

# A Study on Plastic Waste for Replacement of Coarse Aggregate with Soft and Hard Plastic in Concrete

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**Abstract:-** As the today in the fastest growing word the construction around the world is on the peak and as we know that in building construction concrete is the main constituent apart from that in today time. the plastic waste is one of the most dangerous pollutant for environment because to degrade plastic take throughout of the year. the idea behind this reachers is to overcome these plastic waste with the construction material in order to overcome the environmental problem that the word are facing .this paper aim to review the using to this plastic with replacement of course and fine aggregate and its effect on the property of concrete like workability, Tensile strength test and other tests are separated into compressive strength test and other tests. And on a partially replaced concrete specimen size (150mm X 150mm X 150mm) cube, the results were checked after 7 days, 14 days, and 28 days, and compared to a conventional concrete cube that had 0% percent plastic trash mixed in. Replacement of natural aggregates by recycled plastic aggregate can be as a sustainable development approach toward environmental friendly construction approaches and our test we verry the percentage of plastic 0 to 25% percent by the volume of concrete and adopt mixed design as IS and check its property.

**Keywords:-** Recycle Aggregate, Plastic Waste, Construction Material.

## I. INTRODUCTION

Disposal of waste in environment is generally a big problem due to its low biodegradability and it will increase day by day and quantity increase .Plastic waste is increasing continuously specially in the form of throw away packaging such as polyethylene water bottle. Plastic disposal has a lower recyclability rate then other type of material such as glass and paper. Non load bearing concrete block for safe and efficient use can be manufactured using plastic flakes as a partially replacement with aggregate. therefore finding alternative method for disposing waste by using friendly method are becoming a major research issue. Plastic garbage dumped in the environment is seen as a major or significant problem. because of its limited biodegradability and large amount current industrial and urban applications Polypropylene and polyethelene, terephthalate waste are used to replace a portion of the traditional concrete aggregate. Polypropylene, polyethylene, terephthalate, and polystyrene make up the

majority of plastic garbage. Waste reuse is essential from a variety of perspectives.

It help to save our sustainable nature resources that are not replenished. beside using of plastic waste material in concrete mix will not only be its safe disposal and dumping technique but may get improve the concrete properties like tensile strength chemical resistance drying, shrinking and creep and shorts and long term basis. Today sustainability has get top priority in construction industries. Recently Plastic work used to prepare the course aggregate . This provides a long-term solution for dealing with plastic waste. As a result, plastic trash recycling is an important topic to discuss in order to reduce pollution and resource waste. Polyethylene is a semi-crystalline plastic with exceptional chemical resistance, good corrosion resistance and good fatigue and wear resistance. It provide good resistance to organic solvent and strength with low moisture absorption.

## II. LITERATURE REVIEW SURVEY

**Dr. M Lokeshwari<sup>1</sup>, Nikunj Ostwal<sup>2</sup>, Nipun K H<sup>2</sup>, Prakhar Saxena<sup>2</sup>, Pracheer Pranay<sup>2</sup> 2019(1)**, according to all the reachers he tested property like compressive strength and conclude that both the fresh and hardness state property tends to decrease as the percentage replacement of plastic in concrete mix increases all curing ages.

**Edmund T.S.J.\*<sup>1</sup>, Jun Hon C.<sup>2</sup>, F Hejazi and M. S. Jaafar 2018 (2)**, the main conclusion according to this can be dwawn that as we replace the aggregate by some percentage amount of coarce aggregate then compressive strength is significantly lower than the ordinary OR controlled concrete and also have some conclusion for the slump test also where higher percentage to irregular cutting shape of plastic, angularity as well as the smooth surface of the plastic used by the substitution.

**Lhakpa Wangmo Thight Tamanges(3)**, In 2017 hi performed on plastic aggregate as coarse aggregatethey perform taste on mechanical property of concrete containing plastic aggregate with various proportion of 10% 15% and 20% and they found that decrease in strength of concrete with increase with plastic waste and he obtained optimum result at 15% of plastic replacement.

**Ashwini Manjunath B T(4)**, In 2015, they employed e-plastic waste as a partial replacement for course aggregate in concrete. Plastic can be utilised to substitute course aggregate in concrete mixtures to some extent.. this contributes to

reducing the unit weight of concrete. this is useful in application requiring non-bearing light weight concrete planets used in facades.

**Raghoatate Atul M (5)**, In 2012, study examined the properties of plastic bags as a concrete fibre. After adding fibre in proportions of 0.2 percent, 0.4 percent, 0.6 percent, 0.8 percent, and 1 percent by weight of concrete, he discovered that increasing the plastic content reduced compressive strength but increased tensile strength, with the optimal strength at 0.8 percent.

**Baboo Rai et. Al(6)**, They generated M30 grade concrete with varied proportionate plastic and tested the concrete with and without plasticizer in a 2012 research of waste plastic in concrete with plasticizer. He observed that when he mixed plastic plates in proportions of 5%, 10%, and 15% by weight of concrete, there was a reduction in density, which can assist achieve lightweight concrete, as well as a fall in slump, which affects workability, but the addition of plasticizer solved the problem. He also discovered a very low and allowable drop in compressive and flexural strength.

