

IEE Master Black Belt Curriculum Content

Enterprise DMAIC (extension of standard DMAIC tools)

- Defining the business purpose and metrics
- Measuring high level business performance
- Analyzing the high level business performance
- Identification of optimal improvement efforts
- Implementing controls to maintain business performance

Understanding the Enterprise

- Corporate finance and accounting
 - Hard and soft benefits
 - Cash flow
 - Time value of money
 - Financial statements and various financial metrics
- Organizational Issues
 - Mentoring
 - Coaching
 - Navigating the organization
- Understanding the process improvement organizational options
- Instructional Techniques
 - Characteristics of adult learners
 - Preparing to teach
 - Learning barriers and motivation
 - Four elements of learning
- Learning cycle and learning types

Advanced Leadership Topics

- Managing change/leading change efforts
 - Breakthrough Communication, Problem Solving and Change Management using Psychological Type Preferences (provided by Licensed Psychologist)
- Advocacy: Selling your ideas (provided by University of Texas professor)
 - Building partnerships and networking
 - Overcoming resistance
 - Persuasion and influence

Project Define

- Improved project definition statements
- Working with business leadership on project selection
- Planning the project schedule and participation

Project Measure

- Identifying primary metric performance (predictability and capability)
 - Control charting of business level metrics (high level outputs of continuous and attribute data)
 - Distribution analysis and transformations of data
 - Capability assessments (continuous and attribute)
 - Subgrouping concepts for better analysis and understanding
- Probability theory
 - Bayes Theorem
 - Understanding dependent probabilities

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- Data collection and sampling methods
- Measurement System Analysis
 - Attribute gauge analysis
 - Decision system analysis
 - Continuous gauge analysis
 - Calibration vs. MSA issues
 - Data validation and verification
- Theory of Constraints analysis
- Wisdom of the Organization
 - Process mapping
 - Brainstorming
 - Force Field Diagrams
 - Analytic Hierarchy Process (AHP)
 - Why-Why Diagrams (fault tree diagrams)
 - Nominal voting methods
 - Prioritization matrixes (Cause and Effect Matrix)
 - Failure Modes and Effects Analysis (FMEA)
- Lean assessment tools
 - Value Stream Map
 - Spaghetti Diagrams
 - Combination work charts
 - Work Flow Analysis
 - Physical flow maps
 - Transaction flow analysis
 - 5S
 - General Lean concepts
 - Value added/ Non-value added analysis
 - Time Value mapping
 - Logic flow diagrams
 - Takt time analysis
 - Batch size analysis
- Advanced Control Charting Tools
 - CUSUM chart
 - Zone charts
 - EWMA
 - Three way control chart

Project Analyze Phase

- Basic Statistics (t, z, F.... testing)
- Non-Parametric Testing
- Extensive Minitab charting techniques for insight into performance data
- Simple regression overview
- Multiple regression
- Simple one way Analysis of Variance (ANOVA) for comparing multiple groups
- Multiple factor ANOVA
- Analysis with mixed continuous and discrete terms (Regression and ANOVA methods)

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- Variance Components Analysis (Nested ANOVA)
- General Linear Models (GLM)
- Distribution analysis
- Bootstrapping
- Logistic regression (attribute or pass/fail response)
- Non-statistical (six sigma) methods to provide evidence of significance

Project Improve Phase

- Tolerance Design testing
- Parameter Design testing
- Factorial and fractional factorial Design of Experiments (DOE)
- DOE for variation reduction
- DOE for data collection (as part of analyze effort)
- DOE for pass fail data and other data types
- Solution selection methods
- Lean improvement methods
 - Kaizen improvement events
 - 5S improvements
 - Future Value Stream Mapping
 - Visual controls
 - Cellular flow
 - Process flow improvement (pull, supermarkets, pace maker management)
 - Theory of Constraints improvements
 - Batch size improvement validation
 - Kanban implementation
 - Heijunka Box methods
 - Flow leveling (balancing)
 - Constraint analysis
- Improvement plan development
- TRIZ method for innovation
- Reliability analysis
 - Repairable systems
 - Non-Repairable Systems
 - Generic method to deal with missing data.
- Total Productive Maintenance (TPM) issues
- Pre-Control Charts
- Response Surface Methods (RSM)
 - RSM designs
 - Evolutionary operations (EVOP) steepest ascent
- Process mean optimization exercise (based on complex simulation)
- Process variation reduction exercise (based on complex simulation)