International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 5 Issue 2, January-February 2021 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Study on Properties of Concrete using Rice Husk Ash and Fly Ash as a Partial Replacement of Fine Aggregate & Cement with Sisal Fiber

Yash Dixit[1], Nitesh Kushwaha[2]

[1]M Tech Scholar, [2]Professor,

[1,2]Department of Civil Engineering, Millennium Institute of Technology, Bhopal, Madhya Pradesh, India

ABSTRACT

- Concrete is the most widely used construction material in the world it is a mixture of cement, sand, coarse aggregate and water.
- Storage and safe disposal of industrial by product such as fly ash, SF and rice husk ash is a huge problem everywhere, reuse of these waste eliminates/reduce the problem.
- In this experiment fine aggregate is replaced 0%,10%,20%,30% and 40% of its weight by rice husk ash and cement is replaced 20% of its weight by fly ash & SF in all concrete mix and there effects are studied.
- In this experiment the compressive strength of the concrete is increased.
- It is found that the strength increases with the replacement of cement and fine aggregate by fly ash at about 19%, SF at 1% and RHS at about 40%, and beyond this the workability of concrete will not achieved.

How to cite this paper: Yash Dixit | Nitesh Kushwaha "Study on Properties of Concrete using Rice Husk Ash and Fly Ash as a Partial Replacement of Fine Aggregate & Cement with Sisal Fiber" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-2, February 2021, pp.1166-1168, URL: www.ijtsrd.com/papers/ijtsrd38660.pdf

IJTSRD38660

INTRODUCTION

Fly Ash: Fly ash is a fine powder produced as a product from industrial plants using pulverized coal or lignite as fuel. It is the most widely used pozzolan siliceous or aluminosiliceous in nature in a finely divided form. They are spherical shaped "balls" finer than cement particles.

RHA: The rice husk ash has good reactivity when used as a partial substitute for cement. The ash obtained from properly burned rice husk is found to be active within the cement paste. The use and practical application of rice husk ash for concrete manufacturing may be cost effective.

Sisal fibre: Sisal fibre is one of the most widely used natural fibres and is very easily cultivated. It has short renewal times and grows wild in the hedges of fields and railway tracks. Nearly 4.5 million tons of sisal fibre is produced every year throughout the world.

OBJECTIVES

- To find out properties of concrete by adding Fly ash and RHS with SF.

METHODOLOGY

In this study different ratio of partial replacement of cement with fly ash +sisal Fiber and fine aggregates with RHA will be carried out by mixing concrete.

Compressive strength test

1. Filling of cube moulds of size **(150x150x150) mm** must be done in three layers. The concrete must be placed using a scoop and the scoop should be moved around the top edges of the cube mould so that symmetrical distribution of concrete is done in each layer as the concrete slides down from the inclined scoop into the moulds. 18 cubes were prepared.
2. Each layer must be compacted fully either by using a tamping rod or by using vibration techniques. Concrete is compacted by hand tamping, in 150 mm mould, then 35 strokes are given per layer uniformly covering the entire surface especially the corners.
3. The concrete should be compacted fully well in each layer leaving no chance for air entrapment within its mass. When air bubbles no longer appear on the top surface of concrete it is understood that the concrete is fully compacted.
4. Finally, trowel the surface level with the top of the mould. Identification mark, number and/or date can be lightly scratched on the wet trowel led concrete surface using a matchstick or a scraper.

Figure 1 Cubes Test

EXPERIMENTAL WORK

- Workability Test
- Compressive strength
- Flexural Strength
- Split Tensile strength

Results of the experiments are:

In this stage the experimental work is Carrie out by using cement, fine aggregate, coarse aggregate, RHA, SF and flyash.

- The specimens were casted for M30 grade of concrete by replacing the fine aggregate 10%, 20%, 30%, and 40% by RHA and 20% cement is replaced by 19% fly ash and 1% sisal fiber.

Graphical and Tabular Presentation Are Given Below.

