

# POWER FACTOR COMPENSATION USING BOOST RECTIFIER

Project report is presented in partial fulfillment for the award of the Bachelor of Electrical  
Engineering (Hons.)

*Of*

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## **ACKNOWLEDGEMENT**

All praises be to Allah, Lord of the Universe, the Merciful and Beneficent to Prophet Muhammad S.A.W, His Companion and the people who follow His path.

First and foremost, I would like to take this opportunity to express my sincerely gratitude and appreciation to my parents, Ab Latif@Lafit b. Khatib Ngah, and my family for the support through my university years.

Special appreciation to my supervisor, Assoc. Prof. Mohamad Fadzil Saidon for taking time through the whole project year and offering clear and enthusiastic explanation ,guidance and supports toward the making of this thesis. May Allah bless you.

Lastly, I would like to thanks to all my friends especially to Ahmad Faridz bin Abd.Ghafar, Khairul Sapuan b. Mohammad, Zahiruddin b. Idris, Khairul Saruddin b. Mohammad, Amran b. Abdul Jalil, Ahmad Muzzafar Mustapha, Mohd Rozilah Yusof, Fatimah Rusbiahty bt. Ahmad, Hayati Nur bt. Ab Aziz for all effort helping me to complete this thesis and also anybody who are participate in offering help. May Allah bless you all.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

Most people in the power engineering field have encountered the question about which direction the harmonic power is flowing, from the source to the load or, from the load to the source. While this is still a controversial topic for some people, the most commonly accepted practice for determining this is to look at the harmonic watts phase angle, or the relationship between the voltage and current for a particular harmonic. The presence of harmonics can distorted the supply waveforms and cause problems in respect to firing circuits which rely on the supply voltage zero as reference to the delay firing angle [1].

### **1.2 Harmonic History**

The problem of power systems harmonics is not a new phenomenon by any means. It is as old as the power network itself, with the first studies on the subject traced back to the 1890s, when transformers and rotating machinery were identified as the main source of waveform harmonic distortion [1]. It is reported that in 1893, Charles Proteus Steinmetz arrived in Lynn, Massachusetts, to work for Thomson-Houston. One of his early assignments was to solve a motor heating problem at Hartford, Connecticut. Steinmetz had the mathematical background to conduct harmonic analysis and made good use of it to identify and solve the problem, which was traced to the combined action of a resonance in the transmission circuit feeding the plant and a generator with a substantial amount of waveform distortion. To analyze this problem, he used a device called a wave-meter to construct electric waveforms and, not without a great amount of work, carried out Fourier analysis.

Reportedly, it took him about one hour to produce each coefficient of the Fourier series.