BLACK BELT

Six Sigma & Lean Six Sigma

A Practical Training eBook

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About This eBook

This eBook consolidates the completed Black Belt programme into one continuous learning resource. It preserves the nine-section, thirty-three-lesson structure and the terminology, tools, application examples and case studies specified in the Black Belt programme source.

The lesson material is organized into a consistent learning format for study, instructor-led delivery and future MemberPress implementation. The content is a compilation and structured presentation of the supplied Black Belt programme material; it does not introduce additional Black Belt subjects beyond that source.

Programme Structure

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- Lesson 32 — Control & Documentation
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Section 1 — Problem Identification & Project Selection

Section 1 contains 3 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 1 — Operational Excellence

Learning Objectives

- Explain Operational Excellence as an organization-wide continuous-improvement philosophy.
- Describe how Lean, Six Sigma and quality management contribute to performance.
- Recognize the role of efficiency, customer satisfaction and long-term competitiveness.
- Identify performance measures and improvement frameworks associated with Operational Excellence.

1. Introduction

Operational Excellence is a philosophy of continuous improvement that integrates Lean, Six Sigma, and quality management to achieve sustainable performance across the organization. It focuses on efficiency, customer satisfaction, and long-term competitiveness. |

2. Concept / Theory

Operational Excellence is a philosophy of continuous improvement that integrates Lean, Six Sigma, and quality management to achieve sustainable performance across the organization. It focuses on efficiency, customer satisfaction, and long-term competitiveness. |

3. Key Topics

- Balanced Scorecard
- KPI dashboards
- benchmarking
- Lean Six Sigma frameworks. |

4. Tools / Methodology

Balanced Scorecard, KPI dashboards, benchmarking, Lean Six Sigma frameworks. |

5. Worked Example / Case Study

Application Example: A manufacturing firm tracks KPIs like defect rate, cycle time, and customer complaints to identify improvement opportunities. |

Case Study: A telecom company applied Operational Excellence principles to reduce customer churn. By combining Lean waste elimination with Six Sigma defect reduction, they streamlined billing processes and improved customer satisfaction, cutting churn by 15% in one year.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Operational Excellence is a philosophy of continuous improvement that integrates Lean, Six Sigma, and quality management to achieve sustainable performance across the organization. It focuses on efficiency, customer satisfaction, and long-term competitiveness. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 2 — Roles & Responsibilities Across Belt Levels

Learning Objectives

- Distinguish the responsibilities of Yellow, Green, Black and Master Black Belts.
- Explain the Black Belt role in cross-functional improvement projects.
- Use role-clarification tools such as RACI and organizational charts.
- Recognize why clear responsibilities support coordination and avoid duplication.

1. Introduction

Six Sigma uses a structured hierarchy of belts to define expertise and responsibilities: o Yellow Belt: Awareness, data collection. o Green Belt: Leads departmental projects. o Black Belt: Leads cross-functional projects, applies advanced tools. o Master Black Belt: Strategic guidance, training, governance. |

2. Concept / Theory

Six Sigma uses a structured hierarchy of belts to define expertise and responsibilities: o Yellow Belt: Awareness, data collection. o Green Belt: Leads departmental projects. o Black Belt: Leads cross-functional projects, applies advanced tools. o Master Black Belt: Strategic guidance, training, governance. |

3. Key Topics

- RACI matrix (Responsible
- Accountable
- Consulted
- Informed)
- organizational charts. |

4. Tools / Methodology

RACI matrix (Responsible, Accountable, Consulted, Informed), organizational charts. |

5. Worked Example / Case Study

Application Example: In a hospital, Green Belts mapped patient flow, Black Belts analyzed data, and Master Black Belts aligned projects with strategic goals. |

Case Study: A global bank structured its Six Sigma program with clear belt roles. Green Belts reduced loan approval times, Black Belts improved fraud detection processes, and Master Black Belts ensured alignment with corporate risk strategy. This clarity accelerated project success and avoided duplication.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Six Sigma uses a structured hierarchy of belts to define expertise and responsibilities: o Yellow Belt: Awareness, data collection. o Green Belt: Leads departmental projects. o Black Belt: Leads cross-functional projects, applies advanced tools. o Master Black Belt: Strategic guidance, training, governance. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 3 — Project Charter

Learning Objectives

- Explain the purpose of a Six Sigma Project Charter.
- Describe business case, problem, goal, scope, timeline and team elements.
- Use measurable goals and clear boundaries to maintain project focus.
- Recognize the Charter as a living reference for stakeholders.

1. Introduction

The project charter is a formal document that defines scope, objectives, roles, timelines, and expected benefits. It prevents scope creep and ensures stakeholder alignment. |

2. Concept / Theory

The project charter is a formal document that defines scope, objectives, roles, timelines, and expected benefits. It prevents scope creep and ensures stakeholder alignment. |

3. Key Topics

- Charter template
- SMART goals
- stakeholder analysis. |

4. Tools / Methodology

Charter template, SMART goals, stakeholder analysis. |

5. Worked Example / Case Study

Application Example: A logistics company created a charter to reduce late deliveries, defining scope (delivery process), goal (reduce delays by 30%), and roles (supervisor, analyst, driver). |

Case Study: A packaging plant faced high defect rates. The charter outlined scope = packaging line, goal = reduce defects by 25%, timeline = 6 months, roles = operators, engineers, quality team. With this clarity, the project stayed focused and achieved a 28% defect reduction, saving $200K annually.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

The project charter is a formal document that defines scope, objectives, roles, timelines, and expected benefits. It prevents scope creep and ensures stakeholder alignment. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 2 — Data Collection & Process Gap

Section 2 contains 4 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 4 — Descriptive Statistics & Graphical Analysis

Learning Objectives

- Explain mean, median, mode and standard deviation as descriptive measures.
- Use histograms, box plots and scatter plots to visualize data.
- Select a graphical tool according to the question being investigated.
- Interpret descriptive and graphical output before further analysis.

