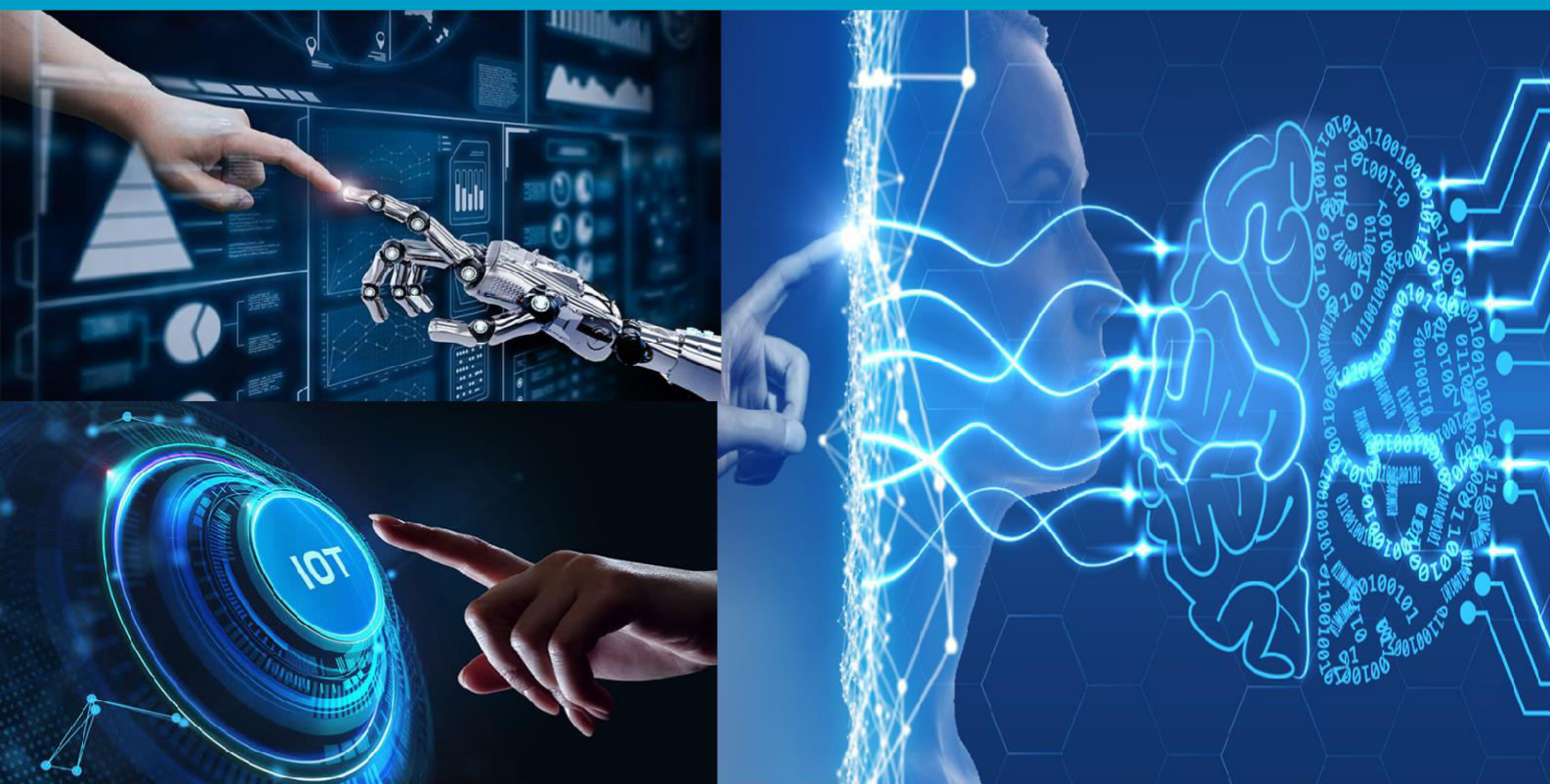




INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

Volume 9, Issue 4, April 2022



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.580



+91 99405 72462



+9163819 07438



ijmrsetm@gmail.com



www.ijmrsetm.com

A Review on Strength and Capacity for the Different Proportions of RHA and WPSA Affect the Behaviour of Concrete

