USE OF BRICK DUST, FLY ASH AND CEMENT KILN DUST AS A REPLACEMENT OF FINE AGGREGATE IN SELF COMPACTING CONCRETE

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ABSTRACT

Over the most recent five years, various SCC spans have been developed in Europe. In India, the utilization of SCC in expressway connect development is extremely restricted as of now. Nonetheless, India's precast solid industry is starting to apply the innovation to design concrete. SCC has high potential for more extensive basic applications in interstate scaffold development. The use of cement without vibration in roadway connect development isn't new. In the current Study, Attempt has been made to analyze the mechanical properties of self-compacting and ordinary solid examples and. The models utilized depended on 7days, 28-day and 56 days compressive, parting malleable and flexure quality and of regular and self-compacting concrete for five Fly debris, Brick residue and Cement furnace Dust proportions as a substitution to fine total.

KEYWORDS: Brick Dust, Fly Ash, Cement Kiln Dust & Compacting Concrete

Received: Jun 08, 2020; **Accepted:** Jun 28, 2020; **Published:** Sep 03, 2020; **Paper Id.:** IJMPERDJUN20201031

INTRODUCTION

SELF-COMPACTING CONCRETE

Self-compacting concrete will be solid which, without the impact of extra compaction vitality, streams exclusively affected by the gravity, just as totally occupies the strengthening spaces and the formwork. Its basic properties are high flowability and great sedimentation strength. These properties can be accomplished by the utilization of expanded flour grain (flourcorn type), by balancing out added substances (stabilizer type) or by their mix in blend with exceptionally powerful stream specialists. Most of the individuals probably won't have the foggiest idea about a great deal about it or if nothing else don't care for it to an extreme yet, concrete is around us all over the place. In the event that you don't live alone in the focal point of a desert or an ocean, it would be ideal if you simply turn your head around and you will find this reality. There is no uncertainty that the solid is of uncommon significance in the structures and developments. Among the other structure and development materials (for example steel, block black-top, wood and so on.), it is still in the high level as indicated by its most noteworthy utilization contrasted with others around the world. As per the Cement Sustainability Initiative, the utilization of the solid is relied upon to be equivalent to 25 billion tons for each year which implies above 3.8 tons per individual every year on the planet. Solid innovation has made superb step in the previous decade. The development of determining a solid as indicated by its presentation prerequisites, marginally than the constituents and fixings has opened various open doors for makers of cement and clients to configuration cement to go with their specific necessities. Development of self-compacting concrete (SCC) is a needed achievement in the development business so as to conquer issues

related with cast set up concrete.

LITERATURE GAP

- Various researchers have worked on use of these materials in SCC, however the research is limited to binomial materials only. The present research will emphasis on the use of tertiary combination of materials in SCC, the various mechanical properties as discussed above will be taken into consideration as well.
- In addition the proportioning of materials used in previous papers are giving a broader / tentative results, in present research the interval of proportion will give more precise results.

OBJECTIVES

- To relate the mechanical properties of self-compacting and normal concrete specimens.
- To Study the effect of various proportions of solo, binary and tertiary materials on the strength of SCC.
- To predict the optimal proportion of mix for best possible outcomes.

MIXTURE PROPORTIONING

Mix designations followed as per Table 3.11 are given below

Table 1: Mix Proportions of SCC

Mix Design	Control Mix	Mix 1	Mix 2	Mix3	Mix 4
Cement (Kg/m ³)	475	475	475	475	475
Flyash (kg)	0	44	88	132	176
Brick Dust (kg)	0	44	88	132	176
Cement Kiln Dust (kg)	0	44	88	132	176
Coarse Aggregates (kg)	856	856	856	856	856
Fine Aggregates (kg)	891	759	627	495	363
Super Plasticizer (kg/m ³)	3.8	3.8	3.8	3.8	3.8
Water(Kg/m ³)	166	166	166	166	166
Water/Cement	0.35	0.35	0.35	0.35	0.35

- Control mix: 100.0% cement 100.0% fine aggregate
- Mix-1: 100.0% cement, 85% of fine aggregate content and 5.0% fly ash, 5.0% Brick dust & 5% CKD
- Mix-2: 100.0% cement, 70% of fine aggregate content and 10.0% fly ash, 10.0% Brick dust & 10% CKD
- Mix-3: 100.0% cement, 55% of fine aggregate content and 15.0% fly ash, 15.0% Brick dust & 15% CKD
- Mix-4: 100.0% cement, 40% of fine aggregate content and 20.0% fly ash, 20.0% Brick dust & 20% CKD

RESULTS AND CONCLUSIONS

Fresh Concrete Properties

So as to examine the impact on new solid properties when Fly debris and Brick dust is included into the solid as fine total substitution, the SCC containing diverse extent of Fly debris and Brick dust were tried for Slump stream, V-channel, U-Box, L-box. The consequences of new properties of all Self-compacting Fly debris and Brick dust cements are remembered for Table 4.1. The Table -2 shows the properties, for example, droop stream, V-pipe stream times, L-box, U-box. As far as droop stream, all SCCs showed agreeable droop streams in the scope of 590–740 mm, which means that a decent deformability.

