

A Review on Concrete Behaviors by Partial Replacement of Cement with Iron Dust and Addition of Steel Fiber

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ABSTRACT: This paper deals with the study of the effect of partial replacement of cement with iron dust and then addition of steel fibers. Iron dust are industrial by-products generated from the milling industry and factories. It can be mainly obtain by grinding and lathing of the iron product. This is a waste material used as a pozzolanic material in concrete to increase durability and strength. It is very important to take appropriate particle size of iron dust. Iron dust replaced with cement then particle size of iron dust is less than 0.75 micron. Steel fibre produced as a by-product from industrial processes. The use of steel fibre has led to the improvement of the concrete mechanical properties such as material toughness in tension and also durability. Steel Fibres are generally utilized in concrete to manage the plastic shrink cracking and drying shrink cracking. The length of steel fibres is 30mm and diameter is 0.75mm and aspect ratio 40. Commercial production of steel fibres for use in concrete is also available now a day. In present investigation an attempt is made to evaluate the workability, compressive strength, , split tensile strength and flexural strength on the replacement of iron dust in the percentage of 0%,2%, 4%,6%, 8% by the weight of cement. Then investigate the result. Fixed the percentage of iron dust in maximum result then adding the steel fibres in the percentage of 0.5%, 1%, 1.5%, 2%. Standard cube of 150X150X150mm will be cast and tested for obtaining 28-day compressive strength. Standard cylinder of 150mm diameter and 300mm height will be cast and tested for split tensile strength. Standard beam of 500X100X100 will be cast and tested for flexural strength. Then analyze all the result mathematically and graphically.

KEYWORDS: iron dust, steel fibres, compressive strength, split tensile strength, flexural strength.

I. INTRODUCTION

Now these days construction cost is very high with using conventional material. Cement reacts with water and release CO₂ gas. We are trying to partial replacement of cement by different kind of material.(iron dust) and addition of steel fibres Which also increases strength, reduces cost and consumption of cement. Investigate the parallel study between replace material iron dust and additive material steel fibers. Find the values of compressive strength, flexural strength and split tensile strength. And investigate the changes in values of their strength properties. The rapid development of construction industry has increased the consumption of cement. But the production of cement involves the depletion of natural resources and greenhouse-gas emissions. Also production cost of cement is increasing day by day. Thus, there is a need to search for alternative materials to cement for use in the construction

II. REVIEW OF LITERATURE

MOHD KHAWAJA HUSSAIN- 2015: The steel fibre used in this investigation is a hook end type fibre. The length of the fibre used in this experiment is 50mm and the diameter o f the Steel fibre is 1mm. The compressive strength of concrete increases as the percentage of replacement of cement fly ash is increased up to 20% in addition with steel fibre 2%. further replacement there is decrease in strength of concrete.

AZMIRA SOMA SHEKHAR-2016 : Behaviour of cement concrete with partial replacement of cement by iron rust and coal dust. The compressive strength of M20 grade concrete is tested with 5%, 10%, 15% and Replacements for 7 days and 14 days . The compressive strength found by partial replacement of iron rust is more than the compressive strength by partial replacement of coal powder The maximum value obtained is 32 N/mm² for iron rust at 14 days of curing.

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M. DAYANAND- 2015: In this investigation the cement partially replaced by silica fume and metakoline in the percentage of 0%, 5%, 10%, 15%. Also adding steel fibers 2% by the weight of cement. By analysis the experimental results of fibre reinforced concrete, the addition of 10% of Silica fume and 10% Metakoline with 2% of steel fibre has achieved the maximum compressive strength.

N.KAVIBALA-2016: Partial replacement of cement with marble powder and fine aggregate with quarry dust in the ratio of 5%, 10%, 15% and 10%, 20%, 30%. The compressive strength increased with the addition of marble powder upto 12 % and 12 to 30% of quarry dust. To investigate and compare the strength of hardened concrete for various polypropylene fiber mixes with optimum percentages of marble powder and quarry dust obtained. The Compressive strength of Cubes are increased with the addition of marble powder up to 12% replace by weight of cement

AISHWARYA SAHA – 2015: Characteristics strength of concrete with addition of steel fibers and partial replacement of cement with GGBS. M20 grade. Ratio of GGBS 10%, 20%, 30%, 40% and addition of steel fibers 0.5%, 1%, 1.5%, 2%. Investigate the property of GGBS and steel fibers. Steel fiber contains low carbon percentage which is provide the easy bonding with concrete and steel fibres. The concrete mixture with 20% GGBS and 1% steel fibers gives highest compressive strength.

ARVIND B. NAKUM- 2015: Effect of mechanical and durability property of concrete with replacement of cement with GGBS (20%, 30%, 40%) by weight and the addition of steel fibers in different percentage (1.5%, 2%, 2.5%). Investigate the durability property like hardness, toughness, and shrinkage. 30% GGBS and 2% gives highest flexural strength.

