# *ABSTRACT*

Specification of electricity provided by PLN for household sector is AC single-phase with voltage 220V and frequency 50 Hz. To convert an AC source into a DC source rectifier is required. The next problem that comes up is the emergence of harmonics on AC fundamental wave caused by the use of rectifier itself, so that the fundamental wave that was pure sinusoidal AC becomes no longer a pure sine. Therefore, the use of harmonic filter is necessary to minimize harmonics caused by the use of rectifier device itself.

Rectifier is a device that functions to convert AC into DC source. Nowadays, the use of rectifier is increasing because there are more electronic devices that require DC power source. The unexpected effect from the use of rectifier is the appearance of harmonics in the system. The presence of harmonics becomes constraint as a direct effect on the power factor, the smaller the value of the power factor in a system, the worse the performance of the system.. Therefore, harmonic filter is necessary to minimize harmonics. Harmonic filter here is in the form of a passive filter that composed of passive components such as resistors, inductors, and capacitors. Resistive or inductive load will be attached to system to test the performance of the system. Harmonic analysis will be conducted on system supplied with a single-phase AC signal wave and will be based on harmonics standard IEEE std 519-1992.

The scope of work of this final project is designing and analyzing passive harmonic filter which aims to minimize harmonics caused by the use of rectifier and nonlinear loads. The performance of system before and after filter installation to the system will be compared. The application of harmonic filter is expected to minimize harmonics on a system that uses rectifier and nonlinear loads, so that consumers from household sector can get maximum and effective power because less harmonics at the system leads to better power factor which means better performance.

In this final project has been designed and analyzed of a passive harmonic filter which serves to reduce harmonics caused by the use of rectifier and nonlinear loads. Comparative testing to get the results done on system performance before and after the filter is installed. Based on simulation results, the installation of harmonic filter managed to reduce THDi up to 27.09 to 0.11% for the harmonic frequency of 150 Hz (harmonic order 3) according to IEEE standard 519-1992, despite the firing angle (firing angle) 90 filter harmonics yet able to reduce the THDi to less than 20%. Installation of passive harmonic

filter can reduce harmonics to obtain maximum and effective power because less harmonics at the system leads to better power factor which means better performance.

*Keywords: rectifier, harmonics, passive harmonic filter, THD, IEEE std 519-1992*