Diagnostic Analytics Using Statistical Process Control

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Module 0. About the Course (8 min)

Module 1. Introduction to SPC (38 min)
- *Basic Definitions*
  - Preliminary Definition of SPC
  - Process
  - Statistical Methods
  - Control
- *Understanding Variation*
  - Sources of Process Variation
  - Causes of Process Variation
  - Case Study Example
  - Impact of Variation on Process Performance
  - Predictability of Process Variation
- *SPC and Quality Management*
  - Process Variation and Quality
  - DMAIC Quality Management Lifecycle
  - History of SPC
  - Updated Definition of SPC
  - SPC Capabilities

Module 2. Control Charts (56 min)
- *Basic Statistics*
  - Descriptive Statistics
  - Probability Concepts
  - Normal Distribution
  - Process Signature
  - Populations and Samples
  - Applications to Process Variation
- *Control Chart Fundamentals*
  - Fundamentals Concepts
  - Process Change Example
  - Detecting Process Change
  - Alarm Conditions
  - Control Chart Rules
  - Control Chart Components
  - Examples of Non-Random Behaviour
- *Types of Control Charts*
  - Types of Process Measurements
  - Control Charts for Variables
  - Control Charts for Attributes
  - Discrete and Continuous Statistical Properties
  - Variable Xbar Chart
  - Variable s Chart
  - Attribute p Chart
  - Attribute np Chart
  - Attribute c Chart
  - Attribute u Chart
- *Control Chart Design Considerations*

Module 3. SPC Applications (66 min)

- *Application Areas of SPC*
- *Role of SPC in Process Management*
    - Process Definition and Purpose
    - General Process Components
    - Information Management Process Components
    - Business Activity Process Components
    - Management Process Components
    - Process Performance
    - Management and Control
    - Measurement and Monitoring
    - Insight from Analytics
    - Process Management Framework
- *Operations Improvement Example*
    - Context and Description
    - Control Chart Design
    - Control Chart Implementation
    - Process Monitoring and Improvement
- *Real Time Process Monitoring Example*
    - Context and Description
    - Control Chart Design
    - Control Chart Implementation
    - Process Monitoring and Improvement
- *Master Data Interface Monitoring Example*
    - Context and Description
    - Control Chart Design
    - Control Chart Implementation
    - Process Monitoring and Improvement
- *Data Quality Monitoring Example*
    - Context and Description
    - Control Chart Design
    - Control Chart Implementation
    - Process Monitoring and Improvement
- *Business Performance Monitoring Example*
    - Context and Description
    - Control Chart Design
    - Control Chart Implementation
    - Process Monitoring and Improvement

Module 4. Beyond the Basics (65 min)

- *Improving Control Chart Performance*
    - Performance Criteria
    - Limitations of the Shewhart Chart
    - Needs and Challenges
    - Average Run Length
    - Detecting Smaller Process Changes
    - Monitoring Correlated Data
- Analyzing Process Capability
    - Quick SPC Review

- o Positioning within DMAIC Framework
- o Process Performance Review
- o Process Performance Criteria
- o Process Capability
- o Key Assumptions
- o Process Capability Ratio
- o Process Capability Ratio Values
- o Implications for an Off-Center Process
- o Precision and Accuracy
- o Off-Center Process
- o Off-Center Process with a Target
- o Process Capability Ratios Summary
- o Interpreting Process Capability Ratio
- o Capability Analysis Example
- *A Final Word*