

A FINAL YEAR REPORT  
DIPLOMA IN MECHANICAL ENGINEERING  
DEPARTMENT OF MECHANICAL ENGINEERING  
MARA INSTITUTE OF TECHNOLOGY  
SHAH ALAM

REDESIGN THE FUEL TANK  
OF WATER VEHICLE  
TO IMPROVE ITS STABILITY

ABDUL RAZAK LAULANG ( 93739528 )  
MAHANI IBRAHIM ( 93767482 )  
SAZRI AZAM ROSLAN ( 93805190 )

JANUARY 97

## 1.0 INTRODUCTION

### 1.1 OBJECTIVE

The objective of our final project is to design the fuel tank of water vehicle to improve its stability. In our design we will do an analysis and calculation to find the suitable fuel tank which can improve the water vehicle stability.

Our design is based on the water vehicle that we have choose. From the data which we get from this water vehicle, we will design and find the suitable fuel tank that can improve the water vehicle stability.

In this project, we have choose the ship which is aluminium patrolvessel ship.

## 1.2 SCOPE OF PROJECT

The scope of this project is to find the suitable fuel tank to the water vehicle which we have choose. We will do analysis to design the fuel tank which will improve the water vehicle's stability.

The stability of the ship is consider to be indicated by the distance of metacentric height  $GM$  . But when the ship is load by the fuel tank and free surface effect is taken in calculation, so the stability is depend on the fluid metacentric height  $G'M$ . From the value of  $G'M$ , we can estimate either the fuel tank which we design suitable and improve the ship stability.

In this design project, we will do a calculation to find the fluid metacentric height  $G'M$  of the ship after loading the fuel tank which we design. To find the  $G'M$ , we have to understand the element that will be used in stability calculation.

<b>Contents</b>	<b>Page</b>
Preface	i
Acknowledgement	iv
<b>1.0 INTRODUCTION</b>	
1.1 Objective	1
1.2 Scope of project	2
1.3 Brief history	3
<b>2.0 LITERATURE STUDY</b>	
2.1 Forces and moments	4
2.2 Centre of gravity	5
2.3 The metacentre	6
2.4 Metacentric height	7
2.5 Free surface effect	8
2.6 Free surface in divided tank	10
<b>3.0 RESEARCH METHODOLOGY</b>	
3.1 Design analysis	11
3.2 The original data	13
3.3 Ship diagram	15

<b>4.0 DESIGN</b>	
<b>4.1 Cuboid shape</b>	
4.11 Design 1	17
4.12 Design 2	23
4.13 Design 3	29
4.12 Design 4	35
<b>4.2 Prism shape</b>	
4.21 Design 1	42
4.22 Design 2	46
4.23 Design 3	50
4.24 Design 4	54
4.3 Metacentric height	58
<b>5.0 DISCUSSION</b>	<b>59</b>
<b>6.0 CONCLUSION</b>	<b>62</b>
<b>Bibliography</b>	<b>64</b>