

UNIVERSITI TEKNOLOGI MARA

**DESIGN AND FABRICATION OF
PET BOTTLE FILAMENT**

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Dissertation submitted in partial fulfillment
of the requirements for the degree of

**Diploma
(Mechanical Engineering)**

College of Engineering

Jul 2023

ABSTRACT

Making PET bottle filament is a promising way to recycle PET bottles and turn them into useful 3D printing materials. The main features of PET bottle filament manufacture, including the advantages and prospective uses, are outlined in this abstract. Recycling PET bottles into small flakes and processing them through washing and drying are all steps in the creation of PET bottle filament. When fed into an extrusion machine, the clean, dry PET flakes are melted and extruded through a tiny aperture to create a continuous thread. After cooling, the filament is wound into spools and put through quality control tests. There are various benefits to making PET bottle filament. First off, it contributes to the solution of PET bottle waste by converting used bottles into a useful resource. Furthermore, PET bottle filament has great dimensional stability, heat resistance, and durability, making it appropriate for a variety of 3D printing applications. Additionally, using recycled PET to make filament lessens reliance on virgin plastic resources and promotes environmental sustainability. PET bottle filament has a wide range of potential uses, from art and crafts to small-scale manufacturing and prototyping. Its interoperability with the majority of FDM 3D printers enables the development of practical prototypes, specialised components, and creative creations. Additionally, PET bottle filament is employed in educational settings to encourage sustainability and recycling. To make that its diameter, tensile strength, and flexibility meet the required standards. In conclusion, producing PET bottle filament offers a creative and environmentally responsible way to reuse PET bottles while producing a high-quality 3D printing material. PET bottle filament advances circular economy ideas and promotes a more sustainable manufacturing sector thanks to its potential for a wide range of applications and favorable environmental impact.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my diploma and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor, Mr. MUHAMAD FARIS SYAFIQ BIN KHALID

Finally, this dissertation is dedicated to my father and mother for the vision and determination to educate me. This piece of victory is dedicated to both of you. Alhamdulillah.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Since plastic items are being produced in industrial quantities on a global scale, environmental contamination brought on by plastic waste has become a problem. A significant portion of the environmental impact is attributable to global supply networks and large-scale manufacture of goods. With over 1,550 manufacturers and about 2 million tons of resins for plastics produced locally each year, Malaysia's economy has experienced rapid growth, making it one of the largest producers of plastics in Asia (Wahab, Abidin, and Azhari, 2007). This rapid growth has also resulted in a significant amount of waste being produced, particularly in rural areas.

Therefore, the goal of this project is to build and create a low-cost filament extruder machine that can specifically produce 3D filament from waste products made from shreds of bottle plastic polyethylene terephthalate (PET) as well as to identify the best parameters for extruding the PET bottle plastic to 3D filament.

1.2 Problem Statement

Plastic waste is a major issue; therefore it would be great if some of it could be recycled into something helpful. Furthermore, the vast majority of polymers used today are thermoplastics, which are technically suited for 3D printing. Besides that, the cost of filament for 3D printing is quite expensive. So, by using the PET as our raw material we can reduce the cost to get the filament.

1.3 Objectives

The main objectives of this project are: