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COMPARISON OF STRENGTH CHARACTERISTICS OF CONCRETE BY USING FLY ASH AND RICE HUSK ASH

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Abstract : A state of maximum lowland areas renovation program in several components of the country has cause to bring the employment of recycled mixture. However, the caliber of recycled mixture has restricted its use to inferior applications like roadwork sub-base and pavements, whereas its adoption for higher-grade concrete is rare thanks to the lower compressive strength and higher variability in mechanical performance of recycled mixture. a brand new concrete compounding technique, that's the two-stage mixing approach (TSMA), was publicly recommends to enhance the standard of recycled mixture concrete (RAC) by cacophonic the mixing method into 2 stages. The variation of compressive strength by experimental analysis involving the new compounding method with the two-stage compounding approach by proportioning ingredients with the share of recycled coarse aggregates (RCA), ash and rice husk ash. supported experimental works and results, enhancements in strength to RAC were achieved with TSMA. this will be thought to be to the porous nature of RA and also the compounding method that fills up a number of its pores and cracks, resulting in a denser mixture and concrete. AN improved zone around RA provides the next strength than the conventional compounding approach (NMA)

IndexTerms: Concrete, Fly ash, Rice husk ash, Rapid hardening cement, Recycled aggregate, Two stage mixing approach(TSMA), Normal mixing approach(NMA)

I. INTRODUCTION

It is noted that wastage in Republic of India within the industry is as high as half-hour. this can be an oversized, comparatively straightforward and straight forward challenge must be tackled by engineers. These wastages area unit activities that absorb man hours, resources and materials however produce no price. during this project, you may use those waste materials to create one thing productive by creating a concrete victimization recycled mixture and ash. once creating concrete you may compare the compressive further as flexural strength characteristics of the concrete created through NMA and TSMA. Normal commixture approach (NMA) is that the commoner method wherever all the materials area unit mixed in outlined proportion.

The problem with this approach is once concrete gets hardened some void house remains within it that affects its strength. in an exceedingly two stage commixture approach (TSMA) a skinny layer of cement suspension is made on the surface of RA that helps in feeling those void spaces. This leads to the upper strength of the composite. during this project, you're planning to prepare 2 completely different sample of concrete victimization on top of 2 commixture approaches and confirm compressive strength, the flexural strength of these on day seven and twenty eight. These environmental issues area unit a actuation in developing AN pressing and thoughtful property approach towards our natural resources to that the usage of the aggregates looks to be a allowable remedy.

The paper presents a comparison of the compressive strength of the concrete created through NMA and TSMA. idea of use of recycled mixture in concrete is not new, researches are distributed on recycled mixture everywhere the planet. However, use of Recycled mixture in high strength concrete production couldn't become widespread in Republic of India. There is AN increasing importance to preserve the atmosphere within the gift day world. Rice Husk Ash (RHA) from the parboiling plants is motion a heavy environmental threat and ways in which area unit being thought of to dispose them. This material is truly a super-pozzolana since it's wealthy in silicon dioxide and has regarding eighty fifth to ninetieth silicon dioxide content. a decent manner of utilizing this material is to use it for creating “High Performance Concrete” which suggests high workability and long sturdiness of the concrete.

II. AIM AND OBJECTIVES

Aim : To compare strength of concrete by using fly ash, rice husk ash replaced with Rapid Hardening Cement and Recycled coarse aggregate.

Objectives:

1. To reduce industrial waste.
2. To reduce demolished construction waste.
3. To reduce cost of material.
4. To examine the gainful use of modern waste as the cement substitution in construction work.
5. To evaluate the optimum proportion of rice husk ash as a beneficial replacement with cement in cement concrete.

III. LITERATURE REVIEW

Patil S.P et al, have complete in their paper on Recycled Coarse Aggregates that the compressive strength of concrete containing five hundredth RCA has strength in shut proximity to it of traditional concrete. Tensile ripping take a look at shows that concrete has smart lastingness once replace upto 25-50%. The strength of concrete is high throughout initial stages however bit by bit reduces throughout later stages. Water absorption of RCA is above that of natural combination. Thus the usage of RCA in concrete mixture is found to own strength in shut proximity to that of natural combination and may be used effectively as a full price element of latest concrete.

Vyas C.M and Bhatt D.R, in their analysis on use of recycled Coarse aggregates in concrete have declared that the experimental results show that the first compressive strength of concrete made from natural coarse combination and recycled coarse combination square measure close to same. because the share of recycled combination square measure enhanced then the workability decreases. The compression take a look at result indicates associate increasing trend of compressive strength within the early age of the concrete specimens with hour recycled aggregates. The results conjointly show that the recycled combination is employed in concrete with four-hundredth replacement of natural coarse aggregate.

