Lean 6σ
Black Belt

Lean Six Sigma Black Belt Training

LEAN SIX SIGMA AND ARTIFICIAL INTELLIGENCE BLACK BELT TRAINING AND CERTIFICATION

Alex Boussetta, P.Eng., M.Eng., PMP, SMC, Master Black Belt, EP

What is a Black Belt

A Lean Six Sigma Black Belt is a trained improvement agent who demonstrates change management skills, project management skills, team leadership, and understands team dynamics. Black Belts have a thorough understanding of all aspects of the methodology in accordance with Lean Six Sigma principles and aim for *breakthrough improvements*.

Black Belts also have a knowledge of Lean enterprise concepts. They contribute greatly to performance improvement in their environment.
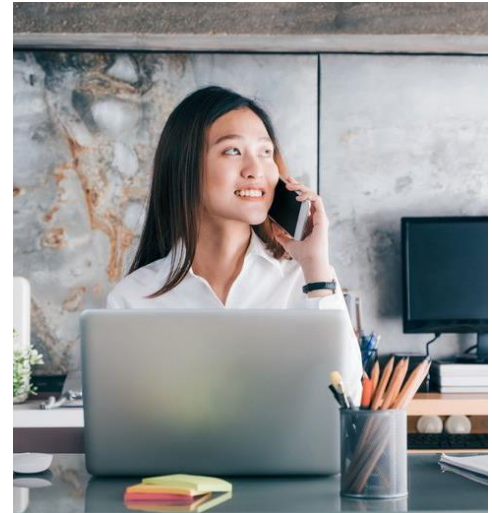
What is a Black Belt

- Lead *complex* and *multifunctional* process improvement or process design projects by applying the Lean Six Sigma methodology.
- Manage projects using a roadmap that encompasses the change management steps
- Identify and optimize the key factors that are linked to the customers needs in a process or product
- Analyze data and information in order to *demonstrate* and *prove* the way forward
- Achieve successful breakthroughs in *environments where resistance is a challenge*

Typical role of a Black Belt

- Lead, as a team leader, complex cross functional projects
- Provide technical support and mentoring to Black Belts and Green Belts, including on the most recent tools
- Act as an internal consultant and a Lean Six Sigma expert
- Participate to the governance
- Establish procedures, best practices
- Adapt and introduce new tools and methods in line with the needs, and participate to the training development
- Promote the use of the Lean Six Sigma methodology in the company, as a **change agent**

**Lean 6σ
Black Belt**

Overall content

- Change management tools
- Team decision making tools
- Analysis tools
- Statistical tools
- Project management
- Artificial Intelligence tools

Recognize and Define phase
Defining the problem

1. Selecting the right projects to improve
2. Strategic planning / Hoshin Kanri
3. Multi generation project plans
4. Defining the project
5. Teamwork and team building
6. Overview of process management
7. Project management tools and principles
8. Change management tools
9. Leadership styles
10. Artificial Intelligence / Machine Learning: applications and overall process

Measure
Measuring the actual performance

1. Voice of the customer and survey techniques
2. Mapping the process or the product
3. Value Stream Mapping
4. Analysis of the mapping
5. Measurement system analysis (Gauge R&R, continuous, attribute)
6. Process capability: Z, Cp, Cpk, Pp, Ppk, DPMO, yield, RTY for normal and non normal data
7. Coaching, giving feedback

Analyze phase
Identifying the vital factors

1. Sample size calculation
2. Hypothesis testing, ANOVA
3. Correlation and regression
4. Selection of the factors to improve
5. Change management
6. Communication, presentations
7. AI/ML supervised (KNN, LR) and unsupervised (K Means, PCA) learning

Improve phase
Selecting the right solution

1. Workshops guidelines and facilitation
2. Process design methodology including the Pugh matrix
3. Scenario evaluations and selection, creativity
4. Design of experiment (full, fractional)
5. Lean Thinking improvement tools
6. Pilot and implementation plan
7. Change management
8. ML/AI: Neural networks and deep leaning notions (Feed forward NN, Convolution NN, Recurrent NN)

