Lean Six Sigma Black Belt

An education program focused on profitable and effective improvement methods

In our Lean Six Sigma Black Belt training program you will learn effective improvement tools and methodology at the same time as you develop your role as an improvement leader. Through this course, you will develop your competence regarding systematic and fact-based problem-solving and process development as you are trained to use an extensive problem-solving toolbox. Parallel to the classroom training, you will also carry out a personal improvement project in your organization. Experience from thousands of such projects shows that the average pay-off from these projects is several times the total cost of the training. The Lean Six Sigma Black Belt training gives in-depth knowledge about identifying root causes analytically, and how to find evidence-based solutions that improve goods, services, and processes. A critical part of this knowledge is applied statistical methodology. The participants also learn how to develop a process and increase the effectiveness of the flow through the use of Lean tools. The course has a strong focus on the practical application of improvement methodology.

Purpose
To provide the knowledge and ability to apply effective methods and tools that improve profitability, cost-effectiveness, and customer satisfaction. After completing the course, participants will be able to coach and support improvement teams, lead improvement projects, and analyze what is needed to find a suitable solution for each project.

Who should take this course?
Those who work or will work as improvement specialists or as Black Belts in Lean Six Sigma programs. This course is also suitable for those taking part in excellence or business development programs.

Pre-qualifications needed
No previous knowledge is required. If you already are a Six Sigma Green Belt or Lean Six Sigma Green Belt ask us for an upgradation program.

Documentation
Participants will receive relevant course materials that will serve as useful reference for their future work. This documentation includes the following:

Binder with copies of ppt and articles
Management of excellence and quality, Lars Sörqvist (book)
Six Sigma Handbook (book)
Practical statistics, part 1 (book)
Practical statistics, part 2 (book)

General information
This training program includes lectures, project work, group work, and discussions. A key element in the education is the application of participants' own projects in the course assignments. At the start of the course, participants are expected to choose a project that the participants will focus on and complete during the course.

After fulfilling the course requirements and completing an improvement project, the participant will receive a Lean Six Sigma Black Belt diploma.

The lectures will be led by consultants from Sandholm Associates and will be given in English.

Many analyses in Lean Six Sigma are done using the software Minitab.

Length
20 days divided into 4 modules of 4 days each, over an approximately 8-month period.

Place
The course is given at Sandholm Excellence Center in Ponte de Lima in northern Portugal or company internal at your location.

The course is also given internationally online on Zoom. When given online, the training days are not divided into those modules.

CONTENT:

Main parts of the Lean Six Sigma Black Belt training:

- Six Sigma - background, purpose, result, and implementation
- Roles and responsibilities in improvement work
- DMAIC (Define, Measure, Analyze, Improve, Control) – The improvement process in Six Sigma
- Lean Six Sigma - the integration of Lean and Six Sigma
- Identifying and prioritizing Six Sigma projects
- Project leadership, coaching, and group dynamics
- Identify poor quality costs, economic improvement potential, and business cases
- Process mapping, process analysis, and value stream mapping
- Understanding the voice of the customer and identifying customer needs and expectations
- Identifying key performance indicators that are critical to quality
- Designing a measurement system
- Analytical problem-solving and identification of root causes
- Improvement tools and statistical analyses
- Statistical theory necessary to understand and implement Six Sigma
- Using the statistical software Minitab
- Innovative problem-solving and creative techniques
- Identification and test of solutions
- Implementation of solutions
- Creating an effective process flow with Lean principles
- Leading change and working with human factors
- Following up and reporting improvement results
- Project presentation and summation

Course schedule – Lean Six Sigma Black Belt training

Module 1 (4 days) – Introduction to Lean Six Sigma, DMAIC, and basic problem solving

We start with an introduction to Six Sigma and Lean, focusing on how a successful improvement program should be run. We learn about organization, roles, and responsibilities of improvement work. Methodology and strategies for identifying and prioritizing good improvement projects are discussed. During this module, we focus on Six Sigma's problem-solving model DMAIC. We start with the define phase and learn how to define, scope, and limit a problem, develop a business case, identify customer needs, and study problem-related processes with a SIPOC. We also discuss essential project management, focusing on leading and planning improvement projects.

We proceed to the measure phase of the DMAIC model and show how to identify critical measurable variables, design a measuring system, plan the measuring work, and perform the measuring. Then we learn problem-solving methodology and cover the analyze phase. Finally, we focus on basic problem-solving and root-cause analysis. In this work, we introduce many of the basic problem-solving tools. We also discuss other problem-solving strategies, such as innovative problem-solving and techniques to solve human controllable failures.

