



TAMBUKAT, SEREMBAN, NEGERI SEMBILAN

**A STUDY ON THE EFFECTS OF
COMPOSITIONS ON THE MECHANICAL
PROPERTIES OF POLYMER MIXED CONCRETE**

**MOHD ASWADI BIN ELIAS
(2000127818)**

**BACHELOR OF ENGINEERING (HONS)
(MECHANICAL)
MARA UNIVERSITY OF TECHNOLOGY (UiTM)
OCTOBER 2004**

357 - Fajar

358 - Anis Nur Hafizah

359 - Muzammil

ACKNOWLEDGEMENT

In the name of ALLAH, The Most Beneficent and Merciful. We praise Him and seek His blessings on His noble Prophet (peace be upon Him).

First of all, we give thanks to ALLAH who has enabled us to complete this project on time. Special thanks to our parents who have given their moral support, encouragement and advice. We wish to express our sincere gratitude and appreciation to our project advisor, PM Nor'Aini Wahab who has given us the very meaningful guidance and assistance in completing this project.

Apart from that, we would like to convey our appreciation to Mr Shahruzi and Miss Nadia who supervises our final project. Special thanks to Mr. Ziyadi, Strength Material Technician and Mr. Ahmad Khuzairi, Welding Technician who actually helped us during the operating our final project. Lastly, it is our pleasure to thank for those who have involved directly and indirectly in this project.

“May ALLAH Bless You”

ABSTRACT

The purpose of this project is to study the effect of different compositions on the mechanical properties of Polymer Concrete. The polymer concrete in which we are concern with composes of sand, talcum powder and resin. The total amount of sand, talcum powder and resin for all compositions are equal to 3500g. The resin that we chose composes of Polyester and Hardener M-50. We changed the compositions by changing the amount of resin and sand.

To study the mechanical properties of the composite, three tests were conducted, the tensile test, the impact test and the bending test. For each test, at least three specimens from the same composition were tested. For the tensile test conducted the composition gives a performance result in range of (479.7N – 824.4N). For a maximum tensile stress the result are (1.713Mpa – 2.944Mpa) and the increasing value of modulus elasticity from (340.279Mpa – 409712Mpa). For the bending test the increasing value of maximum bending stress from (2.43Mpa – 3.52Mpa). For a maximum bending strain the result are (0.025 – 0.035) and the modulus elasticity also showed the increasing value from (321.2Mpa – 397.5Mpa). For the impact test was conducted the result of the impact energy increasing from (2.74J – 2.96J).

TABLE OF CONTENTS

CONTENTS

ACKNOWLEDGEMENT

ABSTRACT

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Scope of project

CHAPTER 2 METHODOLOGY

CHAPTER 3 THEORY OF POLYMER SAND COMPOSITE

- 3.1 Composite
 - 3.1.1 Particle Reinforced Composite
 - 3.1.2 Advantages composites
- 3.2 Polymer
 - 3.2.1 Molecular Weight
 - 3.2.2 Advantages of Polymer
 - 3.2.3 Physical Properties of Polymer
- 3.3 Polymer Matrix Composite
 - 3.3.1 Geometrical Morphology
 - 3.3.2 Factors Leading to Good Polymer Filler Bonding
 - 3.3.3 Fillers
 - 3.3.4 Mechanical Properties of Particulate Filled Polymers
 - 3.3.5 Mixing and Dispersion

CHAPTER 1

INTRODUCTION

1.1 Introduction

Polymer concrete (PC) is a composite material in which the binder consists entirely of a synthetic resin concrete organic polymer. It is variously known as synthetic resin concrete, plastic resin concrete or simply resin concrete. Because the use of a polymer represents a substantial increase in cost, polymers should be used only in applications in which the higher cost can be justified by superior properties, low labor cost or low energy requirements during processing and handling. It is therefore important that engineers have some knowledge of the capabilities and limitations of PC materials in order to select the most appropriate and economic product for a specific application.

We study the composite and structure of the polymer concrete (PC) with some experimental work. Using the needed percentage mixture, we find the result to find the specific mixture of PC. To produce the PC, we use polyester resin, hardener M-50 as a cross-linking agent and a catalyst are mixed with sand as filler. Other ingredients added to the mix include talcum powder. The amount of hardener used is generally small and is usually determined by the size of the filler. Normally the hardener content will range