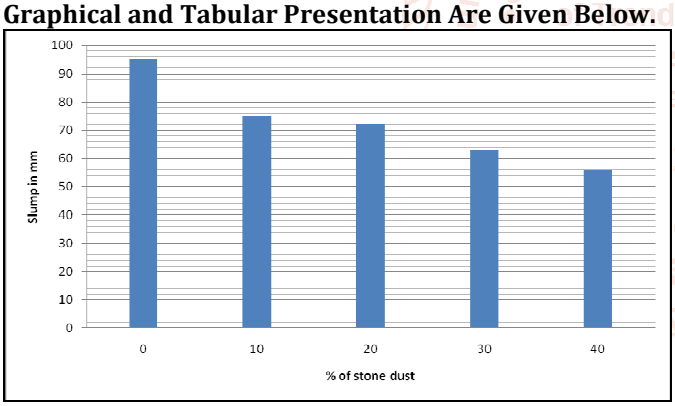

Figure 2 Slumps of M-30 with 20% cement is replaced by 19% fly ash and 1% sisal fiber.

COMPRESSIVE STRENGTH TEST

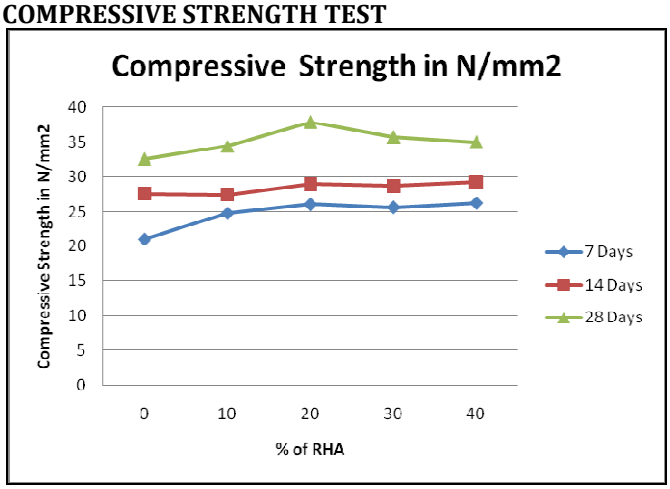

Figure 3 Graph of Compressive Strength at 7, 14and 28days (with fly ash 19% + Sisal Fiber 1% from 20% Cement)

FLEXURAL STRENGTH

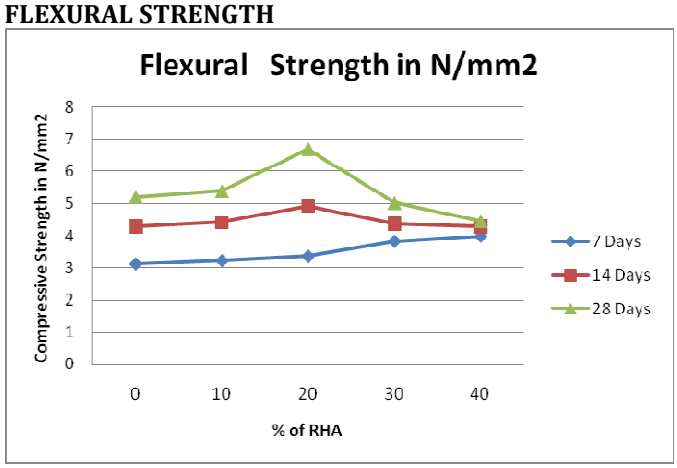

Figure 4 Line Graph of Flexural strength at 7, 14and 28days (with fly ash 19% + Sisal Fiber 1% from 20% Cement)

