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INFLUENCE OF M-SAND IN SELF COMPACTING CONCRETE WITH ADDITION OF STEEL FIBER IN M25 GRADE

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ABSTRACT:

The Self-Compacting Concrete doesn't require any vibration for the process of compaction. It can stream with its own particular weight, totally rounding formwork and doing full compaction, even within the sight of congested support. The harden state of concrete is thick, homogeneous and having equivalent building homes and solidness as ordinary vibrated concrete. It decreased system costs as no vibration is required, shortened production time, early strength gain. By adding steel fibers, it improves the tensile parameters. The steel fibers (straight) can be effective on micro and macro cracks. In the present paper, the effect of steel fibers with a length of 30mm and diameter of 0.5 mm were used in the self-compacting concrete. Due to this the workability of the concrete get reduces. Increasing the workability by adding super plasticizers. The concrete is testing at a period of 7 days and 28 days. At 7days 60% of strength will attain. In SCC the steel fiber amount is 0.3 %, 0.6 %, 0.9 %, 1.2 % has been taken. By increasing the percentage of steel fiber, the compressive strength and flexure strength will gain.

Keywords: *Steel fibers, Workability, Super plasticizer, flexure, Self-Compacting Concrete.*

1.INTRODUCTION:

Concrete is a composite material made up of coarse total with fluid bond that hardens after some time. Most of cement utilized is lime-based cements, for instance, Portland cement concrete or bonds made with other water driven cements. Asphalt concrete is most normally utilized for street surfaces, and furthermore a sort of cement, in which the cement material is utilized as bitumen, and polymer cements are likewise utilized where the establishing material is a polymer. At the point when total is blended with dry Portland bond and water, the blend frames fluid slurry that is effortlessly formed into shape. The substance response of concrete with water and different fixings to frame hard network materials that ties together into a hard stone-like material. Consistently, included substances, (for instance, pozzolans or super plasticizers) are fused into the mix to improve the physical characteristics of the dry mix or the finished material. Most of the concrete is poured with strengthening materials, to give rigidity and yielding reinforced concrete.

1.1 STEEL FIBER:

Steel fibers are firmly separated and moderately short as contrasted and constant fortifying bars of wires. The concrete resistance will give rise to cracking, fragmentation, orthography and fatigue. It gives more strength to self-compacting concrete.

1.2 SUPER PLASTICIZER:

Super plasticizers are also known as high water reducers. The expansion of Tec-Mix will recapture the work capacity required for the Self Compacting Concrete. This gives more workability.

2.LITERATURE REVIEW:

In self-compacting concrete, steel fiber is added to gain the compressive strength of the self-compacting concrete. Due to the addition of steel fiber workability of self-compacting concrete

decreases. Super plasticizer is added to increase the workability. The flow of self-compacting concrete is smooth.

2.1 Kosmas K. Sideris, In this paper they discussed an experimental study on Mechanical properties of self-compacting concretes which is subjected to an elevated temperature up to 700°C. Different strength categories of eight different concretes of four self-consolidating concretes SCC and four conventional concretes were produced. Specimens were placed in an electrical furnace and the heated at a rate of 5°C/min at the period of 120days until the required temperature is reached. A maximum temperature of 100, 300, 500, and 700°C was maintained for 1hour. Then the Specimens were taken to cool in the furnace and it is tested for splitting tensile strength, ultrasonic pulse velocity and compressive strength.

2.2 N R Gaywala et.al., This paper discuss about the SCC which gives good finishing when we compared to ordinary concrete without any compaction. The maximum compressive strength, tensile strength, compressive strength, pull out strength and flexural strength for self-compacting concrete can be achieved by adding 15% of fly ash in mix as compared to addition of 25%, 35%, 45% and 55% of cement replacement with fly ash. SCC gives property of good durability when compared to ordinary concrete. The tensile strength, flexural strength, compressive strength and pull out strength of M25 grade of concrete and Mix-3 (35% fly ash) results are nearer so in construction of heavily congested reinforcement structures and high rise buildings, this mix proportion can be adopted.

2.3 Manikandan.P, This project presents the behaviour of Self-Compacting Concrete by replacing cement with fly ash and silica fume, fine aggregate is replaced by M-Sand and recycled aggregate is used as a coarse aggregate. The main objective of this study is to determine the mechanical characteristics such as Split tensile, Compressive strength and Flexural strength of concrete by varying the recycled aggregate percentage content.

