

This paper presents a type of expert system for controlling the 22kV voltage levels of power system in northern region of Thailand based on the SCADA system. At present, for the operation, the operators have to make decision by their knowledge and experience to control the voltage. This expert system is obtained for alleviation of voltage violation in the day-to-day of distribution substation in the system and process the data from the SCADA to help the operator detect buses experiencing abnormal conditions.

This expert system focused on shunt reactive power compensating devices and transformer tap changer to select the most effective control for keeping the bus voltage in the entire system within limits. The performance of the expert system is compared with the operator control in the terms of voltage deviation indices, numbers of tap changing and , numbers of switching shunt reactive compensation. The application of this expert system has been tested on 6 substations. The substations are Chiangmai1(CM1), Chiangmai2(CM2), Chiangmai3(CM3), Chomthong(CTG), Lumphun1(LN1), Lumphun2(LN2), which contained 11 of distribution transformers (115/22kV), a tie transformer (230/115kV) and 28 steps of shunt capacitors for 22kV, 6 steps of shunt capacitors for 115kV.

The results are presented by the average actual data from the expert system and operator for controlling the 22kV voltage levels based on the SCADA system. The voltage of power system is in limit range (-3% to +7%) when operating by both operator and expert system. However, the results of the expert system can reduce the number of transformer tap changing more by than 50 percent and voltage deviation within limits.