

A Review on Artificial Sand in Concrete

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ABSTRACT- The paper Present the investigation of supplanting of characteristic sand with counterfeit sand in concrete customarily concrete is a blend of bond sand and total there is an expansive variety in the quality of concrete because of variety in quality of total use there is a lack of regular sand because of substantial demand in construction activities which strengths to discover appropriate substitute the chipset and simple method for getting substitute for normal sand will be sand which is created from quires tone by crusher arranged uncommonly to get cubical, smooth textured, very much evaluated particles of fine total is called fake sand . This paper introduce the physibility of simulated sand in concrete with the end goal of experimentation concrete blends are configuration for m20 and m25 grades by 0 to 100 % with addition of 20 % substitution of common sand by counterfeit sand. Compressive and tensile test are directed to ponder the quality of concrete for above substitution..

KEYWORDS – Natural sand, Artificial Sand, concrete, construction activities, substitute, Compressive and tensile test.

I. INTRODUCTION

We can't envision the structures without concrete. Concrete is a fundamental constituent of the Civil Engineering structures. It is turning into the foundation of infrastructural improvement of entire world. Concrete has ability to upgrade its properties with the assistance of other appropriate constituents..

The main disadvantages of concrete are as follows.

- Brittleness
- Very low tensile strength
- Less resistance to cracking
- Heavy mass (density)
- Plastic and drying shrinkage.
- Permeability and bleeding of water

Around 80% of aggregate volume of concrete is comprised of totals. Totals attributes (size, shape, surface, reviewing) impact the workability, complete capacity, dying, and isolation of new concrete and solidness of solidified concrete. Fine totals might be one of the accompanying sorts; Natural sand, pulverizing normal rock, smashing hard stones (counterfeit sand). With characteristic sand stores the world over going away, there is an intense requirement for an item that matches the properties of normal sand in concrete. In the most recent 15 years, it has turned out to be clear that the accessibility of good quality characteristic sand is diminishing. With a couple of neighborhood special cases, it is by all accounts a worldwide pattern. Existing common sand stores are being exhausted at the same rate as urbanization and new stores are found either underground, excessively near officially developed territories or too far from the ranges where it is required, that is, the towns and urban areas where the makers of concrete are found. Ecological concerns are likewise being raised against uncontrolled extraction of common sand.

The contentions are for the most part with respect to securing riverbeds against disintegration and the significance of having common sand as a channel for ground water. The above concerns, consolidated with issues of protecting ranges of magnificence, recreational quality and biodiversity, are a necessary part of the procedure of most nearby government organizations allowing consent to total makers over the world. This is the circumstance for the

construction business today and most will concur that it won't change significantly soon. Test were led on 3D shape and chamber by supplanting regular sand 0% , 20%, 40%, 60% 80% and 100% by fake sand for M20 and M25 evaluations of concrete.

II. LITERATURE REVIEW

The utilization of bond substance, workability, compressive quality and expense of concrete made with Quarry Rock Dust were examined by scientists Babu K.K.et.al , Nagaraj T.S.et.al, and Narasimahan et.al. The blend outline proposed by Nagaraj et.al demonstrates the conceivable outcomes of guaranteeing the workability by shrewd mix of rock clean and sand, utilization of super plasticizer and ideal water content utilizing summed up lyse Rule.

M. R. Chitlange in 2010 study demonstrates that blends with fake sand as fine total gives reliably higher quality than the blends with characteristic sand. The sharp edges of the particles in manufactured sand give preferable bond concrete over the adjusted particles of regular sand bringing about higher quality. The unnecessary seeping of concrete is diminished by utilizing fake sand.

R. Ilangovana¹, N. Mahendrana¹ and K. Nagamanib² states that the Physical and synthetic properties of quarry rock dust is fulfilled the necessities of code procurement in properties concentrates on. Regular stream sand, if supplanted by hundred percent Quarry Rock Dust from quarries, may a few times give equivalent or superior to the reference concrete made with Common Sand, regarding compressive and flexural quality studies.

