



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 improvement tools and methodology at the same time as you learn to tackle 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 tool box. Parallel to the classroom training, you will also carry out a personal improvement project in your own 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 how to identify root causes in an analytical way, and how to find effective solutions that improve goods, services, and processes. One important 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 practical application of improvement methodology.

Purpose

To provide the knowledge and ability needed to apply effective methods and tools that lead to substantial improvements in profitability, cost effectiveness, and customer satisfaction. After completion of the course, participants will be able to coach and support improvement teams, lead improvement projects and analyse 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 just ask us for an upgradation program.

Documentation

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

- 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

Included in this training program are 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 the fulfillment of the course requirements and the successful completion of 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 is given in English.

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

Length

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

Place

The course is given in a training building in the area of Ponte de Lima in northern Portugal or company internal at your site.



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, Analyse, 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 where we focus 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, how to develop a business case, how to identify customer needs, and how to study problem-related processes with a SIPOC. We also discuss basic project management, with focus 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 measuring. Then we learn problem solving methodology and cover the analyse phase. 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 how to follow up, report and communicate 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 understanding for how common and special causes of variations effect 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 assure that a process will meet actual demands. Methodology used to analyse process output and capability is presented, and Cp and Cpk are introduced.

We proceed to 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. We cover the advantages and disadvantages of aggregated data, and introduce the Pareto diagram.

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

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

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

We then introduce the tools needed to analyse and understand the actual situation in a process. 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 analyse processes. Participants learn how to measure and analyse time in a process and how to identify bottle necks and use theory of constraints.

During this module we also focus on how to develop a new future flow in a process by develop its ability to deliver customer value and eliminate waste. Participants learn how 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 effect the flow. Focus is then on reduction of change over time and the SMED-method is introduced.

The participants also learn how to develop a systematic process approach by introducing standardized work and design work in an effective way. The Jidoka concept is introduced and we discuss how error proofing by Poka Yoke can be introduced in a process to avoid failures. Techniques for establishing god housekeeping with Five S is 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 maintenance 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 of the training project. Focus is on lessons learned so far and preparation for final examination in the last module. We then proceed and focus on management of improvement and management of change to become prepared to lead continual improvement work. The focus is on how to lead and coach improvement teams, and how to lead the changes that often arise when solutions are implemented and action taken. As part of this the participants learn the concept, methodology and tools from Change Management.

During this module we also focus on how to successfully implement a Lean Six Sigma program in an organization. We discuss success factors and common problem and learn how to plan implementation and related training activities. As a part of this 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 finally 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 is then learned. We also introduce principles from Business Process Reengineering (BPR) and discuss how digitalization and use of new technology could be of importance 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 for 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 or 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 are discussed, and regression analysis is introduced as a new tool. We also deepen knowledge of statistical methodology by introducing Measurement System Analysis (MSA) and Gage R&R - 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.