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Review Paper on Light Weight Material: Floating Concrete

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Abstract – *Floating Concrete is one of the composite materials which contains both physical & chemical properties & composed of cement, water, aggregates and various types of admixtures. Generally the density of the ordinary Portland cement is 2400-2500 kg/cm³ & the density of the floating concrete will be very lighter as comparison with the normal and it ranges in the range of less than 1000kg/cm³. The aim of the project is to introduce the various types of mixtures with their different compositions and check the results for the max strength. The use of Floating is used to reduce or minimize the dead load of the structure which reduces the overall cost of the project. In this the use of thermal balls can be introduced for the construction of light weight concrete. Due to the less density than water it will float on the surface.*

Key Words: **Floating Concrete**, **Light Weight, Thermal Balls,Pumice Stones, Coarse Aggregates, Expanded polystyrene(EPS) & Cement.**

1. INTRODUCTION

Floating concrete is a solid (hard) body of reinforced concrete which is loaded with dense and light material. They face challenges and problems across the construction industry. Two thirds of the world's surface is covered in water. It is therefore not surprising that many concrete activities have taken place in the ocean in recent decades. The disadvantage of conventional concrete is heavy concrete, whose density varies between 2,200 and 2,600 kg/m³ (generally 2500 kg/m³). With this approach, the weight of concrete is reduced in order to achieve the efficiency of concrete as a structural material. The main characteristics of floating concrete are its low density and low thermal conductivity. Lower weight can reduce overall construction costs. This is therefore advantageous for inexpensive home applications.

2. LITERATURE REVIEW

The following are research paper reviewed based on the floating concrete:

Roshan Peter et al. (2016) conducted various experimental studies on lightweight aggregates for floating concrete structures. In this experiment, they attempted to investigate the mechanical properties of an M20 lightweight concrete using pumice stone as a partial replacement for coarse aggregates and mineral additives such as silica fume with as a control mixture, the compression strength study was prepared for six series. Each set consists of 3 cubes. The optimal 7 days Compressive strength was obtained in the range of 5% silica powder for different replacement of coarse aggregate with pumice Stone for 10%, 20%, 30%, 40% and 50%. A comparison of the compressive strength can lead to the conclusion that any structure can be built with 50% pumice coarse aggregate replacement with the addition of 5% silica vapor.**[1]**

Jay Bankim Shah et al. (2015) concluded that the costs, compressive strength and tensile strength gradually decrease with the increase of BPA in concrete blocks. Adding plastic balls to concrete blocks with EPS increases compressive strength, but it also gradually increases costs. The use of EPS and plastic beads in appropriate amounts leads to good compression strength and rising costs are not important. This can be an effective form of eliminating and using EPS Plastic beads which are waste from many industries. **[2]**

Hemant k. Sarje et al. (2014) studied the technique of growing lightweight concrete. His study focuses on demonstration on compression, water absorption. Low thermal conductivity and low density are the main advantages of lightness. Concrete, which minimizes the permanent load and the construction costs by mixing fly ash and air entraining agents such Protein-based Kemelit foaming agent. **[3]**

Thomas Tamut et al. (2014) studied the partial replacement of polystyrene spheres in concrete and also examined this properties of lightweight concrete containing EPS spheres, such as compressive and tensile strength & its properties. They have been compared to traditional concrete properties. In 28 days, the compressive strength was 5%, 10%, 15%, 20%, 25% and 30% of the strength of the EPS-based concrete were 91%, 77%, 57% and 45% respectively with normal cement. On this basis, they were stretched by increasing the pearl content of EPS in concrete mixes, the compressive and tensile strength of concrete. Without fasteners, EPS concrete has good workability and can be light compacted and improved processing by increasing the content of EPS accounts. The replacement with EPS had a positive impact. The use in the construction of non-structural elements as an alternative material and is also the solution for the elimination of EPS. The results show that EPS concrete is

suitable for non-structural purposes, such as partition walls, wall panels, etc. **[4]**

Ganesh Babu et al. (2013) found, depending on the strength and density requirements that can be formed from lightweight concrete with replace all or part of the normal unit with a light unit. This study deals with the use as light moulded aggregate made of expanded polystyrene in concrete and mortar, which contains silica as an additional cement-based material. The mixtures are developed in different proportions to the efficiency of the silica vapor. The resistance win rate of these concretes shows that increasing the silica dust percentage increases the 7-day durability. This turned out to be the case approximately 75%, 85% and 95% of the corresponding 28 day resistance to the 3%, 5% and 9% silica fume substitute. Absorption results show that EPS mixtures based on sand are less absorbed than normal aggregate mixtures. In addition, the absorption values decreased with increasing cement content. Even with the minimum smoke quantity of Silicic acid, these concretes have proven to be very good in terms of corrosion resistance and chloride permeability. **[5]**

Abhijit Mandlik et al. (2013) used EPS beads to examine lightweight concrete. It is suitable for different areas like bridges, low temperature walls, repairs to wooden floors of old buildings, floating docks etc. So we can see that the EPS concrete costs are lower than with conventional concrete. Increased EPS pearl content in concrete mixes decreases the tensile strength of concrete. He noted that the exchange of EPS was a good use in building non-structural structures. The Elements as an alternative material serves as a solution for the best EPS layout. EPS concrete can be made without binder and can be easily compacted. **[6]**