Priyanka A. Jadhava and Dilip K. Kulkarni The impact of concrete with halfway substitution of made sand on the properties of typical quality concrete with water bond proportion of 0.45 and 28 day's compressive, split tensile and flexural quality of 20Mpa (2900 psi) and workability (droop and compacting component) were considered. The impact of rate substitution of made sand on quality property and workability were assessed and contrasted and reference blend of 0% substitution of common sand by fabricated sand.

P.T.Santhosh Kumar¹ and K.K.Sajeevan² Even however concrete with CSFA has a lessened 28 day compressive quality than waterway sand (Table 1), it can be received for construction, as the quality acquired from CSFA is impressively more than that anticipated by Fig. 47 of SP: 23-1982. Likewise, IS: 383-1970 licenses the utilization of CSFA as fine total in the event that it affirms to the necessities in Table 4 of this code.

P.Aggarwal researched that the base fiery remains which falls into the heater base can go about as a contrasting option to characteristic sand as the Compressive quality of base cinder concrete containing half base slag is worthy for most auxiliary applications since the watched compressive quality is more than 20 MPa at 28 days.

Mark James Krinke infers that with the expansion of a superplasticiser a concrete blend containing produced sand is fit for not just accomplishing a workability like that of normal sand, however to accomplish this workability, measurements as high as 2.36 percent were required. The extra cost of these a lot of super plasticiser in the concrete blend makes the made sand concrete blend less sparing to deliver then a characteristic sand control blend.

However with the declining accessibility of characteristic sands appropriate for use in concrete, the utilization of concrete blends containing 100 percent produced sand or high rates of fabricated sands in the total mix may turn into significantly more basic.

It is seen from above studies there a variety in quality improvement of concrete produced using simulated sand to support the utilization of locally accessible counterfeit sand elevates to study to check it reasonable substitution rate in the concrete.

III. MATERIAL

1. Cement

The mixed sort of bond with particular gravity 3.10 affirming to IS 1489 (Part 1) – 1991 was utilized [16]. The underlying and last setting time was 164 minutes and 244 minutes individually. The 7 days compressive quality was 43.2 N/mm².

2. Fine aggregate

The common sand with particular gravity 2.60 and fineness modulus 2.66 was utilized. The water assimilation and mass thickness was 1.85% and 1560 kg/m², individually. The manufactured sand got from neighborhood crusher with particular gravity 2.73 and fineness modulus 3.01 was utilized. The water retention and bul k thickness was 2.55% and 1762 kg/m³ respectively. The both sands are affirming to zone II of IS 383-1970.

3. Coarse aggregate

Pulverized regular rock stone total of ostensible size up to 25 mm (A1) and total passing 12.5 mm (A2) were utilized. The totals A1 and A2 were proportioned by trial in the blends. The particular gravity, water ingestion and mass thickness was observed to be 2.96, 1.32% and 1620 kg/m³ separately.

4. Steel fibers

The crimped steel filaments of comparable distance across 1.35 mm and 40 mm long with viewpoint proportion of 30 were utilized as a part of the characteristic sand and simulated sand concrete. The yield quality of the fiber was 550 MPa. 3.1.5 Super plasticizer. The lignosulphonate based 'Roff super plast - 320' affirming to ASTM C494-1977 with particular gravity 1.16 was utilized as a part of the extent of concrete substance for sought workability.

IV. EXPERIMENTATION

Concrete mixes were designed in accordance with IS 10262-1982 [19] and IS 456-2000 [20] by assuming good degree of quality control and moderate exposure conditions. The mixes are designed for M20, M30 and M40 concrete with 100% replacement of natural sand by artificial sand. The adopted mixes proportions by weight batching method are summarized in Table-1

Table-1. Concrete mix proportions (kg/m³)

Material	M20	M30	M40
Cement	310	385	450
Artificial sand	612	590	556
Coarse aggregate A1	520	504	480
Coarse aggregate A2	780	755	720
Water	155	174	180
Super plasticizer (Lit)	3.1	3.85	4.5
Water / Cement ratio	0.50	0.45	0.40
Cement/Aggregate ratio	1:6.16	1:4.80	1:3.90

The exact amount of concrete ingredients were weighed and mixed thoroughly in laboratory concrete mixer till the consistent mix was achieved. The workability of fresh concrete was measured in terms of slump value and compaction factor. The physical properties of green concrete are given in Table-2.

