Experimental Investigation On Properties Of Self-Compacting And Self Curing Concrete, Replacing Natural Sand By Quarry Dust Using Light Weight Aggregate And Silica Fume As Mineral Admixture For M-40 Grade Concrete

Sanjay P R [1], Mr.Ramesh.S[2]

[1]M. Tech Student, Dept. of Structural Engineering, NCET, Bengaluru.
[2]Assistant Professor, Dept. of Civil Engineering, NCET, Bengaluru, Karnataka, India.

Abstract - *self-compacting concrete (SCC) addresses an achievement in .solid exploration. SCC is an exceptionally flow able, non-isolating .solid that can spread in to put, fill the formwork an exemplify the support with no mechanical vibration for union. SCC was initially evolved at the University of Tokyo, Japan during the year 1986 by Prof. Okamura and his group to improve the nature of development and furthermore to defeat the issues of faulty workmanship. A model of SCC for underlying applications was first finished in 1988 and was named "High Performance .concrete ", and later proposed as "Self Compacting High Performance .concrete ". A board of trustees was framed to examine the properties of SCC, remembering a crucial examination for functionality of .concrete , which was done at the University of Tokyo by Ozawa and Maekawa.*

SCC addresses perhaps the most exceptional headway in .solid innovation during the most recent decade. Because of its particular properties, which are accomplished by the amazing coordination of deformability and isolation opposition, SCC may add to a huge improvement in the nature of .solid designs and open up new fields for the use of .concrete . The utilization of SCC offers numerous advantages to the development practice the disposal of the compaction work brings about diminished expense of arrangement, a shortening of the development time and in this way in an improved efficiency. The use of SCC likewise prompts a decrease of clamor during projecting, better working conditions and the chance of extending the setting time in downtown territories. Different benefits of SCC are the improved homogeneity of the .solid and the phenomenal surface completion without blowholes or other surface deformities, because of the advanced blend of the individual parts of the solid blend.

Key Words: **self compaction concrete, compression loading on specimens.**

1. INTRODUCTION

The current situation requests ID of substitute materials for stream sand for making of .concrete. Likewise these days relieving is a major issue so we attempted self-restoring, by supplanting coarse total by light weight total. The decision of substitute materials for sand in .concrete relies upon a few factors like their accessibility, cost, actual properties, compound properties, synthetic fixings and so on for lessening the expense of .cement and furthermore to fulfill the need. Locally accessible waste materials, for example, silica seethe, rice husk, saw dust, squashed stone powder, earthenware scrap, lake debris can be utilized as substitute materials. We utilized fake light weight total, were LWA was drenched for 24hours and afterward utilized in .concrete .

While inspecting the characteristics of silica smoke and Quarry Dust it becomes obvious that if both are utilized together, the misfortune in strength because of one might be halfway refuted by the improvement in functionality brought about by the incorporation of the other. This undertaking is intended to decide if such advantages could be acquired by the utilization of these two materials together, and to evaluate such advantages. Positive outcomes will prompt the chance of utilizing two side-effects in enormous amounts, while lessening the reliance on compound admixtures

2 OBJECTIVES

The aims of this experimental study are as follows,

- To describe every one of the elements of Self Compacting .concrete containing distinctive extent of QD, LWA and steady rate Silica seethe.
- To decide the stream properties by directing Slump stream, T50 droop stream, J-ring, V-pipe, U-Box and L-box and tracked down that the qualities are inside the cutoff points recommended by EFNARC.
- To decide the diverse strength boundaries of the Self-Compacting .concrete in contrast with NSC.

3 Supplementary products for cement

3.1 QUARRY DUST

Basalt fines, regularly called Quarry or Crushed stone powder are side-effects of the creation of .solid totals by pulverizing of rocks.

Quarry Dust (QD) which is for the most part considered as a waste material causes an ecological burden because of removal issue. The expansion of Quarry Dust to typical .concrete blends is restricted due to its high fineness. Consequently Quarry Dust is utilized as an option in contrast to common sand and its consequences for the strength and functionality of SCC are explored. The expansion of Quarry Dust to new .solid builds the water interest and subsequently the concrete substance for given usefulness and strength prerequisite anyway possible advantages to utilizing Quarry Dust is the expense having, on the grounds that the material expense shifts relying upon the source.

