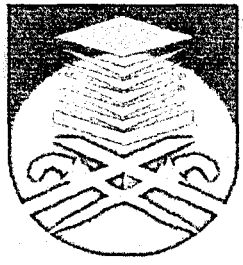
POWER QUALITY CONCERNS IN ASSESSING THE IMPACTS OF NONLINEAR LOADS IN FAKULTI TEKNOLOGI MAKLUMAT DAN SAINS KOMPUTER (FTMSK) BUILDING

This project report is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Honors)
UNIVERSITI TEKNOLOGI MARA



KAMARUL HISYAM BIN KAMARUZZAMAN
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
SELANGOR DARUL EHSAN,
MALAYSIA.
MARCH 2001

ACKNOWLEDGEMENT

In the name of ALLAH, the Beneficent and Merciful who has given the strength and ability to complete this final project as well. First and foremost, I would like to take this opportunity to express my sincerely gratitude and appreciation to my mother and my father Tuan Haji Kamaruzzaman bin Hassan that support me in every aspect. I love you ma and abah.

Secondly, to my project advisor, Encik Mohd Zaki bin Abdullah and Encik Ahmad Fawzal bin Mohd Noor whose patience, inspiration, ideas, suggestions, constant guidance and their dedication have helped me to successfully complete my final year project, may ALLAH bless you.

Thirdly, to all Muslim, please be patient in waiting me to enter the engineering life and I will fight in this arena like "fisabilillah" warrior. I will never let you down. That is my promise.

Finally, I would like to extend my sincere thanks to all lecturers, staff of maintenance especially Encik Jamil and friends for the continuous assistance in every aspect either directly or indirectly throughout to complete this project.

"ALLAHUAKBAR", MAY ALLAH BLESS ALL MUSLIM

Thank you.

Kamarul Hisyam Kamaruzzaman
Universiti Teknologi MARA,
Shah Alam, Selangor Darul Ehsan.

ABSTRACT

This project mainly explained of how well predictive maintenance can be used to prevent and avoid power problems in electrical systems due to non-linear loads. It also gives a general outline of the analysis methods for harmonics and presents results obtained from field measurement. It also focused on the effects of high content of harmonic, overload and loose connection in the distribution systems that cause power quality problems.

This project report summarizes some of the results of survey and monitoring of quality of electricity supply conducted at Faculty of Computer Science (FTMSK), MARA University of Technology (UiTM) using Reliable Power Meter (RPM) and supported by thermograms captured using infrared thermography (IR) camera.

The aim of the project is to understand the available theory and correlation with the actual cases referring to Residual Current Circuit Breakers (RCCB's) nuisance tripping at FTMSK as a case study. The survey and monitoring were performed at incoming point supply of the Main Switch Board (MSB) down to the loads at final distribution board of FTMSK. Data analysis of voltage and current events was monitored using RPM whereas IR camera is used for capturing unequal temperature at all current carrying conductor of the supply distribution to assist analysis and problem's diagnosis.

A special interest goes to the assessment of the harmonics; type of perturbations induced by the load users of FTMSK and supported evidence from thermograms related to assessment of harmonics. Thermograms also used in detecting neutral overload and bad termination.

High harmonic content, neutral overload and bad termination causes problem and failure to the operation of the equipment, due to protection device tripping and for future concerns are discussed together with the recommended solutions. Mitigation of harmonics until meets the IEEE standards also discussed in brief.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

Predictive maintenance is a technique which continuously monitored power information captured and analyze trends in power quality and harmonics [1]. Therefore bad conditions can be identified and prediction can be made, thus action can be taken. There is a lot of instrument that can capture power information and using powerful software tools that analyze trends in various power information, for example Professional Power Recorder System known as Reliable Power Meter (RPM) and Infrared Themography Camera known as AGEMA 550. Typical benefits obtained by implementing predictive maintenance are more efficient repairs because repair quality can be checked and guaranteed. reduced maintenance cost and increased productivity by reducing the probability of catastrophic failure.

Power Quality is a term used to broadly encompass the entire scope of interaction among electrical suppliers, the environment, the systems and products energized, and the users of those systems and products [2]. From the customers' perspective, it can be defined as the availability of pure sinusoidal wave voltage of the declared magnitude and current at the incoming point of the supply system. It also can be defined as any problem manifested in voltage, current or frequency deviations that results in the failure or misoperation of customer equipment [3]. It is more than the delivery of undistorted electric power that complies with industry standards. It involves the maintability of that power, the design, selection and the installation of every system. Power Quality has been a problem ever since the conception of electricity, but only over the last two decades it has received considerable attention from researchers and industry. With increasing integrated