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Estimation of Conventional Pcc Strength And Durability with Partial Replacement of Cement using Aluminium Powder and Rice Husk Ash

T. Siva Sankar Reddy, Bodanapu Sony, M. Madhusudhan Reddy, U. Praveen Goud, Shaik Ahamed Mynuddin

Abstract: Bond is generally noted to be most costly constituents of cement. The whole development industry is looking for an appropriate and viable the waste item that would extensively limit the utilization of concretes and at last lessens the development cost. Rice husk slag (RHA) which has the pozzolanic properties is a route forward. A relative report on impacts of solid properties when OPC of differing evaluations was mostly supplanted by RHA is examined in this paper. Rate supplanting of OPC with RHA was 0, 10, 20, 30 and 40% individually. The compressive quality, water ingestion, shrinkage and solidness of cement were for the most part considered. The examination recommends that up to 20% supplanting of OPC with RHA can possibly be utilized as halfway concrete substitution, having great compressive quality execution and durability. Percentage supplanting of OPC with Aluminum powder (Al) is 0.5% which is kept steady. We are utilizing M sand rather than typical sand to diminish the expense of development and builds quality and sturdiness concrete. The examination proposes the supplanting of concrete with RHA and Aluminum powder expands the compressive quality, solidness, and diminishes the expense of development.

Index Terms: Rice Husk Ash, ordinary Portland cement (OPC), M sand.

I. INTRODUCTION

In advancement to build up the development business everywhere throughout the world, numerous endeavors have additionally been made by different analysts to decrease the expense of the constituents and subsequently complete development cost by exploring and determining the waste material which could be named nearby materials.

In this undertaking we favored aluminum powder, quarry residue and rice husk fiery debris as halfway substitution of concrete. Since during the utilization of concrete, the measure and waste can cause land transfer, wellbeing and natural issues. To lessen these issues elective strategy is supplanting the concrete by aluminum powder, quarry residue and rice husk slag. Reducing the issues as well as diminishing the expense of concrete in development industry. Nearly decent quality is normal when bond is supplanted somewhat or completely with or without solid admixtures and synthetic admixtures. It is proposed to consider the likelihood of supplanting bond with locally accessible waste without yielding the quality and functionality of cement.

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***Correspondence Author(s)**
Dr. T. Siva Sankar Reddy[1], Professor, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Hyderabad, Telangana, India.
Bodanapu Sony[2], **U. Praveen Goud**[4], **Shaik Ahamed Mynuddin**[5], Assistant Professors, Department of Civil Engineering, Guru Nanak Institute of Technology, Hyderabad, Telangana, India.
M. Madhusudhan Reddy[3], Research scholar, Department of Civil Engineering, Koneru Lakshmaiah Education Foundation (Deemed to be University), Green fields, Vaddeswaram, A.P., India.

II. LITERATURE SURVEY

Anoj et al., 2017: The point of this diary is to research the fractional substitution of bond as quarry residue and M30 evaluation solid 3D shapes were casted for finding the compressive quality. The investigation of this trial gives halfway supplanting 25% quarry dust with bond gives the compressive quality of 41.5N/mm2 and after that it continues diminishing when contrasted with ordinary with no substitution of quarry dust. It is obviously seen that expansion of quarry residue up to certain degree will build the compressive quality of cement.

Selvaraj.R. 2015: The point of this diary is to research the fractional substitution of bond as quarry residue and M30 evaluation solid 3D shapes were casted for finding the compressive quality. The investigation of this trial gives halfway supplanting 25% quarry dust with bond gives the compressive quality of 41.5N/mm2 and after that it continues diminishing when contrasted with ordinary with no substitution of quarry dust. It is obviously seen that expansion of quarry residue up to certain degree will build the compressive quality of cement.

