



A REVIEW PAPER ON STUDY OF STRENGTH OF CONCRETE CONTAINING IN CERAMIC WASTE

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Abstract : Everyday more than 30% of tiles become a waste in ceramic industry because there are cracks design. These are use in to fill the dump. Therefore environment become a polluted so in this research replace ceramic tiles as a fine aggregate with natural aggregate. In this research replaces 0% to 50% with different portion of fine aggregate, with different water cement ration with different grade of concrete. The mix design for various kinds of mixes was created by substituting broken tiles for fine aggregates and cement at various percentages. Workability, compressive strength, this study concludes that ceramic waste could be used for non-structural works. Ceramic waste material should not be used in concrete structures where strength is the major consideration.

IndexTerms – ceramic Fine waste, compressive strength, tensile strength

I. INTRODUCTION

The building sector makes a significant involvement in the development of infrastructure in any place where concrete is utilized as the primary material [1–5]. In the previous three centuries, concrete has been the most widely used man-made substance on Earth. The sustainability of green construction has recently gained widespread acceptance around the globe [6]. Therefore, the development of sustainable materials that result in the preservation of natural resources, the lessening of carbon dioxide (CO₂) emissions, the economic utilization of waste materials, and the production of durable materials is essential. Therefore, several researchers focused on improving the sustainability of construction industries.

II. LITERATURE REVIEW

- **A review on ceramic waste-based concrete: A step toward sustainable concrete** (Jawad Ahmad*, Wael Alattyih, Yasir Mohammed Jebur, Muwaffaq Alqurashi, and Natividad Garcia-Troncoso)

In this research paper to use a ceramic waste in concrete with different water cement ratio. To know about bleeding, workability Air content, density, and different strength property of concrete. Also comparison of cost benefit ration with normal concrete.

The concrete flow ability decreased with CW due to the rough surface texture. Also, a decrease in fresh density was observed due to the low specific gravity of CW. Furthermore, CW did not considerably alter the air content.

The strength properties of concrete decreased with the substitution of CW, although some researchers observed improvement in strength properties with the substitution of CW. Ceramic aggregates are typically less dense and less durable than traditional aggregates such as crushed stone or gravel, which can result in a higher porosity in the concrete when they are used as an aggregate. Higher porosity in concrete can lead to a reduction in the overall strength of the concrete. However, up to 10% CW, a slight decrease in strength was observed indicating that the CW up to 10% can be used for normal strength concrete.

The cost–benefit analysis shows that CW of up to 75% can be used for structural application which saves the concrete cost of 9.81%.

- **Utilization of Ceramic Tiles Waste as a Partial Replacement of Fine Aggregate in Cement Mortar** (Sumanth C, Mahendra K R, Yashwanth H B, Nikil H, Arun Kumar B R, Uma A)

The research methodology involves collecting ceramic tile waste from local sources and conducting laboratory experiments to evaluate the physical and mechanical properties of cement mortar incorporating different percentages of ceramic tile waste. The properties investigated include workability, compressive strength, flexural strength, and water absorption capacity. The experimental results demonstrate that the addition of ceramic tile waste as a partial replacement for fine aggregate in cement

mortar exhibits promising outcomes. The workability of the mortar is within an acceptable range for construction purposes, and the compressive and flexural strengths show satisfactory performance. Moreover, the water absorption capacity of the mortar reduces with an increase in the percentage of ceramic tile waste, indicating improved durability.

The test results show clearly that the ceramic waste can be used as replacement materials for m-sand in mortar. The mortar with 25% replacement of ceramic tiles has the compressive strength compared to the control mix. However, higher the percentage addition of ceramic waste reduces the strength of normal mortar. The mortar with 25% replacement of ceramic tiles has optimum water absorption compared to 50% and 75% replacement of ceramic tiles. The mortar with 25% of replacement of ceramic tiles has high density. Density decreases with increase in ceramic content.

