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Comparative Study on Self-Compacting Concrete

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Abstract – *This paper deals with comparative study of Self-Compacting Concrete and we will study the behavior and strength of concrete after partially replacing cement by other materials like silica fume, ultrafine, red mud, etc. The use of concrete is increasing at very high rate. Raw material extraction has caused many serious environmental problems. This paper also aims towards innovations in* ***SCC****.*

Key Words**:** environmental problems, red mud, silica fumes, strength of concrete.

1. INTRODUCTION

Concrete has become the most popular in world of construction. It is a man-made material, whose raw material can be provided worldwide. Concrete needs less effort in its construction. But as it Results in environmental effects, many inventions are carried out for improvement as well as to have less harmful effects on environment. It has also led in many studies to improve its quality, reducing the cost of implementing it in construction, and make the concrete environmental friendly.

2. LITERATURE REVIEW

Salem alsanusi. (2013), Volume - 7 The aim of this study is to check the feasibility of using SCC made with aggregates of Eastern Province of Libya by examining its basic properties and characteristics. This research consists of development of a suitable mix for SCC such as the effect of water to cement ratio, limestone and silica fume that would satisfy the requirements of the plastics state, casting of concrete samples and testing them for compressive strength and unit weight. It is suggested that no more than 6% silica be replaced by mass rheological tests chosen and performed were sufficient to ascertain whether the mix will have all the attributes of SCC or not. It is recommended that, at minimum, slump test, U-box and L-box should be performed for the laboratory verification tests.

P.Kumar. (2017). Volume - 8 In this experiment the study was made on flow properties and compressive strength of self-compacting concrete with ultrafine natural steatite powder (UFNSP) as replacement to cement. The test were conducted on specimens with 5%, 10%, 15%, 20% and 25% of replacement of UFNSP. The replacement of UFNSP in self-compacting concrete system can have an influence on the workability, flow of fresh concrete, compressive strength of hardened concrete, and microstructural properties. There was decrease in flow properties of SCC with increase in addition of UFNSP. The maximum strength is achieved in SCC15 specimens. The strength enhancement is seen on all replacement specimens, wherein the strength of SCC25 specimens is almost equal to that of SCCCS. The replacement of UFNSP should be maintained below 20% and the UFNSP will enhance the strength parameters of SCC.

Batham geeta, Akhtar saleem, (2013), Volume- 4 The paper aims towards the recent innovations in self-compacting concrete containing agro-industrial waste material. This paper reviewed about the latest application of admixtures and their performance on SCC quality. The effect of innovative material on fresh and hardened properties is discussed here. The use of various agro-industrial waste in SCC has positive effect on fresh and harden properties. It is possible to produce high strength, medium strength and also high strength good quality of SCC using waste.

Jose A., Albert De La Fuente, (2018), Volume- 6 In this paper six different mixes where produced in two different conditions- In concrete plant in order to verify the adaptability of the existing equipment to produce and pour this material under real boundary conditions. In laboratory controlled conditions, a physical and chemical characterization including 1100 specimens was carried out. The conclusion was, if the aggregates are properly pre-saturated, these do not alter the consistency of fresh concrete, and a more fluid consistency can even be achieved if recycled aggregates are introduced in the saturated state with dry surface.

N. Krishnamoorty, P.K.Sarkar. This paper focus on possibility of using industrial by-products Ground Granulated Blast furnace slag (GGBS) And silica fumes in preparation of SCC. This powder is partially replaced for cement in production of SCC by using Nan Su et al. method for mix design. In this paper there is comparison of performance of GGBS and SF based SCC mix. The SCC mixes containing both powdered material tested for their fresh properties as per EFNARC, has satisfied the norms laid down by EFNARC. Hence we can conclude that achieving fresh SCC properties is possible by using Nan Su et al. method, when these industrial by-products are used as powders.

Georghey asachi, (2016), volume -62. The property of spreading of SCC is attained by increasing powder contain and limiting coarse aggregate volume. The most common mineral addition is filler limestone, an industrial by-product. This paper studies the influence of limestone powder content on the compressive strength and the modulus of elasticity. Thus the addition of limestone powder increases the necessity of water and reduces the compressive strength. The addition of limestone powder about 30% of the total powder content will reduce the modulus of elasticity.

Mr. Gokulnath, Dr. B. Ramesh. (2018), Volume - 119. In this paper, the impact of steel fibers with a length of 30 mm and with measurement of 0.5 mm was utilized as the part of self-compacting concrete. Due to this the functionality of solid get decreased. After 7 days 60% of quality will achieve. TECHMIX 550 was used as the plasticizer. By adding the steel fibers in self-compacting concrete with higher percentage increases the compressive strength of concrete. Obtained strength of river sand is greater than M-sand. But the M-sand is higher than the required level.