Table-2. Density and workability of green plain concrete.

S. No.	Mix	Water cement ratio	Wet density (kg/m ³)	Dry density (kg/m ³)	Workability of fresh concrete		
					Slump (mm)	CF	VB (sec)
1	NS20	0.50	2624.45	2610.25	120	0.90	9.3
2	AS20	0.50	2620.18	2607.12	90	0.90	10.2
3	NS30	0.45	2615.89	2603.48	100	0.88	16.0
4	AS30	0.45	2610.45	2598.32	75	0.87	18.50
5	NS40	0.40	2598.34	2587.87	80	0.88	19.2
6	AS40	0.40	2588.64	2577.64	55	0.87	22.4

The standard cubes of 150 mm size, cylinders of 150 mm diameter - 300 mm length and prism of 100x100x500 mm were cast in steel moulds and compacted on a vibrating Table. The specimens were cured in water for 28 days by immersion and tested immediately. In the concrete mixer, the natural sand concrete and artificial sand concrete were prepared with about 80% of the designed water quantity and then steel fibers were spread manually in the volume fraction of 0%, 0.5%, 1.0%, 1.5% and 2.0%. After two minutes mixing, the remaining quantity of water mixed with super plasticizer was spread and concrete was mixed to get the uniform color.

V. EXPECTED RESULTS

It is watched that supplanting of common sand with 60 % to 80% by simulated sand is discovered achievable. For M20 evaluation of concrete the rate increment in compressive quality and tensile quality by 29.44% and 5.39 % separately by supplanting common sand. Henceforth simulated sand can be suggested as a decent and aggressive substitute for characteristic sand. It can be seen that blends with counterfeit sand as a fine total gives preferred qualities over blends of common sand because of sharp times of the molecule in manufactured sand give preferred bond concrete over adjusted molecule of regular sand . The buy expense of fake sand is around 60% to 70 % to that of characteristic sand. Subsequently fake sand concrete might be lively than characteristic sand concrete. The test result acquired from well plant and deliberately performed trial customized considering specialized, natural and business component.

Table 3 Result Of Compressive Strength & Split Tensile Strength (M 20 Grade)

Sr. No	Percentage of Artificial sand	Percentage of Natural sand	Compressive. Strength N/mm ²		Split Tensile strengthkN/mm ²	
			7 Day	28 Day	7 Day	28 Day
1	00	100	26.21	31.58	0.83	1.67
2	20	80	26.69	31.85	0.67	1.76
3	40	60	27.69	32.29	1.34	1.76
4	60	40	27.70	40.88	1.25	1.79
5	80	20	27.70	39.11	1.17	1.50
6	100	00	26.54	35.15	1.25	1.55