Ahsan Habib et.al., 2015: In this analysis, age strategy for hydrogen gas was utilized for the air circulation process. For different rates of OPC, as depicted in the gasification technique, aluminum powder is added to the slurry. To assess the impact of aluminum powder on cement different tests, for example, thickness, water retention and compressive quality test were completed. On account of circulated air through concrete, 0.15% aluminum powder helps in picking up quality.

Aruova Lyazat. Dr.2014: Circulated air through cements have a place with the best materials for fencing structures of structures of various reason. The part made out of circulated air through cement has high quality, solidify obstruction, low normal thickness, fire security, high air and vapor transmission while giving happy with living conditions inside the structure.

Ismail and waliuddin. 1996: Had dealt with impact of rice husk fiery remains on high quality cement. They contemplated the impact the rice husk slag (RHA) passing 200-and 325-micron strainers with 10-30% substitution of bond on quality of HSC. Test outcome demonstrated that quality of HSC diminished when bond was in part swapped by RHA for keeping up same estimation of usefulness. They saw that ideal substitution of concrete by RHA was 10-20%.

III. MATERIALS AND METHODOLOGY

A. Cement: Ordinary Portland cement (OPC) of 53 evaluation was utilized in which the creation and properties pursues the Indian standard association. Concrete can be characterized as the holding material having firm and glue properties[2,3] which makes it fit to join the diverse development materials and structure the compacted gathering.

B. Fine Aggregate: Fine total are fundamentally sands won from the land or the marine condition. Those particles going through 4.75mm strainer and transcendently held on the 75 µm (no.200) sifter are called fine totals[4,5,7]. For expanded usefulness and economy as reflected by utilization of less concrete, the fine total ought to have an adjusted shape.

C. Coarse Aggregate**:** The most extreme size total utilized might be reliant upon certain conditions. By and large, 40mm size total utilized for typical qualities and 20mm size is utilized for high quality cement.

D. Rise Husk Ash: Rice husk fiery debris is created by consuming the external shell of the paddy that turns out as a waste item during processing of rice. In the greater part of the cases, the husk created handling of the rice is either singed or dumped as waste material. Rice husk fiery remains contains 90% - 95% of receptive silica.

E. Aluminum Powder: Fine, uniform, smooth metallic powder free from totals accessible from market is utilized in this examination and it has a nuclear load of 26.98. The aluminum powder of evaluation was utilized in this undertaking. It had a thickness of 0.55 g/cm3.

F. Mix Design:

Mix proportions = 1: 2.25: 1.86 for Cube

Mix proportions = 1:5.32:4.42 for Cylinders

IV. RESULTS AND DISCUSSIONS

1. Compression Test:

Compressive quality tests are done on 3D squares of size 150 mm as indicated by May be: 516–1959. Every one of the solid shapes are tried under dry condition, in the wake of drying the outside of the examples containing dampness in them. For each blend extent (preliminary blend), three 3D squares are tried at 7 days, 14 days and 28 days utilizing pressure testing machine (values are shown in table 01). The example appropriately put and focused in the testing machine. Some Al dross examples were relieved and tried for compressive quality. A definitive burden (P) be tried promptly on expulsion from the water and will be noted down as shown in figure 1.

- Compressive strength=load/zone Fc=P/A

Figure 1: Compression test by using UTM

2. SPLIT TENSILE STRENGTH TEST:

Part rigidity test on solid chamber is a strategy to decide the elasticity of cement. The solid is frail in strain because of its weak nature and isn't required to oppose the immediate pressure. The solid creates splits when exposed to tractable power as shown in figure 3. Variations are shown in the form of graph 1and 2, between Compressive tensile strength and Tensile strength verses percentage replacement of cement with AL & RHA.

