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STUDY ON STRENGTH BEHAVIOUR OF CONCRETE PRODUCED USING PARTIAL REPLACEMENT OF FINE AGGREGATES WITH FOUNDRY SAND

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Abstract:
In this paper we studying the replacement of ordinary sand with foundry sand in concrete. Now a day the use of sand in concrete production is very high. To reduced the demand of sand in concrete production some country developed some alternative for sand which can be used instead of natural sand foundry sand is one of this. In metal casting process foundaries of metal use large amount of sand.After that the sand which can recycle and reuse but after more reused the sand no longer be reused. Foundry sand is a waste material.Which is produced from, ferrous and nonferrous metal industry.Its contain high quality silica. replacement of fine aggregate with two percentage that is 10% and 20% by weight of fine aggregate. Compressive,flexural and tensile strength test were performed for curing of 7 and 28 days.

Keywords — **Solid waste, Efficiency, Durability, Strength and Curing**

INTRODUCTION:

Concrete is one-third of the sand cement water and mixture which is jointly connected by cement. The mixture means acting as a bonding agent. Concrete is close to 60% of total concrete.

The content that is made is called Concrete. Building construction uses concrete material, in which hard chemical substances are included as "composite". Usually it is made from various types of gravel and sand, which brings together water and components.

Concrete is a mixture of cement, water, coarser and sand. The metal industry is an example of this when the industry has produced a great deal. The waste industry has not used many waste products in the future due to this waste for many years. So develop core environmental issues. In this type of waste produced by the metal industry, the demand for sand can be overcome by "foundry sand".

FOUNDRY SAND:

Foundry sand is in the right size, it is designed to make high-quality silica molds for ferrous metal and non-ferrous metal casting. Foundry sand is more fine than normal fine sand. In the casting process of most metals, fountain sand is used for most of the water. Foundry sand-metal casting is generally recycled for raw materials that make sand dunes.

After repeating this process, they abandon their features when they are inappropriate product processing in the future. All these materials are being discarded as waste, they are mainly casting sand and core sand. The waste industry has not used many waste products in the future due to this waste. From metal industry waste, it can overcome the demand of sand is "Foundry sand".

LITERATUR REVIEW:-

Several authors have reported the use of waste foundry sand in various civil engineering applications:

Khatib and Herki
Topic : Concrete was examined in place of 0%, 30%, 60% and 100% WFS with the right set. Water content, thick total, water in cement and cement ratio remained steady. Properties were examined in 7, 28 and 90 days. The results indicate that ultrasonic pulse velocity with increased amount of WFS in systematic increase in the absorption of water through capillary action, decreased compression strength and concrete in concrete. He also told that sufficient strength can be achieved using a suitable replacement level of foundry sand.

Vema Reddy, S. Sridhar Through the Sridhar-related issues, various civil engineering applications have reported the use of waste for the use of sand - the performance of the performance of the fresh and hard assets of the concrete of the foundry sand, which was put in place of the penalty. When the percentage of foundry sand increases, the concrete pile decreases. By increasing the percentage of foundry sand as well as components. Normal sand weighing up to 20% and increase in compressive strength of 13.42% the increase in compressive strength is achieved when the replacement of the founder's tensile strength found after 60% of the 100% replacement of the founder of the deficient tensile strength reduction of foundry sand split.

PranitaBhandari, Dr.K.M.Tajne-Concrete Strategy of Concrete leaves the pilot test. This test is being recommended for 100% replacement of the waste inspection. Penalties from 10% to 20% .

RafatSiddiqui (2008) - The result of a laboratory inspection to examine the mechanical properties of the subject-inspection, in part (10%, 20% & 30%).The latest flexibility measurements, elasticity, strength and strength of stress were concluded at 28,56,91 and 365 days. The result of the simple concrete properties was increased due to test results because the use of penalties for fine sand partial rehabilitation concrete and construction material can be used effectively.

Pretty Pandey, Alvin Harrison, VikasSrivastava-test results and the strong properties of concrete, up to 50% due to the sand particles of the foundry. They have concluded that 10% micronutrients resulting from the sand of the for 28 days.Strength reduction of sand split.

