TESCO METERING

A Crash Course in Power Quality Issues and Monitoring

TESCO's Meter School
TESCOOL
July 21-24, 2024

Wednesday July 24

10:30 AM - 12:00 PM

Jeff Moore,
Instruments & Technology

What is "Power Quality"?

- Power Quality refers to how well the Voltage, Frequency & Waveform match the established specifications.

- It can refer to compatibility load to the source.

- It can also used to describe how the utility customer feels their needs are being met

Why is it important?

Poor Power Quality is expensive!

- Damaged Equipment
- Unplanned Downtime
- Out of spec product
- Danger to personnel (elevator, fires etc.)
- Environmental Hazards

Where does Poor PQ come from?

- Utility Transformer

  You can start here

- Wiring inside the customer's house or building

  We have all see wiring that is more reminiscent of a bird's nest that professional, modern wiring.

- Devices/Equipment inside the building

  Variable speed drives, computers, high-tech loads, and other internal loads cause disturbances & harmonics

Key areas of Focus

- Sags
- Swells
- Harmonics
- Flicker
- Transients
- Grounding

Voltage Swells

- a.k.a. Surges
- A temporary increase in voltage which lasts several cycles(1/2 cycle to 1 minute duration)
- Caused by sudden changes in load or when a fault is cleared

Voltage Sags

- A temporary reduction in voltage.
- Caused by an abrupt increase in load or a failure of utility equipment

HARMONICS

- Harmonics are defined as Sinusoidal Voltages or Currents having frequencies that are integer multiples of the frequency (fundamental frequency = 60 Hz for NA) at which the supply system is designed to operate

- Results in a distorted Waveform

- Caused by VFD's, Switching Power Supplies & Damaged Equipment

Harmonics Part Deux

Negative Sequence Harmonics

- 5th, 11th, 17th, etc. are important to industrial environments
- They are caused by electronically controlled motors.
- Negative sequence harmonics counteract electrical power systems. (They make motors run backwards).
- These cause motor overheating and failure.

Harmonics Part Tres

Zero Sequence & Triplen Harmonics

- Caused by computers and electronic equipment
- 3rd, 9th, 15th, etc. (div. by 3) are important to commercial environments.
- Triplen Harmonics cause a disruption in the balance of a 3-phase system and cause unusually high neutral current and
- causes overheating

Harmonics Part Quatro

Harmonic THD or Total Harmonic Distortion

- Caused by computers and electronic equipment
- IEEE provides guidelines for acceptable harmonic current and voltage distortion levels.
- IEEE Standard 519-1992 states that THD for critical motors should be less than 5% Voltage THD & 20% Current THD

- Triplen Harmonics cause a disruption in the balance of a 3-phase system and cause unusually high neutral current and
- causes overheating

Flicker

- A momentary or sustained fluctuation of Voltage that causes lighting to "Flicker"

- Short Term Flicker(PST) is measured over 10 minutes
- Long Term Flicker(PLT) is measured over 2 hours

- Can cause vision trouble, headaches, annoyance & distraction

- Mitigation focuses on reducing the amplitude of the voltage fluctuations

Transients

- Sudden brief fluctuations of voltage or current lasting only milliseconds
- Caused by lightning, switching operations or faults
- Typically corrected by surge suppressors

Grounding & Bonding

- Grounding is not a problem
- Bonding is not a problem
- Lack of Grounding and/or Bonding is a Huge Problem!!
- Without proper Grounding & Bonding Measurement Results will be suspect & mitigation devices will not function properly
- Without proper Grounding & Bonding Safety will also be compromised as protection devices will not function properly

QUESTIONS?

?'s

THANK YOU!

Contact me anytime:

INSTRUMENTS & TECHNOLOGY, INC.

Jeff Moore

700 NORTH GLENMORE STREET
LOCKPORT, IL 60441 • TEL; (815) 341-1978
jeff@instrumentsandtechnology.com