1. Introduction

Descriptive statistics summarize data (mean, median, mode, standard deviation) and graphical tools (histograms, box plots, scatter plots) visualize patterns. |

2. Concept / Theory

Descriptive statistics summarize data (mean, median, mode, standard deviation) and graphical tools (histograms, box plots, scatter plots) visualize patterns. |

3. Key Topics

- Minitab
- Excel
- histograms
- box plots
- scatter diagrams. |

4. Tools / Methodology

Minitab, Excel, histograms, box plots, scatter diagrams. |

5. Worked Example / Case Study

Application Example: A factory tracks defect counts per day and uses a histogram to see distribution. |

Case Study: A packaging plant used box plots to compare defect rates across shifts. The analysis revealed higher variation in the night shift, leading to targeted training and a 20% defect reduction.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Descriptive statistics summarize data (mean, median, mode, standard deviation) and graphical tools (histograms, box plots, scatter plots) visualize patterns. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 5 — Probability & Distribution Analysis

Learning Objectives

- Explain how probability represents uncertainty in process outcomes.
- Distinguish normal, binomial and Poisson distributions by general application.
- Explain probability plots, goodness-of-fit tests and normality tests.
- Relate distribution analysis to practical process decisions.

1. Introduction

Probability models uncertainty; distributions (normal, binomial, Poisson) describe data behavior. Understanding distributions helps predict outcomes and set process limits. |

2. Concept / Theory

Probability models uncertainty; distributions (normal, binomial, Poisson) describe data behavior. Understanding distributions helps predict outcomes and set process limits. |

3. Key Topics

- Probability plots
- goodness-of-fit tests
- normality tests. |

4. Tools / Methodology

Probability plots, goodness-of-fit tests, normality tests. |

5. Worked Example / Case Study

Application Example: A call center models customer arrivals with a Poisson distribution to plan staffing. |

Case Study: A hospital emergency department analyzed patient arrivals. Probability distribution analysis showed arrivals followed a Poisson pattern, enabling better nurse scheduling and reducing patient wait times by 15%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Probability models uncertainty; distributions (normal, binomial, Poisson) describe data behavior. Understanding distributions helps predict outcomes and set process limits. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 6 — Process Mapping & Gap Identification

Learning Objectives

- Explain how process mapping visualizes workflow.
- Use flowcharts, swimlanes and SIPOC to understand processes.
- Define a process gap as a difference between current and desired conditions.
- Use mapping and gap identification as a starting point for further investigation.

1. Introduction

Process mapping visualizes workflows; gap identification compares current vs. desired performance to highlight inefficiencies. |

2. Concept / Theory

Process mapping visualizes workflows; gap identification compares current vs. desired performance to highlight inefficiencies. |

3. Key Topics

- Flowcharts
- swimlane diagrams
- SIPOC
- gap analysis charts. |

4. Tools / Methodology

Flowcharts, swimlane diagrams, SIPOC, gap analysis charts. |

5. Worked Example / Case Study

Application Example: A bank maps loan approval steps and identifies delays in document verification. |

Case Study: A university mapped student registration. Gap analysis showed a 40% delay at the payment stage. By digitizing payments, registration time dropped from 5 days to 2 days.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Process mapping visualizes workflows; gap identification compares current vs. desired performance to highlight inefficiencies. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 7 — Data Collection & Sampling

Learning Objectives

- Explain why systematic data collection is important.
- Explain how sampling can provide information without measuring an entire population.
- Distinguish random, stratified and systematic sampling.
- Recognize the importance of reducing sampling bias.

1. Introduction

Data collection must be systematic; sampling ensures representative data without measuring the entire population. Bias reduction is critical. |

2. Concept / Theory

Data collection must be systematic; sampling ensures representative data without measuring the entire population. Bias reduction is critical. |

3. Key Topics

- Random sampling
- stratified sampling
- systematic sampling
- check sheets. |

4. Tools / Methodology

Random sampling, stratified sampling, systematic sampling, check sheets. |

5. Worked Example / Case Study

Application Example: A survey uses stratified sampling to capture customer feedback across regions. |

Case Study: A retail chain wanted to measure customer satisfaction. Instead of surveying only urban stores, they used stratified sampling across urban and rural outlets. This revealed rural customers had longer wait times, leading to staffing adjustments and improved satisfaction scores.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Data collection must be systematic; sampling ensures representative data without measuring the entire population. Bias reduction is critical. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 3 — Measurement System Analysis

Section 3 contains 2 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 8 — Gage R&R — Repeatability & Reproducibility

Learning Objectives

- Explain repeatability and reproducibility.
- Describe how Gage R&R evaluates measurement-system variation.
- Recognize the role of Gage R&R studies, ANOVA and Minitab.
- Use measurement-system findings to support confidence in process data.

