Power Factor Correction Capacitors; Essentials And Cautions

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Summary

In electrical installations with a low power factor, significant cost savings can be made through the application of power factor correction. These savings are achieved largely due to the way electrical utilities bill their customers. Improvement of power factor can reduce power costs, release electrical capacity of the distribution system, raise the voltage level, and reduce the system losses. Using shunt capacitor banks for power factor correction (PFC) is a very well established approach. However, there are cautions and difficulties associated with using capacitors. When sizing and locating capacitors for PFC, many designers tend to base their calculations on maximizing the revenue from such installation by minimizing insulation cost and maximizing the energy savings. Fewer emphases are usually given to the potential adverse affects caused by interaction phenomena between PFC and some power system elements. Among the most common and potentially harmful phenomenon is the harmonic amplification that can result the presence of a resonance in the power system close to the frequency of a nearby harmonic source. This paper focuses on those phenomena other side of PFC that can cause significant damage and disruption to a given power system. The scope of the paper includes an outline on some available mathematical tools to analyze these phenomena and apply them on a study of an industrial power system