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Course ID: S09

LEAN SIX SIGMA BLACK BELT PROGRAMME

Onsite course: 20 one-day workshops, with external ASQ examination & project work

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1. BLACK BELT PROGRAMME OBJECTIVE

The black belt (BB) is a full-time six sigma programme member who has responsibility for selecting & prioritising projects, leading projects, deploying project learnings and training and mentoring green belts. The BB is trained in advanced project management and statistical analysis tools. The BB is expected to contribute between €250K and €1M to the company's operating profit each year by undertaking process improvement projects that lead to enhanced customer satisfaction.

BB candidates are selected for training on the basis of their ability to lead cross functional teams to be successful problem solvers, and their potential to progress to higher levels within the organisation. In general, they are dynamic "can do" personnel. The full-time BB role is often a temporary one of 2-4 years duration.

On completion of the CLSSBB course, candidates will be able to

- Select strategic and tactical projects that aid organisation competitiveness;
- Define customer needs for selected processes;
- Understand the value of cross-functional teamwork;
- Use a wide range of problem-solving techniques, both statistical and non-statistical, to improve process performance;
- Lead a cross-functional team through project steps that will resolve process problems;
- Mentor yellow belt and green belt project teams, and
- Will be able to quantify business and financial benefits for the organisation and all associated stakeholders.

CLSSBB projects will deliver significant benefits to the organization in terms of simplifying and standardizing processes. Customers will experience improved service levels, margins will expand, and the organisation's competitive position will improve.

2. PROGRAMME STRUCTURE AND CONTENT

2.1 Summary BB Programme Structure

- Formal workshops: 20 days, in blocks of 3 or 4 days over six months. Total workshop contact hours = 140 hours.
- Project work: One project will typically take between 10 to 12 months elapsed time to complete. Typically, full time BBs will work on 2 to 3 projects at a time as well as mentoring GBs.
- Examination: BBs will complete an internationally recognised six sigma examination prior to certification. The most popular agencies are the [American Society for Quality \(ASQ\)](#) and the [International Association for Six Sigma Certification \(IASSC\)](#).
- Certification: a six sigma black belt certification is awarded to the candidate following attendance at the workshops; successful completion of the required number of projects, and successful completion of the external six sigma CLSSBB examination.

A detailed workshop agenda is shown on table 1 below.

2.2 Workshop agenda

The following 3 pages provide a layout of the course content over approximately 22 weeks. Course workshop spacing can be altered to suit calendar holidays and events within the organisation that require a reschedule.

ON SITE BLACK BELT COURSE MODEL				
Week	Workshops in sequential days	Contact hours per workshop = 7 hours	Project phase	Topics (guide only, based on ASQ curriculum)
1	3	21	Enterprise	Introductions, curriculum, certification criteria, lean and six sigma pioneers, organisation goals, risk analysis & hoshin Kanri, process performance KPIs, dashboard, cost benefit analysis, voice of the customer, stakeholder analysis, role of the sponsor, projects review, exam questions
2				
3				
4	3	21	Teams & Define	Team leadership, team roles, motivation, team dysfunction, decision making tools, training, voice of the customer, segmentation, customer satisfaction, problem statement & goals, QFD, SIPOC & project charter, portfolio management, project management tools, VSM, takt time, process maps, process observation, exam questions
5				
6				
7	2	14	Measure	Types of data, data collection, calibration, metrology, MSA, descriptive statistics, measures of location and dispersion, central limit theorem, data distributions, normal distribution and z values, other distributions, projects review, exam questions
8				
9				
10	3	21	Measure & Analyse	Hypothesis testing, non-parametric tests, power & samples size, FMEA, 5 whys, fishbone, fault tree analysis, performance measurements, linear regression, residuals analysis, projects review, exam questions
11				
12				

Week	Workshops in sequential days	Contact hours per workshop = 7 hours	Project phase	Topics (guide only, based on ASQ curriculum)
13	2	14	Measure & Analyse	MANOVA, ANOVA, hypothesis testing for means, variance & proportion, non-parametric tests, power & samples size, projects review, exam questions
14				
15				
16	3	21	Analyse & Improve	FMEA, 5 whys, fishbone, fault tree analysis, DOE full and fractional experiments, EVOP, other DOE designs, 5S, error proofing, standard work, kanban, kaizen, projects review, exam questions
17				
18				
19	2	14	Improve & control	Process observation and sampling plans, calculating control limits, statistical process control for individuals, groups & attribute data, out-of-control conditions, control plans, projects review, exam questions
20				
21				
22	2	14	Control, Design for Six Sigma & certification	Control vs. capability, process capability analysis, TPM, design for six sigma, Taguchi robust design, projects review, examination technique, mock exam
22				
22				
	20	140		
	Total days	Total contact hours		

Table 1. CLSSGB Workshop contents and timing

In addition to the above workshops, completion of continuous assessment online assignments will prepare candidates for the public ASQ or IASSC examinations. The examinations are proctored online events.

In parallel to the academic studies, candidates are required to work on a project within the organisation. A project certification review event is scheduled on the completion of each candidate's project.

