An Experimental Analysis of Polypropylene Concrete

Dr. A. W. kharche[1], Prof. . P. R. Chopade[2], Mr. Nitin Pawar[3], Vipul Deshmukh [4]
[1, 2, 3, 4]Dept of Civil Engineering
[1, 2, 3, 4]Padm. Dr. V. B. Kolte College of Engineering Malkapur , Maharashtra, India

Abstract- *Presently, it is defined that the plastics are synthesized high. Polymers which have plasticity, and consequently substances made of these natural materials are precluded. Plastics can be separated into two types. Polypropylene, also known as Olefin, is a synthetic thermoplastic polymer derived from oil and natural gas production. Up until the late 1950's, the gas propylene was a waste product of oil and natural gas facilities. It was not until Italian scientist, Giulio Natta, polymerized the gas propylene and made a commercially feasible plastic polypropylene. Polypropylene is then extruded through a shower head like device known as a spinneret. The spinneret creates the shape and length of threads. After the threads cool, they are spun together in various color and size combinations to make yarns. The polypropylene yarns are then woven into fabric.*

Keywords- Polypropylene1, Concrete2, Sand 3, Cement4,

I. PERFORMANC ANALYSIS

Design of stipulations.

Characteristics compressive strength. = fck =25N/mm^ 2
Maximum co * f degrees * aggregate = 20mm
Degree of workability= 0.92 (as per IS 456-2000-compaction factor) Test data of materials.
Cement used OPC 53grade.
Specific gravity of cement -3.10
Specific gravity of sand -2.75
Specify gravity of metal (aggregate) = 2.78
W.A of coarse aggregate (20 mm) = 0.3%
W.A of coarse \ aggregate (12.5 mm) =0.4\%
W.A of fine aggregate=4% 8) Initial setting time = 90minutes.
Final setting time = 540minutes.

From IS 456-2000, table no.5 maximum free water cement ratio required for mix design moderate condition M {25} is 0.50. So we are taking W/C ratio is 0.45 Selection of water and sand
Maximum water content= 186 liters.
Volume of C.A.=62\%=0.62
Volume of F.A.=100-62=38\%=0.38
Assume slump 100 mm As per IS 10262-2009(increase 3% for every increase of slump above 50 mm.)
. Estimated water 186+ (6 % x 186) =197.16 kg/m
From table. IS 15 456-2080
Clause 8.24.2 maximum water content= 300 kg/m¹ Hence ok. =290 kg Determination f course and fine aggregate.
Volume of concrete. =1m^ 3
Volume of cement-*10^ -3=0.142 m^ 3
Volume of water-*10^ -3 =0.198m^ 3
Volume of all in aggregate volume of concrete – (Volume of cement+ volume of water)
-1-(0.142+0.198): =0.66 m^ 3
Weight of C.A = volume of all in aggregate volume of c.a.* specificgravity- 10³
=0.66*0.62*2.78*10^
=1100 kg/m^ 2
20 mm=60\%=1137*0.6=715kg
12.5 mm=40\%=1137*0.4=385kg
Weight of F.A = volume of all in aggregate volume of c.a. specific gravity-10²
=0.66*0.38*2.75*10^ *
=690 kg/m^ 3
Water absorption for aggregates and sand. For 20 mm,
Water increase due to 20 mm aggregate is (683 * 0.3) * 2.05 * 1 Change in weight of 20 mm aggregate is (683-2.05) 681 kg.
For 12.5 mm
Water increase due to 12.5 mm aggregate is (455 * 0.4)
.82 lit. Change in weight of 12.5 mm aggregate is (455-1.82)453 kg.
For crusher sand,Water increase due to C.sand aggregate is (690 * 4) * 27.59lit
Change in weight of C.sand aggregate is (690 - 27.59) * 662 kg. So, the total water increases

Design Mix data

Cement (kg)	Water (kg)	F. Aggregates (kg)	C. Aggregates (12.5 mm)	C. Aggregates (20 mm)	GGBS	Density of Fresh Concrete (kg)
290	176	935	385	715	60	2561

Compression Strength: -

TESTS

To know the hardening properties of concrete the following tests should be conducted on the specimens for 7 and 28 days from time of mixing the water to the dry materials.

