



**PERFORMANCE ANALYSIS OF OPEN CATHODE AIR-COOLED FUEL CELL
USING HY-EXPERT INSTRUCTOR FUEL CELL SYSTEM**

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"I declared that this thesis is the result of my own work except the ideas and summaries which I clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree".

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ABSTRACT

This project is mainly about conducting numerous of experimental works on a 50W, 10 cells open cathode air-cooled proton exchange membrane (PEM) fuel cell stack located in the fuel cell section at the Alternative Energy Research Centre of Mechanical Engineering Faculty. All of the experiment conducted using the recently acquired HY-EXPERT instructor fuel cell system produced by Heliocentris Energiessysteme GmbH company which is capable to perform various experimental based on the following input parameter required which the analysis is then is related to the thermal engineering, electric power output and the overall system efficiency which is power efficiency gained from the voltage and current values. This fuel cell system arrived with a proper manual on how to run the fuel cell system. But still, a specific procedure for this fuel cell experiment was needed to make the fuel cell system running in order so the experiment could be conducted in smooth and safe. But instead using nominal current as the variable data, it was changed to load power since the manual does not specify on how to get or set the nominal current value and in the manual the nominal current value should start at 0 A . The value of minimum fuel stack current obtained is higher than 1 when the fuel cell system is started since the power load value is started with 0.7 W . The methodology used in this research is experimental method. With the collected data, some calculations had to be done for further data analysis. It is found that these values depend on many other variables and operating conditions imposed which could contribute to highest value of overall efficiency. Further study on the behaviour and the performance of the PEM fuel cell stack needed to be executed in order to improve and maximise the efficiencies of it.

TABLE OF CONTENT

CONTENTS	PAGE
ACKNOWLEDGEMENT	i
ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	vii
LIST OF TABLES	ix
CHAPTER 1 INTRODUCTION	
1.1 Background of Research	2
1.2 Problem Statement	3
1.3 Objectives	3
1.4 Significant of the Project	4
1.5 Scope of the Project	4
CHAPTER 2 LITERATURE REVIEW	
2.1 Types of Fuel Cell	5
2.2 Proton Exchange Membrane Fuel Cells(PEMFC)	6
2.3 How PEM fuel cell works	7
2.3.1 Reactions that occur in the fuel cell	10
2.4 Fuel Cell Components	10