FOAMED CONCRETE

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ABSTRACT

Foamed concrete has unique characteristics that can be exploited in civil engineering works. it requires no compaction but will flow readily from an outlet to fill restricted and irregular cavities and it can be pumped over significant distances and height .thus it could be thought of as free flowing , self setting fill . This research paper provides are compact's of foam concrete. Covering its constituents, production, engineering properties and uses. Foamed concrete is simple to produce but at present there is a need to provide close control during its production and on site supervision during its placement and curing. The need for such special requirements will reduce as industry become more familiar with the character and behaviour of the material. Research is still required on some aspect of the properties of foam concrete.

I. INTRODUCTION

Foamed concrete is a versatile material which consists primarily of a cement based mortar mixed with at least 20% of volume air. It possesses high flow ability, low self-weight, minimal consumption of aggregate, controlled low strength and excellent thermal insulation properties. It can have a range of dry densities, typically from 400 kg/m3 to 1600 kg/m3 and a range of compressive strengths, 1 MPa to 15 MPa Foamed concrete typically consists of slurry of cement and fly ash or sand and water, although some suppliers recommend pure cement and water with the foaming agent for very lightweight mixes. This slurry is further mixed with synthetic aerated foam in a concrete mixing plant. The foam is created using a foaming agent, mixed with water and air from a generator. The foaming agent used must be able to produce air bubbles with a high level of stability, resistant to the physical and chemical processes of mixing, placing and hardening.

Foamed concrete mixture may be poured or pumped into moulds, or directly into structural elements. The foam enables the slurry to flow freely due to the thyrotrophic behaviour of the foam bubbles, allowing it to be easily poured into the chosen form or mould. The viscous material requires up to 24 hours to solidify (or as little as two hours if steam cured with temperatures up to 70 °C to accelerate the process.), depending on variables including ambient temperature and humidity. Once solidified, the formed produce may be released from its mould.

II. CONSTITUENTS

Generally ordinary Portland cement is used for making foamed concrete. Fly ash has been used in the range of 30-60% to reduce its cost and heat of hydration.

Water cement ratio varies between 0.4-0.6.

The foaming agent is mixed in 20 part of potable water. The weight of foam should be minimum 50g/l.

Sand is also used as fine aggregates in foamed concrete.

III. EXPERIMENTAL SETUP

Foam is made by foaming agent and water by the help of foam generator. Cement, fly ash and sand slurry is made with 0.4-0.6 water cement ratio. At last foam is mixed with wet slurry and filled in mould of size 400x250x100mm.
After 24 hours moulds are removed and specimen put under water for required days. After 7 days, 14 days, 28 days specimens are tested by the help of compressive testing machine. In this study total 81 specimens were made of foamed concrete out of which 27 specimens are made of cement and fly ash, 27 specimens are made of cement and sand and 27 specimens are made of cement, fly ash and sand.

IV. EXPERIMENTAL RESULTS

Table 4.1: Mix proportion for cement, fly ash foamed Concrete

S.NO	CEMENT(gm)	FLY ASH (gm)	Density (kg/m^3)	Compressive strength(MPa) (7days)	Compressive strength(MP) (14days)	Compressive strength(MP) (28days)	Water absorption (%)
1	350	50	650	1.5	2.2	3.1	15
2	350	100	700	1.6	2.3	3.1	13.5
3	350	150	730	1.8	2.4	3.4	12

Table 4.2: Mix proportion for cement and sand foamed concrete

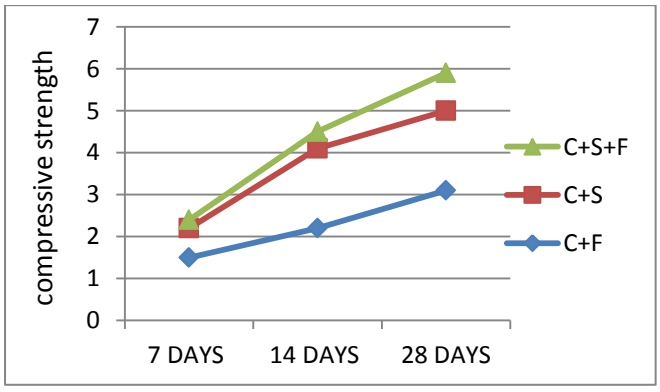
S.NO	CEMENT (gm)	sand(gm)	Density (kg/m^3)	Compressive strength(MPa) (7days)	Compressive strength(MP) (14days)	Compressive strength(MP) (28days)	Water absorption (%)
1	350	50	720	2.2	4.1	5.2	13.2
2	350	100	780	2.3	4.2	5.7	12.2
3	350	150	810	4.8	4.6	5.9	11.2