- **Durability of Concrete with Ceramic Waste as Fine Aggregate** (Hitesh Kumar Mandavi, Vikas Srivastava, V.C. Agarwal)

This paper presents the result of an experimental study carried out in which waste ceramic tiles was used as a partial replacement of natural sand in the range of 10 to 50 percent at an interval of 10 percent. The optimum replacement level was determined based on the result of compressive strength. Durability of concrete made using ceramic waste at optimum replacement level was also determined. Result shows that ceramic waste can effectively be used in concrete as partial replacement of natural sand with improved strength and durability.

The project was more concern on scarcity of natural resources and its effect on environment problem. India is amongst the leading producers of ceramic tiles. As per a recent PwC report Indian ceramic tiles industry grew by around 11% in 2013-14 and is expected to reach a size of Rs 301 billion by 2016, growing at a 15% CAGR. Globally India is ranked third and accounted for over 6% of total global production. This industry is largely unorganized, to the extent of 50%. As per a report by Transparency Market Research "Ceramic Tiles Market" forecast 2012-2018 that market share of ceramic tiles at a CAGR is of 8.6% from 2012 to 2018. Ceramic tiles industries share 750 million sq. m of world. Although India produces around 6% of the world's ceramic tiles, heavy domestic consumption has limited export volumes to very limited levels.

While using ceramic tiles as partial replacement of fine aggregate, workability decreased with increase in replacement level. It is observed that, compressive strength of concrete made using ceramic waste increased with replacement level (up to 40%). Optimum replacement level of fine aggregate with ceramic waste is 40%. In chloride environment concrete with ceramic waste shows better performance than conventional concrete. Ceramic waste can effectively be used as alternative & supplementary materials in concrete.

- **Study on Partial Replacement of Fine Aggregate with Ceramic Waste and Brick Dust in Concrete** (G.G. NIVETHA, M. PRAKASH, M. THAMIZH ILACKIYA, H. GOKULRAM, A. S. ARJUN MOHAN)

This review article about the study of compressive strength in concrete by mixing waste construction materials such as brick dust and ceramic waste as a partial replacement of fine aggregate. This partial replacement of sand is done in different percentage (10%, 20%, and 30%). 10% of sand is replaced with 5% of brick dust and 5% of ceramic waste. Similarly, in the next two mixes 20 & 30% of sand are replaced. The abrasion test is carried out at 7, 14 and 28 days. The test result says that 20% replacement of ceramic dust 10% and brick dust 10% gives the maximum compressive strength to the concrete.

The workability of concrete increase with the increase in ceramic and brick aggregate replacement. The properties of concrete increased linearly with increase in brick and ceramic aggregate up to 20% replacement. The usage of brick and ceramic fine aggregate has some effect on the properties of concrete in decrement manner. Brick and tile powder as fine aggregate has more influences on the concrete. The addition of brick and tile powder improves the mechanical properties of concrete.

III. CONCLUSION

Concrete strength is depending on different water cement ratio. It's also depend on the type of aggregate so in this paper fine aggregate is replace with ceramic fine aggregate. So compressive strength is increase up to 20% to 40% of replacement of aggregate. Workability of concrete is decrease because of roughness of the ceramic particle also air void is present in ceramic particle. If ceramic waste replace as a fine aggregate its very difficult to maintain a workability of concrete because its shock a water and so workability of concrete in decrease. Tensile strength of concrete is also reduce with increase a ceramic waste in mortar.

IV. REFERENCE

- A review on ceramic waste-based concrete: A step toward sustainable concrete (Jawad Ahmad*, Wael Alattyih, Yasir Mohammed Jebur, Muwaffaq Alqurashi, and Natividad Garcia-Troncoso)
- Utilization of Ceramic Tiles Waste as a Partial Replacement of Fine Aggregate in Cement Mortar (Sumanth C, Mahendra K R, Yashwanth H B, Nikil H, Arun Kumar B R, Uma A)
- Durability of Concrete with Ceramic Waste as Fine Aggregate (Hitesh Kumar Mandavi, Vikas Srivastava, V.C. Agarwal)
- Study on Partial Replacement of Fine Aggregate with Ceramic Waste and Brick Dust in Concrete (G.G. NIVETHA, M. PRAKASH, M. THAMIZH ILACKIYA, H. GOKULRAM, A. S. ARJUN MOHAN)