1. Introduction

Gage R&R (Gage Repeatability and Reproducibility) evaluates how much variation in measurements comes from the measurement system itself. Repeatability is variation when the same operator measures the same item multiple times; Reproducibility is variation when different operators measure the same item. |

2. Concept / Theory

Gage R&R (Gage Repeatability and Reproducibility) evaluates how much variation in measurements comes from the measurement system itself. Repeatability is variation when the same operator measures the same item multiple times; Reproducibility is variation when different operators measure the same item. |

3. Key Topics

- Gage R&R studies
- ANOVA method
- Minitab software. |

4. Tools / Methodology

Gage R&R studies, ANOVA method, Minitab software. |

5. Worked Example / Case Study

Application Example: A factory tests whether inspectors consistently measure product dimensions. |

Case Study: An automotive plant found high variation in diameter measurements. Gage R&R revealed reproducibility issues — different inspectors used slightly different techniques. After retraining inspectors and standardizing tools, measurement variation dropped by 40%, improving confidence in quality data.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Gage R&R (Gage Repeatability and Reproducibility) evaluates how much variation in measurements comes from the measurement system itself. Repeatability is variation when the same operator measures the same item multiple times; Reproducibility is variation when different operators measure the same item. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 9 — Attribute Measurement System Analysis — Kappa & AAA

Learning Objectives

- Explain Attribute Measurement System Analysis.
- Describe Kappa as agreement beyond chance.
- Explain Attribute Agreement Analysis (AAA).
- Recognize the importance of consistent categorical inspection decisions.

1. Introduction

Attribute MSA evaluates consistency in categorical judgments (e.g., pass/fail, defect/no defect). Kappa statistic measures agreement beyond chance; Attribute Agreement Analysis (AAA) checks consistency among appraisers and against a standard. |

2. Concept / Theory

Attribute MSA evaluates consistency in categorical judgments (e.g., pass/fail, defect/no defect). Kappa statistic measures agreement beyond chance; Attribute Agreement Analysis (AAA) checks consistency among appraisers and against a standard. |

3. Key Topics

- Kappa coefficient
- AAA in Minitab
- cross-tabulation. |

4. Tools / Methodology

Kappa coefficient, AAA in Minitab, cross-tabulation. |

5. Worked Example / Case Study

Application Example: Inspectors classify products as “defective” or “non-defective.” AAA checks if they agree with each other and with the standard. |

Case Study: In a food processing plant, three inspectors rated product quality. AAA showed only 70% agreement, with one inspector consistently stricter. After calibration training and clear defect criteria, agreement rose to 95%, ensuring reliable inspection outcomes.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Attribute MSA evaluates consistency in categorical judgments (e.g., pass/fail, defect/no defect). Kappa statistic measures agreement beyond chance; Attribute Agreement Analysis (AAA) checks consistency among appraisers and against a standard. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 4 — Statistical Analysis

Section 4 contains 3 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 10 — Hypothesis Test Selection

Learning Objectives

- Explain the purpose of hypothesis testing.
- Recognize how data type, sample size and distribution influence test selection.
- Distinguish t-tests, chi-square, ANOVA and non-parametric tests at a high level.
- Interpret statistical significance in the context of a process question.

1. Introduction

Hypothesis testing determines whether observed differences are statistically significant. Choosing the right test depends on data type (continuous vs. categorical), sample size, and distribution. |

2. Concept / Theory

Hypothesis testing determines whether observed differences are statistically significant. Choosing the right test depends on data type (continuous vs. categorical), sample size, and distribution. |

3. Key Topics

- t-test
- chi-square test
- ANOVA
- non-parametric tests. |

4. Tools / Methodology

t-test, chi-square test, ANOVA, non-parametric tests. |

5. Worked Example / Case Study

Application Example: A company compares defect rates between two shifts using a two-sample t-test. |

Case Study: A textile mill suspected higher defect rates in the night shift. Hypothesis testing confirmed the difference was statistically significant. Management introduced additional supervision and reduced night-shift defects by 15%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Hypothesis testing determines whether observed differences are statistically significant. Choosing the right test depends on data type (continuous vs. categorical), sample size, and distribution. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 11 — ANOVA & Analysis of Variance

Learning Objectives

- Explain the purpose of ANOVA.

- Recognize how ANOVA compares means across multiple groups.
- Distinguish one-way and two-way ANOVA.
- Use ANOVA to investigate sources of variation.

1. Introduction

ANOVA compares means across multiple groups to see if differences are statistically significant. It helps identify variation sources. |

2. Concept / Theory

ANOVA compares means across multiple groups to see if differences are statistically significant. It helps identify variation sources. |

3. Key Topics

- One-way ANOVA (single factor)
- Two-way ANOVA (two factors)
- Minitab/Excel. |

4. Tools / Methodology

One-way ANOVA (single factor), Two-way ANOVA (two factors), Minitab/Excel. |

5. Worked Example / Case Study

Application Example: Comparing yields across three production lines. |

Case Study: A pharmaceutical company tested three different tablet presses. ANOVA revealed one press consistently produced lower yields. Maintenance and recalibration improved performance, raising overall yield by 8%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

ANOVA compares means across multiple groups to see if differences are statistically significant. It helps identify variation sources. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 12 — Correlation & Regression Analysis

Learning Objectives

- Explain correlation as a measure of relationship strength.
- Explain regression as a method for relating an outcome to independent variables.
- Recognize scatter plots, correlation coefficients, regression equations and residual plots.
- Use relationship analysis to support process investigation.

