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Waste Foundry Sand as Partial Replacement of Fineaggregate in Concrete

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Abstract - *Concrete serves a major role as foundation for construction and development projects worldwide. Each component of concrete has an environmental influence. Overexploitation of these resources has led to an increase in their cost in various countries and are on the verge of extinction. Fine aggregate is one of the most expensive and excessively depleted resource among them. There is a need for an alternative to control and overcome this problem. Waste Foundry Sand (WFS) is one such alternative which is a byproduct of foundry industry. Usage of this industrial waste gives an additional benefit since the negative environmental impact on the landfills is reduced to a greater extend. Fine aggregate was volumetrically replaced with WFS (10%, 20%, 30%and 40%). The concrete was tested for workability, compression test, flexural test, split tensile test for 28 days. It was found that 30 % was the optimum percentage of replacement.*

Key Words: WFS, compressive strength, splitting tensile strength, flexural strength, workability

1.INTRODUCTION

Due to its exceptional durability, concrete is a significant building construction material that is utilized extensively globally. Large- scale removal of river sand increases the distance of the river bed, lowers the water table, causes land to be lost to river erosion, etc. Due to limits on river sand withdrawal making it more expensive, the construction industry is in danger of going out of business. In order for concrete to consolidate and provide the necessary strength, sand or fine aggregate is crucial.

Since WFS is more affordable & environmentally friendly than genuine sand, it is regarded as a superior sand substitute. Due to the rapid release of hazardous chemicals into the environment, the stockpiling of WFS in industries leads them to dispose of this waste in landfills. However, landfilling is not seen as the ideal choice because it undermines the UN's zero-waste aim and imposes costly disposal fees on enterprises.

1.1 Objectives

- To determine the workability of concrete replaced with fine aggregate by 0%, 10%, 20%, 30% and 40% of WFS
- To determine the optimum compressive, split tensile and flexural strength of concrete obtained on replacement
- To determine the optimum proportion of fine aggregate that is replaced with WFS

2. METHODOLOGY

- Material Collection
- Preliminary testing
- Mix Design (M25, Proportion 1:1.53 :1.92)
- Slump test for conventional concrete and for various replacements
- Casting of specimens with 0 %, 10 %, 20 %,30 %, 40% replacement of sand with WFS
- Curing for 28 days
- Compressive, splitting tensile and flexural strength test on specimens

3.EXPERIMENTAL PROCEDURE

3.1 Waste Foundry Sand

High grade, uniformly sized silica sand is utilized in the casting process and is also known as spent foundry sand, used foundry sand, or waste foundry sand. Moulds are created by bonding sand, and these moulds are used to cast both ferrous and non-ferrous metals. Foundry sand is regarded as waste when it ceases to be useful, or when it fails to bind with other binders and organic ingredients.