

Power Quality Impact Studies: Voltage Variations, Harmonics, Disturbances—Identification and Solving Problem

Identifying and Ranking the Power Quality Impacts of System Changes Using Electrotek's Family of Power Quality Measurement & Analysis Tools

Utilities, building designers, and end users frequently face the need to make significant changes to their electrical systems. Such changes stem from the need to add infrastructure to support new loads, and/or add energy resources to relieve the strain from grids.

Before major changes to a system are made, power quality (PQ) impact studies should be done. Such studies can identify the PQ impact to existing and new systems via computer modeling and simulations, before designs are started or completed. In some cases, PQ monitoring is required to identify the PQ characteristics of a source(s) or load(s). Monitoring data is often used as an input to the

modeling and simulation process.

Electrotek's *Family of Power Quality Measurement & Analysis Tools* will provide a comprehensive answer to the concerns of making system changes, as well as answers to questions never considered. Although our analysis and simulation software can incorporate data from any monitor, Electrotek prefers to use Dranetz PQ monitors at sites where pre- and post-monitoring is required before system changes are designed and implemented.

Electrotek's latest PQ data management and analysis software, PQView4®, is used to manage and prepare data from any type of monitor as

well as from multiple monitors for simulation and computer analysis. Our modeling and simulation software platform is used to model each aspect of a system including backup and redundant systems, linear and non-linear loads, and distributed generation (DG) equipment. We maintain 1,000's of modules in a custom library to ensure each component of the system is properly modeled.

Our software platform addresses harmonics (SuperHarm® and Harm-Flow®), distributed planning (DistoSuite®), ferro-resonance (FerroView®), and other Electrotek-enhanced software like EMTP for Windows provide the most thor-

ough PQ impact analysis of any electrical situation in the industry.

Power systems and PQ engineering experts at Electrotek work with each client individually to gather all of the critical information and data necessary to model and simulate the expected system change. If PQ monitoring is required, unique Dranetz PQ monitoring equipment is used to collect detailed performance data and upload it back to Electrotek for efficient analysis. Complex impact studies can be turned around in a matter of a few weeks—much shorter than what competitors can offer.

PQ Impact Studies on Harmonics: Use of Electrotek's Software & PQView4®

PQ impact studies on harmonics often require background data, as data resources. In many cases, various PQ monitors installed across a system are used to collect harmonics and disturbance data. Sometimes 100 monitors or more, are used on a single system.

Electrotek can pull in any type of PQ data from even a larger number of monitors using Electrotek's PQView4® data management and analysis software. Measurement of harmonics often generates large data files, especially if harmonics up to the 50th component or higher, are measured. PQView4® can

manage the preparation of harmonics data recorded up to components higher than the 50th, as well as use this data in PQ impact analyses.

Electrotek engineers are also experts in all types of PQ data formats. This allows us to accept PQ data in any format and convert it to

the formats required by our analysis software used in impact studies.

Another expertise of Electrotek's is the integration of different software systems to yield complex results, and identify unexpected situations that may arise from systems changes.

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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.

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Benefits of Using Electrotek to Conduct PQ Impact Studies

When conducting an impact study, it is important to address all of the possible scenarios that could develop and cause a system serious PQ problems. Electrotek's approach for conducting these studies uses a specially designed set of PQ instruments and software tools to provide study results that are statistically relevant to the system at hand, and the changes planned.

- Determining the different impacts of making changes to a power system beforehand also determines the level of risk associated with the different PQ phenomena that can adversely affect the PQ of the system and the changes made to that system.
- Investigate the ranges of power system and power quality operating conditions to determine if any of the conditions the system will experience increases or decreases the risk of power system disturbances and instabilities which may cause malfunction or damage to electrical and electronic equipment.
- Determine if planned changes to a utility power system distribution network increase or decrease the probability of causing PQ problems with sensitive electronic equipment in customer facilities.
- Determine the degree of non-linear load a plant electrical system can support before critical power quality thresholds are exceeded, thus compromising power quality across the plant.
- Provide a risk assessment regarding power quality to an insurance company to demonstrate a customer is pro-actively engaged in managing the power quality of their plant.

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 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, and 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.