1. Introduction

Correlation measures strength of relationship between variables; regression predicts outcomes based on independent variables. |

2. Concept / Theory

Correlation measures strength of relationship between variables; regression predicts outcomes based on independent variables. |

3. Key Topics

- Scatter plots
- correlation coefficients (r)
- regression equations
- residual plots. |

4. Tools / Methodology

Scatter plots, correlation coefficients (r), regression equations, residual plots. |

5. Worked Example / Case Study

Application Example: Regression shows temperature strongly affects defect rate in molding. |

Case Study: An injection molding plant analyzed defect rates vs. machine temperature. Regression revealed a strong correlation (r = 0.85). By controlling temperature within optimal range, defects dropped by 25%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Correlation measures strength of relationship between variables; regression predicts outcomes based on independent variables. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 5 — Root Cause Analysis & Improvement

Section 5 contains 5 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 13 — Root Cause Analysis

Learning Objectives

- Distinguish underlying causes from symptoms.
- Use Fishbone, 5 Whys and Pareto analysis for root-cause investigation.
- Structure an investigation around evidence rather than assumptions.
- Connect root-cause findings to improvement actions.

1. Introduction

Identifies the underlying reasons for problems rather than symptoms. |

2. Concept / Theory

Identifies the underlying reasons for problems rather than symptoms. |

3. Key Topics

- Fishbone (Ishikawa) diagram
- 5 Whys
- Pareto analysis. |

4. Tools / Methodology

Fishbone (Ishikawa) diagram, 5 Whys, Pareto analysis. |

5. Worked Example / Case Study

Application Example: A factory investigates frequent machine breakdowns. |

Case Study: In a textile plant, repeated loom stoppages were traced using 5 Whys. Root cause: lack of preventive maintenance schedule. Implementing routine checks reduced stoppages by 30%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Identifies the underlying reasons for problems rather than symptoms. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 14 — FMEA & Risk Analysis

Learning Objectives

- Explain the purpose of Failure Modes and Effects Analysis.
- Identify failure modes, effects and risks.
- Explain the RPN concept as Severity × Occurrence × Detection.
- Use FMEA findings to prioritize risk-reduction actions.

1. Introduction

Failure Modes and Effects Analysis (FMEA) systematically evaluates potential failures, their effects, and prioritizes risks using Risk Priority Numbers (RPN). |

2. Concept / Theory

Failure Modes and Effects Analysis (FMEA) systematically evaluates potential failures, their effects, and prioritizes risks using Risk Priority Numbers (RPN). |

3. Key Topics

- FMEA worksheet
- RPN scoring (Severity × Occurrence × Detection). |

4. Tools / Methodology

FMEA worksheet, RPN scoring (Severity × Occurrence × Detection). |

5. Worked Example / Case Study

Application Example: A medical device company assesses risks in product assembly. |

Case Study: In an automotive plant, FMEA revealed high RPN for brake component misassembly. Adding poka-yoke fixtures reduced risk, improving safety compliance.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Failure Modes and Effects Analysis (FMEA) systematically evaluates potential failures, their effects, and prioritizes risks using Risk Priority Numbers (RPN). |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 15 — Six Thinking Hats

Learning Objectives

- Explain the six-perspective brainstorming framework.
- Distinguish White, Red, Black, Yellow, Green and Blue Hat perspectives.
- Use structured perspectives when evaluating improvement solutions.
- Balance facts, risks, benefits, creativity and process.

1. Introduction

A structured brainstorming method using six perspectives (facts, emotions, caution, optimism, creativity, process). |

2. Concept / Theory

A structured brainstorming method using six perspectives (facts, emotions, caution, optimism, creativity, process). |

3. Key Topics

- Six Hats framework (White
- Red
- Black

- Yellow
- Green
- Blue). |

4. Tools / Methodology

Six Hats framework (White, Red, Black, Yellow, Green, Blue). |

5. Worked Example / Case Study

Application Example: A team evaluates solutions for reducing delivery delays. |

Case Study: A logistics company used Six Thinking Hats to brainstorm. The “Black Hat” identified risks in outsourcing, while the “Green Hat” suggested route optimization software. Balanced perspectives led to a sustainable solution.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

A structured brainstorming method using six perspectives (facts, emotions, caution, optimism, creativity, process). |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 16 — Pilot Implementation

Learning Objectives

- Explain why improvements may be tested on a limited scale.
- Describe the purpose of a pilot plan and feedback loop.
- Use control charts or other monitoring to evaluate pilot performance.
- Assess effectiveness and feasibility before wider rollout.

1. Introduction

Testing solutions on a small scale before full rollout to validate effectiveness and feasibility. |

2. Concept / Theory

Testing solutions on a small scale before full rollout to validate effectiveness and feasibility. |

3. Key Topics

- Pilot plan
- control charts
- feedback loops. |

4. Tools / Methodology

Pilot plan, control charts, feedback loops. |

5. Worked Example / Case Study

Application Example: A bank pilots digital loan approval in one branch before scaling. |

Case Study: A hospital piloted electronic prescription systems in one department. Errors dropped by 40%. After success, the system was rolled out hospital-wide.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Testing solutions on a small scale before full rollout to validate effectiveness and feasibility. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 17 — Poka-Yoke & Error Prevention

Learning Objectives

- Explain the purpose of mistake-proofing.
- Distinguish prevention from immediate error detection.
- Recognize checklists, design modifications and sensors as Poka-Yoke tools.
- Connect error prevention to process design and risk reduction.

