Study of Floating Concrete

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Abstract- *Floating concrete is a liquid mixture of less density than water, which is suitable for the construction of floating structures, reduces land consumption for buildings. In the project report, the process of preparing the mix ratio of flow concrete, used materials and various test results of various strengths for acceptance of this concrete has been addressed. In addition, it presents an application for concrete with light weight, but for the construction of canoe with strong reinforcement. Despite its weight of canoe, it can tolerate external load in a certain amount.*

I. INTRODUCTION

What is concrete? (Conventional & Floating Concrete)

The most widely used composite material in the concrete building industry is this durable, weather-resistant, environment-friendly and economically economical.

Several types of concrete have been prepared to meet specific technical, structural and aesthetic needs. In broad definition, concrete is a mixture of portland cement, aggregate (gravel and sand) and potable water.

Fresh concrete is a practical, form-able, non-toxic paste that can be easily inserted and made according to the design requirements. During the hydration process, water with Portland cement is gathered to form crystallized and permanent matrix. In a few days after putting concrete, the solid body reaches its strength, provided the treatment process is monitored by experienced and trained teams in the air condition environment.

Concrete compressed strength can easily overcome the narrow power of many naturally occurring rocks; A compressed strength of 70 MPa can be easily obtained in a precast concrete factory and many cast-in-situ concrete elements receive a compressed power of 40 MPa and more.

What is floating concrete structure?

A floating concrete structure is usually a solid body made of a reinforced concrete and an internal series of cells filled with a light impermeable material, usually polystyrene, but here as an air entry agent, concrete floats in addition to aluminum powder.

In addition, polypropylene fibers for good binding in concrete, nano silica to increase its strength, CaCl2 as an accelerator and Dr. Water for evidence of water. Fixtures are included. Instead, steel mesh aluminum mesh is used for reinforcement, making it lightweight and corrosion resistant.

II. MATERIALS USED

The use of cement is somewhat similar to ferrous, but aluminum wire mesh is used regularly with light strings compared to chicken mesh, which creates an innovative type of "aluminum" (carbon fiber) mesh. Aluminum can also change the trap. The best but most strong traps available between light weight.

Pozzolanic Portland Cement (PPC) reinforced with polypropylene fibers, for increasing the binding among particles was used, pursuing following physical & chemical properties:

Physical properties of Portland Pozzolanic Cement and OPC

Property	Results	
	Ordinary Portland Cement	Blended Pozzolanic Cement
Compressive Strength (MPa)		
3 Day	11.3	10.7
7 Day	13.2	14.3
28 Day	16.9	21.2
Setting time (min)		
Initial	120	164
Final	166	203
Specific Gravity	3.107	2.936
Fineness %	85.4	86.2
Soundness (mm)	0.5	1

Chemical properties of Portland Pozzolanic Cement and OPC

Property	Results	
	Ordinary Portland Cement (%)	Blended Pozzolanic Cement (%)
Loss on Ignition	2.05	1.05
Insoluble Residue	4.1	20
Total alkalis	0.59	0.71
Chloride Content	0.07	0.01
SiO2 Content	28.7	23.5
Al2O3 Content	13.5	12.9
CaO Content	53.6	47
MgO Content	2.21	1.74
Fe2O3 Content	2.27	2.04
SO3 Content	2.9	2.21

Ordinary portland cement is replaced by PPC, because it has been economical with its Poznanic property as well as the use of affordable positive material like fly ash for sustainable development.

Aggregate

Locally available natural sand with 300 microns maximum size was used as fine aggregate.

Admixtures

- The fine powder of aluminum is used as a gas-forming mixture. It produces completely solid like baking soda in a cake. When the mixture is added to a mortar or concrete mixture, the mixture reacts chemically with hydroxides present in the cement, and cigarette-hydrogen gas-bubble size ranges from 0.1 to 1 mm.
- To reduce the setting time of the mixture, the instant mixture used is calcium chloride (CaCl2).

Mineral additives

Since we have made a light weight concrete with density compared to water, so there is very little strength compared to conventional concrete. Therefore, nanotechnology is used to overcome this problem.

- The size of the particle in nano-SiO2 is less than 100 nm, it has been found to improve the capacity and strength of the concrete, increase the resistance of water penetration and control leaching of calcium, which is closely related to various types of concrete is.

Water proofing agent

One of the main requirements of floating concrete is that there should be no leak through it. Concrete mortar hole should be almost zero.

For this reason, waterproofing material is required.

• To make water resistant, fistix powder is mixed in mortar.

