

Extraction of Strip from Waste PET (Plastic) Bottles

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Abstract: Plastic bottles are becoming a growing segment of the municipal solid waste. While plastic bottles offer convenience, they also create unnecessary waste in landfills. This paper intends to investigate the application of plastic bottles as one of the urban wastage in water tank construction and that how it can lead to sustainable development. This paper also includes different factors such as cost, load capacity and reducing waste. Plastic bottle block may be more effective compared to some conventional building materials such as brick. We made efforts towards waste plastic bottle used as construction material. PET bottles produced in China/Turkey and consumed in Germany result in the highest values for all impact categories. This was due to the longer transport distance. In both cases, transportation of materials contributes most to environmental impact.

Keywords: PET Bottles, Urban Wastage, Plastic pollution.

1. Introduction

Plastic has toxic pollutants that damage the environment and cause land, water, and air pollution. It can take hundreds or even thousands of years for plastic to break down, so the damage to the environment is long-lasting. Overuse of plastic is the main cause of plastic pollution. Plastic is cheap and widely available, but people frequently dispose of plastic items. They don't decompose, and they release an incredible amount of toxins into the air if they're burned. Regular, everyday trash is one of the biggest contributors to plastic pollution. Milk cartons with plastic linings, disposable water bottles, soaps with small plastic beads, and other products end up in the environment or in dumps where they can affect the groundwater and nearby wildlife. Commercial fishing nets are another big issue. Although fishing is necessary for the economy and for food supply in many regions, nets are often made of plastic. When the nets are submerged in the water, they leak toxins. They can also break or get lost, adding even more pollutants to the water.

The pollution in the ocean is mostly from plastic, and it has a terrible impact on marine species. As a result, it can hurt the economy and food supply for communities that rely on fishing. Plastic can hurt tiny organisms like plankton, which larger animals rely on for food. If small organisms are poisoned from ingesting plastic, the animals that eat them will also consume toxins. The toxins work their way up the food chain and can

even be present in the fish people eat. Not only does plastic cause damage to the ocean, but it can also damage groundwater sources.

Plastic toxins in dumps and from litter can seep into the groundwater, which people drink every day. On land, wind can carry plastic waste or litter throughout the environment. It can get stuck in trees, fences, traffic lights, or other structures. When animals come into contact with this plastic waste, they risk consuming the toxins or becoming entangled in the plastic and suffocating. If an animal consumes a piece of plastic, the plastic can clog its stomach while also poisoning it with toxins. Almost 200 different species of animals are known to ingest plastic debris. Air pollution is another issue for humans and animals. When plastic is burned in the open air, it releases large amounts of toxins, which pollutes the air. If the toxins are inhaled for a long period of time, it can lead to respiratory problems. In addition to harming plants, animals, and people, it costs millions of dollars every year for cleanup of areas exposed to plastic toxins. Many regions have seen a decrease in tourism because of the amount of pollution in their environment, which can have a serious impact on local economies.

PET bottles now have a big share in the water bottle market recently because of the fact that it is durable and unbreakable and does not cause any changes in the transparency and doesn't interfere and contaminate the taste of water also. Plastic has become a fixture in our lives and we have to accept this as a reality. It is next to impossible to completely eliminate the usage of PET. Although plastic water bottles are convenient, hygienic, and durable. No curing is necessary if waste PET bottles are used as building material as compared to brick.

2. Related work

A. Components required

In this project Report MS Frame Model, PVC Pipe, 12V PMDC Motor, Reduction Gear Box Bearings, Cutter Blades, Toggle Switch, 1sq.mm Wire etc. are used as shown in block diagram.

1) MS Frame Model

MS Frame Model is constructed using 1-inch angle of MS size and frame is kept as 3 feet in length, 3 feet in width, 2 feet

in depth. (3x3x2). The upper size of the frame on one end, 4 MS bar of 12 mm diameter are welded by keeping the distance of 23 cm between each other. Function of MS frame model give support to the whole assembly.



Fig. 1. MS frame model

2) PMDC Motor

Working Principle of Permanent Magnet DC Motor or PMDC Motor:

As we said the working principle of PMDC motor is just similar to the general working principle of DC motor. That is when a carrying conductor comes inside a magnetic field, a mechanical force will be experienced by the conductor and the direction of this force is governed by Fleming’s left hand rule. As in a permanent magnet DC motor, the armature is placed inside the magnetic field of permanent magnet; the armature rotates in the direction of the generated force.

