International Journal of Research in Advent Technology, Vol.3, No.7, July 2015
E-ISSN: 2321-9637

Utilization of Plastic Waste and Iron Slag as Road Filling Material

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Abstract-The quantum of plastic waste in municipal solid waste is increasing due to increase in population, development activities , urbanization and changes in life style which leading widespread trashing on the landscape and it destroying environment life cycle. The disposal of plastic waste is harmful and become serious problem due to their non-biodegradability and unaesthetic view .Apart from this at some places of rural as well as in urban area the road become damaged (pits and holes) due to poor quality and not proper maintenance so with proper utilization of plastic waste and iron slag we are preparing with the combination of 80% Plastic + 20% Iron Slag as a road filling material so that we can minimize the garbage of society as well as repair road and prevent from minor or major accidents due to damaged road.

Index Terms- Municipal Solid Waste **,** Plastic , Iron slag.

1. INTRODUCTION

As in current scenario due to increase in population, urbanization and other development activities the uses of plastic or polythene are continuously increases for daily use. After banned through government still it is continuing in supply and demand in market for domestic purpose. But the proper disposal of these wastes is yet not properly decided by any society or any government. For properly utilization of it here we introduce composition of iron slag and plastics. Plastics are polymers, a very large molecule made up of smaller units called monomers which are joined together in a chain by a process called polymerization. The polymers generally contain carbon and hydrogen with, sometimes it includes other elements such as oxygen, nitrogen, chlorine or fluorine. These plastics are not just polymers which can be molded or extruded into desired shapes but often contain additives that improve their performance. According to the polymer used, the synthetic and semi-synthetic plastics can be designed with a broad variation in properties that can be modified by the addition of such additives [4,5]. And in other way Iron Slag is the co-product of a Iron production controlled process, ,which results in a very uniform composition from source to source. Iron slag cement does not contain carbon and does not cause instability in the entrained air content [3].

2. LITERATURE REVIEW

According to *Tara sen et al. 2010* the waste materials are fly ash, blast furnace slag, cement kiln dust and phosphogypsum which are the industrial wastes posing problems in the disposal and being deposited near the industries in the state of Orissa. The following are the conclusions made from the study:
i.Blast furnace slag has been used as a cementitious binder in road construction.
ii. Blast furnace slag provides a great potential for profitable use of this waste material and produces alternate binder to cement.
iii Just as foundry slag has been used as a substitute for native coarse aggregate in concrete mixtures, blast furnace slag has also been used in asphalt mixtures.
iv. Many steel plants have used their slag as a substitute for coarse aggregate in road construction projects in and around the steel plants for a number of years. In many cases, it has been used as the single source of material for gravel road construction. In other instances, it is used for roadbed, base course, or sub base material [2].

Vatsal Patel et al. 2014 says in his research that most of the paved roads in our country have granular sub base and base; bituminous base and wearing courses. The past practice of providing thin wearing coat of 20 mm premix carpet with seal coat was to allow deformation in granular layers to take place once road is opened to traffic. After the layers get compacted then thick bituminous wearing course was provided. Plastic is a very versatile material. Due to the industrial revolution, and its large scale production plastic seemed to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, electronics, electrical, building construction, communication sectors has been virtually

revolutionized by the applications of plastics.
Waste plastic is ground and made into powder; 3 to 4 % plastic is mixed with the bitumen. Plastic increases the melting point of the bitumen and makes the road retain its flexibility during winters resulting in its long life. Shredded plastic waste acts as a strong "binding agent" for tar making the asphalt last long. By mixing plastic with bitumen, the ability of the bitumen to with-stand high temperature increases [1].

3. OBJECTIVE

As a social responsibility we should make our province and nearby area clean and safe. Due to the large usage of polythenes and plastics, land and water sources area become pollute and also unaesthetic view. As shown in fig 3.1 damaged road which inviting for accident so with the help of above two reference paper we get idea for utilization these wastes in proper way for damaged road development.

Fig 3.1 Damaged road with pits and holes

4. METHODOLOGY

Accordingly proposed plan of my research firstly we collect raw material i.e. the iron slag and plastic waste. Plastics are in the form of polythene & bottles from nearby area and then all plastics crushed in proper specification crushed machine. After crushed we get the plastics in fragmentary form .The iron slag heated up to the temperature of 160^0C-170^0C in which we mixed up the fragmented plastics. Melting forms occurs in plastic during heating. The combination of plastic and iron slag formed a slurry which instantly use for road holes filling because solidification time is very short. By the above mentioned method we have already prepared a sample product with different composition.

5. RESULT

Three tests have been tested by above method, first test of 80% slag + 20% water mixture is not so hard and easily destroyed when compressed, second test 60% slag + 20% Gypsum + 20% water mixture is also not suitable and third 80% plastic + 20% slag as shown in figure 5.1 is having some high Compressive strength 8N/mm^2 than other so it may be more suitable and reliable as a road filling material.

Fig 5.1 Plastic & Slag mix Product with 3.0'x 2.0'x 1.5'

6. CONCLUSION & FUTURE SCOPE

By the using of proper method we can utilize the unaesthetic wastes and prevent our province from unplanned diseases and can also complete our social responsibility after repairing road. For future scope we are trying to convert and use of these waste as a insulated material and use to cover roof top platform.

Acknowledgments

I am very much thankful to my dear students Rohit Chalpe , Neeraj Kumar , Praveen Dewangan , Pramod Yadav for helping me to collection of raw materials and for further process also want to say thanks my HOD Mr. Bhupesh Verma and Principal Dr. B.D.Tharakan for supporting me .

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