analyse uncertainty in the estimate and perform a residuals analysis to validate the model.
- ▶ Use and interpret Multi variate tools such as Principal Components, Factor Analysis, Discriminant Analysis, MANOVA, etc., to investigate sources of variation.
- ▶ Describe Multi-vari charts and determine the difference between Positional, Cyclical and Temporal variation.
- ▶ Analyse attributes data using Logit, Probit, Logistic regression, etc to investigate sources of variation.
- ▶ Hypothesis testing - Define and interpret the significance of Level and Power, Type I and Type II errors of statistical tests.
- ▶ Equality of Means and Proportions.
- ▶ Define & distinguish between Confidence and Prediction intervals.
- ▶ Define & interpret the Efficiency and Bias estimators, Tolerance and Confidence intervals, Hypothesis testing for Means, Variance, and Proportions.
- ▶ Describe Analysis of Variance (ANOVA) and Chi Square tests.
- ▶ Use contingency tables to determine statistical significance.
- ▶ Non-parametric test like Mood's median, Levene's test, Krushal-wallis, Mann Whitney, etc.
- ▶ Describe Finite Mode Effect Analysis (FMEA), distinguish between PFMEA and DFMEA.

- ▶ Root cause analysis using tools like 5 Why's, Pareto chart, Fault tree analysis, Cause and Effect diagrams, etc.) for resolving critical problems.
- ▶ Identify 7 types of waste (Overproduction, Inventory, Defects, Over-processing, Waiting, Motion and Transportation)

#### V. SIX SIGMA APPROACH - IMPROVE

- ▶ Basics of Design of Experiment (DOE).
- ▶ Understand terms like Dependent and Independent variables, Factors, Levels, Response, Treatment, Error etc.
- ▶ Define and apply DOE principles, including Power, Sample size, Balance, Repetition, Replication, Order, Efficiency, Randomization, Blocking, Interaction, Confounding, Resolution, etc.
- ▶ Design and conduct Completely Randomized, Randomized Block and Latin Square Designs and evaluate their results.
- ▶ Determine the effects of Confounding to these experiments.
- ▶ Full Factorial experiments.
- ▶ Tools and techniques for preventing or eliminating waste like Pull System, Kanban, 5S, Standard Work, Poka - Yoke etc.
- ▶ Use techniques for reducing Cycle time using Continuous Flow, SMED etc.
- ▶ Describe and apply Kaizen, Kaizen Blitz and Theory of constraints.
- ▶ Develop plans to implement solution through simulation, pilot run etc.

## VI. SIX SIGMA APPROACH - CONTROL

- ▶ Understand & explain the objective of SPC, including monitoring and controlling process performance, tracking trends, runs, etc. and reducing variation in a process.
- ▶ Describe Rational sub-grouping.
- ▶ Select and apply control charts like Individual and Moving Range chart (ImR), p, np, c, u, short - run SPC and Moving Average.
- ▶ Interpret control charts and distinguish between Common and Special cause of variation.
- ▶ Describe and use Total Productive Maintenance (TPM) and Visual Factory.
- ▶ Develop control plans to sustain the solution, including transfer of responsibility from project team to the process owner. Document the sustained improvements.
- ▶ Develop and implement SOPs, work instructions etc.

## VII. SIX SIGMA APPROACH - DFSS

- ▶ Identify and describe DMADV (Define, Measure, Analyse, and Validate), DMADOV (Define, Measure, Analyse, Design, Optimize and Validate). Explain design constraints, like Design for Cost, Design for Manufacturability and Producibility, Design for Test, Design for Maintainability etc.
- ▶ Explain Robust Design, Tolerance & Statistical Tolerancing.
- ▶ Explain tools like, Pugh Analysis, Porter's Five Force Analysis etc.

***Contact us NOW!!!***

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