1. Introduction

Mistake-proofing techniques that prevent errors before they occur. |

2. Concept / Theory

Mistake-proofing techniques that prevent errors before they occur. |

3. Key Topics

- Checklists
- design modifications
- sensors. |

4. Tools / Methodology

Checklists, design modifications, sensors. |

5. Worked Example / Case Study

Application Example: USB plugs designed to fit only one way. |

Case Study: In a food packaging plant, a sensor ensured labels were applied only when the package was correctly oriented. This eliminated 95% of labeling errors.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Mistake-proofing techniques that prevent errors before they occur. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 6 — Design of Experiments

Section 6 contains 4 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 18 — DOE Fundamentals & Strategy

Learning Objectives

- Explain DOE as a structured experimental strategy.
- Define objective, factor, level and response.
- Recognize factorial design and randomized runs.
- Relate experimental strategy to process outcomes.

1. Introduction

DOE is a structured approach to planning experiments that systematically studies the effects of multiple factors on a process outcome. Strategy involves defining objectives, selecting factors, levels, and responses. |

2. Concept / Theory

DOE is a structured approach to planning experiments that systematically studies the effects of multiple factors on a process outcome. Strategy involves defining objectives, selecting factors, levels, and responses. |

3. Key Topics

- Factorial design
- randomized runs
- Minitab DOE module. |

4. Tools / Methodology

Factorial design, randomized runs, Minitab DOE module. |

5. Worked Example / Case Study

Application Example: A chemical plant tests how temperature and pressure affect yield. |

Case Study: A food company wanted to optimize cookie texture. DOE tested oven temperature, baking time, and ingredient ratios. Results showed temperature had the strongest effect. Adjusting settings improved consistency and reduced customer complaints.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

DOE is a structured approach to planning experiments that systematically studies the effects of multiple factors on a process outcome. Strategy involves defining objectives, selecting factors, levels, and responses. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 19 — Factorial Experiments

Learning Objectives

- Explain how factorial designs study multiple factors simultaneously.
- Distinguish main effects from interactions.

- Recognize full and fractional factorial designs.
- Use interaction plots to understand factor relationships.

1. Introduction

Factorial designs study multiple factors simultaneously, revealing main effects and interactions. |

2. Concept / Theory

Factorial designs study multiple factors simultaneously, revealing main effects and interactions. |

3. Key Topics

- Full factorial (all combinations)
- fractional factorial (subset)
- interaction plots. |

4. Tools / Methodology

Full factorial (all combinations), fractional factorial (subset), interaction plots. |

5. Worked Example / Case Study

Application Example: A paint manufacturer tests pigment type and drying time. |

Case Study: An automotive plant studied two factors: welding speed and electrode type. A 2×2 factorial experiment revealed an interaction — faster speed worked only with a specific electrode. Optimizing both reduced weld defects by 30%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Factorial designs study multiple factors simultaneously, revealing main effects and interactions. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 20 — DOE Analysis & Optimization

Learning Objectives

- Explain the purpose of analysis after DOE runs are completed.
- Recognize ANOVA, regression models and response surface methodology.
- Identify significant factors and useful operating conditions.
- Explain optimization as finding factor settings for desired outcomes.

1. Introduction

After running experiments, statistical analysis identifies significant factors and optimal settings. Optimization finds the best combination for desired outcomes. |

2. Concept / Theory

After running experiments, statistical analysis identifies significant factors and optimal settings. Optimization finds the best combination for desired outcomes. |

3. Key Topics

- ANOVA for DOE
- regression models
- response surface methodology (RSM). |

4. Tools / Methodology

ANOVA for DOE, regression models, response surface methodology (RSM). |

5. Worked Example / Case Study

Application Example: A pharmaceutical company optimizes tablet hardness and dissolution rate. |

Case Study: A plastics manufacturer used DOE to analyze molding temperature, pressure, and cooling time. Regression analysis identified optimal settings that reduced warping defects by 25% and improved throughput.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

After running experiments, statistical analysis identifies significant factors and optimal settings. Optimization finds the best combination for desired outcomes. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 21 — Confirmation Experiment

Learning Objectives

- Explain the purpose of a confirmation experiment.
- Validate predicted improvement under selected settings.
- Recognize replication runs, control charts and hypothesis testing as supporting tools.
- Use confirmation results before full implementation.

1. Introduction

After identifying optimal settings, a confirmation experiment validates that predicted improvements occur in practice. |

2. Concept / Theory

After identifying optimal settings, a confirmation experiment validates that predicted improvements occur in practice. |

3. Key Topics

- Replication runs
- control charts
- hypothesis testing. |

4. Tools / Methodology

Replication runs, control charts, hypothesis testing. |

5. Worked Example / Case Study

Application Example: A bakery tests optimal oven temperature and baking time identified in DOE. |

Case Study: A beverage company optimized carbonation pressure and fill volume. A confirmation experiment validated that defects dropped from 5% to 1%. This proved DOE results were reliable and ready for full implementation.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

After identifying optimal settings, a confirmation experiment validates that predicted improvements occur in practice. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 7 — Lean Tools for Improvement

Section 7 contains 4 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 22 — Value Stream Mapping & Flow Improvement

Learning Objectives

- Explain how Value Stream Mapping visualizes material and information flow.
- Identify waste, delays, handoffs and bottlenecks in a value stream.
- Recognize lead time and process cycle efficiency as improvement measures.
- Use VSM findings to identify flow-improvement opportunities.