**Manhal A Jibral and Farah Peter(7)**, In 2016, researchers looked on the strength and behaviour of waste plastic with concrete content. He used plastic bottles for fine aggregate in concrete, with properties ranging from 0% to 5%. They conclude that using plastic in concrete for non-structural purposes is not a good idea because it reduces strength in both circumstances.

**Amalu R. Get. Al.(8)**, In 2016, a research of the use of waste plastic as fine aggregate in concrete in proportions of 10%, 20%, and 25% found a reduction in concrete strength, but they encourage the use of plastic in non-structural concrete because it has improved workability and allows for the reuse of environmental trash.

**Arvind1 , Kiran Kumar2 , MD Haji Pasha3 , Irfan A D4 , Darshan M K5(9)**, In 2018, According this the conclusion is the density of concrete is decrease . When plastic content increase, plastic has more water tighness compared to natural aggregate thus can help arranging microcrackes, optimum 10% waste plastic is allowed, higher percentage (about 15%) of waste plastic can be used in concrete for temprory structures.

**Ankur C. Bhogayata et. Al(10)**, IThe test findings of fresh and hardened reinforced concrete characteristics with metalized plastic waste (MPW) by the disposal of food packaging industry have been represented. The potential of MPW fibre reinforcing members in concrete for evaluating slump and strength qualities is investigated in this study. MPW films were shredded into 5mm, 10mm, and 20mm long fibres and mixed into concrete in varied amounts ranging from 0% to 2% by volume of concrete mix. The results of the tests suggest that adding MPW fibres to concrete enhances its ductility and crack resistance capabilities. It also improves deformation capacity under axial compression at higher loads. Finally, the addition of MPW fibres up to 1% will be an acceptable change in the concrete's properties.

**Prabesh Thapa(11)**, has represented the use of waste plastic material in Making concrete/mortar is an alternative to dumping waste plastic in an improper manner, which can have a negative influence on the environment. The samples had varying amounts of plastic (0, 10%, 20%, and 30%). The waste plastic utilised in the trials is LDPE (Low-Density PolyEthylene), which is 5-7mm in diameter and has a specific gravity of 0.92. It was discovered that a 30 percent waste plastic mix (as a replacement for coarse aggregate) in concrete may reach compressive strength of up to 80 percent. concrete mixture with egate

**Mr Suryakanta Panigrahi(April/2021)(12)**, proposed that the replacement of the aggregate with low-density polyethene (LDPE) by weight(0%,10%,20%,30%) the compressive strength of modern concrete is achieved by 80% of the simple concrete .and it results in lightweight concrete.

**Ibrahim Almeshal a,b, Bassam A. Tayeha,\*, Rayed Alyousef c, Hisham Alabduljabbar c, Abdeliazim Mustafa Mohamed(2020)(13)**, To summarise, recycled PET bottles can be used in concrete manufacturing at a particular % replacement rate. This method helps to conserve natural resources like sand while lowering the self-weight of concrete in constructions. Although raising the PET replacement ratio impaired the mechanical qualities of concrete and affected its fire resistance, plastic particles can be encapsulated from other components to generate ecologically safe concrete. Furthermore, recycled PET bottles can be used in a variety of applications, including highway medians, sub-bases for highway pavements, and other constructions where strength isn't a concern.

### III. IMPROVEMENT AS PER REVIEWER

We studied the rising needs of the middle and lower classes, as well as the ability to meet them at a lower cost than other materials, in this review paper. We used aggregate as the primary source. According to studies, the plastic is nearly inert, meaning it is less affected by chemicals and has a long lifetime. Plastic is highly dangerous for decomposition because it takes so long has such huge repercussions. We are improving the properties for reuse as a result of this. As the authors' earlier research focused mostly on waste plastics and their usage in construction, there is room for improvement in our work. We are writing a review paper, so we will look at both conventional aggregate and plastic aggregate. While researching plastic and common aggregate, we discovered that it may be utilised as a partial substitute for coarse aggregate, as well as in the bituminous roads portion if we need more flexibility.

### IV. CONCLUSION

After studies all the researcher's paper of all the author's we can conclude that there if some partial replacement of coarse aggregate eg. Plastic aggregate.

As we can see, natural aggregate is spreading pollution across the world, therefore we need to move on to our next alternative, which is plastic and recycled aggregate. Based on

our research on plastic aggregate, we can provide a better option to society and the planet.

From the above study the following conclusions can be drawn.

- The use of such wastes in concrete will contribute to the concrete design's long-term sustainability as well as the natural environment.
- A higher Recycle aggregate percentage might compromise the mix's characteristics and strength.
- It is obvious that recycled aggregate can be used in mix with natural aggregates.
- It can be determined that significantly more upgrading in recycled aggregate is required to replace ordinary aggregate.

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