



## In House Programs

# T<sub>2</sub>G

## TECHNICAL TRAINING GROUP

## Power Factor and Harmonic Analysis

This 1 Day class shows you how to perform a power factor study and a harmonic analysis. Many electric utility companies have rate structures that provide a strong economic incentive to correct power factor. However, correcting power factor without considering harmonics can have devastating consequences. Learn how to analyze harmonics and properly tune capacitors. See how to properly apply IEEE 519 and how the strength of the source can impact the results. Many in class problems to show you how to perform the study.

Course Credit: 1 Day - 0.8 CEUs or 8 PDHs



### Course Agenda

#### POWER FACTOR CORRECTION

kW, kVA, kvar, PF Concepts. Leading and Lagging, Current Flow, Inductive Loads

#### POWER FACTOR CALCULATIONS

Determining Var Requirements, Sizing the Capacitor, Switching Steps and Location at the Load vs. Closer to the Source

#### UTILITY RATE STRUCTURE AND ANALYSIS

Reviewing Utility Bills, Utility Rate Structure, Peak Demand, Demand and Power Factor Based Rates, Rates in a Deregulated World

#### HARMONICS

Concept of Harmonics, Harmonic Spectrum, Sources of Harmonics, Non-Linear Loads, Harmonic Current Flow

#### HARMONIC RELATED PROBLEMS

Capacitor Failure, Fuse Interruptions, Equipment Over Heating, Breaker Mis-Operation, Metering Errors

#### RESONANCE

Determining Parallel and Series Resonance, Effect of Source Impedance, Effect of Capacitor Size, Effects of Resonance on the System, Impedance vs. Frequency Scans

#### IEEE 519

Voltage and Current Distortion Limits, Point of Common Coupling, Enforcement, Ratio of Load vs. Strength of the Utility System

#### THIRD HARMONICS

Switched Mode Power Supplies, 3rd Harmonics and Neutrals, Over sizing Neutrals, The use of Delta-Wye K-Factor Transformers, Over sizing Neutrals

#### EVALUATING HARMONICS

Resonance Calculations, THD Calculations, Effect of Parallel Resonance on THD

#### CORRECTION OF HARMONIC RELATED PROBLEMS

Capacitor Operating Restrictions, Over sizing Neutrals, Detuning Capacitor Banks

#### HARMONIC FILTER DESIGN

Tuning Frequency, Series Resonance, Sizing the Reactor, Evaluating the Capacitor Adequacy

#### CASE PROBLEM

Design of a 5th Harmonic Filter

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For more information contact:  
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See sample videos of Jim's teaching style at:  
[www.brainfiller.com](http://www.brainfiller.com)