Recycling Polyethylene Terephthalate to Reduce Plastic Waste

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Each year, 76% of plastic waste is sent to the landfill, 16% incinerated polluting our airways, and 7% lost to pollute the environment. I wanted to find a way to recycle plastic water bottles at home to prevent plastic waste and limit strain on waste management infrastructure. I built a filament extruder to turn plastic water bottles into filament for use in 3D printing. I then measured the percent error of the filament diameter to determine the accuracy of the filament produced which is important due to the low tolerance of filament required by 3D printers. The filament extruder melted and ejected shredded plastic water bottles to form recycled filament which I compared to store-bought filament. The recycled filament had a higher tolerance than the store-bought filament with a percent error of 2.7% versus a percent error of 1.7%. Furthermore, a MANOVA statistical test determined that there was no statistical significance within or between the diameters of the store-bought or recycled filament. Approximately 50 twelve-ounce plastic bottles can make 322 meters of filament, which is a standard size for rolls of filament. This enables households and businesses to reduce the need for the creation and use of new plastics, providing a sustainable and cost-effective alternative to buying 3D printing filament.

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