Minu Varghese, (2016), Volume – 6 In this paper, the cement was partially replaced by red mud. Red mud is a by-product obtained by byer process of extracting alumina. Red mud improves the flowing and strengthening characteristics of concrete. Various test were conducted to check the physical properties of cement, sand fly ash, aggregate, super plasticizer and red mud. The optimum percentage was found to be 25% by weight of cement.

Hajime okamura, (2003), Volume- 1. In this paper, investigation to develop a rational mix design method and self-compatibility test methods have been carried out from the point of view of making self-compacting concrete a standard concrete. The research in this paper has succeeded in making durable and reliable concrete structures which requires very little maintenance work.

Pravej Akhtar, Vikas Kumar Sigh, (2017), Volume- 5 The present paper investigates the making the self-compacting concrete more affordable for the construction market by replacing high volumes of Portland cement by red mud. The study focus on comparative study of fresh properties of SCC containing varying amounts of red mud with admixture. The result of the research concluded that, the SCC with cement partially replaced by red mud which is industrial waste enhance the strength and reduces the cost of normal SCC.

3. CONCLUSION

We can conclude that by partially replacing cement we can reduce harmful effects on environment. The strength in SCC is obtained as required. We came to know about the difference between SCC with and without replacing cement and benefits of replacing cement in SCC.

REFERENCES

[1] H., Okamura, "Self-Compacting High-Performance Concrete", Concrete International, pp. 50-54, 1997.
[2] J. M., Bartos, “Measurement of Key Properties of Fresh Self-compacting Concrete”, CEN/PNR Workshop, Paris, 2000.
[3] P. L. Domone, “Self-compacting concrete: An analysis of 11 years of case studies,” *Cement and Concrete Composites*, vol. 28, no. 2, pp. 197–208, 2006.
[4] W. R. EUBANK, “Calcination Studies of Magnesium Oxides,” *Journal of the American Ceramic Society*, vol. 34, no. 8, pp. 225– 229, 1951.
[5] K C Panda and P K Bal, “Properties of Self-compacting concrete using recycled concrete aggregate”, *Procedia Engineering*, Vol. 51, pp 159-164, 2013.
[6] Hannawi K, Prince W, and Kamali-Berned S. “Effect of thermoplastic aggregates incorporation on physical, mechanical and transfer behavior of cementitious materials”, *Waste Biomass* Vol. 1, pp 251-9, 2010.
[7] Melo, K.A., Carneiro, A.M.P., —Effect of Metakaolin‘s finesses and content in self consolidating concrete‖, Journal of Construction Building Material, Vol. 24, 1529-1535 pp., 2010.
[8] Self -Compacting Concrete‖, www.efnarc.org., February 2002.
[9] Neville A.M., *Properties of Concrete*, Pearson Education Limited, 2011.
[10] Domone P.L., *A Review of the Hardened Mechanical Properties of Self Compacting Concrete*, Cement and Concrete Composites, *29*, 1-12 (2009).
[11] F.M. Almeida Filho A, B.E. Barragán B, J.R. Casas B, A.L.H.C. El Debs A,
[12] “Hardened Properties of Self-Compacting Concrete -A Statistical Approach”, March 2010
[13] Stephan Assie, Gilles Escadeillas, Vincent Waller “Estimates of self-compacting concrete potential durability”, November 2006
[14] Ping Wang, “Performances of two common types of red mud, Bayer red mud and Sintering red mud”, construction building materials,Vol.10,pp.23-37,2012
[15] Mohan Kushwaha,“Development of self- compacting concrete by industrial waste”, Construction building materials,Vol.13,pp.56-81,2011
[16] Silica fume manual by Oriental Trexim Pvt. Ltd. (2003)
[17] Natural sources for Concrete, Bureau of Indian Standards, and New Delhi, India (1970)
[18] Okamura, H. and Ozawa, K. (1995). “Mix design for self-compacting concrete.” Concrete library of JSCE, 25, 107-120.
[19] Ouchi, M. and Edamatsu, Y. (2000). “A simple evaluation method for interaction between coarse aggregate and mortar particles in self –compacting concrete.”
[20] Su N, Hsu K C, and Chai H W., “A simple mix design method method for self-compacting concrete”, Cement and concrete Research, Vol.13, pp.1799-1807. (2001).

[21]Zhu W, Gibbs C J., and Bartos P J M., "Uniformity of in situ properties of self-compacting concrete in full scale structural elements", Cement & Concrete Composites, Vol.23, pp. 57-64. (2001).