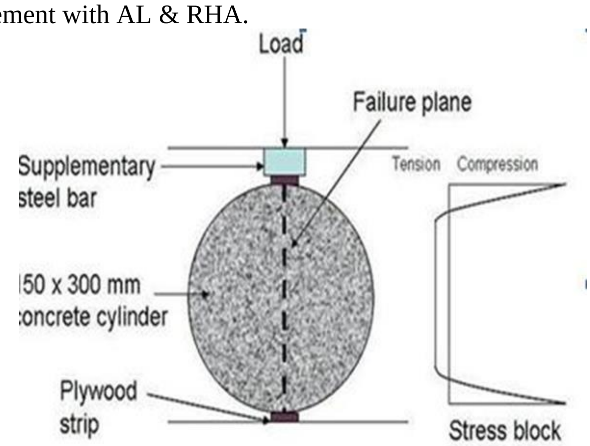

Figure 2: Split tensile strength test

Figure 3: Split tensile strength test by using UTM

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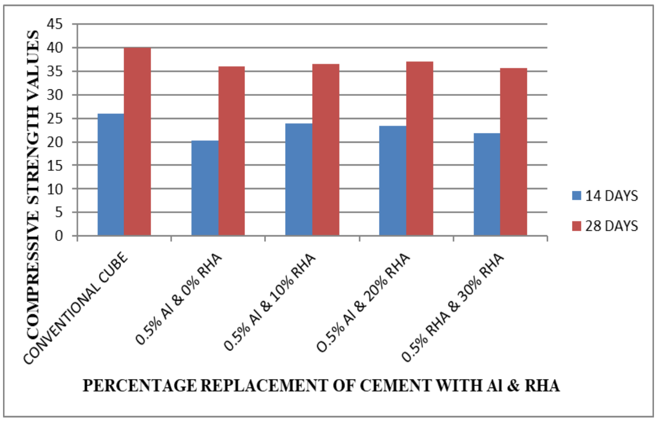
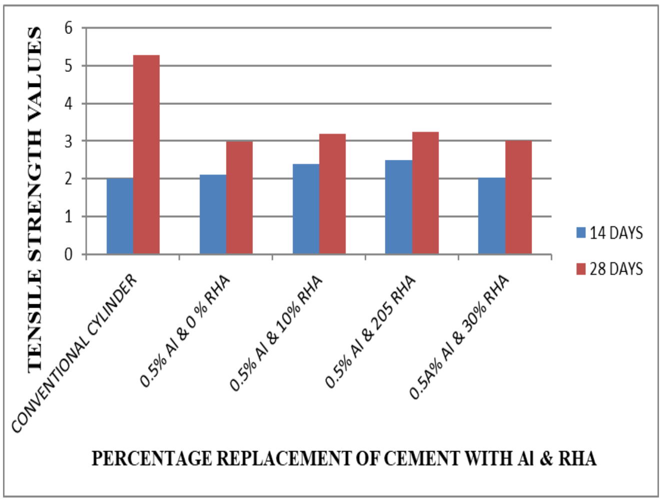


Graph 1: comparison of compressive strength of cubes



Graph 2: comparison of split tensile strength values

V. Conclusion

1) By expanding of Rice husk cinder rate and with various volume portions and keeping the aluminum powder consistent compressive, split ductile, diagrams are plotted. The load conveying limit were observed to increment by increment in level of rice husk cinder up to certain degree.
2) Compressive quality, split elasticity of 0%,10%,20%,30% expansion of rice husk fiery remains and 0.5% aluminum powder is contrasted and traditional solid shapes and chambers individually. From the above dialog it is seen that with the expansion in the level of rice husk fiery debris the usefulness of oneself compacting cement expanded.
3) It is presumed that aluminum powder and rice husk cinder can be utilized as halfway substitution of bond in cement up to 20% RHA and 0.5% Al powder.