3.2 LIGHT WEIGHT AGGREGATE

It is exceptionally permeable light weight total. Its thickness is roughly 0.25g/cm3. It is normally light shaded and clear air pocket dividers. Lightweight total .concrete with shut design has been utilized effectively for underlying purposes since the late nineteenth century. Lightweight total .concrete has clear benefits of a higher strength/weight proportion, better strain limit, lower coefficient of warm extension, and prevalent warmth and sound protection qualities because of air voids existed in lightweight total (LWA) The upside of lightweight total is its diminished mass and improved warm and sound protection properties, while keeping up sufficient strength. The decreased weight has various benefits, remembering diminished interest for energy during development. The diminished self weight of LWC decrease the gravity load and seismic inertial mass prompting decreased part sizes and establishment powers. Totals assume a significant part in cement and they represent 60 to 75 percent of the complete volume of .cement and in this way affect the diverse material properties. Notwithstanding their job as practical filler, totals help control the dimensional strength of concrete based materials, which might be considered to comprise of a system of concrete glue with moderately huge shrinkage developments controlled by the total particles.

3.3 SILICA FUME

Silica rage are ultrafine non glasslike silica created in electric circular segment heater as a result of the creation of natural silicon or compounds containing silicon and comprises of round particles with a normal molecule measurement of 150nm. It is normally a dim hued powder, fairly like Portland concrete. It is otherwise called miniature silica, is a shapeless (non-glasslike) polymorph of silicon dioxide, silica. The crude materials are quartz, coal, and woodchips. The smoke that outcomes from heater activity is gathered and sold as silica smolder. Maybe the main utilization of0this material is as a0mineral admixture0in concrete.

Table -1: Chemical Composition of Silica Fume

SL.No.	Constituents	Quantity (%)
1	Sio2c	91.03m
2	Al2O3c	0.39m
3	Fe2O3c	2.11m
4	CaOc	1.5m
5	LOI	4.05mm

Table -2: details of self compacting self curing solid and normal self compacting solid considered for strength boundaries

Sl. No.	Type Of concrete	Designation	Cementitious Materials		CA Contents		FA contents	
			Cement	Silica fume	CA	LWA	Sand	QD
1	Normal Self-compacting concrete	NSC	100%	0%	100%	0%	100%	0%
2	Self-Compacting Self Curing concrete	S1	69.5%	30.5%	90%	10%	100%	0%
3		S2	69.5%	30.5%	90%	10%	90%	10%
4		S3	69.5%	30.5%	90%	10%	80%	20%
5		S4	69.5%	30.5%	90%	10%	70%	30%
6		S5	69.5%	30.5%	90%	10%	60%	40%
7		S6	69.5%	30.5%	85%	15%	100%	0%
8		S7	69.5%	30.5%	85%	15%	90%	10%
9		S8	69.5%	30.5%	85%	15%	80%	20%
10		S9	69.5%	30.5%	85%	15%	70%	30%
11		S10	69.5%	30.5%	85%	15%	60%	40%

4 METHODOLOGIES

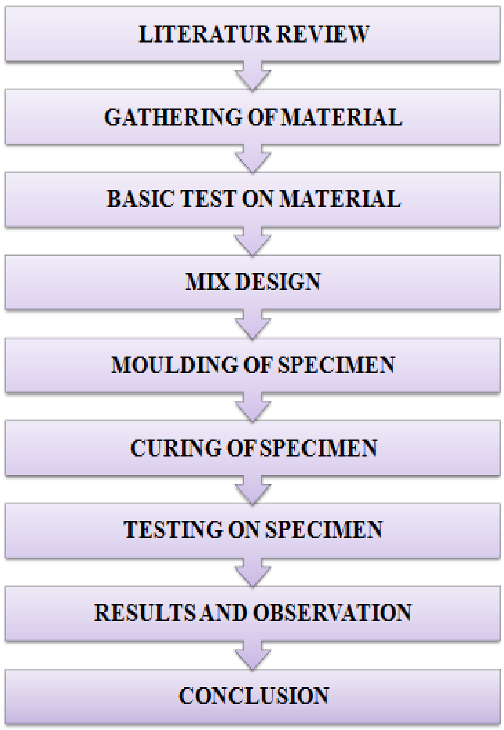

Chart -1: Methodology

5 TEST RESULTS OF CUBE SPECIMENS

At each ideal relieving periods 7, 28, 56days examples of typical .concrete are removed from water and dried and afterward tried for compressive strength. The S .solid 3D shapes are additionally tried for 7, 28, 56days. The 3D squares are tried in 200T limit pressure testing machine to get the compressive strength of concrete.

