



**DEVELOPMENT OF WATER – ROCKET THRUST  
MEASUREMENT STAND**

**SHEIKH RIZUAN BIN JALALUDDIN  
(2001351855)**

A thesis submitted in partial fulfillment of the requirements for the award of  
Bachelor Engineering (Hons.) (Mechanical)

**Faculty of Mechanical Engineering  
MARA University of Technology (UiTM)**

**NOVEMBER 2005**

## **ACKNOWLEDGEMENT**

In The Name of Allah The Almighty and The Most Merciful and Blessings Be upon His Messenger Prophet Muhammad S.A.W. and his Companions.'

Firstly, I am very thankful to Allah S.A.W. the Almighty for his divine inspirational guidance, which had given the opportunity and helped me in completing this my final project report.

would like to express my sincere gratitude and appreciation to my advisor, Pn.Wan Mazlina Binti Wan Mohamed for her help, ideas, support, guidance, patience and encouragement in the theses preparation until its completion.

Thank also to my long time partner, Norhisamuddin Bin Jalil who have been working with me since my diploma days. We did this project from the beginning and we are grateful we've manage to get along with each other very well.

A million thanks to Mohd Izmir Bin Yamin that helped me with the fabrication of our rocket stand.

Lastly not to forget all of my family and friends who had been very supportive and very patience for everything.

## **ABSTRACT**

This project requires student to design and fabricate a water – rocket thrust measurement platform. The purpose of the platform is to measure the thrust produced by water jet. Which determine the optimum pressure required to produce maximum thrust. Parameter that influences the thrust are pressure and water volume. However this project can be made as a teaching aid and a potential research tool.

The governing laws involved are Sir Isaac Newton's third law of motion which states for every action there will always be equal but opposite reaction and the principal of conservation of mass which relates refer Appendix D.

This research methodology will explain the details of water – rocket thrust measurement platform. Empirical data collection is based on the water pressure relative to nozzle size and thrust produced. However comparisons made on the experiment with the theoretical data shows some similarity of result values.

The thrust measurement stand platform can be suitable for future research development and a teaching aid. It is found that the thrust produced is the product of the water expulsion mass flow rate with the velocity of the water jet out from the bottle through the nozzle which concludes this research finding.

## **TABLE OF CONTENTS**

<b>CONTENTS</b>	<b>PAGE</b>	
AUTHOR DECLARATION	1	
CERTIFICATION		
SUPERVISOR	ii	
COURSE TUTOR	iii	
PAGE TITLE	iv	
ACKNOWLEDGEMENT	v	
ABSTRACT	vi	
TABLE OF CONTENTS	vii	
LIST OF TABLE	xi	
LIST OF FIGURE	xii	
LIST OF ABBREVIATIONS	xiii	
<b>CHAPTER I</b>	<b>INTRODUCTION</b>	
1.1	Background of Project	1
1.2	Significance	2
1.3	Scope of Project	2
1.4	Methodology	2
1.5	Objectives	3

## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Background of Project**

Aerospace, has always been an exciting and risk taking endeavor. With a strong partnership among industry, government, and academia, there has been an incredible history of innovation and technological breakthroughs.

Rocketry has played an important role in the civilian and military space industry, from launching commercial to reconnaissance satellites. Therefore it is vital to be a part of this space race which benefits any country who wants to progress. Rocket propulsion is a field by itself, which involves complex theory and mathematical modeling.

Hence water bottle rocket research is carried out to get a better understanding of basic rocket propulsion. This will be a stepping stone towards a more advance rocket system such as the chemical rocket propulsion.

However the is many subjects related to rocketry can be learned by experimentation. Results obtained can be used as a tool to optimize better rocket design. Rocket technology is a very closely guard secret. Nations that possessed rocket technology