

Effect Of Dolomite Powder & Glass Fibre On Mechanical Strength Properties Of Concrete

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Abstract

Concrete is a blender of cement, fine agg, coarse agg and water. Propelled solid innovation increasingly improved to the solid properties like quality, strength, functionality, stream capacity. This paper is on new and solidifying property of cements made with m sand. The test concentrates on Mechanical Strength properties. In this investigation fractional supplanting of Cement with dolomite at 0%, 15%,30%,45% and supplanting characteristic sand with Manufactured sand. The mechanical properties of cement for example compressive quality, split Tensile quality are concentrated of cement made with substitution of dolomite and M sand and results are contrasted and traditional cement. In this work M40 grade solid blend and normal of three examples were tried for 7 days and 28days.

Keywords: M Sand, Dolomite, Strength. Conplast SP430.

1. INTRODUCTION

Concrete is the fundamental structural designing material used in the vast majority of the structural building structures. The ongoing improvement in the field of solid innovation speaks to an incredible advance toward assembling of solid, Concrete is the inclusively material used, after water. It is the establishment of the constructed condition from buildings to the bridges. Portland concrete is viewed as the best structure material for its high mechanical quality. In any case, normal PC doesn't just have inadequate solidness execution yet in addition low opposition towards concoction assaults, additionally the concrete business is one of the most vitality devouring and ozone harming substances discharging industry which is liable for 7% of the worldwide carbon dioxide outflows.

2. LITERATURE SURVEY

Muthukumaran, N. Murali mohan, P. Sudha. [June 2017]:

This work bargains a new and strength quality of concrete by using fine aggregate (manufactured sand) & DP ascement substituent in various level % & w/c extent was viewed as 0.50. The perfect cement substitution. Level with DP is 10% & fine agg with manufactured-sand 40%. The compression strength for this perfect rate is 40.64 N/mm² for M25 grade solid (28 days). The Flexural quality for a perfect substitution of DP 10% and FA with manufactured-sand 40% is 4.06 N/mm² (28 days).

Pramod Dhamne, Dr.P. B. Nagarnaik [Mar-Apr 2019]:

In this investigation a swap material for concrete M30 grade cement and its examples were made by supplanting 0, 5, 1 & 20% of concrete by DP. The Mechanical strength properties of the models were found on the seventh & 28th days. Perfect substituent level of dolomite was resolved. For the preliminary standard mm cubes of concrete & 150mm dia & 300mm size cylinders were casted using M30 evaluation of cement. The compressive quality and split elasticity of cubes (46.37N/mm²) and chambers (3.51 N/mm²) are steadily expanded with including of dolomite powder 10% superseded.

Preethi G , Prince Arulraj G [April 2015] :

This experimental work determines the opportunity of use of DP as a partial substituent radiant to set. The substituent rates endeavoured various from 0 to 25% in 5% intervals by weight of cement. The mechanical characteristics of concrete grows with substituent of DP with cement which increases the compressive, split, bending characteristics of concrete. Grade of cement used is M20 & W/C utilized was 0.48. The strength was found on seventh and twenty eighth day. The 3d square compressive nature of concrete was directed by coordinating test of standard size shape model. A cylinder was chosen to determine split strength. Beams of standard size were made to choose the quality of flexure.

3. Objectives

- To identify compressive quality and split tensile strength of concrete of M40 grade concrete for 7 days and 28 days with manufacturer sand as fine aggregate and dolomite as cement replacement materials by 0%, 15%, 30%, 45% respectively.
- The strength of concrete is investigated by adding 2% of Glass fibres for the concrete with dolomite for each mix.
- To achieve the strength upto 40 MPA by selecting exact slump w/c ratio 0.42 & mix design mixes @ normal curing temperature.
- Proper evidence will be provided for dolomite replacement achieves more strength than that of target strength.

