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Experimental Study of Concrete by Incorporating Alccofine-1203, Plant Fiber as Partial Replacement of Cement

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ABSTRACT
This advanced period required a colossal assortment of substantial materials and limited impacts of recently evolved composite materials. This advancement prompts antagonistic impacts on the general climate. As a piece of natural concern, we need to limit the adverse consequences. In my current exploration paper, I arranged M-20 grade of cement by utilizing Indian guidelines The advancement of Normal Strength Concrete, by the method of substitution materials like alccofine miniature materials and plant strands being utilized for both precast and insitu works. The projected solid shapes are gone through by the valuation of mechanical tests like compressive strength, Tensile strength and non-disastrous testing i.e. Rebound Hammer and UPV tests. The got results are deciphered with state sanctioned test results.

Keywords: parametric study, Alccofine materials, plant fibers

I. INTRODUCTION

Concrete, explicitly Portland concrete cement, has the characteristics of solidarity, sturdiness, flexibility, and economy, and can be set or formed into for all intents and purposes any shape and imitate any surface. It is the most generally involved development material on the planet. In the United States two times so a lot Portland concrete cement is utilized as any remaining development materials consolidated. Outstanding substantial ventures in the U.S. incorporate the Erie Canal, denoting the kickoff of the primary regular concrete works; the primary provincial substantial thruway close to Detroit, Michigan in 1909; Grand Coulee Dam, which utilized almost 10 million cubic yards of cement, making it one of the biggest portland concrete substantial ventures ever; and the main known slant up substantial structure worked close to Des Moines, Iowa in 1912.Interest for concrete with higher strength, better quality, and other unique properties, combined with the advancement of bigger and quicker blender trucks, prompted the rise of the prepared blend substantial industry in the post-World War II period. The prepared blend substantial maker has made concrete an appropriate Concrete is a combination of Portland concrete, water, totals, and at times, admixtures. The concrete also water structure a glue that solidifies (hydrates) and securities the totals together. Substantial quality is straightforwardly connected with the sum and properties of the materials utilized, and how it is put, wrapped up, furthermore relieved. Concrete is a flexible development material, versatile to a wide assortment of horticultural and private employments. With legitimate materials and strategies, it can endure numerous acids,Concrete has significant strength in pressure, however is frail in strain. Most primary uses, for example, shafts, braces, and compost tank covers, include built up concrete, which relies upon substantial's solidarity in pressure and steel's solidarity in strain.

Since concrete is an underlying material, strength is a positive property. Compressive qualities of cement for the most part range from 2000 to 5000 pounds for each square inch (psi), however cement can be made to endure north of 10,000 psi for unique positions

Note: In this my research paper I Decided to prepare high strength concrete by using the Raw materials below

1. Alccofine 1203
2. Plant fiber (i.e : Banana fiber)

II. REVIEW OF LITERATURE

MalavikaGautama and Hemant Sood (2017) stated that the addition of Alccofine in concrete has graduallyincreased the strength of

concrete at all stages. Alccofine has a unique characteristic to enhance the performance of concrete in both fresh and hardend state because of its optimized particle size distribution. Through their experimental study. The optimum percentage replacement of cement with Alccofine to increase the strength was found to be 10 %.The seven day strength showed an increment when compared with the control mix. The ultrafine Alccofinepartical provides smooth surface workability and lower water / binder ratio. Mahim Mathur and Ashish Mathur (2018) studied about the performance of concrete with Alccofine 1203. They stated that the addition of Alccofine 1203 in OPC will initially increase a slump of 10% when compared to M20 grade concrete mix. The optimum value of Alccofine found was 10%. The compressive strength at 10% replacement of cement with Alccofine in M20 grade concrete is 41.11N/mm². Which is greater than the target compressive strength of M30 grade concrete. From this it is proved that the addition of Alccofine will increase the strength properties of concrete.

Devinder Sharma et al. (2016) discussed about the strength development of concrete with Foundry Slag and Alccofine as a partial replacement for fine aggregate and cement respectively. In their study M100 grade concrete samples were casted and tested for compressive strength, tensile strength and flexural strength with varying percentage of Foundry Slag (0% - 50%) and optimum of Alccofine (15%) at the age of 7, 14, 28, 56 and 90 days. Carbonation as alkalinity test and rapid chloride permeability test were also studies. From the experimental investigation they concluded that reasonably high strength concrete mix can be developed by substituting fine aggregate with 10% to 45% of Foundry Slag and cement with 15% of Alccofine. Foundry Slag was found to be safe from carbonation as the pH of concrete was increasing slightly with increase in Foundry Slag content which reduced corrosion and permeability of concrete decrease with increase in Foundry Slag content. Also the study was done to reduce the impact on environment by saving the natural resources.