PANKAJ, ABHISHEK SHARMA

Structural Engineering, CBS Group of Institutions, Haryana, India

ABSTRACT: In addition to the limited quantity of raw resources and the ever-increasing cost of electricity, the rising demand for construction materials is pushing up the total price of those items. By using these extra cementing chemicals, it may be possible to reduce the amount of energy that is used (during the production of cement), so saving money, improving engineering qualities, and helping the environment by lowering waste deposits. These are only some of the many advantages that come with engaging in such behaviour, and there are many more. The physical, chemical, and mineralogical properties of materials, in addition to their permeability, are all linked to a material's capacity to withstand wear and tear over time. Any improvement in these characteristics will almost probably be beneficial to the product's lifetime. When individuals refer to pozzolanic material, which is sometimes referred to as pozzolan, they are referring to a substance that is siliceous and aluminous in nature. When it is at a normal temperature and there is moisture in the air, it will undergo a chemical reaction with calcium hydroxide, more commonly known as lime. Compounds with cementitious properties are what result from this process, which produces such compounds. The rheological behaviour of plastic concrete is affected by the physical processes that are related with the particle size and form of pozzolans. These processes also have an effect on the proportion of concrete mix that is used. The bulk of the effects that are linked with hardened concrete are caused by pozzolanic and cementitious processes. These processes are responsible for the concrete's strength as well as its permeability. As a direct result of the rapid rate at which industrialization has occurred, there has been the production of a considerable volume of rubbish. The vast majority of the wastes are not put to any kind of productive use, and in addition to occupying massive tracts of valuable cultivable land, they also contribute to a range of environmental and ecological problems. This is due to the fact that the disposal of these wastes adds to the contamination that already exists in the environment. The decrease in the cost of making cement as well as the reduction in the quantity of greenhouse gas emissions created per tonne of cement produced are two additional benefits associated with being in the cement sector. As a consequence of this, enterprises involved in the production of cement could potentially be able to benefit from carbon trading. The findings of the research indicated that the early strength of RHA, WPSA, and Mix (RHA+WPSA) concrete was found to be lower, and that the strength rose with age. It has been discovered that an increase in replacements results in a deterioration in the workability of RHA, WPSA, and Mix (RHA+WPSA) concrete. It is convenient to declare, based on the findings of the Split Tensile Strength test, that there is a major increase in tensile strength owing to the inclusion of RHA, WPSA, and Mix (RHA+WPSA). This conclusion is supported by the fact that there is a significant rise in tensile strength.

KEYWORDS: RHA and WPSA, pozzolanic material, WPSA, and Mix (RHA+WPSA) concrete

I. INTRODUCTION

1.1 GENERAL

The growing demand for building materials, along with the limited supply of raw resources and the rising cost of energy, is driving up the overall price of those products. Incorporating these supplemental cementing ingredients may save on energy consumption (during the manufacturing of cement), save money, enhance engineering characteristics, and help the environment by reducing waste deposits. These are just some of the benefits that can be gained by doing so. The physical, chemical, and mineralogical qualities of materials, as well as their permeability, are all connected to a material's durability. Any increase in these attributes will very certainly help the product's longevity. A siliceous and aluminous substance is what people mean when they talk about pozzolanic material, also known as pozzolan. It has a chemical reaction with calcium hydroxide (lime) when it is at an ordinary temperature and there is moisture present. The products of this reaction are compounds that have cementitious characteristics. The physical processes that are connected with the particle size and shape of pozzolans are what affect the concrete mix percentage and the rheological behavior of plastic concrete. Pozzolanic and cementitious processes are responsible for the majority of the effects that are associated with hardened concrete, including its strength and permeability. A significant amount of garbage has