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Table 1: Compression testing results

S.no	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1	1	0%	0%	583	25.91	900	40	26	40
	2			588	26.3	905	40.22		
	3			583	25.91	901	40.04		
2	1	0.50%	0%	440	19.55	810	36.1	20.2	36.2
	2			480	21.33	821	36.48		
	3			450	20	800	35.55		
3	1	0.50%	10%	520	23.11	820	36.4	23.9	36.5
	2			560	24.8	810	36		
	3			537	23.86	840	37.3		
4	1	0.50%	20%	520	23.11	825	36.66	23.4	37.1
	2			510	22.66	850	37.7		
	3			527	23.42	833	37.02		
5	1	0.50%	30%	506	22.48	812	36.08	21.9	35.6
	2			487	21.64	796	35.37		
	3			492	21.86	791	35.15		

Where,

a) Specimen number
b) Replacement of cement with Al in %
c) Replacement of cement with RHA in %
d) Load at braking point for 14 days strength
f) Compressive strength at 14 days
g) Load at braking point for 28 days strength
h) Average compressive strength for 14 days
i) Average compressive strength for 28 days

Table 2: Split tensile Strength testing results

S NO	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1	1	0%	0%	143	2.02	440	6.2	2.01	5.29
	2			135	1.9	350	4.95		
	3			150	2.12	335	4.73		
2	1	0.50%	0%	160	2.26	200	2.82	2.1	2.99
	2			152	2.12	220	3.11		
	3			150	2.12	215	3.04		
3	1	0.50%	10%	160	2.26	220	3.11	2.4	3.18
	2			170	2.4	225	3.18		
	3			180	2.4	230	3.25		
4	1	0.50%	20%	181	2.56	235	3.32	2.52	3.24
	2			180	2.54	232	3.28		
	3			177	2.5	222	3.14		
5	1	0.50%	30%	139	1.96	211	2.98	2.03	3
	2			145	2.05	209	2.95		
	3			149	2.1	218	3.08		

Where,
a) Specimen number
b) Replacement of cement with Al in %
c) Replacement of cement with RHA in %
d) Load at braking point for 14 days strength
f) Tensile strength at 14 days
g) Load at braking point for 28 days strength
h) Average Tensile strength for 14 days
i) Average Tensile strength for 28 days

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AUTHORS PROFILE

Dr.T.Sivasankar Reddy working in Guru Nanak Institute of Technology as a professor.

Mrs.Bodanapu Sony currently working as an Assistant Professor in the department of civil engineering, in Gurunanak Institute of Technology, Ranga Reddy, Hyderabad, Telangana. Completed her Masters of Technology and Bachelor of Technology from JNTU Hyderabad. And went to K L E F (Deemed to be University), Vijayawada for pursuing Ph.D. Mrs. Bodanapu Sony research interests are: I) Transportation Engineering II) Traffic Engineering.

Mr.M. Madhusudhan Reddy worked in Guru Nanak Institute of Technology for about a year (2015-2017). He received his Masters of Technology and Bachelor of Technology from JNTU Hyderabad. And went to Koneru Lakshmaiah Education Foundation (Deemed to be University), Vijayawada for pursuing Ph.D. He is a life time member of Indian Geotechnical Society (IGS). Mr. M. Madhusudhan Reddy research interests are; I) Earthquake Engineering II) Soil-Structure Interaction III) Landslides & Slope stability IV) Ground Improvement. Current Affiliations at K L University.

U.Praveen Goud was born in 1988 in Rangareddy, Telangana. He received his Bachelor of Technology degree in Civil Engineering from Sri Venkateshwara University in 2010. In 2014 he received his Master's Degree in Structural Engineering from Kakatiya University, Telangana. He joined in Gurunanak Institute of Technology as a faculty where he is an Assistant Professor of Civil Engineering Department with a total experience of 6 years in field of Research, Designing and education. He is guiding MTech Thesis work in the field of Structural Engineering. He organized conferences and workshops in the field of Civil Engineering.

Mr. SHAIK AHMAED MYNUDDIN working as Assistant professor in GNIT, Hyderabad from 2016-Present. He received his Masters of Technology and Bachelor of Technology from JNTU Anantapur. He registered as Ph.D scholor from Koneru Lakshmaiah Education Foundation (Deemed to be University), Vijayawada and doing his research work on concrete materials.