Electrotek CONCEPTS

Determining the Cause of Power Quality Problems in Customer Facilities

Wiring, Grounding & Loads Cause the Majority of Customer PQ Problems

Research, testing, and 1,000's of PQ investigations conducted by Electrotek and other organizations in residential, commercial, and industrial, have shown that the majority of PQ problems are caused by wiring, grounding, and non-linear loads in customer facilities.

Customers constantly struggle with maintaining and repairing their electrical systems. Constrained budgets and manpower shortages make this task even more difficult. Many commercial and industrial facilities have not been able to upgrade their electrical systems, or loads. Many customers have replaced their loads with high-efficiency non-linear loads. Many facilities are still using older analog equipment, and control systems. Some customers have upgraded their equipment and control systems to digital devices. All of these activities increase the likelihood of PQ problems.

Operating non-linear loads on aged electrical systems mixed with digital systems and other non-linear loads also increases the likelihood of PQ problems. Non-linear loads like variable frequency drives (VFDs), and loads containing inverters/ converters generate PQ disturbances which flow through a facility, polluting its voltage and current quality.

Wiring and grounding problems can cause utility and internally generated benign disturbances, damaging electronic equipment. Customers struggle with how to deal with these problems. Frequently, the problems go unidentified and continue to eat away at the semiconductor and other materials electronic components rely on to function properly.

Electrotek's process for determining the cause of PQ problems in customer facilities has proven to be highly effective. Careful strategic steps must be taken before making changes to any electrical system or installing any PQ mitigation equipment in the system. Many customers have had bad experiences with trying to solve PQ problems without following a proven approach. Unfortunately, Electrotek has had to go in behind previous attempts by others to solve PQ problems and conduct a detailed analysis to solve the problem.

Customers experiencing equipment malfunctions, suffering from damaged equipment and experiencing PQ problems should contact a reputable power systems and PQ engineering firm, like Electrotek. Investments into solving PQ problems can be cost-effective if proven approaches and steps are followed from the beginning.

It is also important to verify that PQ problems have been resolved once investigative and mitigation steps are complete. Decades of experience from Electrotek will help customers overcome these complex issues.

PQ Disturbances Caused by Normal Operation of Non-Linear Loads

The operation and switching ON and OFF of power electronics-based (non-linear) loads generates PQ disturbances on the circuits powering them.

These disturbances can travel upstream and downstream to other parts of the electrical system, causing malfunction and upset of other electronic equipment. Moreover, such disturbances also cause disturbance currents to be injected into the grounding system. These currents circulate through the grounding system, becoming available to magnify other disturbances generated by the utility or the operation and switching of other non-linear loads.

When non-linear loads are moved to a different location in a plant or when they are taken offline or added as new loads, disturbances generated by those loads change. This creates a new opportunity for disturbances to affect the operation and reliability of other electronic equipment operating in that plant.

Electrotek's in-depth study of PQ phenomena can identify these risks and specific PQ mitigation techniques to reduce disturbances to manageable levels.

Power Systems and Power Quality Engineering Services Center

Electrotek's Power Quality Engineering Services Center is a world-renowned center for power systems and power quality engineering. Our Center includes an Advanced Power Quality Testing & Research Laboratory.

Learn about our Center by visiting: www.pqengineering.com

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Benefits of Including PQ Performance in Product Specifications

Electrotek was the first to present the idea of including detailed PQ performance criteria in product specifications. This offers multiple financial and technical benefits including:

- Allows potential customers to see that manufacturers are committed to ensuring acceptable PQ immunity performance for their products.
- Help potential customers to increase their understanding of the importance of PQ immunity performance for electronic products.
- Helps convince potential customers that the risk of failure and high re-work costs caused by product failures have been proactively managed.
- Allows potential customer to see if a specific product has exceptional PQ immunity performance regarding PQ problems the customer may have already experienced.
- Increases the manufacturer's overall image regarding commitment to power quality and their proactive position in incorporating it into their product designs.
- Provides additional confidence in a manufacturer's product warranty as many manufacturers will not honor their warranties in the event that PQ problems occur in customer facilities.

About Electrotek

Founded in 1984, Electrotek Concepts, Inc. is world renowned for its research, developmental, applications and problem-solving work in understanding, identifying, analyzing, and preventing power quality (PQ) problems. Our expertise extends from the utility generators to inside the electrical/electronic load inside a customers' facility. The experience of Electrotek's team of PQ engineers extends from experts in utility power systems, participants on IEEE and IEC standards boards regarding PQ standards, to designers of end-use electronic equipment. Our engineers are armed to address any PQ problem at any level. The future of reliable, available power, and customer equipment in today's modern technological society depends on compatibility between utility power, the customer's facility electrical system, and the end-use equipment customers depend on to carry out their day-to-day business activities.

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