

# A Literature Review on Study of Concrete Properties with Partial Replacement of Fine Aggregate by Foundry Sand

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**Abstract**—This study presents a potential re-use of waste foundry sand (WFS) in partially replacement with fine aggregate. Regular sand was replaced with five percentages (5%, 15%, 25%, 35%) of WFS by weight and solidification/stabilization (S/S) process was applied to all concrete mixtures. In this study the regular concrete cube with 0% of foundry sand and partially replaced foundry sand cube are tested and compare in this study. In this the results are similar to some percentage replace sand, if replacement percentage is more then compressive strength of a concrete decreases and the minimum replacement shows similar properties like regular concrete cube. In this study 15% is the show the best result and properties, also gives good compressive strength, flexural strength.

## I. INTRODUCTION

This industrial byproducts of which have been a disposed earlier are now being considered for the beneficial use. Beneficial use can be a reduce our nation's carbon production and the consumption of virgin material and result in a economic gains. It is important component of the nation's solid waste management of a hierarchy that first promotes a source of reduction and the waste prevention followed by the reuse, recycling, energy recovery and disposal. Researches all over the world of the today are focusing on a ways of utilizing either a industrial or a agricultural wastes as a source of a raw materials for the industry. These wastes utilization would not be a only be the economical, but may also be result to foreign exchange earnings and environmental pollution control. The utilization of this industrial and the agricultural waste produced by industrial process has been the focus of the waste reduction research for economical, environmental and the technical reasons. This is because over a 300 million tons of the industrial wastes are being produced per annual by the agricultural and industrial process in India.

The problem arising from the continuous technological and the industrial development is the disposal of a waste material. If some of the waste materials are a found suitable in a concrete making not be only cost of a construction can be a cut down, but also a safe disposal of a waste material can be a achieved. The most critical

problems we are facing now a day is the deficiency of a artificial resources for the construction of a purpose. The reason behind this is the ban of on extraction of the sand ordered by government. To solve this problem, we are a using solid waste from industries as a replacement of a material for fine aggregate.

## II. REVIEWS OF ARTICLES

- **N. Gurumoorthi (2016)** Micro and mechanical behaviour of Treated Used Foundry Sand concrete Used Foundry Sand (UFS) is the high quality silica sand by-product from the production of both ferrous and nonferrous metal casting industry. The UFS from ferrous metal casting industry contains more iron content. Inclusion of UFS without proper treatment in concrete will reduce the binding and strength properties. In order to minimize the iron content, the UFS was treated with acid. While treating with acid, the silica in foundry sand has been enriched. This is called as Treated Used Foundry Sand (TUFS). This will pave the way for making good quality concrete and disposing the Used Foundry Sand safely without disturbing the environment.
- **Rafat Siddique-(2008)** Effect of used-foundry sand on the mechanical properties of concrete This paper presents the results of an experimental investigation carried out to evaluate the mechanical properties of concrete mixtures in which fine aggregate (regular sand) was partially replaced with used-foundry sand (UFS). Fine aggregate was replaced with three percentages (10%, 20%, and 30%) of UFS by weight. Tests were performed for the properties of fresh concrete. Compressive strength, splitting tensile strength, flexural strength, and modulus of elasticity were determined at 28, 56, 91, and 365 days. Test results indicated a marginal increase in the strength properties of plain concrete by the inclusion of UFS as partial replacement of fine aggregate (sand) and that can be effectively used in making good quality concrete and construction materials Used-foundry sand is a by-product of ferrous and nonferrous metal casting industries. Foundries successfully recycle

and reuses the sand many times in a foundry. When the sand can no longer be reused in the foundry, it is removed from the foundry and is termed used/spent foundry sand. In an effort to utilize used-foundry sand in large volumes, research is being carried out for its possible large-scale utilization in making concrete as partial replacement of fine aggregate.

- **Bavita Bhrdwaj (2017)** waste foundry sand in concrete: A review Concrete is the most extensively used construction material in the world, second to water. Increasing rate of urbanization and industrialization has led to over exploitation of natural resources such as river sand and gravels, which is giving rise to sustainability issues. It has now become imperative to look for alternatives of constituent materials of concrete. Waste foundry sand, a by-product of ferrous and non ferrous metal casting industries is one such promising material which can be used as an alternative to natural sand in concrete. In last few decades, several studies have been conducted to investigate the effect of addition of waste foundry sand as partial and complete replacement of regular sand in concrete. It has been found suitable to be used as partial replacement of sand in structural grade concrete. A number of properties have been reviewed in the current paper, the results observed from the various studies depict that replacement of foundry sand to a certain extent enhance the durability as well as strength properties of the concrete but simultaneously decreases the slump value with the increase of replacement level of waste foundry sand.
- **N. Gurumoorthi (2016)** Micro and mechanical behaviour of Treated Used Foundry Sand concrete used Foundry Sand (UFS) is the high quality silica sand by-product from the production of both ferrous and nonferrous metal casting industry. The UFS from ferrous metal casting industry contains more iron content. Inclusion of UFS without proper treatment in concrete will reduce the binding and strength properties. In order to minimize the iron content, the UFS was treated with acid. While treating with acid, the silica in foundry sand has been enriched. This is called as Treated Used Foundry Sand (TUFS). This will pave the way for making good quality concrete and disposing the Used Foundry Sand safely without disturbing the environment.
- **Mohd Moiz Khan (2002)** Reclamation of used green sand in small scale foundries Disposal of Used Foundry Green Sand (UFGS) remains one of the significant challenges faced by foundry industry nowadays. Experiments were performed to reduce the total clay content from 12% to as low as 2.2% in waste foundry sand. Three prototypes were developed during the course of this work. They include vertical fluidized bed, horizontal fluidized bed and a novel ball-mill type attrition and sieving unit. The cost per

ton of reclaimed sand is higher in case of fluidized bed based prototypes while in case of attrition and sieving based prototype, it is less than half of the cost of the fresh sand. The experimental data generated on the two-stage attrition and sieving unit under different conditions is further used to arrive at a semi-empirical correlation and the optimum set of design and operating parameters to get the best performance

- **H.MerveBasar,NuranDeveciAksoy( 2012)** The effect of waste foundry sand (WFS) as partial replacement of sand on the mechanical, leaching and micro-structural characteristics of ready-mixed concrete They found that partially replacement of foundry sand is 20 % suitable.
- **Gurpreet singh(2013)** Abrasion resistance and strength properties of concrete containing waste foundry sand (SFS). replacement of sand with WFS enhanced the 28-day compressive strength by 8.3–17%, splitting tensile strength by 3.6–10.4% and modulus of elasticity by 1.7–6.4% depending upon the WFS content

### III. CONCLUSION

The review of earlier studies related to partial replacement of Cement with foundry sand reveals that there is a significant change in the strength properties of concrete such as compressive strength, flexural strength, split tensile strength. These experiments were carried out in various grade concrete to find out the result. From the above literature reviews optimum percentage of foundry sand varies from 5% to 15%. Up to these Percentage Replacement improvement in the strength of concrete has been observed in terms of Compressive Strength, Flexural Strength and Tensile Strength on partial replacement of Cement with foundry sand. Previous studies also show that foundry sand concretes possess superior durability properties.

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