

Abstract

Doctoral thesis focuses on the issue of improving electricity quality in industrial plants, with particular emphasis on reducing the costs associated with the purchase and distribution of electricity. The research was carried out on a simulated model of an industrial network based on the actual layout of the internal power supply network at an automotive manufacturing company. The large number of inductive and non-linear loads drawing power from the extensive power supply network of an industrial plant leads to active power losses and voltage drops. In such cases, compensation in the plant's main switchgear may lead to unnecessary losses.

The research carried out during the project focused on measuring the quality of the electricity consumed by selected groups of loads and modelling them in a computer simulation. In addition, studies were conducted on power quality improvement systems in the form of reactive power compensators based on power capacitors and ASVG active compensators. The aim of the simulation studies was to determine the optimal layout of compensators within an industrial plant's network, taking into account the savings resulting from their operation and the payback period for the equipment. The studies were carried out assuming exclusive reactive power compensation, as well as additional filtering of higher harmonics and load balancing.

The results of the studies provide a basis for implementation verification regarding distributed power quality improvement systems.