5.1 Compressive Strength of S1-S10 concrete

For 10% LWA Replacement				
Designation	QD Replacement	7Days	28Days	56Days
S1	0%	28.88	48.44	58.95
S2	10%	29.1	50.45	63.2
S3	20%	29.79	52.2	64.29
S4	30%	24.7	46.55	56.3
S5	40%	23.3	44	54.45
For 15% LWA Replacement				
S6	0%	28.96	48.45	59.54
S7	10%	29.8	50.98	63.87
S8	20%	30.4	53.32	65.34
S9	30%	25.5	47	55.69
S10	40%	24.99	45.1	54.9
NSC	0%	28.33	47.85	57.4

5.2 Compressive strength of self-compacting self-relieving .concrete and Normal self-compacting concrete

Sl. No	Designation	Average of 3 cubes strength , N/mm2 at different ages		
		7 Days	28 Days	56 Days
1p	NSC	1	1	1
2p	S1	1.02	1.01	1.03
3	S2	1.03	1.05	1.10
4	S3	1.05	1.09	1.12
5	S4	0.87	0.97	0.98
6	S5	0.82	0.92	0.95
7	S6	1.02	1.01	1.04
8	S7	1.05	1.07	1.11
9	S8	1.07	1.11	1.14
10	S9	0.90	0.98	0.97
11	S10	0.88	0.94	0.96