Siddharth P Upadhyay and M. A. Jamnu (2014) studied the effect of Alccofine and Fly ash as a Supplementary Cementitious Material on the strength of concrete. Alccofine and Fly ash are pozzolanic material that can be utilized for the development of highly durable concrete. From their experimental investigation, addition of Alccofine results in early strength gain where as Fly ash show long term strength. By using 10% of Alccofine and 30 % of fly ash maximum compressive strength of concrete can be achieved. Addition of Alccofine increase the filling ability, pass ability, flow ability, pump ability and reduced the segregation and bleeding due to its optimized particle size distribution. It is also an economical solution for higher grade concrete as the relative cost of Alccofine is cheap when compared to cement.

Dr. Sinha Deepa A, Sabuwala Hasan K (2016) has investigated the performance of concrete containing supplementary cementitious materials such as fly ash &alccofine. This study explores the performance of concrete mixtures in terms of compressive strength, flexural strength, split tensile strength, residual compressive strength at elevated temperature and chloride attack test at various ages.It is observed that with increase in percentage of alccofine the resistance to chloride attack increases and also helps to increase the slump flow in concrete

Manisha M. Magdum, Dr. V. V. Karjinni(2016) has explained the contribution of mineral admixture Alccofine 1203 to the mechanical properties of hybrid fiber reinforced concrete with strength and workability is investigated. It reduces thermal, shrinkage cracks and increases strength as compared to conventional concrete.The primary objective of this study was to evaluate the action of hybrid fibers at different volume fractions to obtain a good post-peak behavior of high strength concrete.It deduce that the compressive strength was found to be increased with increase in percentage of mineral admixture alccofine 1203 and noted maximum in case of 10%.And flexural strength was found maximum when we used 1.5% of fiber volume fraction (80% steel fiber and 20% polypropylene fibre) by weight of cement

III. EXPERIMENTAL PROGRAM

1. Selection of problem 2. Collection of data/ references collection 3.Selection of materials 4.Laboratory tests Conducting 5. Correlation of data with IS codes 6.Conclusions

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Fig : 1 Cyclic Process Of Experimental Program

MIX PROPORTION

Mix Proportions:

Water, Cement, Coarse & Fine aggregates (W, C, CA, FA in kg) are obtained from the above design procedure and finally their ratios are

$1 : \frac{FA}{C} : \frac{CA}{C}$(Cement: Fine aggregates: Coarse aggregates)

Amount of cement, sand, aggregate and water in different grades of concrete

Mix	Ratio	Cement In Kgs	Sand In Kgs	Water In Litres
M5	1:5:10	141	785	70.50
M7.5	1:4:8	174	773	87
M10	1:3:6	226	753.60	113
M15	1:2:4	322	717.80	161.00
M20	1:1.5:3	403.20	672	201.60
M25	1:1:2	565	565	282.50
M30	1:1:3	452	452	226

TEST REPORTS

COMPRESSIVE STRENGTH RESULTS

S.NO	MIX TYPE	CUBE ID	COMPRESSIVE STRENGTH N/MM²		
			7 DAYS	21 DAYS	28 DAYS
1	NM+AF+PF	NAP-1	21.36	26.39	31.11
2	NM+AF+PF	NAP-2	21.30	26.41	31.10
3	NM+AF+PF	NAP-3	21.38	26.65	31.32
4	NM+AF+PF	NAP-4	21.41	26.71	31.29
5	NM+AF+PF	NAP-5	21.44	26.70	31.29

