Abstract

The role of power electronics is rapidly increasing in all aspects of electric energy i.e., generation, transmission, distribution and end use. Increased use of power electronic control equipment has made it necessary to pay greater attention to issue of Power Quality for Industrial and Commercial customers. It is an issue that involves maintaining power for a variety of drives, processes, and robotics and database systems. Industrial consumers are required to meet the stringent requirement imposed by utility authorities, at supply network. Hence it is very much essential for the Industrial Plants to have compensator for the reactive volt-ampere and harmonics reduction at their premises. This is not only reduces power tariff but also improves the quality of power supply.
The goal of this thesis is to design and simulate various compensation systems like Fixed Compensation System – Passive Filters, Dynamic Compensation System – TCR (Thyristor Controlled Reactor), TSC (Thyristor Switched Capacitor) and Advanced Compensation systems – Active Filters in an Industrial power system where power quality is major issue.

An actual electrical network, representing a real power system, is used for analysis purpose. The modeling approach adopted in this thesis is graphical in nature, as opposed to mathematical models embedded in code using a high-level computer language. The well-developed graphic facilities available in an industry standard power system packages, namely ETAP and PSCAD/EMTDC, are used to conduct all aspects of model implementation and to carry out extensive simulation studies. Simulation results including compensation systems in the network confirm all power factors; Bust voltages, harmonic and the filter currents are within design criteria.