

Book of knowledge black belt training course

1-Introduction

lean office	
1. Introduction	
1.1.What's The Quality	
1.2.Six sigma	
1.2.1. What is six sigma?	
1.2.2. Six Sigma Evolution?	
1.2.3. Six Sigma Saving	
1.2.4. Six sigma terms	
1.2.5. Six Sigma and defect	
1.2.6. Six Sigma Goal	
1.2.7. Six Sigma Belt	
1.2.8. Different Six Sigma Methodology	
1.2.9. When to Use Six Sigma	
1.2.10. Six Sigma DMAIC Methodology	
1.3. Lean Management	
1.3.1. What is Lean?	
1.3.2. Lean Benefit	
1.3.3. Lean History	
1.3.4. Lean Management Model	
1.3.5. When to Use Lean	
1.4. Lean Six Sigma	
1.4.1. Why Lean Six Sigma	
1.4.2. Development that led to lean six sigma Methodology	
1.4.3. Lean Six Sigma Definition	
1.4.4. Lean Six Sigma Statistical Focus	
1.4.5. Lean Six Sigma Integration	
1.4.6. When to Use Six Sigma or lean	
1.4.7. Lean Six Sigma Combination Power	
2. Lean Principle	
2.1. Lean Matrix	
2.2. Lean implementation steps	
2.3. Lean Methodology	
2.4. Lean Case Study	
2.5. Lean thinking System	
2.6.The Lean Challenge	
2.7.Basic Component of lean	
3. Lean Culture	
3.1. Leadership	
3.2.Communication	
3.3.Empowerment	
3.4.Team Work	
4. Lean Planning	



Arab Academy of Science, Technology & Maritime Transport

INSPIRE Professional & Quality Institute
Egypt- Cairo
Heliopolis & Smart village

5. Lean Concept	
6. Lean Seven Waste.	
6.1.MUDA, MURA, MURI	
6.2.Over Production	
6.3.Waiting	
6.4.Conveyance	
6.5.Inventory	
6.6.Motion	
6.7.Correction	
6.8.Over Processing	
6.9.People Utilization	
7. Lean and Work Cycle	
8. Lean Tools	
9. Lean Tool Diagram	
10. 5s	
11. Visual Management	
12. Standardize Work	
13. Cellular Layout & Spaghetti Diagram	
Bookmark not defined.	
14. Poka Yoke	
15. Mini-tab training	
15.1 Mini-tab windows	
15.1.1 Example	
15.2. Menu structure	
15.2.1 Example	
15.3. Graph types & purpose	
15.3.1 Example	
16. Statistics	
16.1 course objective	
16.2 Quality management	
16.3 What is statistics?	
16.4 the nature of probability and statistics	
16.4.1 descriptive and inferential statistics	
16.4.2 variables and types of data	
16.4.3 data collection and sampling techniques	
16.5 frequency distribution and graphs	
16.5.1 organizing data	
16.5.1.1 categorical frequency distributions	
16.5.1.2 grouped frequency distributions	
16.5.2 histograms, frequency polygons, and ogives	
16.5.3 other types of graphs	
16.5.3.1 bar graphs	
16.5.3.2 pareto charts	
16.5.3.3 the time series graph	
16.5.3.4 the pie graphs	
16.6 data description	
16.6.1 measures of central tendency	

عربي
Arab A



Productivity & Quality Institute

Egypt- Cairo

Heliopolis & Smart village

INS

16.6.1.1 the mean	
16.6.1.2 the median	
16.6.1.3 the mode	
16.6.1.4 the midrange	
16.6.1.5 the weighted mean	
16.6.2 measures of variation	
16.6.2.1 range	
16.6.2.2 population variance and standard deviation	
16.6.2.3 sample variation and standard deviation	
16.6.2.4 variance and standard deviation for grouped data	
16.6.2.5 coefficient of variation	
16.6.3 measures of position	
16.6.4 exploratory data analysis	
16.6.4.1 the five - number summary and boxplots	
16.7 probability and counting rules	
16.7.1 sample spaces and probability	
16.7.2 the addition rules for probability	
16.7.3 the multiplication rules and conditional probability	
16.7.4 counting rules	
16.7.5 probability and counting rules	
16.8 discrete probability distribution	
16.8.1 probability distributions	
16.8.2 mean, variance, standard deviation, and expectation	
16.8.3 the binomial distribution	
16.8.4 other types of distribution	
16.9 the normal distribution	
16.9.1 normal distribution	
16.9.2 application of the normal distribution	
16.9.3 the central limit theorem	
16.9.4 the normal approximation to the binomial distribution	

2-Main course

1.0 Define Phase

1.1 The Basics of Six Sigma

- 1.1.1 Meanings of Six Sigma
- 1.1.2 General History of Six Sigma & Continuous Improvement
- 1.1.3 Deliverables of a Lean Six Sigma Project
- 1.1.4 The Problem Solving Strategy $Y = f(x)$
- 1.1.5 Voice of the Customer, Business and Employee
- 1.1.6 Six Sigma Roles & Responsibilities

