IEE Lean Six Sigma Graduate Workshop 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

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
- 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

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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)
- 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

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  - 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

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