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### TITLE: FEASIBILITY OF PLASTIC FIBRES WITH OPTIMUM REPLACEMENT OF NATURAL SAND WITH ARTIFICIAL SAND

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#### Abstract

The paper gift the study of replacement of natural sand with artificial sand in concrete conventionally concrete could be a mixture of cement sand and mixture there's an outsized variation in the strength of concrete thanks to variation in strength of mixture use there's a inadequacy of natural sand thanks to significant demand in construction activities that forces to find suitable substitute the chipset and straightforward manner of obtaining substitute for natural sand is sand that is made from quires tone by crusher prepared specially so as to get cubical, smooth textured, well graded particles of fine aggregate is called artificial sand .

Now daily we tend to face surroundings protection issues.Manythings that ar unreal for our luxurious life ar accountable for polluting surroundings thanks to improper waste management technique. One of them could be a plastic that must be disposed or recycled properly to take care of the wonder of our nature. To address this issue the fibers from used plastics were else in numerous percentages within the M25 grade concrete. This paper describes the performance of plastic fiber concrete (M25).An experimental work has been meted out on the specimens like cubes and cylinders that were casted within the laboratory and their behavior beneath the take a look at was determined .The plastic fibers were 0.2 %.The compressive and split tensile strengths of concrete were determined when 7days, 14 days and 28 days of action amount. The take a look at results were compared and also the relationships between the determined and foretold strengths got.

**Key words:** Natural sand, Artificial Sand, Glass fibres, Compressive test, etc.

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#### Introduction:

We cannot imagine the structures without concrete. Concrete may be a main constituent of the applied science structures. It is changing into the backbone of infrastructural development of whole world. Concrete has capability to reinforce its properties with the assistance of different appropriate constituents.

The main disadvantages of concrete area unit as follows –

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

The performance of concrete depends on its ingredients. It is acknowledge that plain concrete is brittle and weak in tension. The major advantage of fiber reinforcement concrete is to remodel a brittle concrete into a pseudo ductile material.

The fibers from low cost or waste materials could also be used for manufacture of structural units with cement mortar composites have nice potential for developing countries like Bharat.Different fibers like steel, carbon, glass, artificial organic and natural fibers has been incorporated in concrete and mechanical properties of such concrete is studied by several researchers.But still it's current method to boost properties of concrete.

#### 1. Literature Review

The consumption of cement content, workability, compressive strength and value of concrete created with Quarry Rock dirt were studied by researchers BabuK.K.et.al ,Nagaraj T.S.et.al, and Narasimahan et.al.

The mix style projected by Nagaraj et.al shows the chances of guaranteeing the workability by wise combination of rock dirt and sand, use of super softener and optimum water content using generalize Rule.M. R.Chitlange in 2010 study shows that mixes with

artificial sand fine combination offers systematically higher strength than the mixes with natural sand.

The sharp edges of the particles in artificial sand offer higher bond with cement than the rounded particles of natural sand leading to higher strength.

The excessive hemorrhage of concrete is reduced by mistreatment artificial sand. R. Ilangoval<sup>1</sup>, N. Mahendran<sup>1</sup> and K. Nagamanib<sup>2</sup> states that the Physical and chemical properties of quarry rock dirt is glad the necessities of code provision in properties studies.

Natural river sand, if replaced by hundred percent Quarry Rock Dust from quarries, may some times give equal or better than the reference concrete made with Natural Sand, in terms of compressive and flexural strength studies Priyanka A. Jadhava and Dilip K. Kulkarni. The result of concrete with partial replacement of factory-made sand on the properties of traditional strength concrete with water cement magnitude relation of zero.45 and 28 day's compressive, splittensile and flexural strength of 20Mpa (2900 psi) and workability (slump and compacting factor) were studied.

The result of proportion replacement of factory-made sand on strength property and workability were evaluated and compared with reference mixture of 1/3 replacement of natural sand by factory-made sand. P. T. Santhosh Kumar<sup>1</sup> and K. K. Sajeevan<sup>2</sup> Even though concrete with CSFA has a reduced 28 day compressive strength than river sand (Table 1), it can be adopted for construction.

Also, IS: 383- 1970 permits the employment of CSFA as fine combination if it confirms to the necessities in Table four of this code. P. Aggarwal investigated that rock bottom ash that falls into the chamber bottom will act as an alternate to natural sand because the Compressive strength of bottom ash concrete containing 50% bottom ash is suitable for many structural applications since the discovered compressive strength is quite twenty MPa at twenty eight days. Mark James Krinke concludes that with the addition of a superplasticiser a concrete combine containing factory-made sand is capable of not solely achieving a workability the same as that of natural sand, however to achieve this workability, dosages as high as 2.36 percent were required.

The additional cost of these large amounts of super plasticiser in the concrete mix makes the manufactured sand concrete mix less economical to produce than a natural sand control mix.

However with the declining availableness of natural sands appropriate to be used in concrete, the use of concrete mixes containing 100 percent manufactured sand or high percentages of manufactured sands in the aggregate blend may become a lot more common. It is seen from above studies there a variation in strength enhancement of concrete made from artificial sand to encourage the use of locally available artificial sand promotes to study to visualize it appropriate replacement proportion within the concrete.

### 3. Material And Tests:

#### 1) CEMENT:

Cement (Ordinary Portland cement) 53 grades has been used for mix proportion for M25 Grade concrete.

For examining the suitability of cement, the following laboratory tests are performed:

- a) Sieve test (as per IS 4031, Part 1-1996).