Table 2: Fresh Concrete Properties

Mixture ID	Slump (mm)	V-Funnel (Seconds)	L-Box (H2/H1)	U-Box (H1-H2)
Normal mix	687	9	0.9	30
Mix 1	590	13	-	-
Mix 2	704	11	-	35
Mix 3	740	12	0.9	35
Mix 4	720	9	1.0	-

Compressive Strength

Figure 1: A, B & C are Photographs for Compressive, Tensile and Flexural Strength Testing.

Table 3: Compressive Strength of SCC Mix

MIX	Compressive Strength (N/mm ²)			Average Compressive Strength (N/mm ²)		
	7 days	28 days	56 days	7 days	28 days	56 days
Normal mix	38.96	51.19	67.34	38.36	51.99	66.35
	37.78	52.14	65.23			
	38.34	52.65	66.49			
Mix 1	39.98	53.98	68.83	39.92	54.29	69.01
	39.67	54.12	69.89			
	40.12	54.78	68.32			
Mix 2	41.21	55.65	69.89	41.54	55.44	69.41
	41.20	54.89	69.02			
	42.23	55.78	69.34			
Mix 3	43.12	56.78	71.67	43.43	57.96	71.29
	43.85	58.67	70.97			
	43.34	58.45	71.23			
Mix 4	44.89	61.78	73.20	44.63	62.70	74.15
	44.45	62.89	74.02			
	44.56	63.45	75.23			

Figure 2: Compressive Strength Graph Chart.

Splitting Tensile Strength

Table 4: Tensile Strength Properties

MIX	Tensile Strength (N/mm ²)			Average Tensile strength (N/mm ²)		
	7 days	28 days	56 days	7 days	28 days	56 days
Normal mix	2.74	3.45	4.21	2.72	3.45	4.19
	2.45	3.67	4.15			
	2.98	3.23	4.23			
Mix 1	2.88	3.67	4.44	3.00	3.77	4.38
	3.10	3.76	4.49			
	3.02	3.88	4.23			
Mix 2	3.31	3.89	4.56	3.22	3.85	4.68
	3.21	3.69	4.78			
	3.15	3.97	4.71			
Mix 3	3.56	4.11	4.89	3.59	4.25	4.95
	3.78	4.21	4.95			
	3.43	4.45	5.01			
Mix 4	3.87	4.62	5.23	3.92	4.61	5.37
	3.92	4.78	5.34			
	3.97	4.45	5.55			

Figure 3: Tensile Strength Graph Chart.

Flexure Strength

The flexural quality of the solid blend was estimated at 7 days 28 days & 56 days by utilizing general testing machine on standard light emissions 100mmx100mmx500mm). The flexural quality was found to increment for all blends at the entire days in contrast with control blend.

Table 5: Flexure Strength

MIX	Flexure Strength (N/mm ²)			Flexure Strength (N/mm ²)		
	7 days	28 days	56 days	7 days	28 days	56 days
Normal mix	4.23	5.65	6.34	4.33	5.51	6.35
	4.41	5.54	6.45			
	4.36	5.34	6.28			
Mix 1	4.45	5.67	6.67	4.50	5.71	6.54
	4.49	5.73	6.44			
	4.56	5.75	6.53			
Mix 2	4.76	5.86	6.65	4.78	5.85	6.71
	4.81	5.89	6.78			
	4.78	5.81	6.70			
Mix 3	4.89	5.98	6.91	4.89	5.92	6.85
	4.83	5.87	6.86			
	4.96	5.92	6.79			
Mix 4	5.34	6.08	7.01	5.62	6.05	7.15
	5.55	6.12	7.08			
	5.98	6.97	7.36			

Figure 4: Flexure Strength Line Graph.

CONCLUSIONS

- The properties, for example, droop stream, V-pipe stream times, L-box, U-box. As far as droop stream, all SCCs showed acceptable droop streams in the scope of 590–740 mm, which means that a decent deformability.
- The compressive quality expanded with an Increase in the level of the Fly debris and Brick dust. An expansion of about 37% quality at 7 days, 15% quality at 28 days and 8% at 56 days was seen with the increment of Fly debris and Brick dust content from 5% (SCC MIX1) to 20% (SCC MIX4).
- It was seen that the %age increment in compressive quality was progressively overwhelming at early ages.
- The quality was expanded at later ages likewise yet not all that rapidly in light of the fact that the pozzolanic response of the fly debris is all the more quick at early ages and the block dust goes about as a filler additionally alongside pozzolanic action against the fine total which goes about as a filler item in particular.

- The split rigidities of SCC following 7 days are practically identical to those gotten following 28 days for NC. This was conceivable as a result of the utilization of Fly debris and Brick dust as fine total substitution, which normally will in general increment the early quality of cement.
- The flexural quality was found to increment for all blends at the entire days in contrast with control blend.

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