Roshan Gawale et al. (2016) examined some of the problematic claims that currently produce millions of tons of polystyrene waste around the world. This ultimately leads to pollution and damage to the ecosystem. In a day to day there is an increase in nationally and internationally environmental regulations that had become stricter, making disposal very expensive such the use of polystyrene residues in concrete. Therefore, the composition not only solves the problem of removing these ultra light solid wastes, but also helps preserve the natural. It means for low-density mixes, the strength of lightweight concrete with EPS balls is low. The first results have shown it. Lightweight concrete with EPS beads is strong enough as an alternative building material for road construction. **[7]**

Rayees Ahmad Ganie (2017) studied the production of floating concrete with pumice, foaming agent and thermacol. He It also examined the influence of aggregate types and amounts on the compressive strength of concrete. It was also produced strength which was determined by using five lightweight concrete mixes and different proportions of pumice stones. The result of the investigation was showed. This proportion and the size of the aggregate influenced the compressive strength of the concrete and the unit weight. It also showed the result that you can make satisfied foam concrete using foam and pumice aggregates. Strength requirements for the structural components that carry the load do not match this concrete for the construction of structures such as barges, slabs, buildings, etc. Floating concrete can be used effectively as the highest part of the country is covered in water; the land is used for construction work, minimized and is an ecological method of boat building that replaces wood and metals. **[8]**

Malik Mehran Manzoor et al. (2018) used pumice and aluminum powder as air entraining agents to investigate this development in floating concrete. They had been working on combining the types previously mentioned in the survey. Comparison this study was carried out between simple cement concrete and lightweight concrete with different proportions of aggregates and a fixed amount of aluminum content (2% by weight) of cement. It was made with satisfactory strength using five Light concrete mixes and different proportions of pumice stone. The result of the survey showed that the size of the aggregate and the proportion affects the compressive strength and unit weight of concrete. In addition, the result showed that when using pumice as in addition, it is possible to generate a float with a satisfactory force. This concrete does not correspond to the supporting structure Component strength requirement. **[9]**

Thousif Khan et al. (2018) studied that the coarse aggregates in several were replaced by Thermacol granules and pumice aggregates. The percentage is as (100%, 0%), (90%, 10%), (80%, 20%), (70%, 30%), (60%, 40%), (50%, 50%)) respectively. Based on the test result he concluded that compaction of the mixture used in normal concrete based on the concept of absolute volume can be successful. It is used to obtain a floating concrete which maintains the density of the mixture below 1000 kg/m^3. The volume of the aggregates can be maintained between 0.7 and 0.75 to obtain floating concrete. Alternatively, pumice beads and thermacol can be used for coarse aggregates. The use of light aggregates such as balls and thermacol pumice reduces density and therefore Floating concrete could easily develop. The ingredients used in floating concrete must be selected in such a way that the specific weight of the materials chosen must be less than that used in conventional concrete. **[10]**

Daneti Saradhi Babua et al. (2018) investigated the influence of polystyrene aggregate dimensions on the strength of lightweight concrete and moisture migration properties. Research concerns the use of expanded and unexpanded polystyrene (EPS) Polystyrene beads (UEPS) as a lightweight aggregate in concrete, containing fly ash as additional cemented material. Lightweight concrete with a

wide range of concrete densities has been based primarily on stress cracks, compression, absorption and Moisture migration. Results show that concrete with UEPS aggregates has 70% greater compressive strength than EPS Unit based on unit size and concrete density. EPS aggregate concrete with small EPS aggregates showed higher compression Strength and increase have been reported for low-density concrete compared to high-density concrete. Furthermore, the result of Moisture absorption and migration show that EPS concrete with larger dimensions and higher aggregated EPS volumes shows an increase Moisture absorption and migration. **[11]**

Nikhil S. Chavan et al. (2018) studied the mechanical properties of floating concrete using exhausted polystyrene such as Aggregate exchange. The pressure test, the split tensile test and the density test were performed on concrete and completed. It was possible to float the concrete into the concrete using EPS beads to replace the aggregate. Use EPS Floating concrete provides pearls with standard workability and can be easily compacted and finished. Compressive strength of Floating concrete was inferior to conventional concrete. The density of the floating concrete for each mixing project was less than 1000 kg /m^2. There is leakage and honeycomb problems, the leakage problem can be controlled using a sealing solution. It was also possible to build a boat out of concrete, e.g. H. With floating concrete, which offers more advantages, such as cost savings, reduces the use of wood for the rescue operation. **[12]**

3. CONCLUSIONS

The following conclusion is drawn from the critical literature:

[1] The Partial replacement of the aggregate with expanded polystyrene (EPS) beads makes concrete lighter than the conventional concrete.

[2] When replacing aggregates with EPS beads, a positive application as an alternative building material was observed.

[3] The use of light aggregates can minimize the dead load, but reduce the concrete strength in the concrete mix.

[4] The ingredients used in the floating concrete must be selected so that they correspond to the specific weight of the selected materials lower than with conventional concrete.

[5] It can also serve as a means of effectively using PSE removal.

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