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A REVIEW PAPER ABOUT STEEL FIBER AND FLY ASH BASED CONCRETE

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ABSTRACT: This paper describes the applications and feasibility of steel fiber and fly ash in the concrete industry. This paper also helps in to identify the desired percentage of steel fiber and fly ash in the concrete mix. Many literature reviews have been studied deeply to carry out the proposed dissertation work in a scheduled manner and to achieve the project related goal. To find out the effect of steel fiber and fly ash on the strength concrete the compressive, tensile and flexural test will be conducted with the concrete mix. The final result will be compared with the control mix to find out the effect of steel fiber and fly ash on the strength properties of concrete M30.
Key Words: Steel fiber, Fly ash, Compressive strength, Tensile strength, Flexural strength

I. INTRODUCTION

The proposed study work shall be carried out on the bases of mixing of steel fiber waste and fly ash waste as an admixture in the concrete M30. Today India is the second largest country in the crude steel production. Due to this concrete industry can be a better source of recycling a part of steel wastes in the form of concrete admixture. Also steel fiber waste can enhance the tensile properties of concrete. On the other hand fly ash waste originates from the thermal power plant which can be used as an admixture in concrete mix to solve the recycle problem of fly ash.

II. RELATED WORK

Savita, ShwethaS(2018) an experimental investigation was carried out with steel fiber reinforced concrete. In this Investigation, the fiber is randomly oriented and range from 0.1% to 0.4% at 0.1% interval by weight of cement. The test results show that maximum compressive strength was obtained at 0.3% of fiber at 3 and 7 days and at 0.2% of fiber at 28 days. The maximum split tensile strength and flexural strength are found to be at 0.2% of fiber for 7and 28 days. Workability decreases with partial replacement of cement by fly ash with the addition of steel fibers.

Samarul Huda, Anwar Ahmad(2017) carried out an experimental study on M30 Grade of concrete using fly ash, steel fiber, cement, coarse aggregate, and fine aggregate. The main objective of the experimental work was to achieve a proportion of ingredients and obtain the strength of M30 Grade. The moulds were prepared using coarse aggregate, fine aggregate and the quantity of cement was gradually reduced by adding fly ash and amount of steel fiber was also varied. Two sets of fly ash were varied from 10% to 30% in step to 10% keeping the steel fiber content fixed. In the other set, the amount of steel fiber was varied from 0.5% to 2% in step of 0.5% keeping the other parameter fixed. Finally, it was observed that 6.3 kg of cement, 15 kg of fine aggregate, 24.6 kg of coarse aggregate, 0.486 kg of steel fiber, 2.7 kg of fly ash produces the desired strength of M30 Grade of concrete.

ResmiMadhavan, Sudheer.K.VChittilappilly(2016) carried out investigation work on the flexural strength properties of steel fiber reinforced concrete with the addition of fly ash. The study is carried out for the M25 mix. In this investigation steel fibers varied from 0%.0.5%,1%,1.5% of different aspect ratios 20 mm,30 mm and 40 mm and replacement of fly ash varies from 10%,20% and 30%. The test specimens were tested at the interval of 7days and 28 days respectively. It was observed that cement in concrete can be replaced up to 20% to 30% by flyash with the incorporation of steel fibers up to 1.0% to improve its flexural strength of concrete M25 and the optimum aspect ratio is found as 40mm.

B.R. Phanikumar (2015) This paper is based upon an experimental study on engineering properties of pond ash provided concrete reinforced with steel fibers. Pond ash content was varied as 0%, 10%, 20% and 30% by weight of cement. Grooved steel fibers were varied as 0%, 0.5%, 1% and 2% by volume of concrete. Finally, it was observed that the Compressive strength, split tensile strength and flexural strength increased with the increase of curing period for all fiber contents and pond ash contents.