Table 4.3: Mix proportion for cement, fly ash and sand foamed concrete

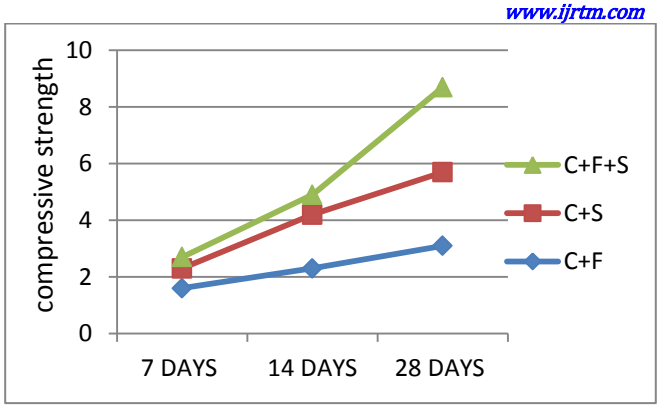
S.NO	CEMENT (gm)	Flyash (gm)	Sand (gm)	Density (kg/m^3)	Compressive strength(MPa)			Water absorption(%)
					(7DAYS)	(14DAYS)	(28 DAYS)	
1	350	50	50	740	2.4	4.6	6.1	11.2
2	350	100	100	810	2.7	4.9	6.5	10.0
3	350	150	150	940	3.0	5.2	6.8	8.1

V. COMPARISON OF TECHNICAL PARAMETERS

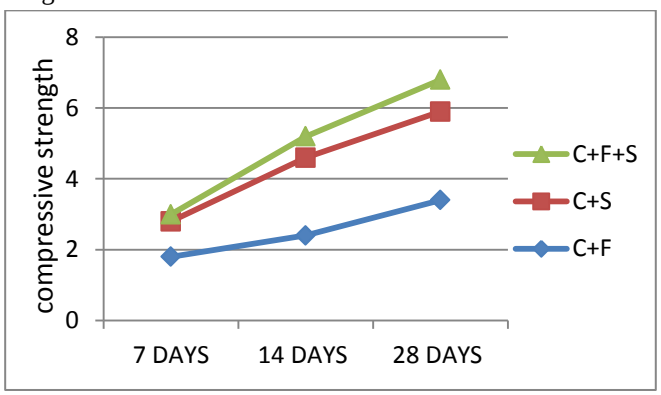
Trial 1
Graph plotted between compressive strength (N/mm^2) and days
350gm cement
50gm fly ash
50gm sand



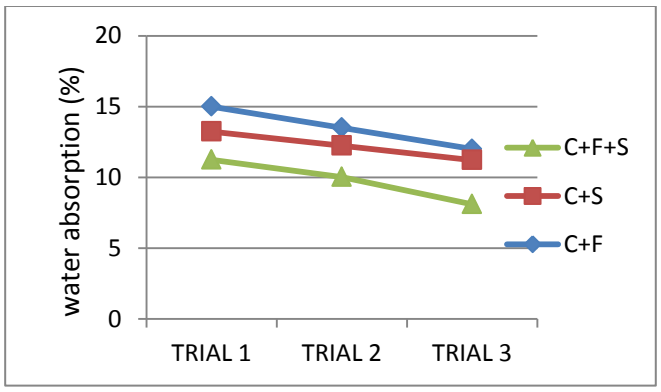
Trial 2
350gm cement
100gm fly ash
100gm sand



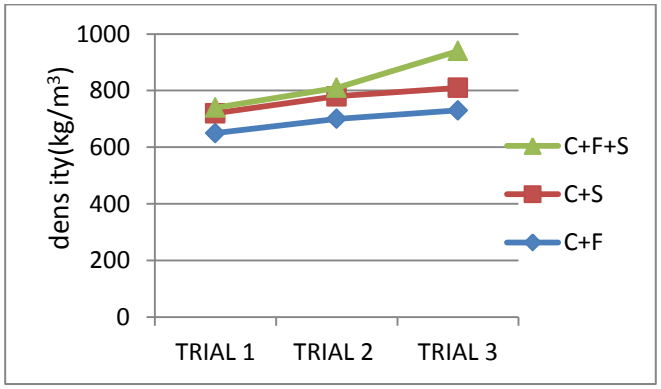
Trial 3
350gm cement
150gm fly ash
150gm sand



Variation in water absorption (%) with different trials



Variation in variation in density (kg/m^3) with different trials



VI. CONCLUSION

This study is shown that sand increases the strength and density of foamed concrete but addition of fly ash with sand increases strength very slightly. Increment in density and compressive strength reduces water absorption capacity.

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