SPLIT TENSILE STRENGTH TEST

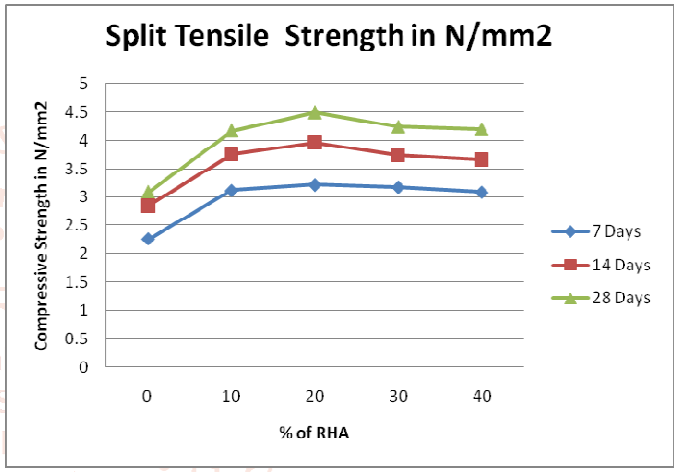

Figure 5 Graph of Split Tensile Strength at 7, 14and 28days (with fly ash 19% + Sisal Fiber 1% from 20% Cement)

CONCLUSION

The strength of the concrete by replacing 20% sand by RHS and 20% cement by the 19% fly ash & 1% SF the strength increases at 3.09 to 4.49 in M-30 concrete. After adding the RHA the strength is Decreases.

Hence by adding the fly ash with stone dust is also increase the tensile strength of the concrete. Hence saving in cost is two ways cost of sand and cement.

REFERENCES

[1] Badorul Hisham Abu Bakar, Ramadhansyah Putrajaya and Hamidi Abdulaziz, School of Civil Engineering, Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Universiti Sains Malaysia; "Rice Husk Ash-Improving the durability and corrosion resistance of concrete", Concrete Research Letters, Vol. 1, March, (2010).

[2] Kartini. K, Associate. Prof, Civil Engineering university Technology MARA, "Rice Husk Ash-pozzolanic material for sustainability", Vol. 1, No. 6, November (2011).

[3] Li Yun-feng, Yao Yan, Wang Ling, "Recycling of industrial waste and performance of steel slag green concrete", J. Cent. South Univ. Technol. (2009) 16: 8–0773, DOI: 10. 1007/s11771-009-0128-x.

[4] Mateusz R. J. O. and Tommy N. " Effect of Composition and Initial Curing Conditions of Scaling Resistance of Ternary(OPC/FA/SF) concrete", Journal of Materials in Civil Engineering © ASCE/October 2008, PP 668-677.

[5] Mauro M. Tashima, Carlos A. R. Dasilva, JorgeI. Akasaki, Michele Beniti Barbosa, FEIS/UNESP, Brazil; "The possibilities of adding the Rice Husk Ash to the concrete"; Multidisciplinary Journal of Research in Engineering and Technology, Volume3, Issue-1, Page. 942 – 947 (2016).

[6] Mauro M. Tashima, Carlos A. R. Dasilva, JorgeI. Akasaki, Michele Beniti Barbosa, FEIS/UNESP, Brazil; "The possibilities of adding the Rice Husk Ash to the concrete"; Multidisciplinary Journal of Research in Engineering and Technology, Volume3, Issue-1, Page. 942 – 947 (2016).

[7] Mehta P. K. (2002), "Greeningof the Concrete Industry for Sustainable Development",

[8] Mehta P. K., Monteiro P. J. M., (2006), "Concrete: Microstructure, Properties, and Materials," New York: McGraw-Hill.

[9] Reading T. J. (1982), "Physical Aspects of Sodium Sulfate Attack on Concrete, " ACI Special Publication SP-77, pp. 75-81.

[10] Rivard P., and Saint-Pierre F. (2019). "Assessing Alkali-Silica Reaction Damage to Concrete with Non-Destructive Methods: From the Lab to the Field", Construction and Building Materials, V. 23, No. 2, pp. 902-909.

[11] Sahin R., Tasdemir M. A., Gul R. and Celik C. (2010). "Determination of the Optimum Conditions for De-icing Salt Scaling Resistance of Concrete by Visual Examination and Surface Scaling", Construction and Building Materials, V. 24, No. 3, pp. 353-360.

[12] Sumrerng Rukzon, Prinya Chindaprasirt, and Rattana Mahachai; "Effect of grinding on chemical and physical properties of rice husk ash", International Journal of Minerals, Metallurgy and Materials, Vol. 16, No. 2, Page 242, April (2009).