1. Introduction

Value Stream Mapping (VSM) visualizes the flow of materials and information through a process, highlighting waste and opportunities for improvement. |

2. Concept / Theory

Value Stream Mapping (VSM) visualizes the flow of materials and information through a process, highlighting waste and opportunities for improvement. |

3. Key Topics

- VSM diagrams
- lead time charts
- process cycle efficiency. |

4. Tools / Methodology

VSM diagrams, lead time charts, process cycle efficiency. |

5. Worked Example / Case Study

Application Example: A bank maps loan approval steps to identify bottlenecks. |

Case Study: A manufacturing company mapped its order fulfillment process. VSM revealed delays in approval and excessive handoffs. Streamlining approvals reduced lead time by 25% and improved customer satisfaction.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Value Stream Mapping (VSM) visualizes the flow of materials and information through a process, highlighting waste and opportunities for improvement. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 23 — Lean Waste Elimination

Learning Objectives

- Identify the eight Lean wastes.
- Use waste walks and Kaizen events to identify improvement opportunities.

- Apply 5 Whys to explore causes of waste.
- Connect waste elimination with process performance.

1. Introduction

Lean focuses on eliminating the 8 wastes (defects, overproduction, waiting, non-utilized talent, transportation, inventory, motion, extra processing). |

2. Concept / Theory

Lean focuses on eliminating the 8 wastes (defects, overproduction, waiting, non-utilized talent, transportation, inventory, motion, extra processing). |

3. Key Topics

- Waste walk
- Kaizen events
- 5 Whys for waste. |

4. Tools / Methodology

Waste walk, Kaizen events, 5 Whys for waste. |

5. Worked Example / Case Study

Application Example: A warehouse reorganizes layout to reduce motion waste. |

Case Study: A hospital conducted a waste walk in its pharmacy. They found excess inventory of medicines and long waiting times. By implementing just-in-time ordering, inventory costs dropped 20% and patient wait times improved.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Lean focuses on eliminating the 8 wastes (defects, overproduction, waiting, non-utilized talent, transportation, inventory, motion, extra processing). |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 24 — 5S, Kanban & Process Flow

Learning Objectives

- Explain the five 5S elements.
- Explain Kanban as a visual scheduling and workflow-control system.
- Recognize the relationship between workplace organization and process flow.
- Use 5S audits, Kanban boards and process-flow diagrams.

1. Introduction

o 5S: Sort, Set in order, Shine, Standardize, Sustain. o Kanban: Visual scheduling system to control workflow. o Process Flow: Streamlined sequence of tasks to reduce delays. |

2. Concept / Theory

o 5S: Sort, Set in order, Shine, Standardize, Sustain. o Kanban: Visual scheduling system to control workflow. o Process Flow: Streamlined sequence of tasks to reduce delays. |

3. Key Topics

- 5S audits
- Kanban boards
- process flow diagrams. |

4. Tools / Methodology

5S audits, Kanban boards, process flow diagrams. |

5. Worked Example / Case Study

Application Example: A factory uses Kanban cards to manage inventory replenishment. |

Case Study: An IT support team applied 5S to organize workstations and introduced a Kanban board for ticket management. Response times improved by 30% and backlog reduced significantly.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

o 5S: Sort, Set in order, Shine, Standardize, Sustain. o Kanban: Visual scheduling system to control workflow. o Process Flow: Streamlined sequence of tasks to reduce delays. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 25 — Lean Six Sigma Improvement Strategy

Learning Objectives

- Explain how Lean and Six Sigma can be combined for holistic improvement.
- Recognize DMAIC, Kaizen, VSM and control charts as complementary tools.
- Apply Lean to waste and flow while using Six Sigma to address defects and variation.
- Relate integrated improvement to measurable operational and financial outcomes.

1. Introduction

Combines Lean’s waste elimination with Six Sigma’s defect reduction for holistic improvement. |

2. Concept / Theory

Combines Lean’s waste elimination with Six Sigma’s defect reduction for holistic improvement. |

3. Key Topics

- DMAIC + Lean tools
- Kaizen
- VSM
- control charts. |

4. Tools / Methodology

DMAIC + Lean tools, Kaizen, VSM, control charts. |

5. Worked Example / Case Study

Application Example: A logistics company integrates Lean and Six Sigma to reduce delivery delays. |

Case Study: A food processing plant applied Lean Six Sigma to packaging. Lean eliminated motion waste, while Six Sigma reduced labeling defects. Together, they achieved a 35% improvement in efficiency and $500K annual savings.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Combines Lean’s waste elimination with Six Sigma’s defect reduction for holistic improvement. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 8 — Control & Sustenance

Section 8 contains 4 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 26 — Advanced Control Charts

Learning Objectives

- Explain the purpose of advanced control charts.
- Describe CUSUM and EWMA at a high level.
- Recognize Hotelling's T^2 as a multivariate monitoring technique.
- Understand how advanced charts can detect subtle process changes.

1. Introduction

Advanced control charts monitor process stability beyond basic X-bar or p-charts. They include CUSUM (Cumulative Sum), EWMA (Exponentially Weighted Moving Average), and multivariate charts. |

2. Concept / Theory

Advanced control charts monitor process stability beyond basic X-bar or p-charts. They include CUSUM (Cumulative Sum), EWMA (Exponentially Weighted Moving Average), and multivariate charts. |

3. Key Topics

- CUSUM chart
- EWMA chart
- Hotelling's T^2 chart. |

4. Tools / Methodology

CUSUM chart, EWMA chart, Hotelling's T^2 chart. |

5. Worked Example / Case Study

Application Example: A semiconductor plant uses EWMA charts to detect small shifts in wafer thickness. |

Case Study: A pharmaceutical company applied CUSUM charts to monitor tablet weight. The chart detected subtle drifts earlier than traditional X-bar charts, enabling corrective action before defects escalated.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Advanced control charts monitor process stability beyond basic X-bar or p-charts. They include CUSUM (Cumulative Sum), EWMA (Exponentially Weighted Moving Average), and multivariate charts. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 27 — Process Control & Stability

Learning Objectives

- Explain process stability and consistency over time.
- Recognize control charts, Cp, Cpk and SPC as control tools.