Xiao-Yong Wang (2015) finds out that compressive strength development of concrete mix containing high quantity of fly ash. It defines that compressive strength of fly ash mixed concrete at early stages is comparatively less than that of control concrete, but when it ages, if the volume of fly ash is 15% to 25% in concrete, compressive strength of fly ash concrete is more than the control concrete and if the w/c ratio is lower, even 45% to 55% of fly ash in concrete also surpasses the control concrete.

Saiyad Waquar Husain(2015)was based upon an experiment with different steel fiber content such as 0.5,1.0,1.5% by weight and fly ash contents 0 to 15% by weight. The final experimental test results showed that maximum compressive strength was attained for 10% fly ash and fiber content of 1.0% giving an increase of 21.49%.

Rajeev Chandak, R K Yadav (2014) investigated the compressive strength of steel fiber reinforced concrete with fly ash for the M40 grade concrete mix. In this investigation steel fibers are mixed in various percentages ranging from 0.5 % to 1.5 % and initial percentage of fly ash 10% and the final percentage was 20%. The compressive strength of concrete cubes was tested at the curing age of 7days and 28

days. Finally, it was found that there is a reduction in compressive strength of concrete with an increment of fly ash after 10 %.

Khadake S.N. and Konapure C.G (2013) investigated that fly ash concrete with steel fibers of aspect ratio (l/d) 71 which varies from 0 to 1.5% of the total volume of concrete with fly ash 10% & 20%, showed higher flexural strength and also marginal strength gain in compressive strength for 1.0 and 1.5% steel fiber.

V.M. Sounthararajan and A. Sivakumar (2013) research show that study on fly ash concrete with steel fibers at a standard volume fraction of 1.5% with the utilization of fly ash up to 50% is replaced with cement which shows good performance. It is also observed an increase in flexural strength for 1.5% steel fiber. Modulus of elasticity of concrete showed maximum strength increases by 35% when compared to conventional concrete.

C. Marthong, et.al (2012) used all 33, 43 and 53 grades of OPC and replaced it with fly ash by the percentage of 10%, 20%, 30%, and 40%. The final results showed that the strength of concrete reduced as the fly ash contents increases in OPC. Fly ash concrete was more durable as compared to OPC concrete.

Saravana Raja Mohan and Parthiban (2011) used a different ratio of class C fly ash in his research work such as 10, 15, 20, 25 &30% with steel fibers of 0, 0.15, 0.3, 0.45 & 0.6%. They observed the choice of 15% fly ash with 0.15% fiber content gives an overall strength increase of 12% at 7 days and 55% at the end of 28 days.

Moinul Islam, et.al (2010) investigates the effects of fly ash on strength improvement of mortar and the optimum use of fly ash in a mortar. Cement was partially replaced with 6 percentages (10%, 20%, 30%, 40%, 50%, and 60%) of class F fly ash by weight. The result showed that strength improves with the increase of fly ash up to an optimum value, after that the strength values start decreasing with further addition of fly ash the optimum amount of cement replacement in mortar was about 40%, which provided 14% higher compressive strength and 8% higher tensile strength as compared to OPC mortar.

Okan karahan, Cengiz Duran Atis(2010) used the different ratio of fly ash such as 0%,15%&30% with polypropylene fiber of volume 0,0.05.0.1,0.2% in his research work and found the several concrete properties. Finally, the results show that the addition of fiber & fly ash reduces the density, increases water absorption, lowers drying shrinkage.

Cengiz Duran Atis, OkanKarahan (2007) used the different fraction of fly ash such as 0, 15&30% and the volume fraction of steel fiber used was 0, 0.25, 0.5, 1, 1.5% based on the volume of aspect ratio which varies from 50 to 70. They found out that by adding the steel fiber of 1% with 0 to 15% of fly ash gave a 30% more tensile strength and with the usage of 1.5% of fiber gave us 66% improvement in tensile strength.

III. CONCLUSION

Above literature shows the feasibility of the use of steel fiber and fly ash with the concrete ingredients as an admixture. The literature review indicates that very few publications are available on the fiber reinforced concrete with spiral steel fibers and fly ash. So there is a deep need for experimental study especially related to the Steel fiber and fly ash-based concrete.

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