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MAINTENANCE AND ENGINEERING | ME-009

Power Factor Correction and Harmonics

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Course content

Why Attend

Poor power factor and excessive harmonic distortion reduce electrical system efficiency, increase operating costs, shorten equipment life, and negatively impact power quality. This course equips participants with the knowledge and practical skills to analyze power quality issues, implement effective power factor correction solutions, mitigate harmonics, and optimize electrical system performance in industrial and commercial facilities.

Course Methodology

The course combines instructor-led presentations, engineering calculations, practical workshops, case studies, equipment demonstrations, power quality analysis exercises, and real-world industrial applications.

Course Objectives

By the end of this course, participants will be able to:

- Understand the principles of power factor and harmonic distortion
- Evaluate the impact of poor power quality on electrical systems
- Apply effective power factor correction techniques
- Measure, analyze, and interpret harmonic data
- Design and implement harmonic mitigation solutions
- Improve electrical system efficiency, reliability, and energy performance
- Prepare electrical systems for modern smart grid and renewable energy integration

Target Audience

- Electrical engineers
- Electrical maintenance engineers and technicians

Course content

Target Audience

- Power system engineers
- Energy managers
- Plant and facility engineers
- Operations and maintenance supervisors
- Industrial automation professionals

Target Competencies

- Power quality analysis
- Power factor correction
- Harmonic analysis
- Electrical system optimization
- Energy efficiency
- Power quality monitoring
- Electrical troubleshooting
- Industrial power systems

Course outline

Day 1: Fundamentals of Power Quality, Power Factor, and Harmonics

- Understanding the principles of power factor and its impact on electrical system performance
- Evaluating the causes and consequences of low power factor in industrial facilities
- Understanding harmonic distortion and its effects on electrical equipment and networks
- Identifying common harmonic-producing loads and nonlinear devices
- Reviewing international standards, regulations, and power quality requirements

Course content

Course outline

• Assessing the relationship between power quality, equipment reliability, and energy efficiency

Day 2: Power Factor Correction Techniques and Applications

• Understanding reactive power and compensation principles

• Evaluating various power factor correction methods for industrial applications

• Selecting and applying capacitor banks for reactive power compensation

• Understanding synchronous condensers and other dynamic compensation technologies

• Optimizing power factor correction systems for different operating conditions

• Performing technical and economic evaluations of power factor improvement projects

• Practical workshop: Designing a power factor correction solution

Day 3: Harmonic Measurement and System Analysis

• Identifying major sources of harmonic distortion in electrical installations

• Applying power quality analyzers and monitoring equipment for harmonic measurements

• Measuring voltage distortion, current distortion, and Total Harmonic Distortion (THD)

• Interpreting harmonic measurement results and identifying system vulnerabilities

• Evaluating the impact of harmonics on transformers, motors, cables, and sensitive equipment

• Practical exercise: Conducting harmonic assessments and interpreting field measurements

Day 4: Harmonic Mitigation and System Improvement

• Understanding passive, active, and hybrid harmonic filtering technologies

• Selecting appropriate harmonic mitigation solutions for different applications

• Designing harmonic filtering systems to improve power quality

• Integrating harmonic mitigation strategies into complex industrial power systems

• Evaluating system performance following harmonic reduction measures

Course content

Course outline

• Practical case studies: Solving harmonic-related operational problems

Day 5: Future Power Quality Technologies and Strategic Planning

• Understanding the impact of renewable energy systems and distributed generation on power quality

• Evaluating smart grid technologies and intelligent power quality management systems

• Reviewing emerging technologies in harmonic suppression and reactive power compensation

• Developing long-term strategies for maintaining power quality and system reliability

• Practical workshop: Developing a comprehensive power quality improvement plan

• Course review, lessons learned, implementation roadmap, and final Q&A

Seminar dates

Available seminar dates

Live dates and pricing for Power Factor Correction and Harmonics generated from the course details page.

Date	Location	Format	Fee
11 - 15 January 2027	Munich - Germany	Classroom	**€3,400.-**
8 - 12 February 2027	Geneva - Switzerland	Classroom	**€4,200.-**
8 - 12 March 2027	Barcelona - Spain	Classroom	**€3,080.-**
12 - 16 April 2027	Amsterdam - Netherlands	Classroom	**€3,400.-**
10 - 14 May 2027	London - U.K	Classroom	**€3,360.-**
14 - 18 June 2027	Munich - Germany	Classroom	**€3,400.-**
12 - 16 July 2027	Kuala lumpur - Malaysia	Classroom	**€1,800.-**
9 - 13 August 2027	Amsterdam - Netherlands	Classroom	**€3,880.-**
13 - 17 September 2027	London - U.K	Classroom	**€3,360.-**
11 - 15 October 2027	Munich - Germany	Classroom	**€3,400.-**
8 - 12 November 2027	Geneva - Switzerland	Classroom	**€4,200.-**
13 - 17 December 2027	Barcelona - Spain	Classroom	**€3,080.-**

Live online option	Online delivery is available at €1,850.-.