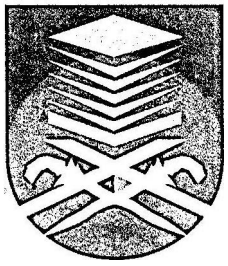
DESIGNING AND IMPLEMENTING INTERACTIVE POWER FACTOR CORRECTION USING VISUAL BASIC 6.0

This project is presented as fulfillment for the award of the

Bachelor in Electrical Engineering (Honours)

Of

UNIVERSITI TEKNOLOGI MARA



SHAZLINA BINTI SHAMURI
Faculty of Electrical Engineering
Universiti Teknologi MARA
40450 Shah Alam

MEI 2006

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the Merciful and Gracious. Praise is for God, Lord of the world, Guide of the bewildered and joiner of those is severed; Whose help we seek in worldly matters and in religion. May His blessings and peace upon our Prophet Muhammad S.A.W, the truthful and Trustworthy.

I would like to convey my sincere gratitude to my supervisor, PM Ir Zulkefli Yaacob, for his guidance, supervision, encouragement and discussion throughout this project. I would also like to thank him for providing me with the information required and patience shown during the preparation of this project.

Last but not least, it would not be possible for me to complete this project without the moral support from my lovely family and friends. May Allah bless you.

Thank you.

ABSTRACT

This paper presents, an interactive power factor correction using capacitor banks application design to reduce time used in calculating the size of corrective capacitor banks. Essentially, power factor is a measurement of how effectively electrical power is being used. The higher the power factor, the more effectively electrical power is being used. Poor power factor happens due to an inductive loads and it can be corrected by reducing the inductive current by applying capacitor banks. Capacitor banks are widely used as it is more practical and economical. Capacitive power factor correction is applied to circuits as a means of reducing inductive load and therefore can be utilised to reduce kVA and electrical costs. In practical, a poor power factor can lead to overloaded generator, transmission lines and transformer greater voltage drop and power losses. This interactive program was created from scratch using VISUAL BASIC software to ease the engineer's burden in calculating the size of capacitor banks required to correct the power factor. Both simulation and experimental results will show the recommended size of capacitor bank required to achieve the required power factor level.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

Power factor is simply a name given to the ratio of real power being used in a circuit, expressed in watts or more commonly kilowatts (kW), to the power which is being drawn from the mains, expressed in volt-ampere or more commonly kilo volt-ampere (kVA).

$$PF = \frac{P}{S}$$

Where;-

PF = Power Factor

P = Real Power

S = Total Apparent Power

Power factor shows how effectively power is being used. The maximum power factor is unity that shows 100% input power is being converted, but it is impossible to obtain unity power factor in practical. Normally, the minimum power factor requirement of 0.85 are used by Tenaga Nasional Berhad (TNB).

Poor power factor are due to inductive loads. The method of connecting a capacitor in parallel is known as power factor correction. The effect of the capacitor is to increase the power factor of the source that delivers power to the load. The end result of power factor correction is improved efficiency and improved voltage regulation.

Power factor correction (PFC) is necessary to comply with the requirements of international standards, such as IEC-1000–3–2 and IEEE-519. PFC can reduce the harmonics in the line current, increase the efficiency and capacity of power systems, and