

Dynamic Analysis of Electro-Mechanical Switch with Experimental Validation

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Abstract

This paper investigates the Dynamic Analysis and optimization of electromechanical switching systems. It is a critical simulation activity which saves time, cost and improves efficiency of the design process. Auxiliary is an indication device for circuit breaker, which have mechanism to indicate whether circuit breaker is in tripped or ON/OFF state. There are many parameters which govern the performance of mechanism inside circuit breaker auxiliary such as material, stiffness of mechanism springs, interference of flexible links and friction. The purpose of the study is to investigate the effect of the above parameters on circuit breaker Auxiliary performance. Auxiliary performance is measured by functional requirements such as Toggle Torque, Response time for manual switching and rotation angle of Toggle. Toggle ON Torque for auxiliary should be always less than associated protection devices. Toggle Torque is applied on the toggle axis to change state of auxiliary from OFF to ON. Transfer function is developed for Toggle torque (Manual Switch ON) as a function of parameters with the help of Design of Experiments (DOE). Dynamic Analysis of the mechanism predicts the toggle torque and confirms with the test results, as well as transfer function is validated. Mechanism simulation effectively captured the product performance and assisted in enhancing the performance.

Keywords: Circuit breaker auxiliary, Dynamic Analysis, Toggle Torque, Design of Experiments

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