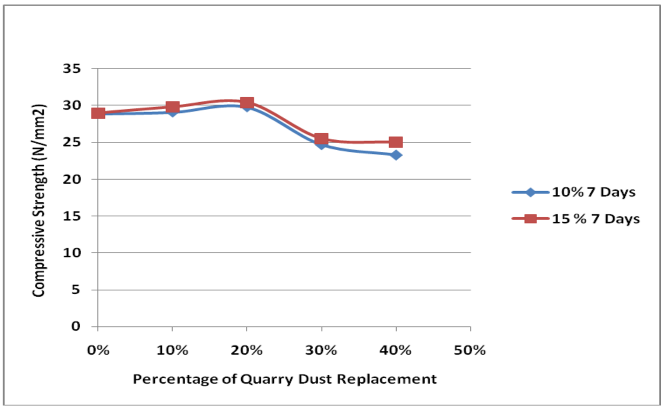

Chart -2: Compressive strength Comparison of S1-S5 and S6-S10 for 7days

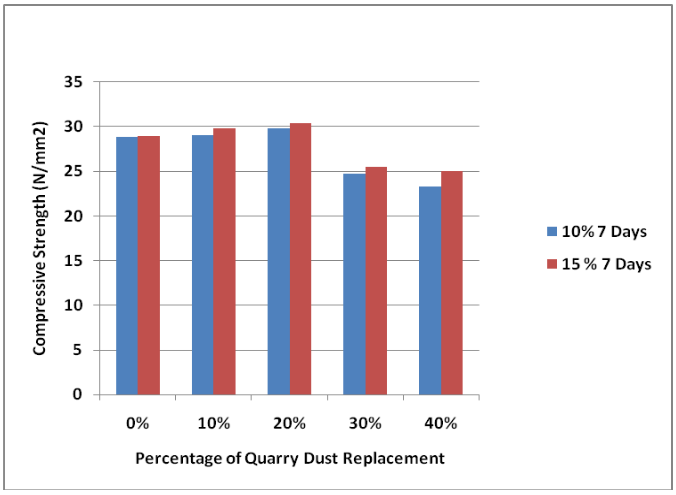

Chart -3: Compressive strength Comparison of S1-S5 and S6-S10 for 7days

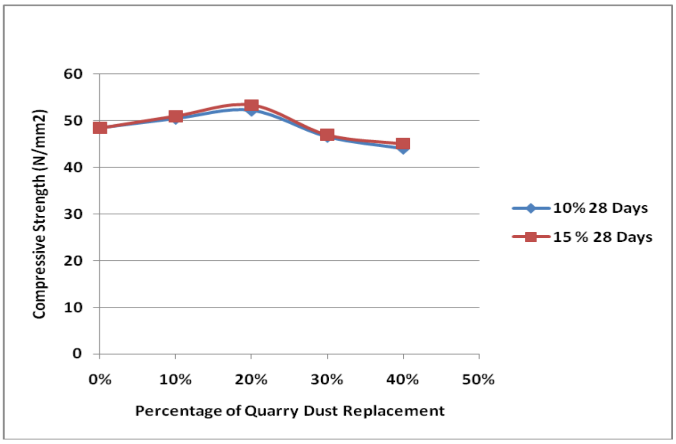

Chart -4: Compressive strength Comparison of S1-S5 and S6-S10 for 28days

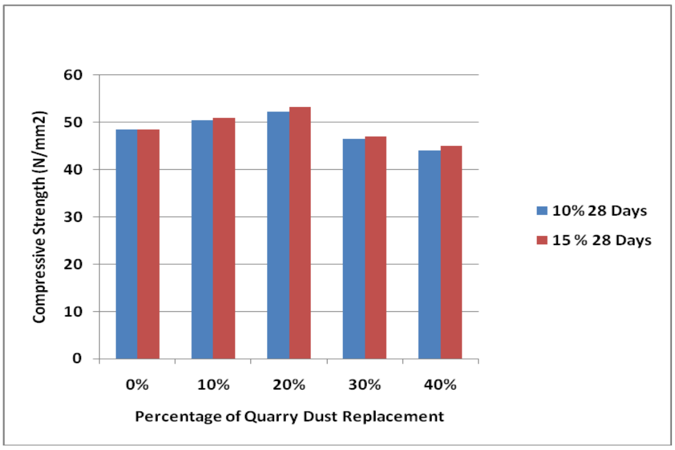

Chart -5: Compressive strength Comparison of S1-S5 and S6-S10 for 28days

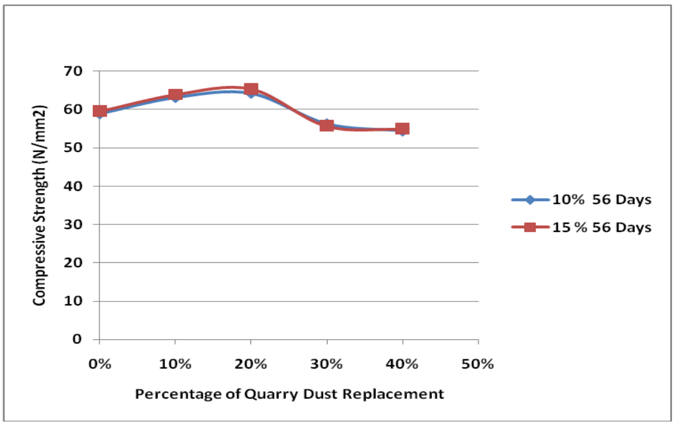

Chart -6: Compressive strength Comparison of S1-S5 and S6-S10 for 56days

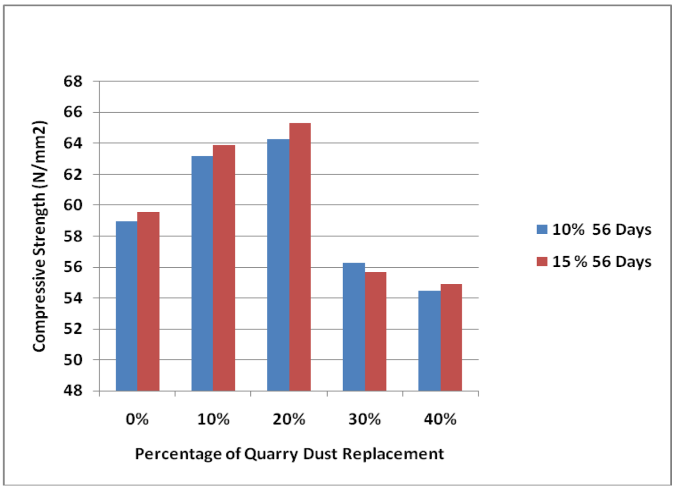

Chart -7: Compressive strength Comparison of S1-S5 and S6-S10 for 56days

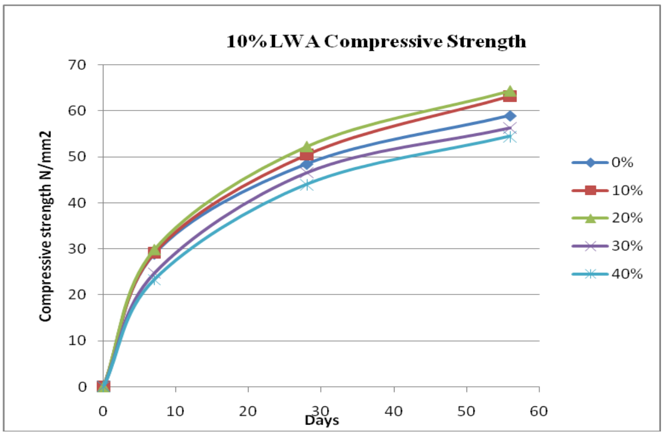

Chart -8: Compressive strength Comparison of S1-S5 concrete

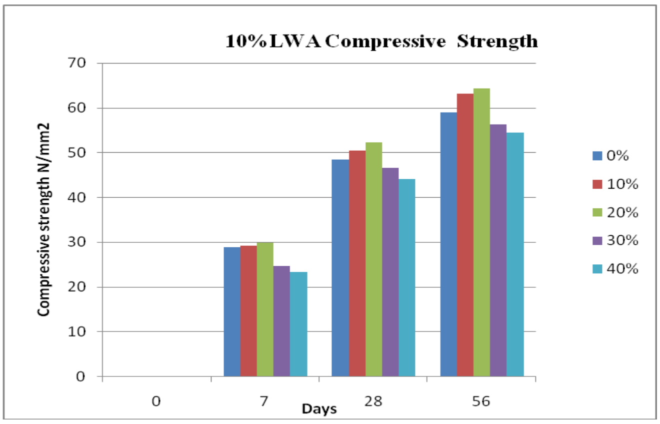

Chart -9: Compressive strength Comparison of S1-S5 concrete

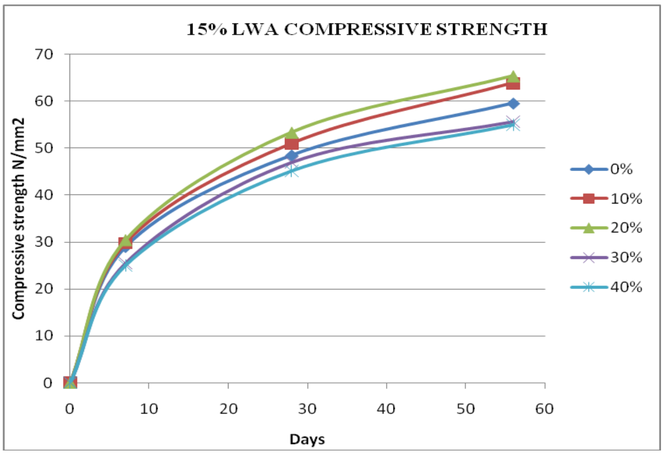

Chart -10: Compressive strength Comparison of S6-S10 concrete

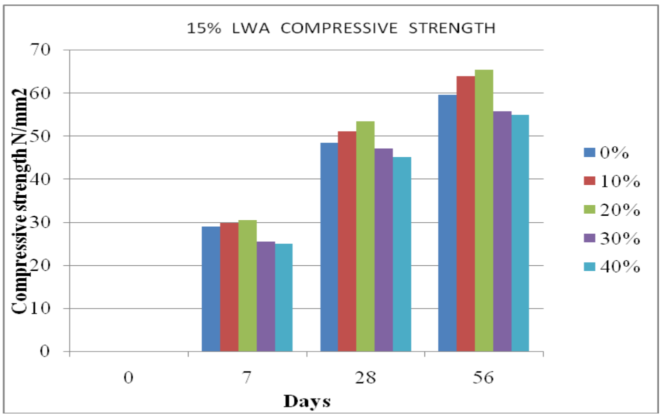

Chart -11: Compressive strength Comparison of S6-S10 concrete

CONCLUSION

In light of the consequence of this investigation, the accompanying end are drawn It is feasible to fabricate an underlying light weight total concrete with low thickness and high self-combining attributes (flow ability, deformability, self-compact ability and soundness) utilizing neighbourhood delivered materials. There is a huge expansion in the compressive strength and split rigidity for both the .solid when sand is supplanted by quarry dust up to 20%.Silica moulder was seen to improve the mechanical properties of SCC. It can be inferred that oneself restoring was nearly just about as compelling as the ordinary relieving technique. The outcomes recommend that self-relieving can be embraced in restoring of self-compacting .concrete especially difficult to reach spaces of .solid constructions. This restoring strategy can likewise help where .solid execution details are significant. It can likewise be inferred that if 20% sand is supplanted by quarry dust in .concrete , it won't just decrease the expense of .concrete and yet will save huge amount of characteristic sand and will likewise diminish the contamination make because of the removal of this quarry dust on important fruitful land.

SCOPE FOR FURTHER STUDY

Clearly there are as yet numerous parts of utilization of Silica moulder, quarry residue and light weight total in .cement and RCC which are yet to be concentrated before it is normalized. Coming up next is a rundown of the potential zones where future catalyst examination might be coordinated.

1) Investigate to concentrate on mechanical properties of concrete by utilizing Light weight total structure distinctive industry can be utilized.

2) Investigations to consider shrinkage and bond properties of self-compacting and self-relieving .concrete .

3) Durability concentrates on self-compacting and self-relieving .concrete .

4) For knowing the reasonable conduct in flexure, shear and pressure tests on model quarry dust part like shafts and segments sizes portraying that utilized overall designs must be done to learn their exhibition

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