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Light Weight Concrete Used in Building Construction -A Review Paper

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Abstract:
It is lighter than the conventional concrete. The use of lightweight concrete has been widely spread across countries. This type of concrete contains expanded light weight aggregates which increase the volume of the mixture.This paper illustrates the several applications and advantages of the lcw. Moreover it portrays the methods of production and further properties. It had been beneficial for the construction purposes.

1. INTRODUCTION

Light weight concrete (LWC) is an amazing human invention which is used in several fields of construction. It has numerous numbers of applications which are immensely important like frames and floors, curtain walls, shell roofs, folded plates, bridges, off-shore oil platforms, and precast. The strength of LWC is 25 to 35% light as compared to normal one. Altogether the concrete are of three types and they are subdivided on the basis of weights which are heavy concrete, normal weight and light weight concrete. The compositions are as follows

Heavy-3200 kg/m to 4000 kg/m
Normal-2400 kg/m to 2600 kg/m
Light -2000 kg/m.

Keywords: lightweight concrete, lightweight aggregate concrete, infra-lightweight concrete, LC, lightweight aggregate, LWA, production, mix design

2. Ltreature Review

Light weight concrete is not a latest invention done byhumans. It has been used evidently from ancient time, itcan be traced to as early as 3,000 BC, when Mohenjo-Daro
and Harappa civilizations.Moreover it was also used by the Romans and magnificent
ancient structures still exists, like St. Sofia Cathedral or Hagia Sofia, in Istanbul, in Turkey.Furthermore , there are several examples which show theuse of LWC primarily in the construction for example the Roman temple, Pantheon, which was erected in the years
A.D. 118 to 128 and to add on the prestigious aqueduct,Pont du Gard, built ca. A.D. 14; and the great Roman amphitheatre, Coliseum, built between A.D. 70 and 82.
One the contrary, the use of light weight concrete declined after the fall of Roman Empire and people started using different material and adopted new measures for
construction.

2.1 Yasar et.al. - This experiment consist of various partsuch as he performed a study on the design of structural lightweight concrete (SLWC) made with basaltic pumice (scoria) as aggregate and fly ash and hence it provides an evident advantage over the reduction of weight. The properties of fresh concrete including density, and slump
and due to these many beneficial reasons it is more
compressive and greener.

2.2 H. Al-Khaiat and M.N. Haque -He worked on theCuring the physical properties and the early strength. And More over lightweight concrete using Lytag LWA with a slump of about 100 mm, fresh unit weight of 1800 kg/m3 and 28 day cube compressive strength. Furthermore the test shows the compressive strengths of SLWC seems to be less sensitive to lack of curing than the NWC. investigation on volcanic pumice. Test was conducted

after 0% to 25% of cement by weight and on concrete by replacing 0% to 100% of coarse aggregate by volume.

2.2 H. Al-Khaiat and M.N. Haque -He worked on The VPC properties were differentiated on the basis of volcanic pumice aggregate (VPA) and various tests were conducted such as workability, strength, drying shrinkage, surface absorption and water permeability. properties of volcanic pumice lightweight aggregates concretes. During the conclusion of the mainly lightweight coarse with natural fine aggregates concrete and lightweight coarse and fine aggregates concrete. The study concludes various results such as tensile strength and drying shrinkage show that these lightweight concretes meet the requirements. Technology has quoted various results such as mineral admixtures affect the physical and mechanical properties of High Strength Structural Light Concrete.amd moreover concluded that further addition of fly ashes improves the compressive strength and splitting tensile strength of HSSLC and furthermore Addition of silica fume enhances the compressive strength about 25%

2.3 P.C.Taylor- currently professor at Wuhan University of Technology has quoted various results such as mineral admixtures affect the physical and mechanical properties of High Strength Structural Light Concrete.amd moreover concluded that further addition of fly ashes improves the compressive strength and splitting tensile strength of HSSLC and furthermore Addition of silica fume enhances the compressive strength about 25%