been produced as a direct consequence of the brisk pace of industrialization. The majority of the wastes are not put to any beneficial use and, in addition to taking up enormous areas of precious cultivable land, they also contribute to a variety of environmental and ecological issues. This is because the disposal of these wastes contributes to the pollution of the environment. A decrease in the cost of producing cement and a fall in the amount of greenhouse gas emissions generated per ton of cement produced are two additional advantages to the cement business. Because of this, cement businesses could also be able to reap the advantages of carbon trading.

II. LITERATURE SURVEY

This section reviews and offerings the work that was done by a variety of investigators on the use of RHA and WPSA as a partial replacement of cement for the production of concrete and mortar. This work was carried out in this chapter. KUTE2

2.1 STUDIES ON RICE HUSK ASH CEMENT CONCRETE

Kartini.K (Nov.2011) According to the findings, increasing the quantity of RHA in the combination produces dry and unworkable mixes unless super plasticizer (sp) is also included. The addition of Sp to RHA concrete, while keeping the water-to-cement ratio the same, resulted in an increase in slump and an improvement in the concrete's cohesion. When taken at a concentration of 28 days, the optimal replacement of OPC with RHA was 30 percent for Grade 30 and Grade 40, whereas only 20 percent was necessary for Grade 50. The water permeability of the concrete was decreased as a result of RHA being used in lieu of OPC. In comparison to the OPC control concrete, the water absorption values of RHA concrete are much lower. These findings highlight the good impact of integrating RHA to enhance the durability of concrete, and this effect is beneficial regardless of the concrete grade used in the mix. The percentage of water absorption that was achieved for all of the grades fell somewhere between 3 and 5 percent, which may be regarded to be the average absorption for the material.

In order to do this, concrete cubes measuring six inches on a side and having a dimension of 150 millimeters on a side were cast using a variety of alternative building materials, with the mix proportions being altered along with the water-to-cement ratios. It was also shown that various alternative building materials, such as saw dust, recycled aggregates, and brick bats, may be utilized efficiently as a partial substitute for traditional aggregates and cement. This was one of the findings of the study.

According to the findings: It was discovered that rice husk ash concrete had a compressive strength that fell somewhere in the region of 70–80 percent of that of ordinary concrete for a replacement of cement that might go as high as 20 percent. Concrete made from rice husk ash takes up more space than concrete made from cement does for the same amount of weight. When compared to traditional concrete, rice husk ash concrete has a higher total volume for the same amount of weight, which results in a cost savings. Because RHA concrete has a lower density than traditional concrete, the structure's self-weight may be lowered, which results in total cost savings. It was discovered that recycled aggregate concrete had a compressive strength that ranged anywhere between 70 and 80 percent of that of normal concrete. It was discovered that brick bat concrete had a compressive strength that was over 35 percent higher than that of normal concrete. It was discovered that saw dust concrete had a compressive strength that was around 10 to 15 percent of that of normal concrete. Therefore, the concrete produced using alternative building materials such as brick bats and saw dust may be used for functions such as partitioning, filling, and nailing when the strength of the material is not the primary concern. Concrete constructed using alternative building materials has the potential to be chosen as the material of preference in any situation in which compressive strength is not a requirement.

Jayanti Rajput and colleagues conducted a study during the months of May and June 2013 to investigate the impact that using RHA as a supplementing cementing material had on the strength of mortar produced by partially replacing OPC. Cement mortar paste was proportioned with different doses of RHA as a partial replacement of OPC, ranging from 5 percent to 30 percent by weight of cement. This was done in order to test the effectiveness of the RHA.

