

# Comparison of Strength Characteristics of Concrete by using Fly Ash and Rice Husk Ash

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## ABSTRACT

A state of extreme landfill areas redevelopment program in many parts of the country has caused to bring the use of recycled aggregate. The low quality of recycled aggregate has limited its use to low-grade applications such as roadwork sub-base and pavements, while its adoption for higher-grade concrete is rare because of the lower compressive strength and higher variability in mechanical performance of recycled aggregate. A new concrete mixing method, that is the two-stage mixing approach (TSMA), was publically recommends to improve the quality of recycled aggregate concrete (RAC) by splitting the mixing process into two stages. The variation of compressive strength by experimental analysis involving the new mixing method with the two-stage mixing approach by proportioning ingredients with the percentage of recycled coarse aggregates (RCA), fly ash and rice husk ash. Based on experiments and results, improves strength to RAC were achieved with TSMA. This can be regarded as to the porous nature of RA and the mixing process that fills up some of its pores and cracks, resulting in a denser aggregate and concrete. An improved zone of RA gives a more strength than the normal mixing approach.

**KEYWORDS:** Concrete, Fly ash, Rice husk ash, Rapid hardening cement, recycled aggregate, two stage mixing approach (TSMA), Normal mixing approach (NMA)

## INTRODUCTION

It is known that waste in India in the construction industry is high than 30%. This is a large, relatively simple and straight forward challenge needs to be tackled by engineers. These wastages are absorb man hours, resources and materials but create no value. In this project, you will use waste materials to make something productive by making a concrete using recycled aggregate and fly ash. After making concrete cubes are compared with compressive strength characteristics of the concrete made through NMA and TSMA.

Normal mixing approach (NMA) is the process where all the materials are mixed in defined proportion. The problem with this approach is when concrete gets hardened some voids remains in it which affects its strength. In a two-stage mixing approach (TSMA) a skinny layer of cement is made on the surface of RA which helps in feeling voids. This results in the higher strength. In this project, you're getting to prepare two different sample of concrete using above two mixing approaches and determine compressive strength, the flexural strength of these on day 7 and 28.

These environmental problems are growing and thoughtful sustainable approach towards our natural resources to which the recycling of the aggregates seems to be allowable remedy. The comparison of strength of the concrete made through NMA and TSMA. The use of recycled aggregate in concrete is not new, researches have been carried out on

**How to cite this paper:** Purva B. Dhengare | Prof. G. D. Dhawale | Prof. R. S. Kedar "Comparison of Strength Characteristics of Concrete by using Fly Ash and Rice Husk Ash" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-1, December 2020, pp.564-565, URL: www.ijtsrd.com/papers/ijtsrd37993.pdf



IJTSRD37993

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recycled aggregate all over the world. However, use of Recycled Aggregate in high strength concrete could not become popular in India.

There is an increases importance to prevent the environment in the present day world. Rice Husk Ash is significant environmental damage and ways are being thought of to dispose them. This material is actually a super-pozzolonic since it is high in Silica and has about 85% to 90% Silica content. A better way of utilizing this material is to use it for making "High Performance Concrete" which gives high workability and long-term durability of the concrete.

## AIM & OBJECTIVE

**Aim:** To compare strength of concrete by using fly ash and rice husk ash.

### Objectives:

- To reduce agricultural waste.
- To reduce industrial waste.
- To reduce demolished construction waste.
- To reduce cost of material.

## LITERATURE SURVEY

Tam V.W.Y et al, proposed the technique of modified mixing of concrete. The poor quality of RAC results weaker interfacial transition zone between Recycled Aggregates

(RA) and new cement mortar hampers the application of RAC for higher grade. The two-stage mixing approach is proposed to poor strengthening of RAC, which is located at the (ITZ) of the RA. The two-stage mixing approach gives the cement slurry to cover up the RA, provide a stronger ITZ by filling up the cracks and pores within RA. From the experiments, the compressive strengths have been improved. This two-stage mixing approach can provide an effective method for increasing the compressive strength and other mechanical performance of RAC, and thus, the approach opens up a wider scope of RAC applications.[1]

Patil S.P et al, have concluded in their paper on RCA that the compressive strength of concrete containing 50% RCA has strength in close nearly to that of normal concrete. The tensile strength of concrete is good when replace up to 25-50%. The strength of concrete is high during initial stages but gradually reduces during increasing stages. Water absorption of RCA is higher than that of nominal aggregate. Thus the usage of RCA in concrete mixture have strength in close nearly to that of natural aggregate and can be used practically as a full value component of new concrete.[2]