2.4 Ali Heidari et.al, This project explains about the effects of using micro-SiO_2 and acrylic polymer in self-compacting concrete (SCC). The characteristics of the concrete improve by using these materials in SCC. Self-compacting samples with 10% micro- SiO_2 and 1-2% of a polymer were made. The result shows that addition of micro-SiO_2 and acrylic polymer that they don't have any negative effect on the self-compacting concrete mechanical properties.

2.5 A.M. Shende1et.al., has investigated for M-40 grade of concrete having blend extent 1:1.43:3.04 with water bond proportion 0.35 to examine the compressive quality, flexural quality, Split rigidity of steel fiber reinforced concrete (SFRC) containing filaments of 0%, 1%, 2% and 3% volume portion of hook tain. Steel fibers of 50, 60 and 67 perspective proportion were utilized. An outcome information got has been analysed and contrasted and a control example (0% fiber). A connection between angle proportion versus Compressive quality, viewpoint proportion versus flexural quality, perspective proportion versus Split elasticity spoke to graphically. Result information clearly demonstrates rate increment in 28 days Compressive quality, Flexural quality and Split Tensile quality for M-40 Grade of Concrete.

3.RESULTS AND METHOD:

The flow ability of the self-compacting concrete is checked through further test: J-ring, V-funnel, L-box and U-box. The strength of the self-compacting concrete in hardened state is checked by another test. Compression test is done.

3.1FRESH STATE TEST:

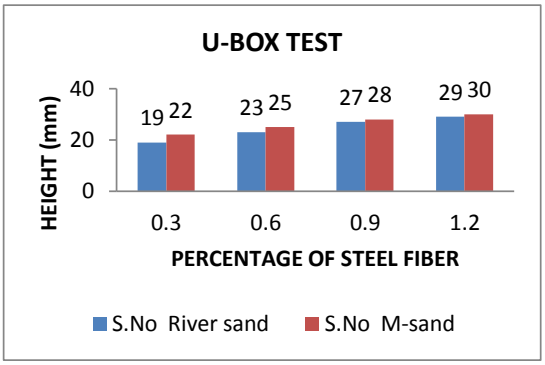
There are totally four types of fresh state tests done on self-compacting concrete.

3.1.1 U-BOX TEST:

The filling ability of the self-compacting concrete is analysed by U-box test. The U-box equipment is divided by using middle wall into sliding gate, the height of concrete in both sections to be measured. Where it can fill it in various forms of the structures.

Steel fiber%	River sand	M-sand
0.3	19	22
0.6	23	25
0.9	27	28
1.2	29	30

3.1.4 U-box test

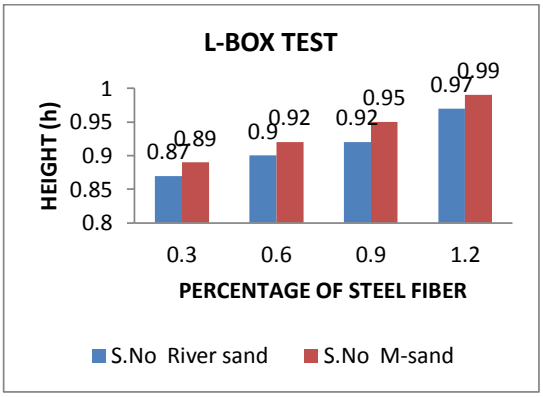


3.1.2 L-BOX TEST:

The passing ability of the self-compacting concrete is analysed by L-box test. The minimum ratio of the height in the vertical section is relative to the horizontal section is considered to be 0.8. If suppose the SCC flows as freely as water, it will be fully horizontal, and the ratio will be equal to 1.0. It is used to judge the self-compacting concrete passes through critical stage.

Steel fiber%	River sand	M-sand
0.3	0.87	0.89
0.6	0.90	0.92
0.9	0.92	0.95
1.2	0.97	0.99

3.1.3 L-box test

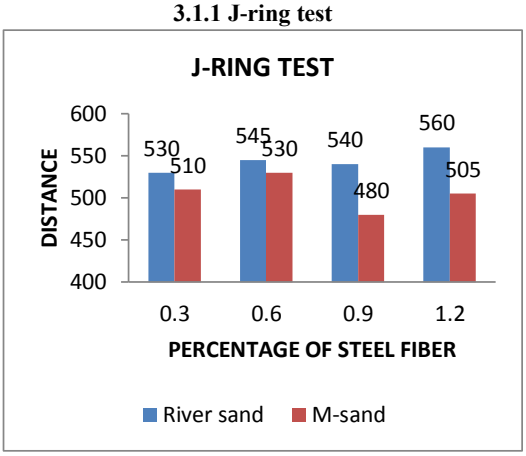


3.1.3 J-RING TEST:

J-ring test is used to check out the flow ability of the self-compacting concrete. It is composed of an size of rigid ring supported in diameter of 16mm rods equally spaced with 12 in diameter of 300mm circle 4 in 100mm above the flat surface. The passage of 25mm indicates good passing ability and 50 mm indicates poor passing ability. It is measured in distances (mm).