Eknath P. Salokhey, D.B Desai Examining experimental study conducted to evaluate the performance of the sand and concrete of the foamy sand. They have concluded that this has decreased. The density of mixing with WFS was less than that of the WFS. He has performed Compressive Strength with WFS and Non-Ferrous WFS.
They concluded that the 20% replacement of a compound compound by Ferrous WFS gives greater strength to non-ferrous WFS after 28 days. While Concrete inspection produced by changing the correct mixed space with 0%, 30%, 60% and 100% WFS.Water content, coarse grained, cement and cement ratio is water stable. After testing properties 7,28 and 90 days, the results indicate that a systematic increase in water absorption by the capillary action, reduction in the compact power and the ultrasonic pulse velocity with the increasing proportion of WFS in concrete. He also said that he could be used in the field.30 percent of magnetWFS give the same strength as the normal concrete, and the thicker and supernatural FWS both offer a thick concrete at 20% extra.

Objective

1. Its main purpose was to find viable use for these waste so that the cost could be reduced and achieved as well.
2. To check the strength to make this concrete with regular concrete.
3. Investigation of concrete properties.
4. To address the problem of industrial waste disposal.
5. Reduce Construction Cost.
6. To analyze the different areas of civil engineering in which foundry sand can be used efficiently.

Advantages-

1. It is a waste from metal industries.
2. Check the strength of the concrete to know the concrete properties
3. The budget of any scale and test needs will increase.
4. To solve the problem of industrial waste.
5. To know the effectiveness of the foundry sand.

Disadvantages:

1. There will be an increase in the budget of any project as the proportioning and testing advance lab assistance.
2. Life span or effective life of concrete cannot be estimated properly as per IS code due to partial replacement of fine aggregate.
3. Even if the results are goods with substantial rise in numbers, actual site implementation is difficult to accept especially for mass concreting.

CONCLUSION

1. The waste foundary sand can be used as fine aggregate in concrete with a proper proportion.
2. The foundary sand shows a optimum strength at 30% replacement beyond 30% there is a significance decrease in the strength of concrete .
3. With 28 days of curing and replacement of fine aggregate by 30% shows maximum strength.
4. Thus we can concluded that foundary sand can be replaced as fine aggregate with proper proportioning.
5. Foundary sand is economic in addition to this it gives the desired strength in compression,tension as well as flexural rigidity.
6. The replaced sand is ecofriendly and use of this sand is beneficial to the environment as it reduces the use of natural sand.

REFERENCES:-

1. DushyantRameshbhaiBhimani, Prof. JayeshkumarPitroda, Prof. Jaydevbhai J. Bhavsa.,Jan –March 2013,Used foundry sand opportunities for development of eco – friendly low cost concrete.
2. N. SaiTrinath Kumar, Chava Siva., Oct-2015,Use of construction renovation and demolition waste in partial replacement of coarse aggregate.
3. Reddi, N. Lakshmi, Rieck, P. George, Schwab, A. P., Chou, S. T. and Fan, L.T., May 1995. Stabilization of Phenolics in foundry sand using cementious materials. Journals of Hazardous Materials,V. 45, pp 89-106.
4. Naik, T.R.; Kraus, N. Rudolph; Chun, Yoon-moon; Ramme, W. Bruce; and Singh S. Shiw, August 2003.Properties of Field Manufactured Cast-Concrete Products Utilizing Recycled Materials. Journals of Materials in Civil Engg., V.15,No. 4,pp 400-407.
5. SohailMd,AbdulWahab, Arfath Khan Md, “A Study on the Mechanical Properties of Concrete by Replacing sand with Waste Foundry Sand”.InternationalJounal of Emerging Technology and Advanced Engineering,ISSN 2250-2459, ISO9001:2008 Certified Journal, Volume3 , Issue11, November 2013.
6. RafatSiddique , RavinderKaurSandhu, “Properties of Self-Compacting Concrete Incorporating Waste Foundry Sand”Leonardo Journal of Sciences ISSN 1583-0233 Issue 23, July-December 2013 p. 105-124.

7. IS: 1489-1991, Specifications for 53-Grade Portland Pozzolana cement, Bureau of Indian Standards, New Delhi, India.

8. IS: 383-1970, Specifications for coarse and fine aggregates from natural sources for concrete, Bureau of Indian Standards, New Delhi, India.

9. IS: 10262-2009, recommended guidelines for concrete mix design, Bureau of Indian Standards, New Delhi, India. [10] IS: 516-1959, Indian standard code of practice methods of test for strength of concrete, Bureau of Indian Standards, New Delhi, India.

10. IS: 5816-1999, Indian standard code for splitting tensile strength of concrete – method o of test, Bureau of Indian Standards, New Delhi, India.

11. IS: 3085-1965, Indian standard code for method of test for permeability if concrete, Bureau of Indian Standards, New Delhi, India