# ABSTRACT

*This study discusses how a three-phase three-leg active front end converter (AFE) that uses the model predictive control (MPC) control method in its switching can reduce the value of harmonics and control the power factor so that the value becomes unity at the source. MPC control is used to predict the voltage and current of the AFE by inputting the voltage vector generated by the converter switches in 8 states of switching into a discrete state-space model and evaluated using a cost function. System testing has been performed on several conditions, such as resistive load, inductive load, capacitive load, nonlinear load, variable frequency drive (VFD) with induction motors, sampling time parameter system testing, testing of combinations of filter RL values and AC source voltages made variable to find out the relationship of the parameters with the system output. The result of resistive load testing, the average values its THDv and THDi respectively are 0.02% and 0.45%, for inductive load are 0.01% and 1.92%, for capacitive load are 0.01% and 1.92%, for nonlinear load are 0.03% and 1.23%, adn for VFD with induction motor load are 0.04% and 1.18%. The sampling time test is proven that it affects the quality of the electricity produced. When the sampling time is 5μs it produces 0.02% of THDi, and when the sampling time is increased to 50μs, the THDi value increases to 1.59%. Tests on the RL filter when the value is 5Ω and 5mH, the THDi is 11.83%, and when the resistor and inductor are rated at 30Ω and 30mH, the THDi value is 0.40%.*

***Keywords** : Harmonics, AFE, MPC*