Dr. A.M. Pande and S.G.Makarande et al, The samples with dimensions of fifteen X fifteen cm were tested, with 12.5, 25, & 37.5% of RHA, commutation in mass the cement. Properties like simple compressive strength, ripping lastingness, water absorption and modulus of elasticity were evaluated. The results were compared to controlled sample and also the viability of adding RHA to concrete was verified. Mixes show higher compressive instead of traditional concrete. Replacement of twelve.5 you look after cement with rice husk ash in matrix causes reduction in utilization of cement and expenditures. can also improve quality of concrete at the age of ninety days. Results indicate that pozzolanic reactions of rice husk ash within the matrix composite were low in early ages, however by aging the specimens to ninety days, respectable impact are seen in strength. in step with study, addition of pozzolans like rice husk ash to the concrete, can improve the mechanical properties of specimens.

Mr. Nitin S.Taksande, Mr. G. D. Dhawale, Dr .S. G. Makrande, Mr.M.R.Nikhar et al, Test result on the specimen is improvement in compressive strength due to continuous increase of Rice husk ash. The strength will increase with addition of Rice husk ash & waste glass powder at third, 5%, 100 percent and subsequently declines at 15 August 1945 and two hundredth bit by bit due to more alkali oxide reaction freed throughout association of cement. the current study investigates the impact of pozzolanic material in concrete and thus up the strength of concrete. This work evaluates the performance of Rice Husk Ash and glass powder as a partial replacement of cement in concrete. during this project the rice husk ash share is with same replacement of glass powder. The strength properties of concrete square measure compared with the above varied share and also the result on that it provides most strength is got wind.

IV. MATERIALS USED

- Cement: Rapid Hardening Cement use in this project. Rapid Hardening Cement contains the following ingredient proportions. 60% Tricalcium silicate (C3S), 15% Dicalcium silicate (C2S), 10% Tricalcium aluminate (C3A) and 8% Tetracalcium alumino ferrite of the total weight of cement. OPC contains 50% C3S of its total weight. So, it is observed that Rapid Hardening Cement contains a higher percentage of C3S than OPC. Rapid Hardening cement with 28 percent normal consistency conforming to IS: 8041- 1990 was used. The specific gravity of cement 3.15.
- Fly Ash: Fly ash includes substantial amounts of silicon dioxide (SiO2), aluminium oxide (Al2O3) and calcium oxide (CaO), the main mineral compounds in coal-bearing rock strata. Fly ash is used as partial replacement of cement of total cementitious material in all the cases of the experiments. The specific gravity as 2.4 and satisfying IS 3812-1999.
- Rice Husk Ash: Rice husk ash is used as partial replacement of cement of total cementitious material in all the cases of the experiments. This material is actually a super-pozzolanic since it is rich in Silica and has about 85% to 90% Silica content.
- Fine aggregate: Locally available sand was used of maximum size 4.35 mm was used.
- Coarse aggregate: Locally available coarse aggregate of maximum size 10.0 mm was used.
- Recycled Coarse Aggregates: Aggregates obtained by the demolished construction waste are known as recycled aggregates.
- Water: Portable water was used for the experimentation.

V. MIX PROPORTION

Table 5.1- mix proportion

Description	Cement	Fine Aggregate	Course Aggregate	Water
Quantities of materials (Kg/m^3)	428.46	573.68	994.8	182.17
Mix Proportion	1	1.33	2.32	0.4

VI. RESULT

- The result presented upto 28 days are regarding the compressive test for different percentage of fly ash and rice husk ash in concrete.
- The addition of 5% of cementations material in which 2.5% fly ash and 2.5% of rice husk ash is replaced with rapid hardening cement.
- Then 10% of cementations material in which 5% of fly ash and 5% of rice husk ash is replaced with cement.
- Then 15% of cementations material in which 7.5% of fly ash and 7.5% of rice husk ash is replaced with cement.
- The addition of 25% of recycled coarse aggregate is replaced with coarse aggregate in each proportion.

➢ **Compressive strength by nominal mixing approach and two stage mixing approach**

Table 6.1- compressive strength up to 56 days

Sr. No.	**% of fly ash**	**% of rice husk ash**	**Average compressive strength by NMA (N/mm2)**	**Average compressive strength by TSMA (N/mm2)**
01.	0%	0%	52.55	52.62
02.	2.5%	2.5%	53.32	53.40
03.	5%	5%	54.79	54.81
04.	7.5%	7.5%	55.27	55.36