Thandavamoorthy et al (2013) The use of RHA concrete as a structural material was investigated in the laboratory using rectangular concrete beams with dimensions of 150 millimetres by 200 millimetres by 2000 millimetres. The beams were cast with concrete containing 10 percent RHA, and they were subjected to monotonic loading until they failed. Researchers looked at the capacity of the beam as well as its failure pattern and fracture pattern. In this work, the specifics of the experimental programme are outlined, and a comparison is made between the behaviour of beams made of RHA concrete and that of beams made of standard concrete.

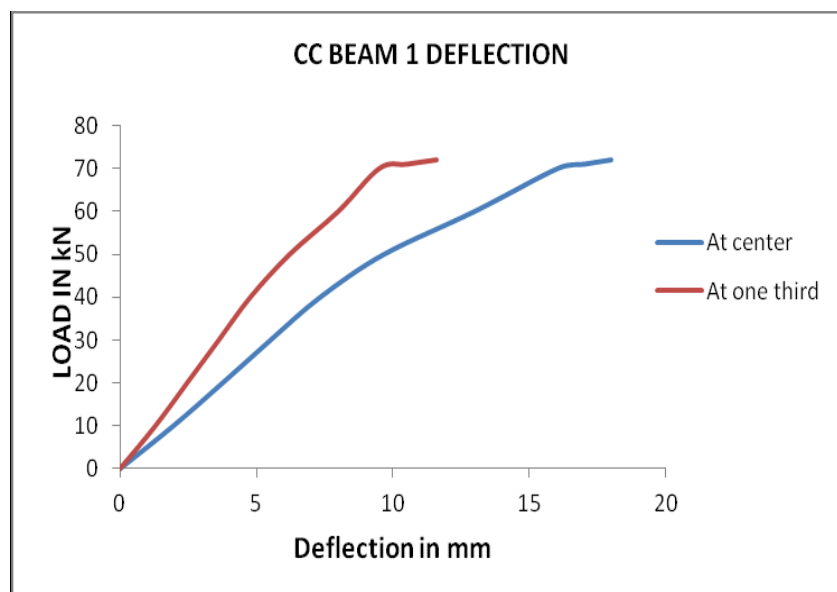
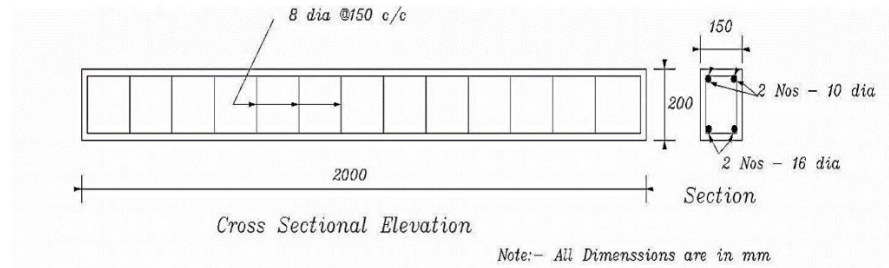


Fig.2.1: Typical Load – deflection curve of normal concrete beam

Mix design of concrete for M-20 grade for moderate exposure was carried out in accordance with IS 10262. The concrete had a w/c of 0.45. The control concrete was used to cast three rectangular beams with dimensions of 150 millimetres by 200 millimetres by 2000 millimetres, together with two numbers of rods with a diameter of 16 millimetres. RHA concrete was used to cast a further three beams of a comparable size. Between the centres of the supports, there was a gap of 1800 millimetres that the beam was supported across. The beam was loaded by means of a 500 kilonewton hydraulic jack that was positioned in the middle of the span. In order to get accurate readings of the beam's deflection, dial gauges were installed below the structure at midspan as well as at third places. The load was increased by 10 kilonewtons at a time, and the readings on the dial were recorded after each load increase.