4. Properties of Materials

The mix designed was for concrete as per IS 10262-2009

- **Cement:** In the present experimental studies, 53 grade of sagar cement was used confirming to IS 8112-1989 was used and the sample of cement was tested as per IS-4031-1988 and IS 269-1976.
- **Fine Aggregate:** In the current work, sand (nearby Manufactured sand) was utilized as fine aggregate with a modulus of fineness of 2.35 & specific gravity of 2.65. Fine total is named zone II according to IS 2386 (I, III), 1963
- **Coarse aggregate:** For the exploratory work, locally accessible squashed stone totals of size 20mm and 12.5mm were used the various tests were done on the totals according to IS 2386-1988 section III.
- **Dolomite Powder:** Dolomite is a regular stone molding mineral. It is a synthetic structure of calcium magnesium carbonate. It is a basic section of the sedimentary material also known as dolostone & the variable material known as marble of dolomitic.
- **Glass fibre:** Glass fiber additionally called fiberglass. It is material produced by amazingly filaments of glass.
- **High performance superplasticising admixture : CONPLAST SP430** The super plasticizers was brought from Bangalore
- **Water:** Consumable water was used for the undertaking work and which is liberated from chloride.

5. METHODOLOGY

Present Project Focused on both concretes of fresh and hardened with addition of Dolomite powder to the mix to determine strength properties of concrete. From the test results the concrete mix design prepared according to IS 10262-2009 for concrete grade mix M40. They are added separately into the conventional concrete by the dosages between 0 % to 45%. The fresh properties of concrete is examined using slump test and Hardened Property determined by compressive strength of Acrylic modified concrete is to be studied at 7 and 28 days and compared with the conventional concrete.

- **Slump Test:**

The form for slump flow test is a frustum of a cone, 300mm of stature. The base is 200mm in width and it has a little opening at the head of 100mm. The head of 100mm. The base is placed on the smooth surface and compartment is loaded up with concrete in 3 layers, whose functionality is to be tried.

- **Compressive Strength Test:**

The compressive strength is measured in Compressive testing machine (CTM) with capacity of 3000kN. The compression strength is carried out on a cube specimen of the size 150x150x150mm of 42 concrete cubes 7 groups, 9 cubes for each of the blends with different dosage of Dolomite along with controlled concrete as 1 group having 9 cubes. The cubes of compressive quality was evaluated at the period of 7th and 28th days.

6. Results And Discussions

From the experimental investigation the following results are obtained for concrete by addition of Dolomite powder to concrete. The compressive quality and Split Tensile quality of concrete has determined with addition of Dolomite Powder.



