



CHAPTER I

INTRODUCTION

1.1 Background

Glass fiber reinforced plastics (GRP) are the most common composites generally used as engineering materials which are particularly occupied by metals and ceramics. Due to retention of strength in the lower weight, corrosion resistance, and electrical property, GRP and other kinds of fiber reinforced plastics (FRP) are going to substitute the old ones, especially in transportation field where weight is the dominant factor to energy saving that exactly leads to the lower costs. They are also extended to other applications such as containers, pipes, roofs, hardware's structure, and cover to household goods.

Due to high potential applications, fabrication industry of GRP or FRP is one of the rapidly growing industries. Many attempts play a great role to boost many new products or new applications. At present many techniques are continuously developed to produce various GRP products into the markets and one of the most interesting developments in recent year is concerned with glass mat thermoplastics. GRP fabrication in Thailand industry is rather just a new one, so both quality and quantity of the products are limited in the conventional products such as water tanks, chemical containers, roofs, etc. However, there are several prospects this industry would be a fast

growing industry in the near future.

1.2 Purpose of the Investigation

Composite materials are interested in many applications and gain larger inroads into structure and automotive applications that can substitute other materials. Advantages of these materials are light weight, corrosion resistance, high strength and flexibility, etc. In the previous days all polymer composition of composites was thermoset, however, at present thermoplastic also share the same role. Advantages of thermoplastic in composites are scrap recovery, product recyclability, unlimited shelf life of prepreg, low price of raw materials, tougher matrix, and no volatile matter during process.

Processing of a large part of thermoplastic composites is easily performed by using compression molding technique. Advantages of this technique are listed in the following categories: 1) low tooling cost; 2) various form and quantity of the fiber can be used; 3) simple process; 4) low maintenance and no destruction of the fiber during process comparing with other large part fabrication techniques. This study, the designed experiment was attempted to improve compatibility and mechanical properties of glass fiber reinforced polypropylene.

1.3 Objectives of the Study

The objectives of this study were as follows:

1. To study the preparation of glass fiber reinforced poly-

propylene by compression molding.

2. To improve compatibility between glass fiber and polypropylene.

3. To improve mechanical properties of glass fiber reinforced polypropylene by the following means:

- a. using optimum condition during process.
- b. using optimum glass fiber content.
- c. using glass fiber coated with appropriate surface treating agents.

1.4 Scope of the Investigation

The glass fiber reinforced polypropylene was prepared by compression molding at various processing conditions and then flexural strength, flexural modulus, microstructure, glass fiber content and void content were investigated. The procedure to reach these objectives was done as follows:

1. Literature survey and intensive study of the past research works.

2. Modification of hydraulic press machine to be able to fabricate thermoplastic composites.

3. Design and fabrication of a low speed cutting machine.

4. Study of the optimum processing condition

in the aspects of

- a. Temperature
- b. Pressure at melting stage
- c. Pressure at cooling stage or consolidating stage

- d. Holding time
5. Effect of the glass fiber content.
6. Effect of the surface treating agents.
7. Preparation of the specimens from glass fiber reinforced polypropylene sheets.
8. Determination of the mechanical properties of glass fiber reinforced polypropylene specimens.
9. Summary of the results and preparation of the report.