PRODUCTION PROCESS AND PROPERTIES

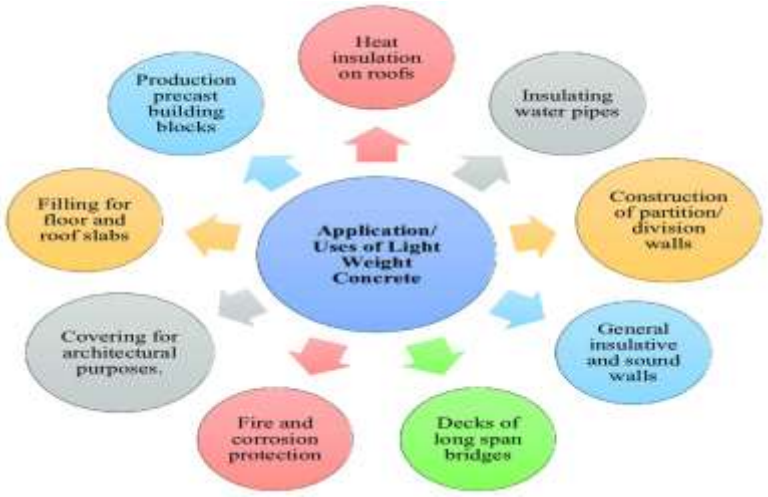
There are various processes in which we can produce the LWC. The first and foremost way to make LWC is produced by eliminating the fine aggregates from the mix completely which is called no-fines concrete. The second most common method of producing this concrete is 'Aerated Concrete', sometimes also referred as foamed, gas or cellular concrete. The method of processing it quiet ifferent as it is formed by indulgence of bubble voids into the concrete it helps to form a cellular structure. The third type of classification consists of Lightweight Aggregate Concrete' (LWAC). This has the specific gravity less as compared to normal concrete which is 2.6. These are the most often type of concrete used in the system. They are mainly used for construction process because of the characteristics they offer.

There are various properties desired in materials used as lightweight aggregates which are as follows -

1) Particle shape and surface texture: As we have studied earlier that there are various methods to produce the LWC and different producers are preferring various method for production of this concrete hence the shape and the surface texture is exceptionally different.
2) Bulk specific gravity: it's the second property in which defines that because of the cellular structure of lightweight aggregate the specific gravity of normal concrete is more as compared to lightweight aggregates.
3) Unit Weight: In the case of weight the LWC is low as compared to all the other kind of concrete that is because of the cellular structure of lightweight aggregate.

APPLICATIONS OF LWC

There are numerous numbers of applications of LWC which are being undertaken for the production purpose. Three main the aggregates that fall under 'Low Density Concrete' have low unit weight (800 kg/m3). Sometimes they are desired as the fill in concrete due to the compressive strength which is equal to 7.0 to 17.0 mpa
which is also referred as moderate strength concrete. In out native place it is used as the masonry blocks and due to the light weight of the blocks it is exceptionally easy for
the labor to carry the blocks and it helps to easily transfer them to different places and complete the circuit at incredible speed which is beneficial for the plant, as the work is being done at high speeds.



ADVANTAGES OF LWC

The first and the foremost advantage of the lightweight aggregate is that they are well suited for the seismic design due to reduce the dead load of a concrete structure. Moreover it works exceptionally well during the natural calamities for example during earthquakes they work ideally dour to the light weight.

There are various advantages over the normal concrete such as higher strength/weight ratio, better tensile strain capacity, lower coefficient of thermal expansion, and superior heat and sound insulation characteristics due to air and voids

CONCLUSION :

In the upcoming years light weight cement has gained popularity due to its economic characteristics. Moreover, since lightweight aggregate can be used in cast in place, load bearing and non-load bearing structures, it is an exceptional alternative for the normal (heavy weight) aggregate which is being used in Indian markets. There is an immense need in Indian market for the LWC and new mandatory norms should be applied in the market for there more usage. They are extremely helpful in various purpose.

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