Table: 1 Compressive strength of combined mix

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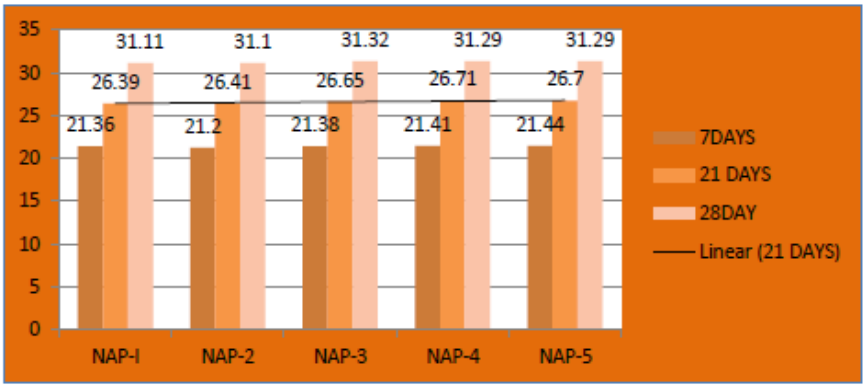
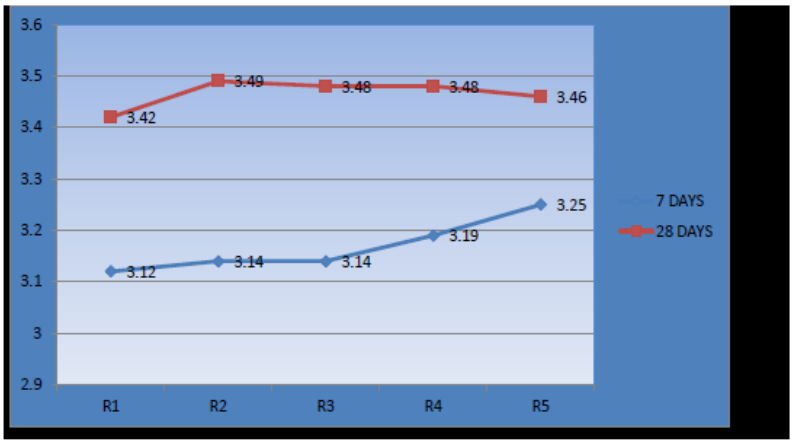


Graph: 1 Compressive strength of combined mix

SPLIT TENSILE STRENGTH OF CONCRETE

S.NO	MIX TYPE	CUBE ID	%OF RPM	COMPRESSIVESTRENGTH IN N/MM^2	
				7 DAYS	28 DAYS
1	NM+AF+PF	R1	10 %+1%	3.12	3.42
2	NM+AF+PF	R2	15%+1%	3.14	3.49
3	NM+AF+PF	R3	20%+1%	3.14	3.48
4	NM+AF+PF	R4	25%+1%	3.19	3.48
5	NM+AF+PF	R5	30%+1%	3.25	3.46

Table: 2 Split Tensilestrength of combined mix



Graph: 2 Split tensile strength of combined mix

ULTRASONIC PULSE VELOCITY TEST

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S NO	CUBE ID	% REPLACEMENT	CURING PERIOD	Obtained average velocity(m/s)	Quality of Concrete
1	S1	10 %+1%	28 DAYS	3518	Good
2	S2	15%+1%	28 DAYS	3578	Good
3	S3	20%+1%	28 DAYS	3589	Good
4	S4	25%+1%	28 DAYS	4010	Good
5	S5	30%+1%	28 DAYS	4100	Good

Table: 3 UPV TEST result

RAPID CHLORIDE PENETRATION TEST:

CUBE ID	VOLTAGE(V)	TEST DURATION(Hr)	CHARGE PASSED (Coulombs)	CLASSOF PERMEABILITY
S1	60	6	1158	Low
S2	60	6	390	Very low
S3	60	6	298	Very low
S4	60	6	298	Very low
S5	60	6	310	Very low

IV. CONCLUSION & DISCUSSIONS

The objective of the Thesis work Is the feasibility of Partial replacement of cement by Alccofine & plant fibers and achieve the desired properties in concrete. The reduction in cement consumption is believed to reduce the cost, and give a rational solution to some concrete disadvantages like cracking due to thermal changes and drying. From the results achieved for the workability, compressive strength, tensile strength, UPV, Carbonation Test, & RCPT the following conclusions are drawn:

- From Normal Mix The average compressive strength of all the cube specimens at 28 days is **27.54 N/mm^2**
- Replacement with 10 % Alcoofine at 28 days is **29 .11 N/mm^2 & Maximum at 29.17 N/mm^2 at 25 % replacement**
- Casting the cubes with combined mix (i.e Normal concrete with alccofine &Plant fiber is maximum at 15 % noted as **31.32 N/mm^2**
- From the result of SPTS is noted maximum at 20 % 3.48 **N/mm^2**
- From the result of SPTS is noted Minimum at 10 % 3.42 **N/mm^2**
- Conclusion drawn based on the UPV all the cubes are up rise as GOOD
- The casted cubes are also satisfies the carbonation test result i.e Turns into pink

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