

Development of copper busbar by silver plating under non-linear load operation using finite element method (FEM)

Abstract

Generally, busbars are used in electrical transmission and distribution power. The presence of harmonic current in the busbar will generate more heat to the system. The generation of heat will be increasing power losses at the busbar and reduced their conductivity. A three-dimensional (3D) Finite Element Method (FEM) by COMSOL Multiphysics software was used in this research to analyze the heat distribution, average temperature, and power losses of copper busbar with 0.5 mm silver plating on their surface. The dimension of 30 mm × 4 mm × 500 mm copper busbar was utilized based on their suitable current carrying capacity from the measured location. The current source starts from 419 A and varies from 0% until 50% of Total Harmonic Distortion (THD) with an interval of 5%. The findings show improvement condition of copper busbar after silver plated on their surface. The bare copper busbar only meets the requirement range condition of BS159:1992 until the existence of 15% Total Harmonic Distortion of current (THDi) component while silver-plated copper complies until the maximum value of THDi which is 50%.