Steel fiber%	River sand	M-sand
0.3	530	510
0.6	545	530
0.9	540	480
1.2	560	505

3.1.1 J-ring test

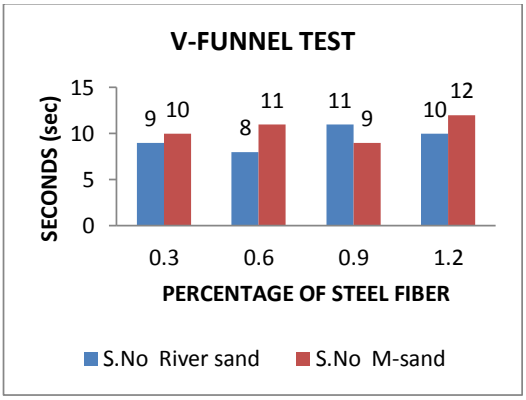


3.1.4 V-FUNNEL TEST:

This test is further to analyse the flowing ability of the self-compacting concrete. It is not suitable when aggregate size exceeds 25mm. They use standard aggregate size to form self-compacting concrete.

Steel fiber%	River sand	M-sand
0.3	9	10
0.6	8	11
0.9	11	9
1.2	10	12

3.1.2 V-funnel test



3.2 HARDENED STATE TEST:

In this test, we are going to test the samples of cubes for 7-days and 28-days. In which we can compare the results of River sand and M-sand. The values will be varied, due to variation of sand and

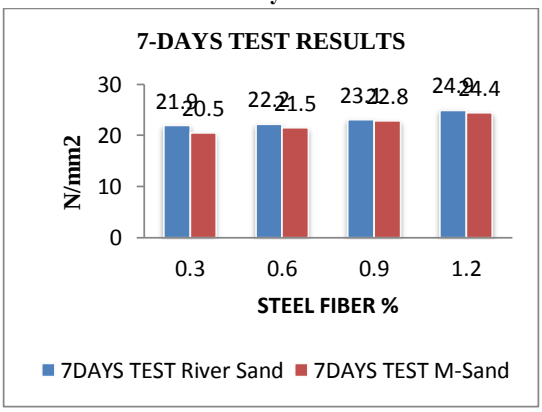
different percentage of steel fiber. So, the strength of the self-compacting concrete is done on CTM.

3.2.1 7-DAYS TEST:

The 7-days test is done to check whether the self-compacting concrete has gained its compressive strength within these days. At certain level of strength.

Steel fiber%	River sand	M-sand
0.3	21.93	20.55
0.6	23.16	21.58
0.9	22.23	22.87
1.2	24.92	24.44

3.2.1 7-days test

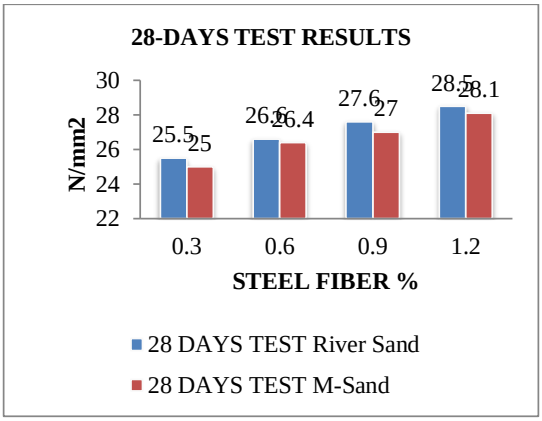


3.2.2 28-DAYS TEST:

This test shows that the self-compacting concrete has gained its maximum compressive strength.

Steel fiber%	River sand	M-sand
0.3	26.66	25
0.6	25.5	27
0.9	27.6	26.4
1.2	28.1	28.53

3.2.2 28-days test



4.CONCLUSION:

This paper study is all about the replacement of river sand by m-sand and by adding the steel fiber in self-compacting concrete has been investigated. The experimental investigation is based on tests of fresh concrete tests and compression test Hence the following conclusions are derived from this study. By adding the steel fiber in the self-compacting concrete with higher percentage increases the compressive strength of the concrete. It can be avoiding cracks and gives high durability. Obtained strength of River sand is higher than the M-sand. But the Strength of M-Sand is higher than the Required level.

