

# Review on Experimental Investigation of Waste Glass Material as A Partial Replacement of Concrete

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**Abstract:-** Glass is an amorphous solid that has been found in various forms. Glass is one of the most resourceful substance on the earth used in many applications. Glass is non-biodegradable material, And once the glass become waste the glass is disposed as landfill, which is unsustainable as the waste glass does not decompose in environment, So to reduce this waste, it is necessary to use the waste glass in for making concrete in construction industry. Paper investigate performance of concrete containing glass pieces as partial replacement of aggregate. Aggregate were replaced by waste of glass pieces by 15%,25% by M30 grade concrete and the concrete cubes tested for compressive strength at 7,14and 28 days.

**Keyword—Waste Glass, Compressive strength, Recycled Waste.**

## INTRODUCTION

As we know India is developing country which facing shortage of post consumed disposal waste, which is very serious problem. This waste has an impact on environment. So it is necessary to regarding and use this waste to prevent environment. This waste includes steel, glass etc.

For these reasons, the study has conducted through basic experimental research in order to analyze the possibilities of crushed waste glass as coarse aggregates in concrete. If the large amount of waste materials generated is used instead of natural materials in the construction industry, there would be some benefits: conserving natural resources, disposing of waste materials and freeing up valuable land for other uses.

As we know Concrete is an composite incorporation of materials consisting of cement, sand, coarse aggregate and water mixed in an appropriate proportion to obtain the required strength. The concrete has many advantages such as good compressive strength, durability, specific gravity etc. due to which it has proved its efficiency in the field of construction industry.

So by using this waste glass in concrete mix we can improve the compressive strength of concrete and reduce waste from environment.

## LITERATURE REVIEW

**T.S.Serniabat<sup>[1]</sup>(2014)** Concluded was large amount of natural aggregates, water and sand has been consumed in

concrete production and to minimize these use of natural material he have concentrated on the use of waste materials as potential alternatives in construction industry specially in concrete industry. For this aspect it is necessary of consumption of waste glass beads in concrete manufacturing to reduce waste and construction cost of project and to improve the strength of concrete.

**G.M. Sadiqul Islam<sup>[2]</sup> (2016)** Concluded that Million tons of waste was generated yearly all over the world. Once the glass become waste, glass is disposed as landfill, which is unsustainable as the waste glass does not decomposed in environment. To reduce this waste glass should be used as construction material for making concrete. The compressive strength test on mortar and concrete were carried out by using 0-25% glass in which water cement ratio is kept the same for all replacement by which the compressive strength test indicates that recycled glass concrete give better strength.

**M.Advaway<sup>[3]</sup>(2015)** concluded that waste management is becoming a serious and major problem for communities worldwide s the glass is non-biodegradable, is not suitable for addition for landfill, Due to high consumption of the construction industry, the utilisation of waste glass as a partial replacement for aggregate in structural concrete particularly attractive. For the test three concrete samples was tested at 7 and 28days, for the glass replacement proportions of 15,20,25,30 and 40%. the compressive strength of concrete found to be increased up to level of 30% at which point the strength developed was 9% and 6% higher the control after 7 and 28days respectively.

**Honjian Du.<sup>[4]</sup> (2015)**Concluded was pozzolanic reactivity of waste glass was experimentally studied at cement

replacement by 0,15,30,45 and 60% by its weight. The result revealed that the compressive strength of concrete does not decrease by cement substitution after 28 days because of pozzolanic reaction, the reaction between cement hydration and glass powers products. The paper also states that high performance concrete could be achieved by using glass powder by adding 15% glass powder by its weight.

**T.Agarna<sup>51</sup> (2016)** Concluded was in order to make concrete industry sustainable, the use of the waste material in place of natural resource is one of the best alternative to prevent environment. The investigation was conducted to study on viability of using waste glass aggregate manufacturing of concrete. The aggregate was replaced by waste of steel and glass as 10,20 and 30% by M20 grade of concrete. The concrete cubes made from this replacement were tested for compressive strength at 7,14,28 days in obtain at room temperature. From this tests it is found that maximum compressive strength test result show that the replacement of aggregate by glass at level of 20% by its weight has significant effect on compressive strength of concrete as compare to normal concrete sample because of nature of coarse glass.

**Sisira Sugunan<sup>61</sup>(2016)**Concluded that in todays world, conventional aggregate like river sand are beyond the reach of majority of population due to non-availability of natural sand. Therefore it is important to develop a new type of building material, which integrates green energy with self sensing properties of functional material.

The majority of waste glass is not being recycled and is the cause of serious problem such as environmental population etc. The environmental studies were conducted in order to analyze the possibilities for recycling aggregates waste as fine or coarse aggregate in concrete. The scarcity of building materials like cement and aggregate along with emission of carbon dioxide during construction work can be overcome by the use of glass waste in concrete.

## OBJECTIVES

1. To compare performance of regular concrete and glass concrete.
2. To analyze the effects of waste glass on the strength of concrete.
3. To reduce harmful impact of waste glass on environment.
4. To analyse the utility glass particles as a partial replacement of fine and coarse aggregate in concrete.



