

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 PROJECT BACKGROUND**

As lifestyles change, plastics will become more valuable in architecture, aerospace, communication, transportation even to medicine and the arts. Plastics have been used in household equipment and so on. This is because the characteristics of plastics itself that are easy to fabricate and light weight. Plastics also have high wear resistance, high impact resistance, easily processing and corrosion resistance.

One type of plastics that commonly used in industries is Acrylonitrile-Butadiene-Styrene or known as ABS. The advantage of ABS is that this material combines the strength and rigidity of the acrylonitrile and styrene polymers with the toughness of the polybutadiene rubber. The most important mechanical properties of ABS are impact resistance and toughness. A variety of modifications can be made to improve impact resistance, toughness, and heat resistance. The impact resistance can be amplified by increasing the proportions of polybutadiene in relation to styrene and also acrylonitrile, although this causes changes in other properties. Impact resistance does not fall off rapidly at lower temperatures. Stability under load is excellent with limited loads. Thus, changing the proportions of its components ABS can be prepared in different grades.

Two major categories could be ABS for extrusion and ABS for injection molding, then high and medium impact resistance. As the used of ABS product has increased over the years, the product become waste because some company does not recycle the defect or unused product that they was made.

The ABS plastic also can be recycled. It is because the recovered polymers are compatible with virgin material and can be used for such product that are computers, office equipment, auto parts, telephones and also home appliances. The technology has proven successful in recovering the selected plastic from obsolete appliances, auto shredder residue, disassembled car parts, industrial scrap plastics and consumer electronics. For this project, dog-bone was prepared as the product recycled. Then, the product was crusher before mixed with the virgin ABS. By using injection molding, the part was produce in 5 sample based on standard ASTM. The part was tested to investigate the tensile strength using Ultimate Tensile Machine for tensile test.

## **1.2 PROBLEM STATEMENT**

Nowadays, many people use ABS because ABS is easy to fabricate and light weight. As the use of ABS has increased over the years, it has become a larger part of waste. Unfortunately, no process is currently known for effectively and efficiently recycling ABS for subsequent use. The present process for recycling ABS in a manner permitting previously used ABS to obtain a second life. The present process employs shredding, separating and blending to recycle used ABS for subsequent use in other products, for example, substrates of decorative laminates.

The recycling ABS has been studied before but in the different scope by R. Scaffaro, L. Botta, and Di Benedetto (Physical properties of virgin-recycled ABS blends: Effect of post-consumer content and reprocessing cycle). They focus more on the how many times ABS can be re-processing and re-formed. Based on their experiment, there are

only three times ABS materials or product can be recycled [1]. Even though many researchers study about recycled ABS, but they do not totally focus on mechanical properties.

Therefore, this project was built to study the percentage of mixed ABS that is suitable to recycle. So, when it can be recycled, the waste of material can be reduced. Recycling plastics reduces the amount of energy and natural resources (such as water, petroleum and natural) needed to create virgin plastic. Recycling plastic products also keeps them out of landfills and allows the plastics to be reused in manufacturing new products.

### **1.3 OBJECTIVE**

The objectives of this project are:

- To design the mold to produce the dog bone shape as a specimen that will be used in this study.
- To investigate the tensile strength of ABS, in terms of recycled ABS mixing percentage.
- To find the suitable percentage of recycled ABS that can mix with virgin ABS by having the highest value of tensile test.

### **1.4 SCOPE OF PROJECT**

The project used virgin ABS mixed with recycled ABS. This is because ABS has a good balance of properties, toughness, strength and high quality surface. This material was melted and extruded into the form of small size which is then used to manufacture other products. Then, the material was injected into injection molding and tested using tensile test. The shape used for testing is dog-bone shape. In designing the dog bone shape, we follow the standard ASTM-D638 tensile bar. The result to be studied is tensile