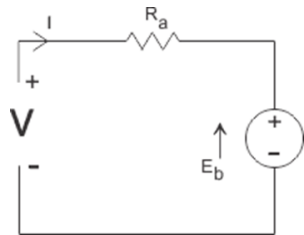


Fig. 2. Equivalent circuit of PMDC

As in PMDC motor the field is produced by permanent magnet, there is no need of drawing field coils in the equivalent circuit of permanent magnet DC motor. The supply voltage to the armature will have armature resistance drop and rest of the supply voltage is countered by back emf of the motor. Hence voltage equation of the motor is given by,

$$V = IR + E_b$$

Where, I is armature current and R is armature resistance of the motor. E_b is the back emf and V is the supply voltage.

In a DC motor, an armature rotates inside a magnetic field. The basic working principle of DC motor is based on the fact

that whenever a current carrying conductor is placed inside a magnetic field, there will be mechanical force experienced by that conductor. All kinds of DC motors work under this principle. Hence for constructing a DC motor, it is essential to establish a magnetic field. The magnetic field is established by using a magnet. You can use different types of magnets – it may be an electromagnet or it can be a permanent magnet. A Permanent Magnet DC motor (or PMDC motor) is a type of DC motor that uses a permanent magnet to create the magnetic field required for the operation of a DC motor. The motor that drives these toys is nothing but a permanent magnet DC motor or PMDC motor. These types of motors are simple in construction. They are commonly used as a starter motor in automobiles, windshield wipers, washers, for blowers used in heaters and air conditioners, to raise and lower windows – and they are extensively used in toys.

As the magnetic field strength of a permanent magnet is fixed it cannot be controlled externally, field control of this type of DC motor cannot be possible. Thus permanent magnet DC motor is used where there is no need to control the speed of the motor (which is usually done by controlling the magnetic field). Small fractional and sub-fractional KW motors are often constructed using a permanent magnet.

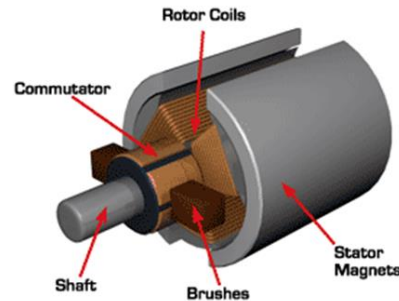


Fig. 3. PMDC motor construction

3) Reduction Gear Box



Fig. 4. Reduction gear box with motor

When a rotary machine such as an engine or electric motor needs the output speed reduced and/or torque increased, gears are commonly used to accomplish the desired result. Gear “reduction” specifically refers to the speed of the rotary machine; the rotational speed of the rotary machine is

“reduced” by dividing it by a gear ratio greater than 1:1. A gear ratio greater than 1:1 is achieved when a smaller gear (reduced size) with fewer number of teeth meshes and drives a larger gear with greater number of teeth. While in many applications gear reduction reduces speed and increases torque, in other applications gear reduction is used to increase speed and reduce torque. Generators in wind turbines use gear reduction in this manner to convert a relatively slow turbine blade speed to a high speed capable of generating electricity. These applications use gearboxes that are assembled opposite of those in applications that reduce speed and increase torque.

3. Construction of Thermoelectric Refrigerator

1) Plastic Bottles into String

When in a scavenging survival situation rope and string to tie stuff up is very valuable. Here is how you can turn scrap plastic bottles into surprisingly strong string or ribbon or rope.

1. Find a plastic bottle. Two liter, bigger soda bottles or PET bottle work great
2. Remove the label
3. Rinse out the bottle so that your string isn't sticky
4. Cut off the bottom of the bottle
5. Take your knife or scissors and cut the bottle in a spiral pattern.

Clarification: Cut the bottle starting at the bottom as if you are going to cut just a ring off of the bottom. But instead angle the first couple of inches of the cut so that the bottle is cut as a tiny thread but keep grows in thickness until you reach get the string as wide as you want it. This could be 1/32 of an inch or a 1/2-inch ribbon. You just keep slowly cutting in a spiral pattern further and further up the bottle towards the cap until you run out of bottle. Simple and relatively easy but strong cordage to tie up all kinds of stuff. You can use it just like string. You can heat up the knots you tie to melt the knot so it doesn't slip or come untied. Heating weakens the plastic a little so only do this if you need too. Also melting the knot prevents you from using that portion of the plastic string again. Now what if you want rope? Simply use multiple strings wound together to form a rope just like regular rope is made.