**Fig 1.Waste glass.**

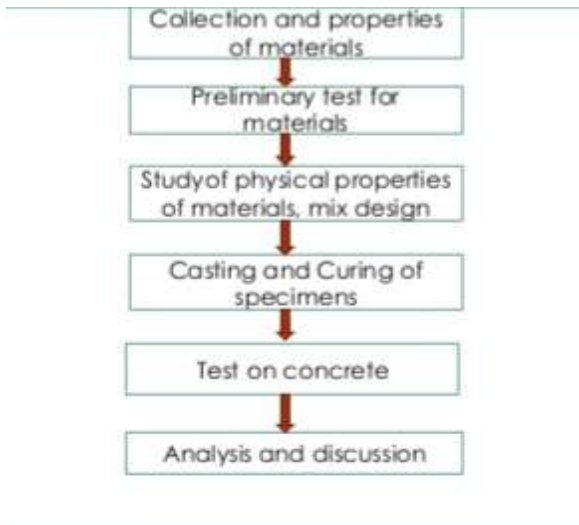


**Fig No.2 waste glass powder from glass industry.**



**Fig No.3 Waste glass concrete blocks.**

**METHODOLOGY**



**RESULT AND CONCLUSION**

From the study of above literature reviews it is observed that glass waste has a serious problem which is harm our environment, so to reduce such effects of waste glass we can use this glass in construction industry to make concrete and improve the strength of the concrete.

Chart 1 shows the 7 days compressive strength in comparison with 15% replaced aggregate by glass.

And Chart 2 shows the 28 days compressive strength in comparison with 15% replaced aggregate by glass.

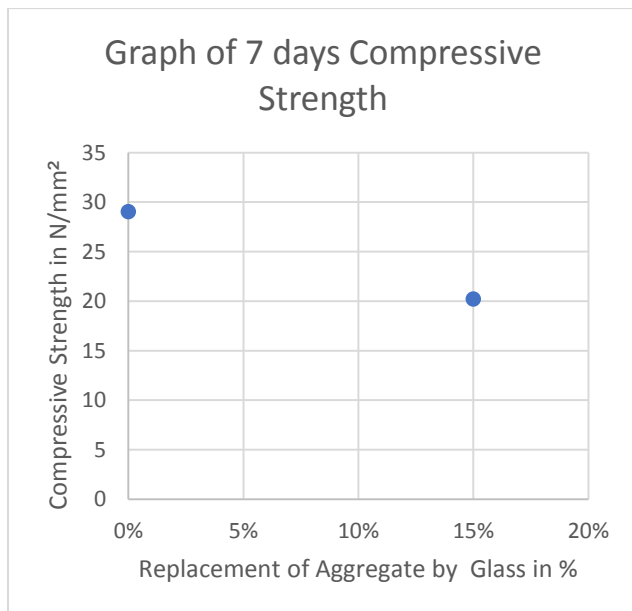


Chart 1

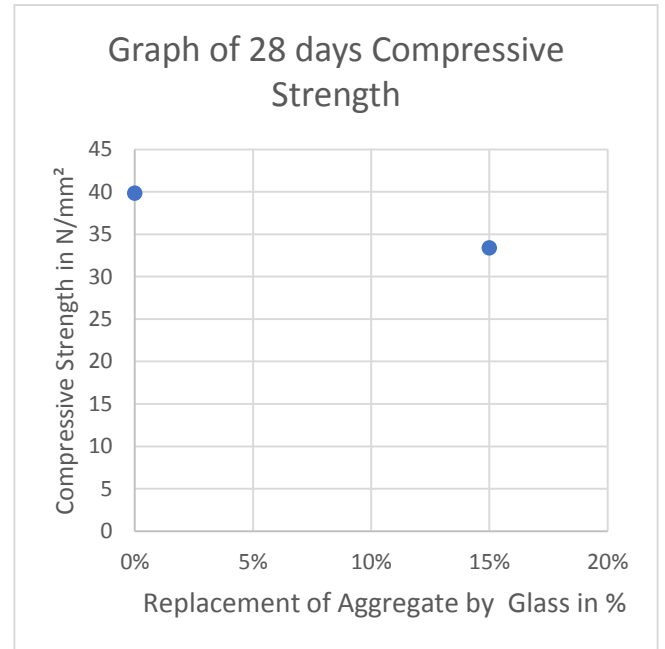


Chart 2

**REFERENCES**

1. T.S. Serniabat and M.N.N.Khan. (2014).“Use of waste glass as coarse aggregate in concrete: A possibilities towards the sustainable building construction”.World academy of science, engineering and technology International journal of civil and environmental engineering.Vol:8,No:10,2014.03(01)
2. G.M. Sadiqul Islam and M.H.Rehman (2016). “waste glass powder as partial replacement of cement for sustainable concrete practice.”International Research Journal of sustainable build environment.04(02).
3. M.Adaway. (2015).“Recycled glass as partial replacement for fine aggregate in structural concrete-effects on compressive strength.” International Journal of structural engineering. 02(03).
4. Hongjian Du.. (2014).“Waste glass powder as cement replacement in concrete” International Journal of advance concrete technology.
5. T.Agarna and S Durga (2016).“Partial replacement of coarse aggregate with waste glass pieces and steel waste” International Journal of engineering science and computing., 03(03).
6. Sisira Sugunan and Nisha Babu (2013). “study of translucent glass concrete”International journal of civil and mechanical engineering.(IOSR).