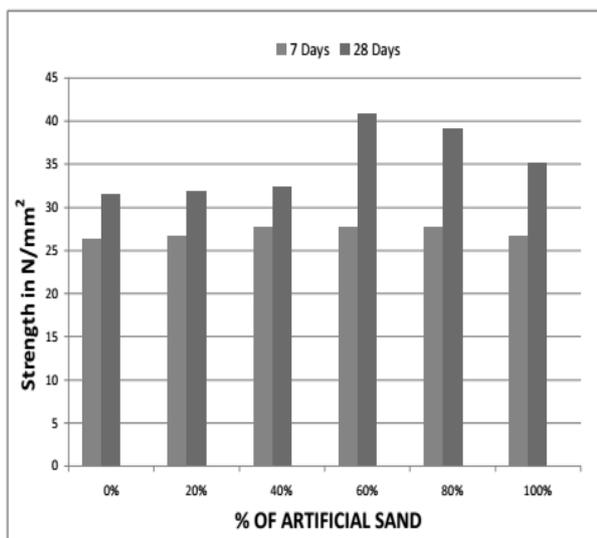
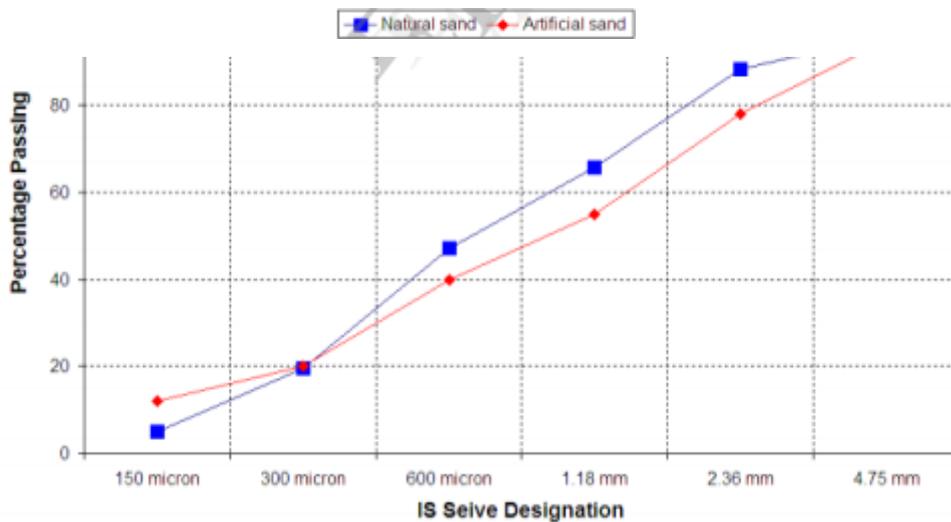


Fig. 2 Graphical Representation of Compressive Strength of Concrete For M20 Grade

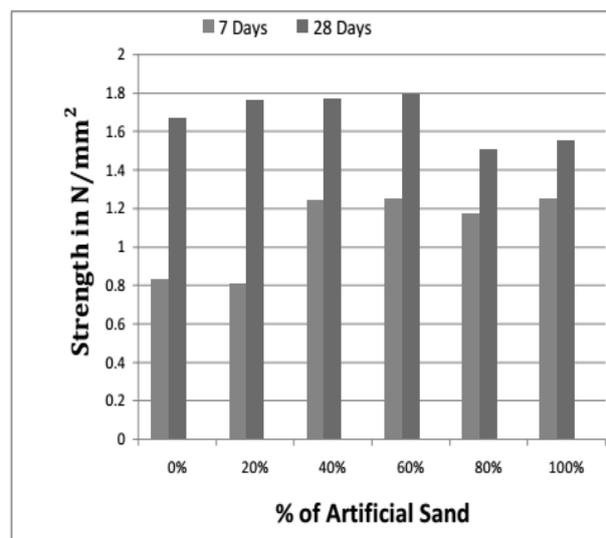


Fig. 3 Graphical Representation Of Split Tensile Strength Of Concrete For M20 Grade

VI. CONCLUSION

It is watched that there is steady increment in the quality of plain concrete when characteristic sand is completely supplanted by fake sand. The sharp edges of the particles in manufactured sand furnish preferable bond with concrete over the adjusted particles of characteristic sand bringing about higher quality. The expansion in compressive anxiety is negligible when contrasted with flexural and split tensile quality. Considering the workability and balling impact of the filaments, the ideal volume portion of fiber is 1.5%. To get the configuration level of workability, the utilization of super plasticizer was fundamental. The over the top seeping of concrete is decreased by utilizing manufactured sand. The expense of fake sand is in the scope of 40% to 70% to that of regular sand and considering expense of screening, washing and wastage because of oversize particles of characteristic sand, the simulated sand concrete will be around 15% to 25% less expensive than that of normal sand concrete. The test results got from all around planed and precisely performed exploratory project empowers the full substitution of regular sand by fake sand considering the specialized, natural and business components.

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