**Table-1:** Fineness Test

Sieve	Weight
90 $\mu$	0.04

- b) Standard consistency test.

**Table-2:** Standard consistency test.

Sr.No	Weight of cement	Percentage of water	Percentage of water in (ML)	Plunger penetration (MM)
1	300 g	26%	78	38
2	300g	30%	90	23
3	300g	33%	99	7
4	300g	34%	102	5

#### 2) NATURAL SAND:

Natural black colored locally available sand at yavatmal region is used.

For examining the suitability of sand, the following laboratory tests are performed:

- a) Fineness modulus

**Table -3:** Fineness modulus

Sieve size	Weight Retained	Cumulative Weight Retained	Cumulative % Weight Retained
4.75	0.063	0.063	6.3
2.36	0.160	0.160	16
1.18	0.318	0.318	31.8
600 $\mu$	0.259	0.259	25.9
300 $\mu$	0.147	0.147	14.7
150 $\mu$	0.035	0.035	3.5
Total			98.20

Fineness Modulus of Sand is 98.20%.

- b) Specific Gravity

Specific Gravity of Sand = 2.7.

- c) Bulking of sand.

**Table-4: Bulking of sand.**

Sr. No	Initial volume V1	Final reading V2	% of water	Change in volume	% of Bulking
1	300	350	2	50	16.66
2	300	360	4	60	20
3	300	360	6	60	20
4	300	370	8	70	23.33
5	300	350	10	50	16.66
6	300	330	12	30	10
7	300	300	14	0	0

Maximum bulking of Sand % - 23.33%



**Fig.-1: Plastic fiber**

**3) ARTIFICIAL SAND:**

Available artificial sand at yavatmal region is used. For examining the suitability of artificial sand, the following laboratory tests are performed:

- a) Specific Gravity  
Specific Gravity of Artificial Sand =1.68.

**4) COARSE AGGREGATE:**20mm and 10mm mix coarse aggregate available at yavatmal region is used .

- a) Specific Gravity  
Specific Gravity of Aggregate = 2.85.
- b) Sieve Analysis Aggregate

**Table-5: Sieve Analysis Aggregate**

Sieve	Weight Retained	Cumulative weight Retained	Cumulative % weight Retained
80mm	0	0	0
40mm	0	0	0
20mm	2.16	2.16	216
10mm	2.8	4.96	496
4.75 μ	0.04	5.00	500
2.36 μ	0	5.00	500
1.15 μ	0	5.00	500
Pan	0	5.00	500
Total			2712

Fineness modulus of Coarse aggregate is 27.12.

- 5) SLUMP CONE TEST:** For 100% Natural Sand concrete.  
Slump cone collapse at a height of 9.5cm.

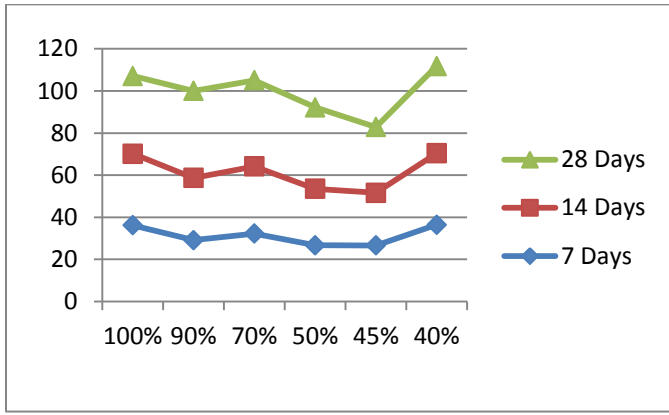
**6) PLASTIC FIBER:**

The plastic fiber were use 0.2% with natural sand and artificial sand.

The following table 6 shows the results of combination of natural sand, artificial sand and plastic fiber for 7days,14days,28days.

**Table-6: Testing Result**

Sr.No.	Fine Aggregate		Fiber	Testing	Strength(N/mm sq)
	Natural	Artificial	Plastic		
1.	100%	0%	02%	07	36.24
				14	33.91
				28	36.95
2.	90%	10%	0.2%	07	29.12
				14	29.59
				28	41.34
3.	70%	30%	0.2%	07	32.30
				14	31.87
				28	40.83
4.	50%	50%	0.2%	07	26.70
				14	26.85
				28	38.64
5.	45%	55%	0.2%	07	26.63
				14	24.98
				28	31.24
6.	40%	60%	0.2%	07	36.46
				14	33.95
				28	41.40



Graph representation of Compressive strength of concrete for M25 Grade.



Fig.-2: Compressive strength testing machine

#### 4. Experimentation

The characteristics were followed by concrete combined check programme can investigate at first. The physical Characteristics of material used that is cement natural sand, artificial sand and coarse aggregate. The exact quantity of concrete ingredients were weighed and combined completely in laboratory machine until the consistence mixed was achieved. The workability of recent concrete was measured in terms of compaction is issue . The standard cube of hundred and fifty mm size is steel mould.



Fig-3: cube casting

#### 5. Conclusion:

From the above result following conclusion are drawn. It is observed that the artificial sand can be use as replacement for the natural sand and we also use plastic fiber. The result shown that the natural sand can be replace with artificial sand upto maximum replacement level of 40% to 60% in order to produce concrete of satisfactory compressive strength.Hence artificial sand are obtain counseled as an honest and competitive substitute for natural sand.

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