- Distinguish process monitoring from one-time improvement.
- Use stability information to support sustained performance.

1. Introduction

Ensures processes remain consistent over time by monitoring variation and addressing instability. |

2. Concept / Theory

Ensures processes remain consistent over time by monitoring variation and addressing instability. |

3. Key Topics

- Control charts
- process capability indices (Cp
- Cpk)
- SPC (Statistical Process Control). |

4. Tools / Methodology

Control charts, process capability indices (Cp, Cpk), SPC (Statistical Process Control). |

5. Worked Example / Case Study

Application Example: A beverage company monitors fill volume stability. |

Case Study: A bottling plant tracked fill levels with SPC. Analysis showed instability due to worn valves. Replacing valves restored stability, reducing customer complaints by 40%.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Ensures processes remain consistent over time by monitoring variation and addressing instability. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 28 — CAPA — Corrective & Preventive Action

Learning Objectives

- Explain corrective and preventive action.
- Distinguish correction of an existing problem from prevention of recurrence.
- Recognize CAPA forms, root cause analysis and risk assessment.
- Understand the role of CAPA in sustaining compliant processes.

1. Introduction

CAPA systems address root causes of problems (corrective) and prevent recurrence (preventive). Widely used in regulated industries. |

2. Concept / Theory

CAPA systems address root causes of problems (corrective) and prevent recurrence (preventive). Widely used in regulated industries. |

3. Key Topics

- CAPA forms
- root cause analysis
- risk assessment. |

4. Tools / Methodology

CAPA forms, root cause analysis, risk assessment. |

5. Worked Example / Case Study

Application Example: A medical device firm documents corrective actions for product defects. |

Case Study: A pharmaceutical lab faced recurring calibration errors. CAPA identified root cause (inadequate SOPs). Corrective action updated procedures; preventive action added quarterly audits. Compliance improved and audit findings dropped to zero.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

CAPA systems address root causes of problems (corrective) and prevent recurrence (preventive). Widely used in regulated industries. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 29 — Control Plans & Sustaining Improvements

Learning Objectives

- Explain the purpose of a Control Plan.
- Identify monitoring methods, responsibilities and corrective actions.
- Recognize SOPs and audit checklists as sustaining tools.
- Use control planning to maintain improvements over time.

1. Introduction

Control plans document how improvements will be maintained, including monitoring methods, responsibilities, and corrective actions. |

2. Concept / Theory

Control plans document how improvements will be maintained, including monitoring methods, responsibilities, and corrective actions. |

3. Key Topics

- Control plan templates
- SOPs
- audit checklists. |

4. Tools / Methodology

Control plan templates, SOPs, audit checklists. |

5. Worked Example / Case Study

Application Example: A factory creates a control plan for packaging line improvements. |

Case Study: An electronics manufacturer reduced soldering defects. A control plan documented inspection frequency, operator training, and corrective steps. Sustaining improvements kept defect rates below 1% for over a year.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Control plans document how improvements will be maintained, including monitoring methods, responsibilities, and corrective actions. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Section 9 — Black Belt Project Completion

Section 9 contains 4 lesson(s). The lessons cover the Black Belt topics specified in the programme.

Lesson 30 — Financial Impact & Project Benefits

Learning Objectives

- Explain why Six Sigma projects should demonstrate measurable financial or strategic benefits.
- Recognize cost savings, revenue growth and efficiency gains as possible benefit categories.
- Use cost–benefit analysis and ROI calculations at a project level.
- Connect project results to organizational value.

1. Introduction

Every Six Sigma project must demonstrate measurable financial or strategic benefits, such as cost savings, revenue growth, or efficiency gains. |

2. Concept / Theory

Every Six Sigma project must demonstrate measurable financial or strategic benefits, such as cost savings, revenue growth, or efficiency gains. |

3. Key Topics

- Cost–benefit analysis
- ROI calculation
- financial impact templates. |

4. Tools / Methodology

Cost–benefit analysis, ROI calculation, financial impact templates. |

5. Worked Example / Case Study

Application Example: A factory calculates savings from reduced scrap and rework. |

Case Study: A packaging company reduced defects by 25%. Financial analysis showed $200K annual savings in materials and labor. This validated the project’s contribution to profitability.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Every Six Sigma project must demonstrate measurable financial or strategic benefits, such as cost savings, revenue growth, or efficiency gains. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 31 — Change Management & Stakeholder Management

Learning Objectives

- Explain why stakeholder engagement supports adoption and sustainment.
- Recognize resistance, communication and organizational culture as change considerations.

- Use stakeholder analysis and communication plans.
- Describe the role of Kotter’s 8-Step Change Model as identified in the programme.

