

LEAN SIX SIGMA BLACK BELT PROGRAMME

#	Item	Page
1	Black belt programme objective	1
2	Reading list	1
3	Software & hardware requirements	1
4	Project selection criteria	2
5	The project champion	2
6	Project mentoring and stage gate reviews	2
7	Programme structure and content	3
8	Examinations	3
9	Critical success factors	3
	Appendix: BB Curriculum	4

1. BLACK BELT PROGRAMME OBJECTIVE

The black belt (BB) is a full-time lean six sigma programme member who has responsibility for selecting & prioritising projects, leading projects, deploying project learnings and training and mentoring green belts. He is trained in advanced project management and statistical analysis tools. He 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 BB role is often a temporary one of 2-4 years duration.

On completion of the BB certification programme participants will be able to lead a cross functional project team using a range of lean six sigma project management, problem solving, change management and statistical analysis tools.

2. READING LIST

2.1 Essential

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

Liker, J. (2004) *The Toyota Way*, McGraw Hill, New York, USA.

2.2 Recommended

Delany, E. (2000), *Strategic Development of the Multinational Subsidiary through Subsidiary Initiative-taking*, Long Range Planning Vol 33, (2000), 220-44

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

Naumann, E. & Hoisington, S. (2001), *Customer Centric Six Sigma*, American Society for Quality, Milwaukee, USA

Seddons, J (2003), *Freedom From Command & Control, a Better Way to Make the Work Work*, Vanguard, Buckingham

Mascitelli, R. (2002), *Building a Project-Driven Enterprise*, Technology Perspectives, Northridge, CA

Prahalad, C. & Ramaswamy, V. (2004), *The Future of Competition*, HBS Press, Boston

Welch, J. (2005) *Winning*, Harper Collins, New York

3. SOFTWARE AND HARDWARE REQUIREMENTS

3.1 Essential

- Laptop computer for each candidate (5 to be supplied by Cordatus)
- Minitab software version 13 or higher, or appropriate software application (5 Minitab will be supplied by Cordatus)

- Calculator (to be supplied by participant)

3.2 Recommended (if using Minitab)

- Brook, Q S (2006 – 2nd Edition) *Lean Six Sigma and Minitab*, Minitab (supplied by Cordatus if client is using Minitab)

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 project prioritisation exercises
- capable of realising €250,000 or greater operating profit increase for the plant
- cross functional in composition, and
- must address a current process or system failure.

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 champion in advance of BB training.

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.

In training, it is preferable that each BB selects a different type of project. This will ensure greater benefit to the group, and the organisation.

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 e.g. 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.

5. THE PROJECT CHAMPION

Each BB candidate must have the support and understanding of a champion (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
- recommending the BB for certification.

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

6. PROJECT MENTORING AND STAGE GATE REVIEWS

6.1 The Role of the Mentor

Each BB is assigned a mentor at the commencement of the BB training programme. The role of the mentor is to:

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

6.2 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 champion, 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. PROGRAMME STRUCTURE AND CONTENT

7.1 Summary BB Programme Structure

- **Formal workshops:** 20 days, in blocks of 2 or 3 days over six months. Total workshop contact hours = 160 hours (assumes no preparatory green belt training).
- **Project work:** One project will typically take between 4 to 6 months elapsed time to complete. Typically 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 (www.asq.org) and the International Quality Federation (www.igfnet.org). The lean examination is a 2 hour written examination developed and administered by Cordatus Consulting.
- **Certification:** a lean 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 lean and six sigma examinations.

7.2 Six Sigma Examinations

IQF Examination (see <http://www.igfnet.org/IQF/blackbeltBOK.htm>). The examination can be taken at the client site at any time by arrangement with IQF.

ASQ: Summary Body of Knowledge & Exam Questions (see <http://www.asq.org/certification/six-sigma/index.html>). The ASQ exam can be taken two times per year in Ireland at the Cork Institute of Technology, Rossa Avenue, Bishopstown, Cork Tel: 021-4326100

8. CERTIFICATION GUIDELINES

ITEM	CERTIFICATION STANDARD
Workshops attended	
Projects completed	
Addition to operating profit	
Projects mentored	
Lean examination	
Six sigma examination	
Review board	

9. CRITICAL SUCCESS FACTORS

- Expectation setting in the organisation
- Candidate selection/full time position
- Project selection
- Training standards/formal certification
- Champion preparation & engagement
- Organisation investment/key career move
- Project success/publicity and cross deployment
- Reward & recognition/retention strategy

APPENDIX: 20-day Black Belt Programme Summary

DMAIC	Purpose	Activities	Topics
Introduction	To introduce lean six sigma concepts & provide a frame of reference for the black belt training	Black belt candidate orientation	Introduction to lean six sigma Lean six sigma history Lean six sigma and your organisation Lean six sigma structures Lean six sigma qualifications Body of knowledge Programme management Competitiveness, Customer Satisfaction
Define	To clarify the goal of the project for the team & to ensure benefit to the organisation & the customer	Select project Secure sponsor Select team leader Set the project goal Complete project charter Get project approval Select team Train team	Project charter/A3 The problem statement & project goal Team leadership Team member selection & role Project planning: Gantt chart Meeting management Project practical example Costing project savings SIPOC chart Business process map Change management Rolled through put yield & DPMO Communication & negotiation skills Surveys Quality Function Deployment EFQM
Measure	To identify and select a measurement appropriate to the problem	Select measurement (existing/new) Identify required data Collect data Convert data into information Establish the measurement	Measurement selection Data representation - introduction Data collection forms Variable & attribute data Simple graphing techniques Histogram Descriptive statistics

DMAIC	Purpose	Activities	Topics
Measure (cont'd)			Central Limit Theorem Measurement system analysis Attribute gauge repeatability & reproducibility Variable gauge repeatability & reproducibility Destructive tests Sampling Probability Probability distributions Nominal Group Technique Force Field Analysis Affinity Diagram
Analyse	To provide insight into the reasons for the problem	Review measurement information Propose reasons for problems Validate reasons for problems Prioritise problems Select problems to address	Cause and Effect analysis (fishbone) The 5 Why's Brainstorming & affinity mapping Process Capability Z tables and sigma levels Hypothesis testing type 1 and type 2 error Confidence intervals variable data Confidence intervals attribute data F test t Test Chi Square test Simple Linear Regression Scatter diagram, correlation Multiple regression One way/two way ANOVA Multi Vari charts Boot strapping FMEA Variance components

DMAIC	Purpose	Activities	Topics
Improve	To identify the actions required to bring the process closer to meeting customer requirements & to reduce process variation	Review conclusions from Analysis phase Develop improvement ideas & prioritise Implement improvement ideas Monitor progress Repeat above steps as often as required	Poka Yoke, 5S, SMED, TPM Designed experiments Blocking and randomising experiments 2 level screening experiments Taguchi Experiments Response Surface Methods EVOP Fold over experiments Mixture designs Boot strapping The lean supply chain
Control	To provide candidates with an understanding of the importance of implementing robust solutions to problems	Graphed & displayed measurements taken Train relevant personnel Take corrective action if deviations occur/revert to Improve phase Prove robust solution	Statistical process control Run chart Variable control charts Attribute control charts Advanced control charts Theory of Constraints Six sigma story board Control plan Reliability testing Pass Fail functional testing Kaizen Certification criteria Lean six sigma programme progress in the organisation Practical project examples
Clinics	Mid and post- training clinics to troubleshoot project issues, air views, and share experiences		
BB Exam	Lean and six sigma BB examinations to be taken on completion of training & black belt project		

Table 1: Black belt 20-day programme details