Graph 6.1- Compressive strength up to 56 days

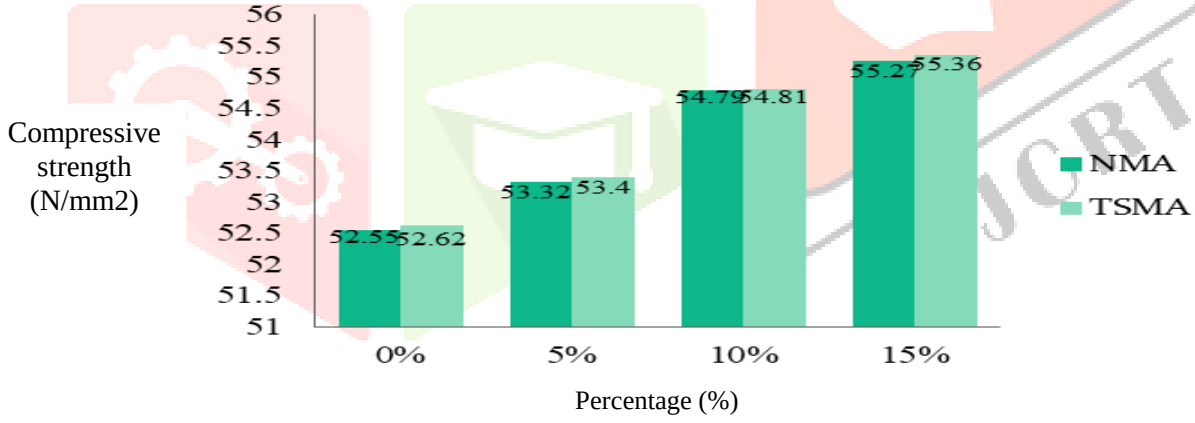
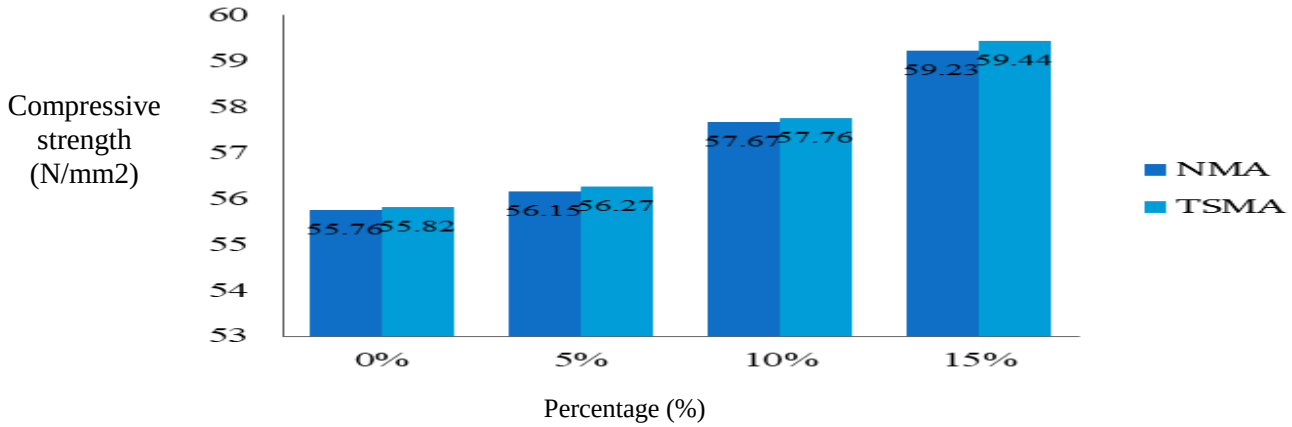


Table 6.2- Compressive strength up to 90 days

SR. NO.	% OF FLY ASH	% OF RICE HUSK ASH	AVERAGE COMPRESSIVE STRENGTH BY NMA (N/MM2)	AVERAGE COMPRESSIVE STRENGTH BY TSMA (N/MM2)
01.	0%	0%	55.76	55.82
02.	2.5%	2.5%	56.15	56.27
03.	5%	5%	57.67	57.76
04.	7.5%	7.5%	59.23	59.44

Graph 6.1- Compressive strength up to 90 days



➢ **Interpretation**

- This graph interpret that the compressive strength for M-40 grade of concrete at 90 days are observed as follow
- The two stage mixing approach was 55.82 n/mm2 in which 0% of fly ash and 0% rice husk ash being higher than nominal mixing approach. Then it rise to 56.27 n/mm2 in which 2.5% of fly ash and 2.5% of rice husk ash. The cement replaced by 5% of fly ash and 5% of rice husk ash it gives 57.76 n/mm2. Later 7.5% of fly ash and 7.5% of rice husk ash substitute by two stage mixing approach and it shows increase in strength with 59.44 n/mm2.
- At the beginning nominal mixing approach shows 55.76 n/mm2 strength. It increase to 56.15 n/mm2 at 5% substitution of ash. later it increase to 57.67 n/mm2 with 10% substitution. At 15% replacement it shows 59.23 n/mm2 strength**.**

VII. CONCLUSION

- Compressive strength of Two stage mixing approach (TSMA) is greater than Nominal mixing approach (NMA) at age of 7 days, 28 days and 56 days of concrete cube.
- With the use of fly ash and rice husk ash the compressive strength of TSMA as well as NMA is increases.
- Effect of 25% of recycled aggregate replaced by coarse aggregate also helps to increase in compressive strength of concrete cube.
- The gainful use of modern waste as the cement substitution in construction work.

VIII. FUTURE SCOPE

- From the above study it is clear that the use of fly ash and rice husk ash in concrete cubes increases compressive strength so as the percentage increases the more efficient is the structure.
- Now a days industrial work is increases and due to this production of fly ash also increases, if this waste is utilized properly with different percentage in concrete, it can lower the pollution and the key materials required for construction is reduced. This results in reduction of overall cost of construction.
- Reduction of concrete materials in construction reduce emissions of carbon which is more efficient.
- The use of recycled materials for construction could be a property move within the housing industry. The use of demolished materials helps to reduce the construction waste.
- In reinforced concrete the rice husk ash is beneficial for reinforcement.

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