During this module, we also focus on the improvement phase of the DMAIC model and learn how to implement solutions and take action. Finally, the participants learn the control phase, and we discuss how to ensure and maintain implemented solutions and follow up, report, and communicate the final results of the improvement project. As a part of this module, participants also identify and define their proposed training projects.

Module 2 (4 days) – Understanding variations and using basic statistical analysis

During this module, we start to learn statistical methodology, which we will build on throughout the course. In this module, participants learn basic statistical theory and create an understanding of how common and special causes of variations affect the result of a process. The software Minitab is introduced, and we cover normal probability, control charts for individuals, estimates, and stages. The new knowledge is applied in real, case-based assignments. We continue and introduce more advanced knowledge about control charts. Participants learn to use I-mR and Xbar-R diagrams and discuss how to ensure that a process will meet its actual demands. The methodology used to analyze process output and capability is presented, and Cp and Cpk are introduced.

We learn about confidence intervals, a tool later used to understand hypothesis testing and regression. We also explore different normal probability tests and methods for graphical summary and discuss how to deal with and understand data that is not in normal distribution. Finally, we cover the advantages and disadvantages of aggregated data, and introduce the Pareto diagram.

During this module we also continue the work of defining the training projects.

Module 3 (4 days) – Process improvements and Lean principles

In this module, we initially discuss integrating Six Sigma and Lean in an effective improvement program. Focus is now on running improvements on process level and learning how to develop an effective and efficient flow that delivers value to the customers of the process. To understand Lean, the participants do a Lean simulation where many of the principles of Lean are tested.

We then introduce the tools needed to analyze and understand the actual situation in a process. The focus is on tools like gemba walks, spaghetti diagrams, flow charts, matrix diagrams, and value stream mapping. We also discuss how to use technical devices to record information and analyze processes. Participants learn how to measure and analyze time in a process, identify bottlenecks, and use the theory of constraints.

During this module, we also focus on developing a new future flow in a process by developing its ability to deliver customer value and eliminate waste. Participants learn to create a continuous and balanced process flow and implement takt time. We also discuss the principles of a pull system and how lot size affects the flow. Focus is then on reducing change over time, and the SMED method is introduced.

The participants also learn to develop a systematic process approach by introducing standardized work and designing work effectively. The Jidoka concept is introduced, and we discuss how error-proofing by Poka Yoke can be introduced to avoid failures. Techniques for establishing good housekeeping with Five S are introduced, and the use of Total Productive Maintenance (TPM) to avoid stops is discussed. We also learn how to design an early warning Andon system that helps to keep an undisturbed process flow. In this module, participants study how to use Kaizen activities to maintain and further develop a Lean-based production system.

Module 4 (4 days) – Change management and development of an advanced Lean flow

The participants start this module by doing a progress report on the training project. We discuss lessons learned and prepare for the final examination. We then learn to lead continual improvement work and how to manage change. The focus is on leading and coaching improvement teams and how to handle changes that often arise when solutions are implemented and action taken. As part of this, the participants learn the concept, methodology, and tools of Change Management.

During this module, we also focus on how to implement a Lean Six Sigma program in an organization successfully. We discuss success factors and common problems and learn how to plan implementation and related training activities. A train-the-trainer material is given to the participants to prepare them to train employees and project members in systematic improvement work.

In this module, we continue to learn how to create a highly effective Lean-based process flow. We now focus on more advanced Lean tools that help us to level and balance a Just-in-time system. Techniques for implementing Kanban and takt time are then learned. We also introduce principles from Business Process Reengineering (BPR) and discuss how digitalization and new technology could be important to develop future processes.

Module 5 (4 days) – Advanced statistical analysis and course examination

This module is focused on more advanced statistical analysis and optimization. We start with hypothesis testing. Participants learn by working with real case studies. Focus is on choosing the right method, applying the method using real data, interpreting the results, and explaining the conclusion to others. Examples of methods we learn in this module are 1-sample t, 2-sample t, paired-t, 1-variance, 2-variance, and comparison of two ore more groups with ANOVA (Analysis of Variance). We also learn more advanced knowledge about hypothesis testing, and additional methods are introduced including: 1-proportion, 2-proportion, power and sample size, and general linear model.

Correlation between variables is discussed, and regression analysis is introduced as a new tool. We also deepen our knowledge of statistical methodology by introducing Measurement System Analysis (MSA) and Gage R&R – the methodology used to evaluate whether measurement equipment and/or processes are giving reliable data. Finally, we introduce the concept of Design of Experiment (DoE).

During the last day, the participants carry out presentations of their training projects and take their Lean Six Sigma Black Belt exam.