1.2 The Fundamentals of Six Sigma

- 1.2.1 Defining a Process
- 1.2.2 Critical to Quality Characteristics (CTQ's)
- 1.2.3 Cost of Poor Quality (COPQ)
- 1.2.4 Pareto Analysis (80:20 rule)
- 1.2.5 Basic Six Sigma Metrics
 - a. including DPU, DPMO, FTY, RTY Cycle Time; deriving these



metrics

1.3 Selecting Lean Six Sigma Projects

1.3.1 Building a Business Case & Project Charter

1.3.2 Developing Project Metrics

1.3.3 Financial Evaluation & Benefits Capture

1.4 The Lean Enterprise

1.4.1 Understanding Lean

1.4.2 The History of Lean

1.4.3 Lean & Six Sigma

1.4.4 The Seven Elements of Waste

a. Overproduction, Correction, Inventory, Motion, Over processing, Conveyance, Waiting.

1.4.5 5S

a. Straighten, Shine, Standardize, Self-Discipline, Sort

2.0 Measure Phase

2.1 Process Definition

2.1.1 Cause & Effect / Fishbone Diagrams

2.1.2 Process Mapping, SIPOC, Value Stream Map

2.1.3 X-Y Diagram

2.1.4 Failure Modes & Effects Analysis (FMEA)

2.2 Six Sigma Statistics

2.2.1 Basic Statistics

2.2.2 Descriptive Statistics

2.2.3 Normal Distributions & Normality

2.2.4 Graphical Analysis

2.3 Measurement System Analysis

2.3.1 Precision & Accuracy

2.3.2 Bias, Linearity & Stability

2.3.3 Gage Repeatability & Reproducibility

2.3.4 Variable & Attribute MSA

2.4 Process Capability

2.4.1 Capability Analysis

2.4.2 Concept of Stability

2.4.3 Attribute & Discrete Capability

2.4.4 Monitoring Techniques

3.0 Analyze Phase

3.1 Patterns of Variation

3.1.1 Multi-Vari Analysis

3.1.2 Classes of Distributions

3.2 Inferential Statistics

3.2.1 Understanding Inference

3.2.2 Sampling Techniques & Uses

3.2.3 Central Limit Theorem

3.3 Hypothesis Testing

3.3.1 General Concepts & Goals of Hypothesis Testing

3.3.2 Significance; Practical vs. Statistical

الأكاديمية العربية للعلوم والتكنولوجيا
Arab Academy for Science and Technology
الجامعة العربية للعلوم والتكنولوجيا



P &
INSTITUTE

Productivity & Quality Institute
Egypt- Cairo
Helwan & Smart village

3.3.3 Risk; Alpha & Beta

3.3.4 Types of Hypothesis Test

3.4 Hypothesis Testing with Normal Data

3.4.1 1 & 2 sample t-tests

3.4.2 1 sample variance

3.4.3 One Way ANOVA

a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

3.5 Hypothesis Testing with Non-Normal Data

3.5.1 Mann-Whitney

3.5.2 Kruskal-Wallis

3.5.3 Mood's Median

3.5.4 Friedman

3.5.5 1 Sample Sign

3.5.6 1 Sample Wilcoxon

3.5.7 One and Two Sample Proportion

3.5.8 Chi-Squared (Contingency Tables)

a. Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.

4.0 Improve Phase

4.1 Simple Linear Regression

4.1.1 Correlation

4.1.2 Regression Equations

4.1.3 Residuals Analysis

4.2 Multiple Regression Analysis

4.2.1 Non- Linear Regression

4.2.2 Multiple Linear Regression

4.2.3 Confidence & Prediction Intervals

4.2.4 Residuals Analysis

4.2.5 Data Transformation, Box Cox

4.3 Designed Experiments

4.3.1 Experiment Objectives

4.3.2 Experimental Methods

4.3.3 Experiment Design Considerations

4.4 Full Factorial Experiments

4.4.1 2k Full Factorial Designs

4.4.2 Linear & Quadratic Mathematical Models

4.4.3 Balanced & Orthogonal Designs

4.4.4 Fit, Diagnose Model and Center Points

4.5 Fractional Factorial Experiments

4.5.1 Designs

4.5.2 Confounding Effects

4.5.3 Experimental Resolution

5.0 Control Phase

5.1 Lean Controls

5.1.1 Control Methods for 5S

5.1.2 Kanban

5.1.3 Poka-Yoke (Mistake Proofing)

5.2 Statistical Process Control (SPC)

5.2.1 Data Collection for SPC

5.2.2 I-MR Chart

5.2.3 Xbar-R Chart

5.2.4 U Chart

5.2.5 P Chart

5.2.6 NP Chart

5.2.7 X-S chart

5.2.8 CumSum Chart

5.2.9 EWMA Chart

5.2.10 Control Methods

5.2.11 Control Chart Anatomy

5.2.12 Subgroups, Impact of Variation, Frequency of Sampling

5.2.13 Center Line & Control Limit Calculations

5.3 Six Sigma Control Plans

5.3.1 Cost Benefit Analysis

5.3.2 Elements of the Control Plan

5.3.3 Elements of the Response Plan

Arab Academy for Science, Technology & Maritime Transport



P & Q
INSTITUTE

Productivity & Quality Institute

Egypt- Cairo

Heliopolis & Smart village