Compressive strength test (18 Cubes)

The cubes are generally tested at 7 and 28 days unless specific early tests are required and Strength of concrete increase with age.

Case 1 for Conventional Concrete Cubes: -

Table Conventional Concrete

Cube sample no.	1	2	3	Avg. Strength
7 Day Strength	16.88	17.17	16.96	17
28 Day Strength	34.36	33.31	34.41	34.02

Case 2 for Proportion for 5% PP Grains

Table Mix Proportion for 5% PP Grains

Material	Water	Cement	Fine Aggregates	Coarse Aggregates	
				10mm	20mm
In Kg/ m^3	187	356	850	420	705
Ratio	0.5	1	2.466	3.992	

Case 3 for Proportion for 10% PP Grains

Table Mix Proportion for 10% PP Grains

Material	Water	Cement	Fine Aggregates	Coarse Aggregates	
				10mm	20mm
In Kg/ m^3	187	338	850	420	705
Ratio	0.5	1	2.466	3.992	

Case 4 for Proportion for 15% PP Grains

Table Mix Proportion for 15% PP Grains

Material	Water	Cement	Fine Aggregates	Coarse Aggregates	
				10mm	20mm
In Kg/ m^3	187	319	850	420	705
Ratio	0.5	1	2.466	3.992	

Casting the specimens taking the control mix design (i.e., 5% grains) as reference weights of materials are calculated as shown above. In all the concrete mixes human Polypropylene fiber was varied in the percentages of 5%, 10%, 15%, by the weight of cement material content was incorporated for the w/b ratio 0.5. Total 18 Cubes (150x150x150mm for all the 3 mixes including control mix.

Mix 1: 5% grains
Mix 2: 10% grains
Mix 3: 15% grains

II. CONCLUSIONS

Shrinkage cracks work reduced in case of addition of PP in M25 mix.

Mixing of concrete by adding PP to take less efforts as compared to conventional concrete. Cost of PP is lesser than that of conventional concrete ingredient thus reduction in cost and economic in material.

By adding 5% PP in M25 grade concrete 7.16%. It observed as compared to conventional concrete. By adding

10% PP in M25 grade concrete 7.49%. It observed as compared to conventional concrete. By adding 15% PP in M25 grade concrete 5.93%. It observed as compared to conventional concrete.

REFERENCES

[1] PROF. M.K.Panchawate & Naiknaware sir.

[2] Dr.K.M Soni, May 2007, "Fiber Reinforced Concrete in Pavements", NBM&CW vol 12, pp 178-181. 2. Dr.S.S.Seehra, March 2007," An Innovative concrete technological development of fully mechanized construction of cement concrete pavement", NBM&BW vol 12 pp76-93.

[3] www.google.com

[4] http://cedb.asce.org/cgi/wwwdisplay.cg(12Sept 2007)

[5] Alhozaimy, A., P. Soroushian, et al. (1996). "Mechanical properties of

[6] polypropylene fiber reinforced concrete and the effects of pozzolanic materials." Cement and Concrete Composites 18(2): 85-92

[7] Bagherzadeh, R., H. R. Pakravan, et al. (2012). "An Investigation on Adding Polypropylene Fibers to Reinforce Lightweight Cement Composites (LWC)." Journal of Engineered Fabrics & Fibers (JEFF) 7(4).

[8] Balaguru, P. N. and S. P. Shah (1992). Fiberreinforced cement composites

[9] Banthia, N. and R. Gupta (2006). "Influence of polypropylene fiber geometry on plastic shrinkage cracking in concrete." Cement and Concrete Research 36(7):1263-1267.

[10] Foti, D. (2011). "Preliminary analysis of concrete reinforced with waste bottles PET fibers." Construction and Building Materials 25(4): 1906-1915.

[11] Lura, P. and G. P. Terrasi (2014). "Reduction of fire spalling in high-performance concrete by means of superabsorbent polymers and polypropylene fibers: Small scale fire tests of carbon fiber reinforced plastic-prestressed self-compacting concrete." Cement and Concrete Composites 49: 36-42

[12] Murahari, K. and R. Rao (2013). "Effects of polypropylene fibres on the strength properties of fly ash based concrete." International Journal of Engineering Science Invention 2(5): 13-19