Fig 1: Slump Test



Fig 2: Compressive strength Test

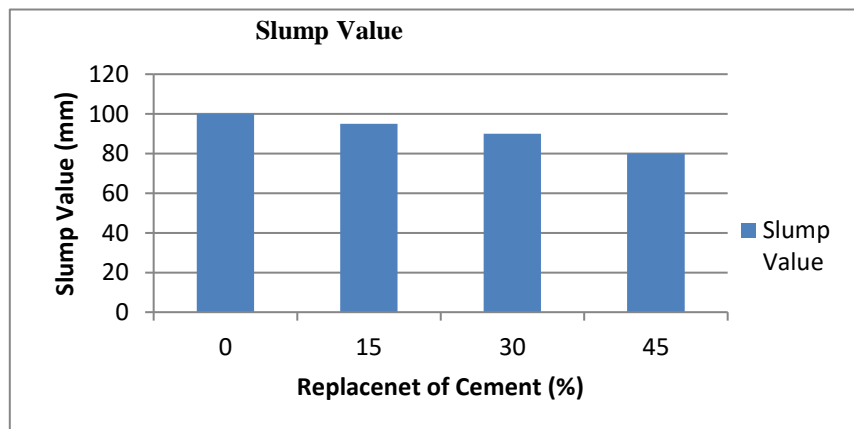


Fig 3: Graph of Slump value

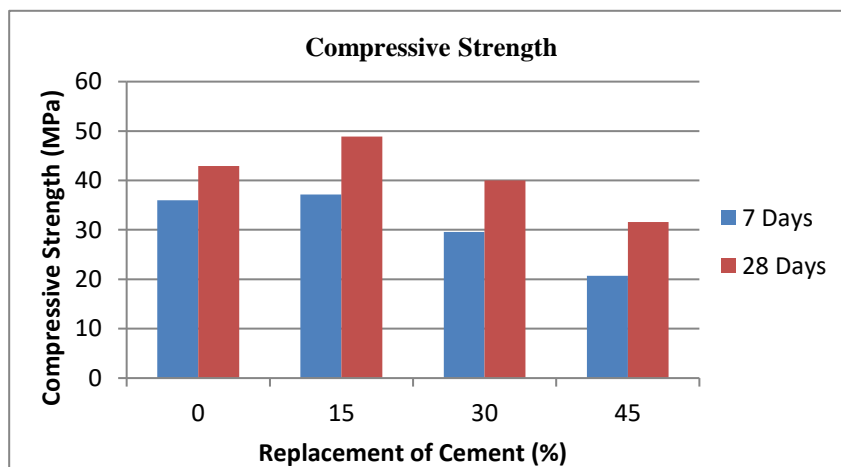


Fig 4: Graph of Compressive strength

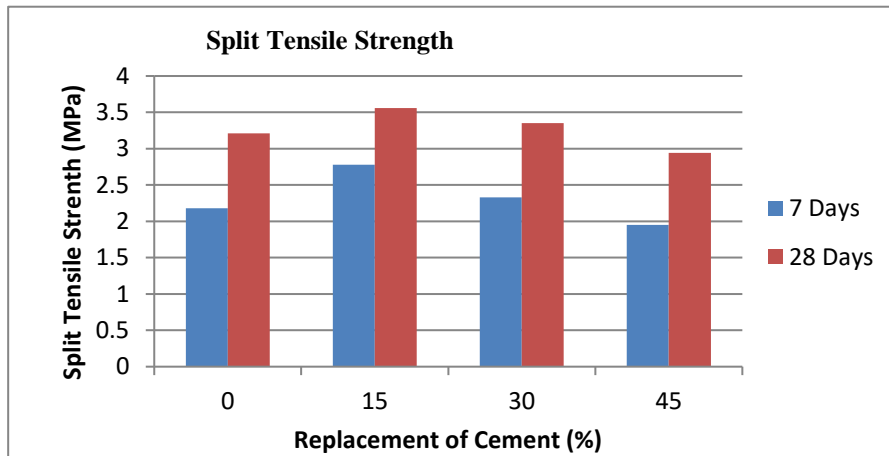


Fig 5: Graph of Split tensile strength

Table 1: Materials quantity required for concrete M40 grade for 1m3 concrete quantities

Sl.No	Materials Name	Quantity	Unit
1	Cement	362	kg
2	F A	714.083	kg
3	C A 20mm	856.8	kg
4	C A 12.5mm	367.2	kg
5	Water	165.269	ltr
6	Slump	75-100	mm
7	W/C ratio	0.42	
8	Proportion ratio	1:2:3.5	
9	superplasticizer	4.12	ltr

Table 2: Test Results Details

S l n o	Grade of Concret e	Replac ement % ofcement	Slump (mm)	Compressive strength (N/mm ²)		Split Tensile strength (N/mm ²)	
				7 Days	28 Day s	7 Da ys	28 Da ys
1	M40	0	100	35.9	42.	2.1	3.2
				7	90	8	1
2		15	95	37.1	48.	2.7	3.5

				4	89	8	6
3		30	90	29.5	40.	2.3	3.3
				7	00	3	5
4		45	80	20.6	31.	1.9	2.9
				9	56	5	4

7. CONCLUSIONS

Based on the results of the above experimental work, following conclusions were drawn:

- It is seen that, as increase in dosage of Dolomite Powder there is a Decrease in the slump value, as per the mix design it ranges from 75 to 100mm
- It is observed that, as increase in dosage of Dolomite Powder there is an incremental in the Compression strength upto max of 15% & then decreases, when compared to normal concrete 30% of dolomite replacement is having closer strength value of 40 MPA as used when required, thereby achieving economy and creating a pollution free environment hence we can use 15% replacement of dolomite when Normal strength concrete is achieved.
- Compressive strength For 15% dolomite replacement at 7th day & 28th Day is 37.14Mpa & 48.89MPa respectively.
- It is noticed that, as increase in dosage of DP there is an incremental in the Split tensile strength upto 15% replacement of cement. After that it decreases.
- Split Tensile strength For 15% of cement is replaced by dolomite Powder at 7th Day & 28th Day is 2.78Mpa & 3.56Mpa respectively.
- The addition of 2% glass fibres for each replacement level of dolomite, the strength is quality examined.

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