



**Process FMEA/FMECA and SPC
Techniques for Process Yield Enhancement**

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2 Course Syllabus

1. *Introduction & Background*

- 1.1. Key Yield Metrics
- 1.2. Yield Improvement Strategy Over Process Life Cycle
- 1.3. Proactive and Reactive Actions Choice
 - 1.3.1. Process FMEA/FMECA
 - 1.3.2. SPC
 - 1.3.3. Control Plans
- 1.4. PPAP Requirements and Submissions

2. *FMEA/FMECA*

- 2.1. Process FMEA/FMECA: Objectives, Types and Approaches
 - 2.1.1. Overview of Failure Mode and Effects Analysis (FMEA)
 - 2.1.2. Definition, Purposes, and Benefits of FMEA
- 2.2. Types of FMEA and definitions
 - 2.2.1. Design FMEA
 - 2.2.2. Process FMEA
 - 2.2.3. FMECA
- 2.3. FMEA in the Development Cycle, and its relationship to Integrated Product Development (IPD), DFM/A, and Other Quality Methods and Tools (FTA, DOE, SPC)
- 2.4. The Role of Design FMEAs in the Product Development Cycle
- 2.5. Pre-Process FMEA Activity - Process Mapping
 - 2.5.1. General Procedure of Mapping
 - 2.5.2. Multilevel Mapping
 - 2.5.3. Mapping Techniques
 - 2.5.4. Map Analysis
- 2.6. FMEA/FMECA Strategy & Key Concepts
 - 2.6.1. Severity, Occurrence, Detectability and Their Ranking Procedures
 - 2.6.2. Risk Priority Number (RPN) Calculation
 - 2.6.3. Criticality Matrix
- 2.7. Analysis of FMEA/FMECA Results Using RPN, SD (Severity & Detectability) and OD (Occurrence & Detectability) Values
 - 2.7.1. Scree Plots
 - 2.7.2. Histogram Analysis
 - 2.7.3. Two-Dimensional Matrices
- 2.8. Software Supporting FMEA and Corporate Knowledge Base
 - 2.8.1. Methodology and Tools
 - 2.8.2. Knowledge Base Libraries
 - 2.8.3. User Procedures

2.9. Class Exercise on Constructing a Design FMEA

3. *SPC*

3.1. Data Collection & Processing

3.1.1. Development of Optimal Data Collection Plan

3.1.2. Review of Data Problems at Different Process Stages and Troubleshooting Techniques

3.2. Measurement & Inspection Systems Analysis

3.2.1. R&R (Repeatability and Reproducibility) Study

3.2.2. Defect Budgeting for Inspection Evaluation & Optimization

3.3. Charting Techniques

3.3.1. Control Charts for Variables (Setting and Analysis)

3.3.2. Control Charts for Attributes (Setting and Analysis)

3.4. Process Characterization and Analysis

3.4.1. Capability and Performance Study (C_p ; P_p ; C_{pk} ; P_{pk})

3.4.2. Process Efficiency Evaluation

3.5. Computerized Class Exercises Using JMP 4

3.5.1. JMP Basics

3.5.2. Data Treatment and Analysis

3.5.3. R&R Study

3.5.4. Control Charts Setting and Analysis

3.5.5. Process Characterization

A group exercise will be held at the end of major topic. (a specific TRICO “real life” exercise can be used, assuming sufficient time for preparation).

3 Course Organization