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# UTILIZATION OF WASTE FOUNDRY SAND AND RECYCLED AGGREGATE IN CONCRETE

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## ABSTRACT

Waste foundry sand are by product which appear the potential to partially replace regular sand as a fine aggregate in concreatprovidings a recycling opportunity for them.low cost concrete production by replacement of fine sand with foundry sand is a new trend and makes effectively use of waste foundry sand as engineering material by reducing disposal pollution problem. Providing a recycling opportunity for them. With the rapid development of construction industry leading to excessive natural resource consumption and the deterioration of the environment, the contradiction between the sustainable development of construction industry and the shortage of resources will become more and more severe. At the same time, a large amount of solid waste is produced in the process of construction of new buildings every year. Today, the reuse of construction waste has become a common concern issue and deserves deep researches. It can be foreseen that the recycled aggregate concrete as a method of reuse and recycling of the construction waste will bringconsiderable economic and environmental benefits.The paper reviews the utilization of foundry sand and recycled aggregate as the concrete constituent and the noticeable and important findings from the experimental works of various researchers. After a careful study of large number of research papers on the topic it was felt by the authors to integrate all the important results for streamlining the potential of this area of research. The paper summarizes conclusions of experiments conducted for the properties like strength and durability.

**Keywords**- Waste foundry sand(WFS), Recycled aggregate(RA).

## I. INTRODUCTION

The worldwide consumption of sand as fine aggregate in concrete production is very high and several developing countries have encountered some strain in the supply of natural sand in order to meet the increasing needs of infrastructural development in recent years. To overcome the stress and demand of river sand, researchers and practitioners in the construction industries have identified some alternatives.Ferrous and nonferrous metal casting industries produce several million tons of by-product in the world. WFS is major by-product of metal casting industry and successfully used as a land filling material for many years. But use of waste foundry sand for land filling is becoming a problem due to rapid increase in disposal cost. In an effort to use the WFS in large volume, research has being carried out for its possible large scale utilization in making concrete as partial replacement of fine aggregate.Waste foundry sand (WFS) is a by-product from the production of both ferrous and nonferrous metal casting .It is high quality silica sand. Foundries use high quality size-specific silica sands for use in their moulding and casting operations. Normally raw sand is of a higher quality than the typical bank run or natural sands used in fill construction sites. In the casting process, moulding sands are recycled and reused many times. Eventually, when, recycled sand degrades to a level that it can be no longer is reused in the casting process. When it is not possible to further reuse sand in the foundry, it is removed from the foundry and is termed as waste foundry sand. These WFS is black in colour and contain large amount of fines. The typical physical and .chemical property of WFS is dependent upon the type of metal being poured, casting process, technology employed, type of furnaces (induction, electric arc and cupola) and type of finishing process (grinding, blast cleaning and coating).The utilization of recycled aggregate is particularly very promising as 75 per cent of concrete is made of aggregates. The use of recycled aggregates from construction and demolition wastes is showing prospective application in construction as alternative to primary (natural) aggregates. Research on the usage of waste construction materials is very important since

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the materials waste is gradually increasing with the increase of population and increasing of urban development.

## II. OBJECTIVE OF PROJECT

The main objectives of the present investigative study are discussed below:

1. To find the efficiency of the Foundry Sand and recycled aggregate for civil constructions.
2. To know the fresh concrete properties of foundry sand and recycled aggregate concrete.
3. To check the possibility of using foundry sand and recycled aggregate in concrete mixes.
4. To economic the cost of construction without compromising with quality.
5. To investigate the utilization of used Foundry Sand as fine aggregate and influence of WFS on the strength on concrete made with different replacement levels.
6. To check the effect of used Foundry Sand and Recycled Aggregate on properties of fresh concrete & compressive strength, Split tensile strength and flexural strength.
7. To check the suitability of used foundry sand and recycled aggregate as an alternative construction material.
8. To effectively utilize the waste material from the foundries.
9. To reduce the problem of disposal of foundry waste.
10. To prove that the foundry waste from foundries can be a replacement for fine aggregate.
11. To study the physical properties of foundry waste and are the ingredients in concrete.
12. To replace the fine aggregate by foundry waste in different ratio such as 10,30,50&100 % in concrete.
13. To determine the compressive strength and compare it with the conventional concrete.

## III. CONCLUSION

Based upon above literature review following conclusion were made regarding properties of concrete incorporating waste foundry sand and recycled aggregate.

a. It is found that compressive strength of concrete mix is increases with increase in percentage of waste foundry sand and recycled aggregate as compare to normal concrete. It was maximum for30-40% replacement after that it reduces.

b. It is also found that split tensile strength increases with increase in percentage of waste foundry sand and recycled aggregate up to 30-40% replacement after that it reduces.

c. It is also found that flexural strength increases with increase in percentage of waste foundry sand and recycled aggregate up to 30-40% replacement after that it reduces.

d. The possibility of substituting natural fine aggregate with industrial by-product aggregate such as waste foundry sand and recycled aggregate offers technical, economic and environmental advantages which are of great importance in the present context of sustainability in the construction sector.

e. As waste foundry sand is waste from metal industries and recycled aggregate is waste from construction industries therefore both waste can be effectively use in concrete mix hence an eco- friendly construction material. By using this waste in concrete, problems regarding to safely disposal is reduced.

## IV. FUTURE SCOPE

Though WFS and RCA can be used to a certain replacement level of NS and NCA without significant adverse effects on the fresh, hardened and durability properties of concrete, yet further investigations needed to confirm the beneficial effects of WFS and RCA for more potential applications. After conducting critical and thorough reviews, the following research needs have been identified:

1. Investigation for increasing the strength with the increase of replacement percentage of WFS and RCA.
2. Investigation on the potential use of RCA in the production of high-strength, high-performance, lightweight, and self-consolidating concretes.

3. Investigation on the effect of different types or sources and particle sizes of WFS and RCA on the properties of concrete.

4. Comprehensive study for examining the effect of WFS and RCA on the durability performance of concrete with respect to resistances to freezing and thawing, sulfate attack, corrosion, carbonation, alkali-silica reaction, and acid attack.

5. Study for the utilization of WFS and RCA in other construction work instead of just a substitute for the constituent of concrete.

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