



Power Quality in Electrical Systems

Course Outline

Marc Thompson, Ph.D.
Senior Managing Engineer
Exponent
21 Strathmore Road
Natick, MA 01760

Alex Kusko, Sc.D, P.E.
Vice President
Exponent
21 Strathmore Road
Natick, MA 01760

Adjunct Associate Professor of Electrical
Engineering
Worcester Polytechnic Institute
Worcester, MA 01609

Overview



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COURSE: Power Quality in Electrical Systems

SPEAKERS: Alexander Kusko, Sc.D., P.E., Exponent, Natick MA and
Marc Thompson, Ph.D.,
Exponent, Natick MA and Worcester
Polytechnic Institute, Worcester MA

DATE: Tuesdays, 6-8 PM; April 5, 12 and 26

LOCATION: Lexington Sheraton Inn, 727 Marrett Rd., Lexington, MA

Class #1 - Hour #1 (4/5/05, MT)

Introduction to Power Quality

- Definition of power quality
 - Sag, swell, transients, harmonics, flicker, voltage imbalance, frequency deviation, etc.
- Examples of poor power quality
 - Voltage distortion
 - Capacitor failures
 - Flicker
 - High frequency conducted and radiated EMI
- Sources of poor power quality
 - Non-linear loads, arcing devices, load switching, motor startup, etc.
- Relevant standards
 - IEEE Std. 519 and 1159

Class #1 - Hour #2 (4/5/05, AK)

Introduction to Voltage Distortion

- Voltage distortion
 - Definitions - sag, harmonic
 - Causes - utility, lighting, harmonic currents, nonlinear loads, commutation
- Harmonics
 - Definition
 - Fourier analysis

Class #2 - Hour #1 (4/12/05, MT)

Harmonic Current Sources

- Single-phase rectifiers
 - Inductor filter
 - Capacitor filter
- Three-phase rectifiers
 - Inductor filter
 - Harmonics
- Switching converters

Class #2 - Hour #2 (4/12/05, AK)

Harmonic Current Effects

- IEEE 519
 - Current paths
 - Harmonic voltage
- Resonance
 - Frequency
 - Capacitor failure
 - Voltage distortion

Class #3 - Hour #1 (4/26/05, AK)

Correction for Power Quality

- Harmonic currents
 - Power factor correction
 - Filters --- differential and common-mode
 - 12-pulse rectifiers
- Voltage distortion
 - UPS/E. Gen
 - Surge suppressors
 - CV transformers

Class #3 - Hour #2 (4/26/05, MT)

Power Quality Measurements

- Quantitative
 - Harmonic voltages
 - Harmonic currents
- Commercial equipment
 - Dranetz, Hioki, AEMC
 - LISNs