III. CONCLUSIONS

The purpose of these experiments was to determine whether or not it would be possible to successfully substitute cement in concrete with RHA, WPSA, or MIX (RHA+WPSA), depending on which combination was used. The following are the findings and conclusions that may be derived from the experiments:

1. The findings of the research indicated that the early strength of RHA, WPSA, and Mix (RHA+WPSA) concrete was found to be lower, and that the strength rose with age.
2. It has been discovered that an increase in replacements results in a deterioration in the workability of RHA, WPSA, and Mix (RHA+WPSA) concrete.
3. It is convenient to declare, based on the findings of the Split Tensile Strength test, that there is a major increase in tensile strength owing to the inclusion of RHA, WPSA, and Mix (RHA+WPSA). This conclusion is supported by the fact that there is a significant rise in tensile strength.
4. The use of waste paper sludge ash, rice husk ash, and mix (RHA+WPSA) in concrete may prove to be cost-effective given that the trash in question is non-useful and free of charge.

5. The use of waste paper sludge ash in concrete will preserve natural resources that are used for the production of cement, and as a result, the concrete construction industry will become sustainable. Waste paper sludge can be used as fuel prior to using its ash in concrete for partial cement replacement, and the disposal problem for paper industries regarding this waste material has been completely resolved.

REFERENCES

1. Ahmad S, Malik M.I., Wani M.B., Ahmad R. (2013). "Study of Concrete Involving Use of Waste Paper Sludge Ash As Partial Replacement of Cement." IOSR Journal of Engineering (IOSRJEN), Vol. 3, Issue 11, pp. 6-15.
2. Alwash J.J.H., "Use of Rice Husk Ash in cement mortar."
3. Balwik S.A., Raut S.P. "Utilization of Waste paper Pulp by Partial Replacement of Cement in Concrete." Int. Journal of Engineering Research and Applications (IJERA), Vol. 1, Issue 2, pp. 300-309.
4. Chun Y.M., Naik T.R., Kraus R.N. (2005). "Durable concrete through use of pulp and paper mill residuals." Composites in Construction, pp. 1-8.
5. Hossain T., Sarker S.K., Basak B.C. (2011). "Utilization potential of Rice Husk Ash as a construction material in rural areas." Journal of Civil Engineering (IEB), pp. 175-188.
6. IS: 10262-1982 (Reaffirmed 1999). "Recommended guidelines for Concrete Mix Design." Bureau of Indian Standards, New Delhi (India).
7. IS: 2386 (Part IV)-1963 (Reaffirmed 1997). "Methods of test for aggregates for concrete." Bureau of Indian Standards, New Delhi (India).
8. IS: 383-1970 (Reaffirmed 2002). "Specification for coarse and fine aggregates from natural sources for concrete." Bureau of Indian Standards, New Delhi (India).
9. IS: 4031 (Part 11)-1988. "Methods of physical tests for hydraulic cement." Bureau of Indian Standards, New Delhi (India).
10. IS: 4031 (Part 15)-1991 (Reaffirmed 2005). "Methods of physical tests for hydraulic cement." Bureau of Indian Standards, New Delhi (India).
11. IS: 456-2000 (Reaffirmed 2005). "Plain and reinforced concrete-Code of practice." Bureau of Indian Standards, New Delhi (India).
12. IS:1199-1959 (Reaffirmed 1999). "Methods of sampling and analysis of concrete." Bureau of Indian Standards, New Delhi (India).
13. Ishimoto B.H, Origuchi T., Yasuda M. (2000) "Use of Papermaking Sludge As New Material." Journal of Material in Civil Engineering, Vol. 12, pp. 310-312.
14. Kartini. K (2011). "Rice Husk Ash-Pozzolanic material for sustainability." Int. Journal of Applied Science and Technology, Vol. 1 No.6, pp. 169-178.
15. Kene S.D., Domke P.V., Deshmuh S.D., Deotale R.S. "Assessment of concrete strength using Fly Ash and Rice Husk Ash." Int. Journal of Engineering Research and Applications (IJERA), Vol. 1, Issue. 3, pp. 524-534.



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT



+91 99405 72462



+91 63819 07438



ijmrsetm@gmail.com

www.ijmrsetm.com