3. SOFTWARE AND HARDWARE REQUIREMENTS

- Each candidate will bring a laptop at the training workshops, and
- The organisation will supply Minitab, JMP or an appropriate software application. A trial version of the software may be downloaded by candidate, as a temporary measure, for up to 30 days.

4. PROJECT SELECTION CRITERIA

4.1 Selection and Approval Criteria

BB projects are selected according to the following criteria:

- designed to enhance customer satisfaction and grow the business
- in line with corporate and site objectives
- preferably derived from annual VSM or process mapping project prioritisation exercises
- capable of realising €100,000 or greater operating profit increase for the organisation
- cross functional in composition, and
- must address a current process or system failure, or new product or process design.

To ensure consistent standards in project selection it is recommended that the organisation develops a standard business case template that takes the above factors and others as appropriate into account. Each BB project should be evaluated and approved by the site lean six sigma leader, the steering committee and the project sponsor in advance of BB training. Lean Ireland can assist with a project selection criteria model.

The finance department is responsible for appointing a cost accountant (or accountants) to approve the project projected savings, in advance of the work commencing on the project. The cost accountant is responsible for signing off on all recorded cost savings, and/or additional revenues, when the project work is complete.

If the project is sufficiently large in scope, more than one BB can work on it and still achieve certification.

4.2 Cross Department Deployment

Following project implementation, BBs have responsibility for overseeing/mentoring the cross deployment of the process improvement in the organisation, for example

- in a household retailer, an improvement in the Google rankings, website hits and sales of the FMCG division should be deployed as appropriate of the white goods division, or
- in a manufacturing plant the reconfiguration of a production from linear batch to cellular one piece flow.

5. READING LIST

Pyzdek & Keller, (2015, fourth edition) *The Six Sigma Handbook*, McGraw Hill, New York, USA.

Breyfogle III, FW (2003 - 2nd Edition), *Implementing Six Sigma*, Wiley New Jersey, USA

Liker, J. (2021, second edition) *The Toyota Way*, McGraw Hill, New York, USA.

Snee, R.D. & Hoerl, R.W. (2003) *Leading Six Sigma*, Prentice Hall, New Jersey

Pyzdek (2003) *The Six Sigma Project Planner: A Step-By-Step Guide To Leading A Six Sigma Project Through DMAIC*, McGraw Hill, New York, USA.

6. THE PROJECT SPONSOR

6.1 Role of the sponsor

Each BB candidate must have the support and understanding of a sponsor prior to programme commencement. The sponsor is responsible for:

- approving the project objective, budget and timeline
- conducting formal stage gate reviews to ensure the project remains on track and is true to the lean and six sigma DMAIC approach
- removing barriers to progress as they arise
- formally confirming the project gains on completion of the project, and
- recommending the BB for certification.

Prior to programme commencement each project sponsor will undergo a two hour induction on supporting black belts, setting performance goals & monitoring progress.

6.2 Project mentoring

Each BB is assigned a mentor at the commencement of the BB training programme. This may or may not be the sponsor, depending on training and level of mentoring experience. The role of the mentor is to:

- guide and encourage the BB through the project lifecycle;
- provide supplementary training and support with data analysis, where necessary;
- ensure project timelines are managed;
- support the project sponsor in the stage gate review process, and to
- assist the BB in preparing for the BB exam and the BB certification review.

Lean Ireland consultants are available to be supplementary mentor on the CLSSGB programme, as an when required.

6.3 Stage Gate Reviews

Formal stage gate reviews are held at each of the DMAIC stages of BB project execution. The purpose of the review is to ensure that the BB project team has fulfilled all of the criteria associated with each project phase, prior to moving to the next phase. Present at the stage gate review are: the sponsor, the BB, the team and the BB mentor. The stage gate review also provides the BB and the project team the opportunity to share concerns with those in a position to provide help and guidance.

7. CERTIFICATION GUIDELINES

The certification criteria will be agreed between the Client and Lean Ireland at the start of the programme. Table 2 below provides a typical certification model.

ITEM	GUIDELINE CERTIFICATION STANDARD
Workshops attended	20
Projects completed	1 or 2
Addition to operating profit	€100K or greater, per project led
Six sigma examination	1 (ASQ or IASSC)

Table 2. CLSSGB certification criteria

Regardless of local or client specified variation, the CLSSBB certification criteria will be in line with international standards as recommended in *ISO 13053-1 Quantitative methods in process improvement - Six Sigma -- Part 1: DMAIC methodology*.

8. CRITICAL SUCCESS FACTORS

- Expectation setting amongst management in the organisation, in particular in relation to the time, effort and support required;
- Sponsor preparation & engagement;
- Organisation investment/key career move;
- Candidate selection/full time position;
- Project selection;
- Training standards/formal certification;
- Project success/publicity and cross deployment, and
- Reward & recognition/retention strategy.

9. REFERENCES

[ISO13053-1 Quantitative methods in process improvement -- Six Sigma -- Part 1: DMAIC methodology](#)
[American Society for Quality](#) (ASQ) CLSSBB certification.
[International Association for Six Sigma Certification](#) (IASSC) CLSSBB certification.