Vyas C.M and Bhatt D.R, in their research on use of recycled Coarse aggregates in concrete have stated that the experimental results show that the early compressive strength of concrete made of normal coarse aggregate and recycled coarse aggregate are approximately same. As the percentage of RCA are increased then the workability decreases. The compression test results increasing technology of compressive strength in the early age of the concrete specimens with 60% recycled aggregates. The results also show that the recycled aggregate can be used in concrete with 40% replacement of natural coarse aggregate.[3]

Satish H. Sathawanea, Vikrant S. Vairagade and Kavita S Kene et al, In this paper, the detailed experimental investigation was done to study the effect of partial replacement of cement by Fly Ash and Rice Husk Ash is in proportions of 30% of FA and 0% of RHA put together in concrete by replacement of cement with the gradual increase of RHA by 2.5% and simultaneously gradually decreases of FA by 2.5%. The last proportion was taken 15%FA and 15% RHA. The tests on hardened concrete were damage in nature which includes compressive test on cube for size (150 x 150 x 150 mm) at 7,14,28 days of curing as per IS: 516 1959. [4]

Sandeep Uniyal, Dr. Vanita Aggrawal et al, a replacement concrete mixing method, that's the two-stage mixing approach (TSMA), was advocated to enhance the standard of RA concrete (RAC) by splitting the mixing process into two. The difference of compressive strength by experiments involving the mixing method with some alteration to the two-stage mixing approach by proportioning ingredients with the share of recycled coarse aggregates (RCA) and ash. Based on experiments and results, improves the strength to RAC were achieved with TSMA. This can flow from to the porous nature of RA and thus the premixing process that fills up variety of its pores and cracks, resulting in a denser aggregate and concrete.[5]

Maurice E. Ephraim, Godwin A. Akeke and Joseph O. Ukpata et al, This research work was experimentally administered to research the results of partially replacing OPC with our local additive Rice Husk Ash (RHA) which is understood to

be super pozzolanic in concrete at optimum replacement percentage which can help to scale back the value of housing. With this research work, the matter of waste management of this agro-waste are going to be solved. The specific gravity of RHA was 1.55. RHA concrete was workable with a slump value of over 100mm. The externalization of RHA in concrete resulted in increase water demand and enhanced strength. The compressive strength at 28days were found to be good at replacement.[6]

## CONCLUSION

From the above literature papers conclusion is as follow:

- Two-stage mixing approach can provide an effective method for increasing the compressive strength and other mechanical performance of RAC, and thus, the approach opens up a wider scope of RAC applications.
- Recycled Coarse Aggregates that the compressive strength of concrete containing 50% RCA has strength in close proximity to that of normal concrete.
- The compressive strength of concrete made of coarse aggregate and recycled coarse aggregate are approximately same.
- The percentage of water cement ratio is depends on quantity of RHA used in concrete. Because RHA is a highly porous material. The workability of concrete had been decrease with increase RHA in concrete .
- Maximum 28 day strength is obtained by concrete made by using TSMA includes replacement of 25% RCA and addition of 10% fly ash. This concrete will be cost effective as well as strong and can be used in any constructional works in place of normal concrete.
- An addition of RHA from 5-10% will increase the strength and a further addition up to 15-25%RHA will have a slight reduction in strength of 15% and a decreasing in strength when RHA are increasing.

## REFERENCES

- [1] [www.researchgate.net](http://www.researchgate.net)
- [2] [www.ijert.org](http://www.ijert.org)
- [3] Tam V. W. Y et al.(2005). "Micro structural analysis of recycled aggregates concrete produced from two-stage mixing approach", Cement and Concrete Research.
- [4] Patil S. P, Ingle G. S and Sathe P.D.(2013). "Recycled Coarse Aggregates", International Journal of advanced Technology in Civil Engineering.
- [5] Vyas C. M and Bhatt D. R. (2013). "Use of Recycled Coarse Aggregate in Concrete", International Journal of Scientific Research
- [6] Satish H. Sathawanea, Vikrant S. Vairagade and Kavita S Kene (2013) "Combine Effect of Rice Husk Ash and Fly Ash on Concrete by 30% Cement Replacement".
- [7] Sandeep Uniyal, Dr. Vanita Aggrawal (2014) "Comparison of Compressive Strength of Concrete Made by Two-Stage Mixing Approach(TSMA) using Fly Ash and Nominal Concrete Made by Normal Mixing Approach(NMA)".
- [8] Maurice E. Ephraim, Godwin A. Akeke and Joseph O. Ukpata (2012) "Compressive strength of concrete with rice husk ash as partial replacement of ordinary Portland cement".
- [9] IS: 10262-2009 Concrete mix proportioning guidelines (First Revision).
- [10] IS: 383-1978 Specification for coarse and fine aggregate from natural sources of concrete.