



Content
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Power Quality and Harmonics - Problems and Solutions

Course details: <https://www.electricityforum.com/electrical-training/pq-harmonics-training>

Power Quality and Harmonics Training - Our 6-hour live online instructor led course explains harmonic distortion and its various causes, identifies problems associated with harmonics and practical limits for harmonic distortion. The course teaches students the methods necessary to identify, reduce and to avoid power quality harmonics problems and how to predict estimated levels of harmonic distortion.

Several real-life examples are worked as a group to demonstrate the techniques used to perform basic harmonic analysis, evaluate alternative equipment and to quantify the expected results.

Upon completion of this course, students should have a meaningful understanding of harmonic voltage and current distortion, the impact that harmonics can have on electric power systems, the typical causes, simple methods to analyze harmonic distortion and methods to minimize harmonics.

This course is applicable to electrical industry professionals serving either industrial or commercial environments. For maximum benefit of this course, participants should have an understanding of basic electrical principles such as Ohms law, power, electrical metering,

motors, and general electrical equipment and systems and a working knowledge of basic algebra.

Harmonic currents flow in a circuit at multiples of the fundamental 60 hertz (Hz) frequency. For example, current flowing in a circuit at 180 Hz is the third harmonic (60 Hz multiplied by 3). Such currents are not directly indicated on multimeters and are usually not found until unusual control and equipment problems begin to surface. Comparing the current readings from an average-responding meter to that of a good quality true-rms meter on the same circuit will help indicate harmonic issues. The average-responding meter will indicate only the 60 hertz current and the True RMS meter will indicate a combination of 60 hertz and harmonic currents. The production and reflection of these harmonic currents back into the electrical distribution system can cause problems.

Power Quality and Harmonics Training course will teach professional technicians and engineers how to isolate harmonic problems at their source and mitigate their effects by either replacing the offending item or installing harmonic filters.

Related Courses

[Power Quality Analysis Training](#)

[Power Quality Troubleshooting and Problem Solving](#)

[Power Quality in Motor Control Applications](#)

[Power Factor Correction Training](#)

[Power Quality Considerations for Energy Efficiency Retrofits](#)

WHO SHOULD ATTEND

- Industrial, Commercial, Institutional Electrical Engineers, And Electrical Maintenance

Personnel

- Consulting Electrical Engineers
- Project Engineers
- Design Engineers
- Field Technicians
- Electrical Technicians
- Plant Operators
- Plant Engineers
- Electrical Supervisors
- Managers In Charge Of Plant Electrical Infrastructure

STUDENTS RECEIVE

- This Course Includes Our Latest Power Quality And Grounding Handbook!! (Value \$20)
- **\$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- 0.6 Continuing Education Unit (CEU) Credits (6 Professional Development Hours)
- **FREE** Magazine Subscription (Value \$25.00)
- Course Materials In PDF Format

COURSE OUTLINE

Power Quality and Harmonics Training Course Outline

Introduction

- Reference materials
- What is harmonic distortion?
- Linear and non-linear loads

- Voltage and current distortion
- Harmonic spectrum
- Total Harmonic Distortion

Causes of Harmonic Current Distortion

- End-user equipment
- AC to DC power conversion equipment
- Block diagram for VFD or UPS
- Types of Rectifiers
- The sequence of harmonics by rectifier type
- 6-pulse rectifiers
- Typical 6-pulse rectifier harmonics
- Effect of source impedance on 6-pulse rectifier current distortion
- 12-pulse rectifiers
- 18-pulse rectifiers

Problems caused by harmonics

- Wasted energy, increased current & kVA
- Equipment failure, Increased operating temperatures
- Effects of harmonics on transformers
- Effects of harmonics on capacitors
- Fuse blowing, C.B. tripping
- Communications equipment interference
- Harmonic resonance (series & parallel)
- Harmonic voltage distortion
- Harmonic voltage distortion analysis
- SCR voltage notching
- The remedy for SCR voltage notching

IEEE Std 519 – Limits for Harmonic distortion

- Voltage distortion limits
- Current distortion limits
- IEEE 519 definitions
- Applying IEEE Std. 519
- Voltage notching limits
- Telephone interference

Remedies for harmonic distortion

- Passive, multi-pulse and active filter techniques
- Line reactors
- Predicting harmonic currents for 6-pulse rectifiers
- Harmonic cancellation transformers
- Tuned harmonic filters
- General rules for tuned filters
- Wideband hybrid harmonic filters
- Multi-pulse rectifiers and harmonics
- Active harmonic filters
- VFD with active front end

Harmonics for single phase equipment

- Typical 1-phase non-linear loads
- 1-phase rectifiers
- Current waveforms
- Typical harmonics and distortion
- Unique problems with 3rd harmonic
- Typical 1-phase remedies for harmonics

Wrap-up

- Symptoms of harmonics
- What to do if you suspect a harmonics problem
- Avoiding harmonics problems

COURSE SCHEDULE:

Start: 10 a.m. Eastern Time

Finish: 4:30 p.m. Eastern Time

Contact us Today for a FREE quotation to deliver this course at your company's location.

<https://www.electricityforum.com/onsite-training-rfq>