III. PROPERTIES

Light Weight: For conventional brick and concrete, the density is 650 kg / m3 to 1850 kg / m3 compared to 1800 kg / m3 to 2400 kg / m3. Despite millions of small air filled cells, it is strong and durable. There is a slight advantage to the design of the structure, which can be saved in supporting structures and foundations.

Compressive Strength: 2.0 to 7.0N / mm2.

Excellent Acoustic Performance: It can be used as an effective sound barrier and for acoustic solution. Therefore, it is highly suitable for the division of the auditoriums, floor screens / ceilings and panel materials.

Earthquake Resistant: Excellent Acoustic Performance: It can be used as an effective sound barrier and for acoustic solution. Therefore, it is highly suitable for the division of the auditoriums, floor screens / ceilings and panel materials.
Since the concrete is light compared to brick, the brightness of the material increases the resistance against the earthquake.

Insulation: Better thermal insulation properties than traditional brick and concrete, hence reducing heating and cooling costs. In buildings, light weight concrete will produce a high fire rated structure.

Workability: Products made from light concrete are light, making them easy to use less skilled labor. Bricks can be seen, drilled and shaped like wood using standard hand tools, regular screws and nails. It is simpler than brick or concrete.

Lifespan: Weather proof, termite resistant and fire proof.

Savings in Material: The framework reduces the dead weight of the walls of filler walls by 50% as there is substantial savings compared to brick. Due to the large and similar size of the blocks, the thickness of the bed mortar and plaster is saved. In most cases, due to lack of structural elements, strong steel and low concentrations of concrete reduces the high cost of light weight concrete.

Water Absorption: Closed cellular structures and hence have lower water absorption.

Skim Coating: Plaster and water-saving cream paint is not required. Wallpapers and plasters can also be planted directly on the surface.

Modulus of Elasticity: The modulus of solid elasticity with a light set is 0.5 - 0.75 less than the normal concrete.
Therefore, more deflection is in light concrete

IV. EXPERIMENTAL VALUES:

Compressive strength test:

Concrete mainly faces compressed stresses. Therefore, concrete behavior is the most important in compression.

A cube of 10cm × 10cm × 10cm was prepared: the amount of cement from the quantity of cement to 1, 3 and 0.08% of the amount of sand for aluminum powder, polypropylene fiber in the same amount of cement, 2% CaCl2 by the weight of the cement , By the weight of nano silica and 10% cement, Fistix Powder in a small amount

The sample was then tested in compressive strength testing machine.

Recommended limit for compressive strength of the concrete is 2-7 N/mm^2 & the calculated result came to be 3.8 N/mm^2.

Flow test:

This test indicates the quality of concrete in terms of stability, harmony and highness of separation.
The mixture ratio of concrete is described in the compressed power test.
In the mould the concrete is filled in two layers, each layer is filled 25 times and after removing the mould, the mould on which the mould is kept and dropped for 15.

The diameter of the spread concrete is measured in about 6 directions.

Flow is calculated as given below:

Flow percent = (Spread diameter in cm-25) ×100) / 25
The value could range anything from 0-150
The calculated value of flow came to be 18.67%.

V. CONCLUSION

Conclusions on the basis of Compressive strength test:

- The results of the received tests have shown that temporary concrete in compression is not as effective as conventional
- Its strength can be improved by incorporating substances like carbon nano fiber and silica nano particles, which provide enough power.
- With the strength of this strength, floating concrete can be used for loading and unloading in vessels and docking, respectively, on ships and vessels.
- Apart from this, a hollow cube can be made with floating concrete slab and can be filled with styrofoam to make it compact and it can be used in floating structures and hence its carrying capacity can be
- Pumice stone (about 20 mm in total size) can be used as a thick set in a solid mixture to increase its mixture.

Conclusions on the basis of Flow test:

- Concrete can be used for marine structures because the flow is within the specified
- Stabilization of structures is more than traditional concrete
- The problem of separation has also been substantially reduced; It can be used to make marine holes.

OVERALL CONCLUSION

Floating concrete can be used effectively for the construction of structures, such as slab, barge, building etc. Because the maximum part of the Earth is covered with water, it reduces the consumption of land for construction works and the timber location is environmentally friendly. Boats and metal construction.

REFERENCES

[1] Concrete Technology by M L Gambhir
[2] Concrete Technology by M.S. Shetty
[3] http://en.wikipedia.org

[4] http://www.youtube.com
[5] Brouwers H.J.H, Hüsken G. and Quercia G. "Research on use of nano silica"
[6] http://www.vsl.net
[7] www.engineeringcivil.com
[8] Concretecanoe.engin.umich.edu, University of Michigan (Concrete Canoe)
[9] Canoe.slc.engr.wisc.edu