DEEPTHI D-2016: This paper deals with the study of the effect of addition of wood waste ash (WWA) and crimped steel fibre (CSF) in concrete. evaluate the workability, compressive strength, split tensile strength and flexure strength on addition of 0, 10, 20 and 30% WWA along with CSF of 0%, 0.5%, 1.0% and 1.5% in concrete. The results obtained show that gradual increase of both WWA & CSF has decreased the workability. However, the compressive strength increased with the increase of WWA up to 20% and increase of CSF up to 0.75%. Similar trend was followed for split tensile strength of cylinders and flexural strength of beams.

NEELAPU PAWANI-2016: The investigation reported in this paper is carried out to study the utilization of fly ash in cement concrete as a partial replacement of cement as well as an addition of steel fibres so as to provide an environmentally consistent way of its disposal and reuse. This paper deals with the strength properties of fly ash concrete, on the effect of different percentages partial replacement of cement by 0% fly ash with addition of steel fibres 0%, 1% & 1.5%, 10% fly ash with addition of steel fibres 0%, 1% & 1.5%, 20% fly ash with addition of steel fibres 0%, 1% & 1.5% and 30% fly ash with addition of steel fibres 0%, 1% & 1.5%.

DILIP LALWANI-2015: In this thesis partial replacement of cement with flyash and addition of steel fibers. M-40 grade of concrete have been used. The percentage of steel fibers 0%, 1%, 1.5% and 2%. Cement was replaced by two percentages 40% and 60% of fly ash.

At 0% fly-ash and 2% steel fibers maximum compressive strength is obtained.

SIDDHARTH- 2015: Experimental study of strength of concrete by adding GGBS with the addition of steel fibers. GGBS have added 10%, 20%, 30% of weight of cement and steel fibers 1% of weight of cement. 40% GGBS and 1% steel fibers gives maximum result.

S.H SATHAWANE-2012: Using fly ash and rice huge in the percentage of 10%, 20%, 30% and adding steel fibers 0%, .25%, 0.50%, 1%. Grade of concrete M-20. 20% fly ash, 10% rice huge and 1% steel fibers gives highest compressive strength of concrete. Compressive strength increases with the increase in the percentage of Fly ash and Rice Husk Ash up to replacement (22.5% FA and 7.5% RHA) of Cement in Concrete for different mix proportions. The maximum 28 days split tensile strength was obtained with 22.5% fly ash 7.5% rice husk ash mix. The maximum 28 days flexural strength was obtained again with 22.5% fly ash and 7.5% rice husk ash mix.

MUNTAHER ALI CHALOO-2013: Effect of Fly Ash and Steel Fibre on Portland Pozzolana Cement Concrete. Percentage of fly ash is 10%, 20%, 30% and steel fibers added .5%, 1%, 1.5%. there was reduction in compressive strength of concrete with steel fibre and 30% of fly ash. The compressive strength increases up to 28.5% with 1.5% of steel fibre and without of fly ash.

CHETAN KHAJURIA-2013: Mixing the iron slag with partial replacement of sand. The Compressive strength tends to increase with increase percentages of iron slag in the mix only 30% of iron slag. Investigating the property of iron slag. For future aspect the iron slag may also be replaced cement partially fixed the percentage of iron slag and then any other material added in the concrete.

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Mr. NIKHIL GADGE-2013: The cement in concrete is replaced accordingly with the percentage of 10 %, 20%, 30%, and 40% by weight of slag and 0.5%, 1%, 1.5%, 2% by steel fiber. replacement of Ground Granulated Blast Furnace Slag Powder to cement and steel fiber the maximum compressive strength is 20 % & 1.5 % respectively for M20.

DIVAKAR YADAV-2012: In this investigation fine aggregate replaced by granite powder. Ratio 5%, 15%, 25% to 50%. compressive strength has increased by 22% with the use of 35% replacement of fine aggregate with granite fines. With increase of granite fines up to 50% increasing compressive strength will limit 4% only.

HUSAM NAJM-2016: In this thesis the granite power replaced by sand in the ratio of 0%, 5%, 10%, 15%, 20%. The compressive strength of concrete increased with the addition of granite powder as partial replacement of sand using 10% granite powder.

SARAVANA RAJA MOHAN-2011: Cement is replaced by flyash and steel fibres. Ratio of fly ash is 10%, 15%, 20%, 25%, 30% and steel fibers for every percent of flyash is 0.15%, 0.30%, 0.45%. An ideal choice would be 15% fly ash with 0.15% of steel fibers gives an increases 5 to 31% increases in cube strength.

III. CONCLUSION

All the above practical based upon the additional material. Some material and its adding percent give good result to increases the strength and performance of concrete. In this work, experimental investigation will be made to understand the behaviour of concrete with partial replacement of iron dust and addition of steel fiber. Workability, compressive strength, split tensile strength and flexural strengths will be analyzed and tested. Results will analyse to derive useful conclusions regarding the strength characteristics of steel fiber. Iron dust has not be used as the replacement of cement in earlier studies. So this would seen that the fixed percentage of iron dust. Tested all the sample of iron dust and fixed the percentage of iron dust which sample will be give maximum result. Then adding steel fibers in different percentage with the fixed percentage of iron dust. This experiment may be gives some intresting conclusion which is topic of analysis. The main aim to gives the high strength and high performance concrete and also have a economical for construction work.

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