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Waste Plastic Bottle as a Substitute of Binding Wire in Structures

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Abstract: Today we all are in the world in which high-rise building, structures and towers are the main identity of any country. All of the people describe the beauty of our country through the reference of some most beautiful or high-rise structure of our country. In construction industry, there is more competition to show our ability in the field of construction with intelligence. Due to more construction works at this time, the main problem that occurred is 'how safe your structure is as compare to others'. Disposal of non-bio-degradable substance has become a major concern nowadays. Mounds of plastic garbage has been creates on earth surface. The disposal of waste plastic (PET, PP etc.) is biggest challenge nowadays. Only one in six plastic bottles is properly recycled. As we, all know that, the main component or material in any structure is steel after the concrete. Most of the cost of any structure is depends on 'how much steel are to be used in the structure', so in this research study we introduce a method to reduce a cost as well as the weight of steel by using waste plastic. In this the binding wires, which are to be used in structure to binding up the main and distribution steel for stable or proposed design purposes, are to be replaced with plastic binding wire which are prepared through the waste plastic bottles.

Keywords: Structure, Steel, Concrete, Waste Plastic Bottle.

I. INTRODUCTION

A structure is defined as- "A system of interconnected member assembled in a stable configuration and used to support a load or combination of load under the equilibrium of various external forces and internal reactions". The load can have vertical or lateral effects on the structure components.

The structural members connected together by providing different types of joints or supports. In the structure the steel bars are connected with the help of binding wires which provide stability to the members.

II. INTRODUCTION OF BINDING WIRE

Binding wire materials have galvanized wire, stainless steel wire, PVC coated wire, brass wire, aluminum wire and so on. It is soft, ductile and having high strength and is easily bent and tied in a knot. Binding wire, with heat treatment, will have high strength and become softer. Covering the wire with zinc, so that its resistance to corrosion achieved. Galvanized binding wire has a matte or shining finish and it is easy to oppose the negative effects of the environment. PVC coated binding wire also resist the corrosion.

III. PLASTIC BOTTLES

The plastic bottles are constructed from high density plastic. Plastic bottles are typically used to store liquid such as water, soft drinks, motor oil, cooking oil, medicine, ink and other fluids. The size ranges from very small bottles to large carboys. Plastic was invented in the 19th century and was originally used to replace common materials such as ivory, rubber and shell. Plastic bottles were used commercially in 1947 but remained relatively expensive until the early 1950's when high-density polyethylene was introduced.

IV. MANUFACTURING TECHNOLOGY

In this paper, the discussing is about, how we can prepare a waste plastic bottle to use as a binding wire for tying up the bars. The transformation of plastic bottles into binding water is completed in following two-stages (which are similar to the making of steel binding wires).

In the First stage bottles should be cut into the long thin form of wire with the help of generic bottle cutter, in this the plastic bottles are converted into ropes or threads.

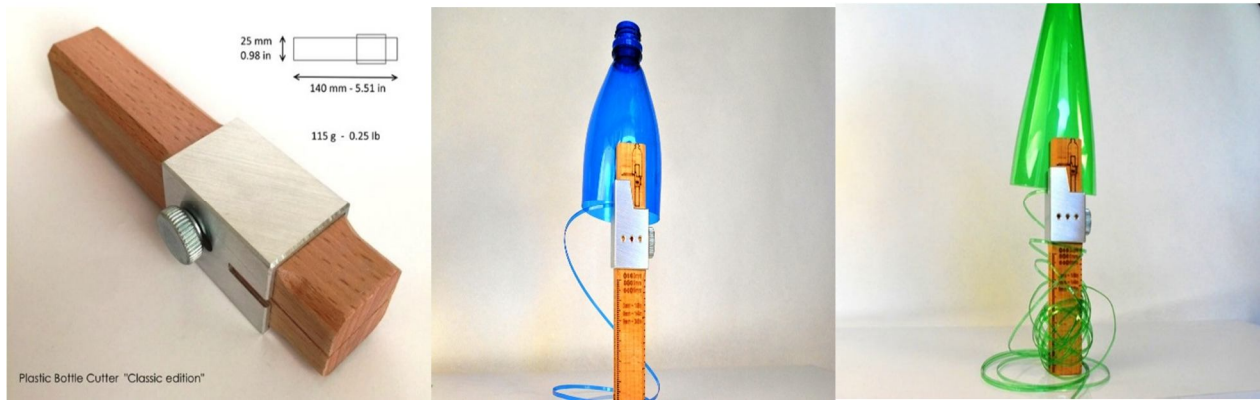


Fig. 1 Generic Bottle Cutter

In the Second stage, passes the ropes under the high pressure through a hole by drawing it in a circular cross section having a diameter of 0.16mm – 2mm. The most common use diameter is 0.8mm, 1mm and 1.2mm

The other way to use plastic ropes as a binding wire in structure with the help of automatic tying machine, rebar tier tool strapping 8mm- 34mm wrench.



Fig. 2 Binding Wire-Tying Machine

But the little changes needed for this material at the time of action machine is tie up the bars and this when they end the work both the end of wire is to be stick together with providing the heat through the machine, so as a result the knot is not able to displace easily.

V. COMPARISON BETWEEN STEEL BINDING WIRES & PLASTIC BINDING WIRES

TABLE I

Parameters	Steel Binding Wire	Plastic Binding Wire
Material	Steel , Iron	Plastic, Polyethylene
Process	Manufacture in factory or large scale industries.	Manufacture on site and also in factory
Environment effect	Absorb moisture and gets corrosion	Doesn't absorb moisture
Quality	With increase in quality price increases	Depend upon the plastic bottle type
Price	Approx. Rs. 40-Rs. 60 per kg	Less than Rs. 20 per kg
Tensile strength	Less	High
Elasticity	Less	High
Shape	Rolled wire	Rolled wire or slightly thin ropes



VI. EXTRA INFORMATION ABOUT TOOLS & MACHINE

- A. MAKITA 18V LXT DTR180 Brushless Rebar Tying Tool.
- B. Generic Bottle Cutter Environmental DIY Craft Plastic Rope Tool.
- C. Zerone Portable Creative DIY Craft Plastic Bottle, Rope Cutter Tools.
- D. HITSAN Incorporation Automatic Handheld Rebar Tier Tool Building Tying Machine Strapping Electrical Equipment 6mm-25mm

VII. CONCLUSION

In this research, we observed that we could use plastic bottles as the binding wire to tie up the bars in structure. Because use of innovative material with sustainable application such as plastic bottles can have considerable benefits including finding the best optimization in the energy consumption of the region reducing environmental degradation.

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