Control phase
Maintaining the improvements

1. Setting a control plan (recap)
2. Quality system and standardized work
3. Evaluation of the gains
4. Control charts, SPC (recap only)
5. Exam I and II

Black Belt Roadmap

Lean 6σ Black Belt

Recognize
- Strategic plan
- SWOT analysis
- Hoshin Kanri
- Value Stream Improvement Plan
- Customer complaints and surveys
- Kano model
- Scorecards, Dashboards, bowling charts
- COPQ
- Benchmarking
- Tree technique
- Selection grids
- Multi Generational Project Plan

Define
- Mission statement
- Initial problem complexity assessment (is ML needed)
- Scope and team:SIPOC
- 5W2H
- Project Management Plan (10 dimensions)
- Force field analysis
- Stakeholder analysis

Measure
- Voice of the customer, Needs, Y, X, Takt time
- Survey design
- Kano Model
- QFD, Benchmarking
- Brainstorming, Ishikawa, 5W, 5W2H, ICUKU
- Process mapping
- Value Stream Mapping
- VA/NVA and other analysis types
- Risks: FMEA
- Observation
- Data collection plan, sampling
- ML data preparation
- ML learning strategy
- Measurement system analysis
- Process capability
- Cpk, Ppk, Z, DPMO, yields – Normal and non normal

Analyze
- Critical X
- Graphical analysis
- Chronological analysis
- Statistical analysis
- ML modeling, learning, analysis
- Sample size calculation
- Hypothesis testing, ANOVA
- Correlation and regression
- Selection of the factors to improve
- Change management
- Communication, presentations
- Functional analysis, Value Engineering

Improve
- Scenarios
- Functional analysis
- Flow techniques
- 5S, TPM, SMED
- Pull: Kanban, Heijunka
- Poka Yoke
- Selection grids
- Pugh principle and creativity
- Process design methodology including simulation
- Design of experiment
- ML implementation (Control or DSS)
- Pilot (PDSA) and Implementation plan

Control
- Visual management
- Control plan
- Control charts
- ML relearning strategy
- Standard work
- Standard work combination sheets
- Transfer of power
- Lessons learned
- Update of MGPP
- Celebrate
- Post mortem and audits
- Quality system and standardized work
- Evaluation of the gains

Certification and training

Intro	Recognize Define	Measure Analyze	Improve Control
4hr Webinar on a Saturday morning	3 day seminar in Montreal Friday to Sunday	3 day seminar in Montreal Friday to Sunday	3 day seminar in Montreal Friday to Sunday
	Recap Exam	Recap Exam	Final Exam

Certification Project Identification

Coaching and work on the project

Certification

Reason for Black Belt Certification

- Assurance for Black Belts that they have the set of skills and experience to
  - Drive transformational initiatives
  - Address complex organizational and technical problems
  - Coach colleagues and promote Continuous Improvement methodologies

Lean 6σ
Black Belt

Certification Project Selection Criteria

The project needs to deal with a problem that is SMART

- Specific - One problem

- Measurable – If you can't measure it, you don't know if you improved

- Achievable – Contained enough to be able to make a difference

- Relevant - Still having a impact on the institution's operations

- Time constrained- Your project needs to have an end date

Project Selection Criteria

- The project is connected to a recognized need, impacts and adds value to your organization (quality, time, cost)

- No minimum dollar value, still SMART

- The project has a measurable benefit that can be confirmed and is correlated to a product or process performance characteristic that is measurable in a valid and reasonable way.

Project Selection Criteria

- The project is based on a process that does not depend on major influences outside of your control.

- The project request has a process owner who is willing to support the project.

Examples

- Projects lead time reduction
- Product or service lead time reduction
- Inventory turns improvement
- Bid process
- Yield improvement
- Top 1 or top 2 customer complaints reduction
- Improve change management in products or services
- Cost estimating process

Examples

- Reduction of blood stream infections in ICU
- Reduction in patient information errors
- Emergency Department Patient Wait Time
- Day surgery lead time reduction
- Redesigning a wing for efficiency and quicker communication
- Improved Patient Throughput in Radiology
- Unique treatments dosage preparation and control