

# **Use of Waste Glass as a Partial Replacement for Sand in Concrete**

**Ashish Verma<sup>1</sup>, Tarun Kumar Meena<sup>2</sup>, Vikash Kumar Meena<sup>3</sup> & Vijendra Kumar Meena<sup>4</sup>**

<sup>1,2,3,4</sup>Department of Civil Engineering, Poornima Institute of Engineering and Technology, Jaipur, Rajasthan,

E-mail: <sup>1</sup>ashish.verma@poornima.org, <sup>2</sup>2016pietcvtarun087@poornima.org,

<sup>3</sup>2016pietcvvikash092@poornima.org, <sup>4</sup>2016pietcvvijendra091@poornima.org

## **ABSTRACT**

As we know that the amount of glass waste produce is very high, and it creates serious environmental problems. Glass is a non-biodegradable material, and not suitable for landfill. In construction industry high consumption of materials, the use of glass waste as a partial replacement of sand in concrete is particularly attractive. The different percentages of glass material use in concrete and analysis the compressive strength of concrete. The test is performed at 7 and 28 days on the concrete cubes and glass replacement proportions 0,20, 25, and 30% used in concrete cubes.

**KEYWORDS:** - Compressive strength, CTM, Waste Glass, Concrete.

## **1. INTRODUCTION**

Population levels around the world are rapidly increasing, causing a lot of waste. To ensure we don't run out of storage space, we need to create innovative ways to recycle waste. Glass materials are not biodegradable and are not suitable for landfill. Fortunately, glass can be recycled without loss of quality. we must use waste materials instead of natural resources. A large amount of waste glass is produced around the world. In order to use the waste glass as an aggregate, crush it to a specified size.

The use of river sand as fine aggregate can cause deformation of natural resources, lower groundwater levels and river bed erosion. If a certain percentage of waste glass replaces the fine aggregate in a specific size range, the content of fine aggregate will be reduced, it reduce the adverse effects of river damage, and thus enabling the sustainable development of the concrete manufacturing industry. Glass products have been increasingly used in recent years, which generate waste glass. When waste glass is used to make concrete, the overall cost of concrete

will also be decreases. It will serve two purposes: first, it will be environmentally friendly; second, it will waste valuable and relatively expensive natural resources in situ..

The fine aggregate was partially replaced by waste glass at 20%, 25%, and 30% by weight, respectively. The determined compressive strength was tested on concrete specimens, and the results were compared with ordinary M-25 concrete cube.

## **2. MATERIALS USED**

**2.1.** Cement and aggregates were used throughout the entire work process with Class 43 ordinary Portland cement limited to IS 8112 [8]. The fine aggregate used consisted of clean river sand with a size of 4.75mm and a specific gravity of 2.7. Coarse aggregate passes through 20mm IS sieve and remains on 4.75mm IS sieve, with a specific gravity of 2.8

**2.2.** Powder waste glass was collected from the Raj Glass Aluminium works in Jaipur, Rajasthan, including waste glass windows. It was crushed. One. The wear equipment was then screened through a 1.18mm IS sieve. The specific gravity of the glass is 2.42

## **3. EXPERIMENTAL INVESTIGATION**

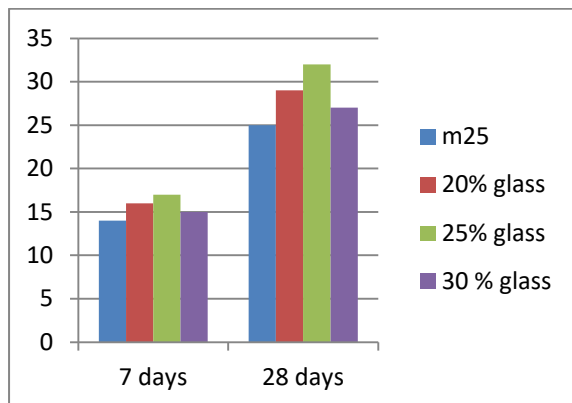
The concrete mix design was according to M-25 concrete. The water to cement ratio is 0.45 and concrete grade is M-25.

## **4. RESULT AND DISCUSSION**

In this research we made 3 cube of different % of waste glass, Compression strength test is done at 7 days and 28 day in CTM, the following results were obtained.

A comparison between the compressive strength of different cubes is shown below-

% glass	Com. Strength in 7 days	Com. Strength in 28 days
0%(no glass)	14mpa	25mpa
20%	16mpa	29mpa
25%	17mpa	32mpa
30%	15mpa	27mpa



## 5. CONCLUSION

According to the result obtained from compressive strength test, following conclusion were made:-

1. By replacing 20% of sand by glass waste (powdered), the compressive strength will increase by 21% in 7 days and 25% in 28 days.
2. The sand can be replaced by glass waste up to 30% by weight. After that the strength will decrease.
3. Percentage water absorption of concrete will decrease with increase in glass waste.
4. Total weight of concrete will also decrease with increase in glass waste, making concrete lighter.
6. By using glass waste in concrete we can reduce the overall cost of concrete, because glass waste is not usefull, making concrete economical.
7. Proper use of glass waste can be done without damaging environment.

8. By using glass waste in concrete we can reduce the consumption of sand, and preserve natural resources.

## REFERANCES:-

- [1]. M. Iqbal Malik, Muzafar Bashir, Sajad Ahmad, Tabish Tariq, Umar Chowdhary Students, B-Tech Civil Engineering, IUST, Awantipora, J&k, INDIA.
- [2]. Asoka Pappu, MohiniSaxena, and Shyan R. Asolekar, "Solid Waste Generation In India And Their Recycling Potential In Building Materials", Regional Research Institute (CSIR) and IIT Bombay, India.
- [3]. P Turgut and E.S. Yahlizade, "Research into Concrete Blocks with Waste Glass", International Journal of Civil and Environmental Engineering 1:4 2009.