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DESIGN AND FEBRICATION OF PET 3D FILAMENT MAKING MACHINE FROM WASTE PET BOTTLE

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Abstract: 3D printing is a form of additive manufacturing technology where a 3D object is created by laying down successive layers of material. It is mechanized method whereby 3D objects are quickly made on a reasonably sized machine connected to a computer containing blueprints for the object. As 3D printing is growing fast and giving a boost to product development, the factories doing 3D printing need to continuously meet the printing requirements and maintain an adequate amount of inventory of the filament. As the manufactures have to buy these filaments from various vendors, the cost of 3D printing increases. To overcome the problem faced by the manufacturers, small workshop owners, the need of 3D filament making machine arises. This project focuses on designing and fabricating a portable fused deposition 3D printer filament making machine with cheap and easily available components to draw 2 mm diameter ABS filament.

INTRODUCTION

A 3d printer is an additive manufacturing technique where 3D objects and parts are made by the addition of multiple layers of material. It can also be called as rapid prototyping. It is a mechanized method where 3D objects are quickly made as per the required size machine connected to a computer containing blueprints of any object.

The additive method may differ with the subtractive process, where the material is removed from a block by sculpting or drilling. The main reason to use 3d printer is for 90% of material utilization, increase product life, lighter and stronger. 3D printing is efficiently utilized in various fields such as aerospace, automobile, medical, construction and in manufacturing of many household products.

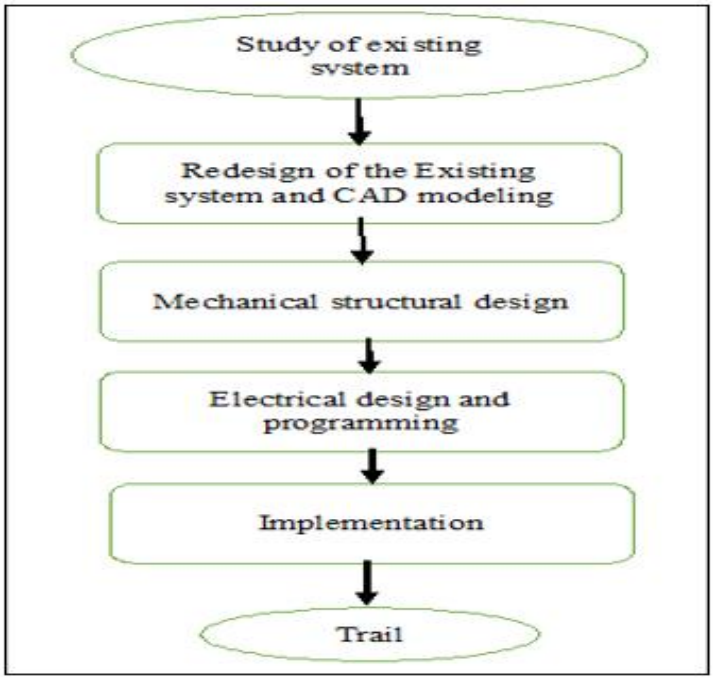
Nowadays we are using 3D printed parts in each project, components are tiny, however we need them to be sturdy, for instance, gears, clutches, motor mountings. Scientists are developing techniques to enhance mechanical properties of prints. The chances that 3D printing provides us are irreplaceable, very low price, speedy stage of computer aided design conversion into a true object, 3D printing permits us to form parts that are inaccessible by alternative methods. Throughout the prototyping, a lot of filament and components are discarded as waste as unsuccessful prints, poorly designed models or poor print optimization. Making a totally satisfying print brings a lot of unused material that goes into the bin.

OBJECTIVE

1. Create a plastic filament extruder for 3D printing by designing and developing one.
2. The goal was to make filament with a diameter of 1.75 mm from ABS pellets.
3. Create a 3D printing filament extruder that can be utilised by small-scale manufacturing units, businesses, and universities that have a portable 3D printer on hand.
4. Conduct design calculations in order to guide the creation of a filament-making extruder.

PROJECT METHEDOLIGY

The methodology and stages in designing of the proposed model is shown in the Figur



We wanted normal plastic bottles to be tested in 3D printing filament. Here's a summary of the steps we took to test converting PET bottles to filament:

1. Water bottles collected, cleaned (properly) and also removed any extraneous caps or seals.
2. The top of the bottle is trimmed. A long 10mm width strip is made by using the specially designe cutter.
3. The strip width can be regulated depending on the thickness of the material.
4. The next step is to wind the plastic string on the bobbin.
5. The PET was then fed into the filament extruder.
6. After several tests on various nozzle diameters and temperatures, we ended up with a great result of PET Filament

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We are learn a lot from this project about Design and Fabrication of PET Filament Making Machine.

CONCLUSION

Recycling. A word often related to large companies receiving tons and tons of paper or plastic in an effort to reduce our carbon footprint. However if we look at plastic bottles for instance, humans buy a million plastic bottles per minute, and 91% of all plastic is not recycled. This article is going to cover what makes plastic recycling so important, how to recycle PET and the future of recycling in 3D printingThe biggest issue that faces 3D printing recycled filament dirt. With the above experiment, just cleaning those bottles took a great deal of effort. Now imagine doing it with tons of plastic, often coming from dumps that have been contaminated all forms of impurities.Also, one has to take note that different types of plastic produce different types of filament. High-density polyethylene — shampoo bottles, for example are relatively easy to convert into filament, but it's difficult to print with because it shrinks more than other plastics as it cools. On the other hand, PET, prints well but is brittle, making it difficult to spool as filament.

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