REFERENCES:

1. Tomasz Ponikiewski, Jacek Gołaszewski "Composition of Steel Fiber Reinforced Self-Compacting Concrete for Optimal Rheological and Mechanical Properties", Procedia Engineering 65, Pages: 290-295, 2013
2. Mohamed I. Abukhashaba, Mostafa A. Mostafa, Ihab A. Adam "Behaviour of self-compacting fiber reinforced concrete containing cement kiln dust", Alexandria Engineering journal, Volume53, Issue2, June2014, Pages 341-354
3. Farhad Aslani, Shami Nejadi, "Self-compacting concrete incorporating steel and polypropylene fibers: Compressive and tensile strengths, moduli of elasticity and rupture, compressive stress–strain curve, and energy dissipated under compression", Composites Part B Engineering 53, Pages121-133
4. H. Mazaheripour, S. Ghanbarpour, S.H. Mirmoradi, I. Hosseinpour , "The effect of polypropylene fibers on the properties of fresh and hardened lightweight self-compacting concrete", ISSN 0950-0618, 2011, Pages 351-358
5. Kosmas K. Sideris - "Mechanical Characteristics of Self-Consolidating Concretes Exposed to Elevated Temperatures" Volume 19, Issue 8, August 2007
6. NimithaVijayaraghavan and A S Wayal, "Effects of Manufactured Sand on Compressive Strength and Workability of Concrete", International journal of structural and civil engineering research, ISSN 2319-6009, Volume 2, Number 4,

November 2013
7. Hajime Okamura and Masahiro Ouchi, "Self-Compacting Concrete", Journal of Advance Concrete Technology, Volume 1, Number 1, Pages 5-15, April 2003
8. S.A. Bhalchandra, "Performance of Steel Fiber Reinforced Self Compacting Concrete", International Journal of Computational Engineering Research (ijceronline.com), Volume 2, Issue 4
9. Dr. Th. Kiranbala Devi, "Effects of Steel Fibers in Reinforced Concrete", International journal of Engineering Research and Technology, ISSN: 2278-0181, Volume 2, Issue 10, October 2013
10. Constantin E. Chalioris, Constantin N. Pourzitidis "Self-Compacting Concrete Jacketing – Tests and Analysis", AASRI Procedia, Volume 3, Pages 624-629, 2012
11. N R Gaywala, D B Raijiwala "Self-Compacting Concrete: A concrete Of Next Decade", Journal of Engineering Research and studies, ISSN0976-7916, Volume 2, Issue 4, Oct-Dec 2011, Pages 213-218
12. Stephan Assie, Gilles Escadeillas, Vincent Waller "Estimates of self-compacting concrete potential durability", November 2006
13. Chetan V Borad, Krunal J Dhandha, B.G. Buddhdev, M.D. Kakkad - "Emery" The Industrial Waste as A Supplementary Cementitious Material in Self Compacting Concrete, International Journal for Innovative Research in science & technology, Volume 1, Issue 12, ISSN 2349-6010, May 2015
14. Rajkumar .R, "Performance of Self Compacting Concrete Using Fly ash & Msand"
15. Manikandan.P "Sustainable Self Compacting Concrete with M-Sand and Recycled Aggregates Obtained from Construction Demolition Waste" International Journal of Civil, Mechanical & Production Engineering, Volume 2, Issue 3, ISSN : 2454-4272, June 2016
16. Oladipupo S. Olafusi, Adekunle P. Adewuyi, Abiodun I. Otunla, Adewale O. Babalola, "Evaluation Of Fresh And Hardened Properties Of Self-Compacting Concrete", Open Journal of Civil Engineering, Volume 5, Number 1, 2015
17. Ali Heidari and Marzieh Zabihi, "Self-Compacting Concrete Incorporating Micro and Acrylic Polymer", Advances in Civil Engineering, Volume 4, pages 1-6, April 2014
18. F.M. Almeida Filho A, B.E. Barragán B, J.R. Casas B, A.L.H.C. El Debs A, "Hardened Properties of Self-Compacting Concrete -A Statistical Approach", March 2010
19. Oladipupo S. Olafusi, Adekunle P. Adewuyi, Alex F. Adisa, Obanishola M. Sadiq, Olubayo T. Olateju, "Flexural Performance of Self-Compacting Concrete Containing Corn-Cob Ash", ISBN No: 978-1-63248-093-4, Pages 17-21, March 2016
20. A.M. Shende1, A.M. Pande2, M. Gulfam Pathan "Experimental Study on Steel Fiber Reinforced Concrete for M-40 Grade" ISSN (Online) 2319-183X, Volume 1, Issue 1 (September 2012)