If you want to prepare ahead of time there are a few simple devices that you can make that will make the job of making bottle string so much faster and easier. It is really simple to make too. You will need a piece of channel iron. It can be made of hard metal or something such as aluminum. The lighter the better I say. Channel iron is a simply square tubing but with one of the 4 sides missing. It will look like this. Now drill a hole straight through so that the drill bit goes through two sides of the channel iron. This hole needs to be just big enough to fit a piece of all thread through the holes. Now take a piece of all thread and make a very slight bend the rod. About 15 degrees should be good. Put the all thread through the holes until the bend reaches the channel iron. Now secure the rod in this position with washers and nuts. Now take a hacksaw and cut into the corner of the channel iron until your cut creates a

hole/gap in the channel iron. Now make another cut or two just like the first close to each other but each cut will be of different sizes. This will make the string different widths. The width matches the cut/hole in the metal. Now you will need either a regular razor blade or even the blade from a pencil sharpener. Glue or weld the blade such that the blade is inside of the channel iron and the sharp edge is in the corner where the small cuts are. The blade will effectively cover up one side of the cut slits in the channel iron.

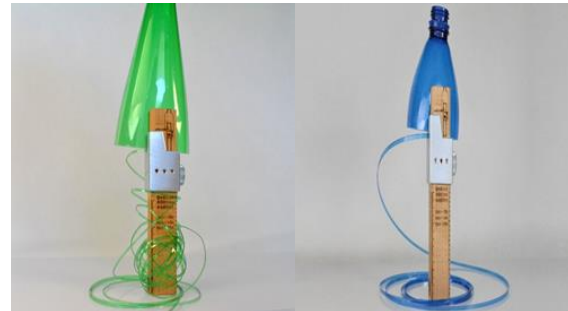


Fig. 5. Plastic bottles into string

The project work model is constructed using various material like 1-inch angle of ms, MDF, AL sheet, PVC sheet etc. and using various component like stainless steel and cutter, PMDC motor, wire, PVC pipes, wires, Switches etc.

The Base frame is constructed using 1-inch angle of MS size and frame is kept as 3 feet in length, 2feet in depth, 3 feet in width. The upper size of the frame on one end, 4 MS bar of 12 mm diameter are welded by keeping the distance of 23 cm between each other placed is arranged in central alignment. Even these bar a MDF plate of size 12-inch width, 3 feet long is placed, that is 8 mm thick. These bar passes through MDF plate. This base plate of MDF supports cutter assembly. The cutter assembly is made with help of tick wood, of size 25mmx30mmx50mm. The cutter assembly is handmade, on this wooden piece a vertical cut is made up to depth of 3/4 inch using hack saw, two horizontal cut are made using hack saw of depth 6 mm. first cut is kept at distance of 4 mm from end of vertical cut, the second cut is kept at distance of 7 mm from the same reference point. The cutter blade can be fixed in these horizontal slot.

A movable Aluminum link is fixed with the help of screw that keep the cutter blade in position at other end of the main frame of spindle made of PVC pipe of diameter 40 mm with the help of bearing no. 60822 this spindle is made to rotate using a PMDC motor. Another PMDC motor is attached in the side of project frame that is used to cut the base of PET bottles. At the frame base power supply is fitted that supply 12V DC, 4A electricity to the Dc motor. The base cutter assembly simply made using PMDC motor and cutter attached to it.

The base cutter assembly is provided with a guide way to accommodate and guide to be cut the strip of plastic bottles from the main cutter are extended manually in the beginning and then are attached to the spindle fitted in the assembly. These

strips are fixed using an aluminum latch that can be screwed. This motor turn once in the desired direction of rotation and turned the PET bottle is extracted in to a rope like strips to be used further

of life from urban cities (Mumbai Delhi Bangalore, etc.). Plastic bottles are reduced in other forms. It creates employment. Air quality index improve.

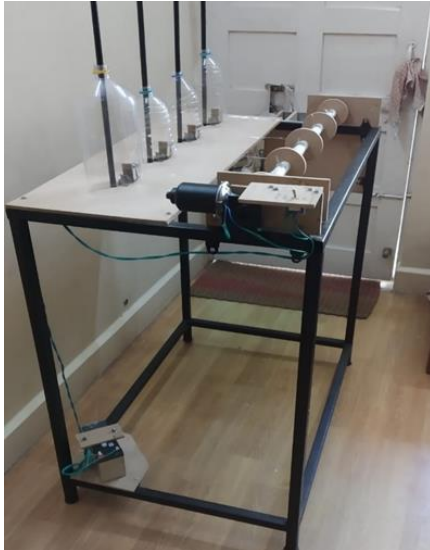


Fig. 6. Working model

4. Conclusion

By using this technique, we reduce pollution. Save millions

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