

Power Quality Lecture

Abstract

Power Quality has always been important to electric utility customers. It is now even more critical to industrial and commercial customers because of the increasing application of power electronic loads and electronic controllers which are sensitive to quality of power supplied. Voltage sags and momentary interruptions last only a few cycles, but will have significant impact on loads. When critical loads drop off, they can stop a manufacturing process and cause significant damage in terms of lost production, poor product quality, product scrap and process restarting requiring several hours of down time. Surveys have shown that voltage sags impact industrial customers more than power outages. Sensitivity of loads like ASDs, PLCs, relays, contactors, etc., to voltage sags will be reviewed. Custom Power technology involves the application of power electronics for supplying a level of power quality needed by customers with sensitive loads. The mitigation equipment includes embedded solutions protecting the individual loads to protecting the whole plant. Custom power devices, Dynamic Voltage Restorers (DVR), Dynamic UPS, Static Transfer Switches (STS), StatCom, SMES, Dynamic Sag Corrector (DySC ®), Dip Proof Invereters, Coil hold-in devices etc., to protect the loads at commercial and industrial facilities will be reviewed.

Harmonics are important aspect of power quality. Increasing application of power electronics in industrial, commercial and residential loads is increasing harmonics levels in the power system. Lecture describes the application of harmonics standards, and when the industrial and commercial customers should be concerned about harmonics levels in the facility. The IEEE and IEC standards will be discussed. IEEE Standard 519 "Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems" is based on customers limiting current harmonics at PCC (Point of Common Coupling). Proposed revisions to the standard will be discussed. IEC standards require limiting harmonics from individual equipment. A case study on applying the IEEE standard will be discussed.