



## MidAmerican Energy POWER QUALITY WORKSHOPS

We understand that power quality and electric reliability are critical to the productivity and success of your business. Our one-day Power Quality Workshops, each at a different location, are free of charge and are intended to present you with practical information and methods for reducing downtime and preventing equipment problems.

A MidAmerican Energy Power Quality Workshop  
will take place:

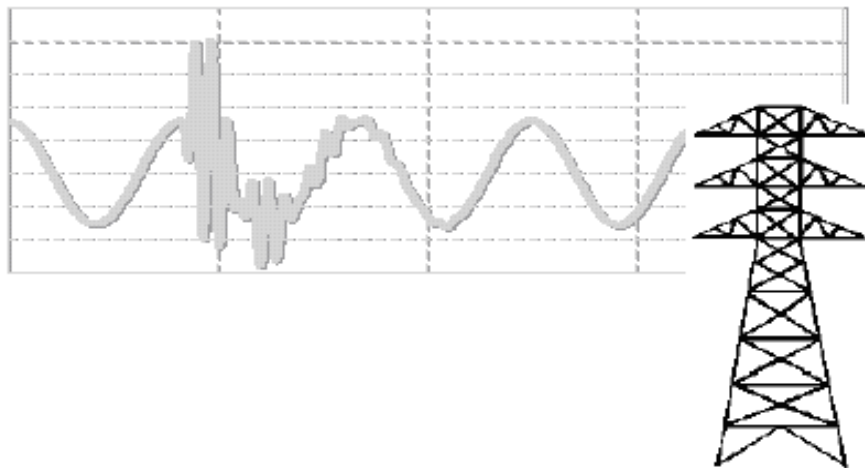
*Tuesday, March 11, 2014*

*Davenport, Iowa*

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*Wednesday, March 12, 2014*

*Des Moines, Iowa*



## Synopsis of MidAmerican's **POWER QUALITY WORKSHOPS**

These workshops, taught by EnerNeX, will:

- Provide the background and information needed to investigate and solve power quality problems involving possible interaction between events on the power system and the response of equipment within end user facilities
- Address important concerns within customer facilities that can often be mistaken for problems with the electric supply system (for example, wiring and grounding problems, local harmonic problems within the facility, voltage variations caused by loads within the facility, etc.)
- Focus on the full range of solutions that can be implemented for the various types of power quality problems that you may encounter

Topics will include the basics of power quality investigations, site audits, power quality monitoring, power quality concerns analyses and case histories.

### **WHO SHOULD ATTEND?**

The one-day workshop is designed for utility engineers and industrial and commercial end-users dealing with power quality issues.

### **ABOUT THE INSTRUCTOR**

David Mueller is the Director of Energy System Studies for EnerNeX. Since 1990 he has studied and solved power quality problems for industrial, commercial and utility clients.

He started the Power Quality Services group for East Midlands Electricity in Nottingham, England, where he also developed the 10-volume set, "Power Quality Training Manuals". He assisted PowerGrid Ltd. in Singapore to develop power quality capabilities.

Dave has written dozens of technical papers and articles on power quality. He has made presentations nationally and internationally.

Prior to joining EnerNeX, he was employed by Electrotek, managing power quality projects and studies and by General Motors, working as a project engineer on a variety of facilities and automation controls projects. While working at GM, he won a Corporate Energy Conservation Award.

Dave received a B.S.E.E. degree from the University of Cincinnati and a Master of Engineering degree from the Electric Power Engineering Department at Rensselaer Polytechnic Institute. He is a registered Professional Engineer.

# Power Quality Workshop Outline

## **The Technology of Power Quality**

- Objective of the course
- Why power quality keeps growing in importance
- IEEE definitions for different types of PQ variations
- Examples of different types of problems

## **Wiring and Grounding**

- Functions of the grounding system
- Loose connections
- Neutral and ground currents
- Case histories

## **Voltage Sags and Momentary Interruptions**

- Causes of voltage sags and voltage sag characteristics
- Characterizing equipment sensitivity
- Solutions for improving voltage sag performance
- Finding the most economical solution

## **Harmonics Problems**

- Sources of harmonic distortion
- Harmonics problems in commercial facilities
- Harmonics problems in industrial facilities
- Rules for identifying possible problem situations
- System analysis procedures (identifying resonance problems)
- IEEE 519 Standard on harmonic control

## **Transient Overvoltage Concerns**

- How to find the source of transients
- Capacitor bank switching concerns
- Adjustable speed drive nuisance tripping
- Motor failures

## **Example Cases Histories**

- The role of monitoring
- How to interpret waveforms from disturbance (monitoring) data
- Typical culprits of power quality problems

## WORKSHOP DETAILS

### DAVENPORT, IOWA

**Tuesday, March 11, 2014**

Radisson Quad City Plaza  
"Bettendorf Room"  
111 E. 2nd Street  
Davenport, IA 52801  
(800) 395-7046

Registration 8:30 a.m.  
Workshop 9 a.m. – 4 p.m.  
Lunch is included

### DES MOINES, IOWA

**Wednesday, March 12, 2014**

Comfort Suites at Living History Farms  
"Granary Room"  
11167 Hickman Rd.  
Urbandale, IA  
(800) 395-7675

Registration 8:30 a.m.  
Workshop 9 a.m. – 4 p.m.  
Lunch is included

### REGISTRATION

Please register for this workshop by completing and returning the registration form.  
*Enrollment may be limited to ensure a quality learning environment for each participant.*

**Please RSVP by FEBRUARY 21<sup>st</sup>**



### REGISTRATION FORM - MIDAMERICAN ENERGY POWER QUALITY WORKSHOPS

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

E-mail \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Workshop location:  **Davenport, March 11, 2014**

**Des Moines, March 12, 2014**



Return this form to:

MidAmerican Energy, ATTN. Dean Roling, P.O. Box 4350, Davenport, IA 52808  
Fax to (563) 333-8838 or Click the Submit by email button.

If you have any questions regarding the power quality workshop, please contact:  
Dean Roling at (563) 333-8134 or [djroling@midamerican.com](mailto:djroling@midamerican.com)

Thank you for your interest in our power quality workshop! A confirmation email will be sent to the address listed above. **We look forward to seeing you!**