1. Introduction

Ensures improvements are accepted and sustained by managing resistance, engaging stakeholders, and aligning with organizational culture. |

2. Concept / Theory

Ensures improvements are accepted and sustained by managing resistance, engaging stakeholders, and aligning with organizational culture. |

3. Key Topics

- Kotter’s 8-Step Change Model
- stakeholder analysis
- communication plans. |

4. Tools / Methodology

Kotter’s 8-Step Change Model, stakeholder analysis, communication plans. |

5. Worked Example / Case Study

Application Example: A hospital introduces electronic medical records with staff training and communication. |

Case Study: A bank implemented digital loan processing. Initial resistance from staff was overcome using Kotter’s model — creating urgency, building coalitions, and celebrating wins. Adoption reached 95% within 6 months.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Ensures improvements are accepted and sustained by managing resistance, engaging stakeholders, and aligning with organizational culture. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 32 — Control & Documentation

Learning Objectives

- Explain why project results and lessons learned should be documented.
- Recognize control plans, SOPs and closure reports as documentation tools.
- Support transparency and repeatability through clear records.
- Use documentation to help transfer sustained improvements.

1. Introduction

Documenting project results, lessons learned, and control mechanisms ensures transparency and repeatability. |

2. Concept / Theory

Documenting project results, lessons learned, and control mechanisms ensures transparency and repeatability. |

3. Key Topics

- Control plans
- SOPs
- project closure reports. |

4. Tools / Methodology

Control plans, SOPs, project closure reports. |

5. Worked Example / Case Study

Application Example: A factory documents improved inspection processes in SOPs. |

Case Study: An electronics firm reduced soldering defects. Documentation included updated SOPs, training manuals, and control charts. This ensured improvements were sustained and transferable to other lines.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Documenting project results, lessons learned, and control mechanisms ensures transparency and repeatability. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Lesson 33 — Closure, Handover & Celebration

Learning Objectives

- Explain the purpose of formal project closure.
- Describe handover of ownership to process owners.
- Recognize closure checklists and handover plans.
- Explain the role of recognition and celebration in project completion.

1. Introduction

Formal closure includes handing over ownership to process owners, celebrating success, and recognizing contributions. |

2. Concept / Theory

Formal closure includes handing over ownership to process owners, celebrating success, and recognizing contributions. |

3. Key Topics

- Closure checklist
- handover plan
- recognition events. |

4. Tools / Methodology

Closure checklist, handover plan, recognition events. |

5. Worked Example / Case Study

Application Example: A logistics company hands over improved delivery process to operations team. |

Case Study: A pharmaceutical project reduced batch failures. At closure, the team handed over control plans to production managers and held a recognition event. Celebrating success boosted morale and encouraged future participation in Six Sigma projects. Six Sigma Belt Progression Matrix Level Focus Areas Tools Introduced Application Example Case Study Highlight Yellow Belt (14 topics) Awareness of Six Sigma, basic problem definition, simple data tools SIPOC, basic flowcharts, Pareto, check sheets, simple descriptive statistics Identifying defects in a packaging line Call center reduced dropped calls using SIPOC + Pareto Green Belt (27 topics) Practitioner level: DMAIC framework, project selection, data collection, root cause tools, Lean basics Histograms, sampling methods, Fishbone, 5 Whys, hypothesis testing, regression, ANOVA, 5S, Leading departmental projects with measurable outcomes Hospital Green Belts mapped patient flow, reduced waiting times by 20% Level Focus Areas Tools Introduced Application Example Case Study Highlight VSM, control charts Black Belt (33 topics) Advanced leader level: DOE, advanced statistics, risk analysis, Lean Six Sigma integration, control & sustenance, project closure DOE (factorial, RSM), advanced control charts (CUSUM, EWMA), FMEA, Six Thinking Hats, CAPA, financial impact analysis Leading cross-functional projects, optimizing processes, sustaining improvements Automotive plant used DOE to optimize welding speed & electrode type, reducing defects by 30% Key Progression Insights | Yellow Belt → Foundation: Awareness, simple tools, small improvements. | Green Belt → Application: Structured DMAIC projects, statistical basics, Lean integration. | Black Belt → Leadership: Advanced analytics, DOE, risk management, financial impact, change management.

6. Practical Application

Apply the lesson to a relevant Black Belt improvement situation by using the tools identified in the programme, documenting the evidence or output, and relating the result to the process or project objective.

7. Lesson Summary

Formal closure includes handing over ownership to process owners, celebrating success, and recognizing contributions. |

8. Lessons Learnt / Conclusion

The Black Belt should use the lesson as part of a structured improvement approach, selecting the appropriate tool for the process question and connecting analysis, action and sustained results.

Black Belt Quick Reference

DMAIC

Define → Measure → Analyse → Improve → Control

Belt progression

Yellow Belt: awareness/data collection; Green Belt: departmental projects; Black Belt: cross-functional projects and advanced tools; Master Black Belt: strategic guidance, training and governance.

Core statistical analysis

Descriptive statistics → Probability/distributions → Hypothesis testing → ANOVA → Correlation & Regression

Measurement systems

Gage R&R → Attribute MSA → Kappa / AAA

Root cause & improvement

Fishbone → 5 Whys → Pareto → FMEA → Six Thinking Hats → Pilot → Poka-Yoke

DOE

Objective → Factors → Levels → Responses → Experimental design → Analysis → Optimization → Confirmation

Lean improvement

VSM → Waste elimination → 5S → Kanban → Lean Six Sigma integration

Control & sustenance

Advanced control charts → Process stability → CAPA → Control Plans

Project completion

Financial impact → Change & stakeholders → Documentation → Closure/Handover/Recognition

Assessment Companion

The Black Belt programme is supported by a separate 100-question final assessment prepared for the 33-lesson curriculum. The assessment should be treated as a companion assessment resource rather than inserted into the lesson text.