

Use of Aluminum Powder To Create Light Weight Blocks- A Review

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Abstract:

Light weight concrete or foam concrete is the new invention technology in the construction infrastructure. The dead load of light weight concrete is less as compare to normal concrete. Light weight concrete performance has low compressive strength as a result the compressive strength will reduce with the rise of voids. It was notice that 1% of foaming agent is greater compressive strength than 1.4% of foam. Similarly the compressive strength of 1.4% of foaming agent is slightly greater than that of 1.6% of foam.

Keywords — **Foam concrete, conventional concrete**

I. INTRODUCTION

Concrete is a very essential constituents of construction material. Now a day under the concrete construction industries are highly increase. In forthcoming years there is been an growing worldwide demand for the construction of structures, infrastructures and an airport. Due to high dead load of the normal concrete it causes some problems to overcome this there is an invention of light weight concrete in construction field. Lightweight concrete is includes an intensifying agent in that it increases the volume of the mix and decrease the dead load of structure. The weight of light weight concrete is lighter than that of conventional concrete. Lightweight concrete is a solid structure made up of concrete and an inner chain is filled with a lightweight material. The expected life of low is long as 50 to 100 years and it as low maintenance cost. The structure which is made up of lwc is using high strength; quality controls reinforced concrete. The design of the concrete structure must meet the working

conditions, strength and serviceability requirements, safety requirements, durability and cost-effectiveness. Lightweight concrete decreases the dead load of building. Light weight concrete is very easy to handle their for it's transportation. Light weight concrete has high workability as compare to normal concrete.

Normal concrete: The weight of normal concrete is 2400kg per cubic meter. The normal concrete is a mixture of cement, fine aggregate, coarse aggregate and water.

Light weight concrete: Density of light weight concrete is in range between 300kg per meter cubic to 1850kg per meter cubic .Their are mainly three types of light weight concrete are fallow

- NO FINES CONCRETE
- LIGHT WEIGHT AGGREGATE CONCRETE
- AERATED CONCRETE

II. LITERATURE REVIEW

1.P. S. Bhandari, Dr. K. M. Tajne,(Issue 11 November 2014)

In this paper, the author are studied the performance of lightweight concrete with normal concrete in term of density and compressive strength. From this notice that the comp active tentacles of low weight for bulk mixture are low. In this paper they investigate that increase of void in the concrete block due to use of foaming agent in concrete mix lowers density of concrete as a result increase in voids in concrete decreases the compressive strength of concrete. As the strength increases its density also rises. From her investigation it was shown that the 1% of foaming agent has higher compressive strength than 1.4% foam. Similarly the mix with 1.2% of foam agent is slightly higher than 1.4% of foam because when foam is added to the concrete it increases the density not compressive strength. In her investigation they used two type of cement grades i.e.43 and 53 grade. From this they observed that 43 grade cement has lower Compressive strength than 53 grade cement.

1. Dr. N.Arunachalam, V. Mahesh (April-2012)

In this paper author described that the, Lightweight concrete consist of increasing agent which rises the density of mixture due to rise in density weight of concrete is decreases. The light weight concrete has lighter density than the conventional concrete with a density of 300 kg/m^3 to 1840 kg/m^3 .The main purpose of lightweight concrete are comparatively low density and little thermal conductivity. The lightweight concrete can either be used using either light weight aggregate or

with air entraining agent. In this project light weight is used as aluminum powder form agent for making concrete. While adding Aluminum powder to the cement slurry the hydrogen gas is produced. This hydrogen gas is useful for producing concrete lighter than normal concrete and hence dead load of concrete is decreases.

2. Dr. K. Chandrasekhar Reddy, (Issues on 7 July 2017)

In this research paper the author said that light weight concrete (LWC) shall be stated as a type of concrete which includes as increasing agent and it rises the amount of mixture. Due to increase in density it lowering the dead weight of the structure. When compare to conventional concrete its weight is less and dry density lesser than 2000 kg/m^3 .The major importance of the foamed concrete block are its low density and less thermal conductivity as relate to normal concrete. The main object for this investigation is to develop the most reasonable light weight concrete for structure with reasonable amount of strength. In this fly ash is replace with a fixed amount as 5%, 10% and 15 % of cement in the mixture. The addition percentage of aluminium powder is restriction into three categories that are 0, 0.5 and 1 to the light weight concrete mixture. The test shows that 5% and 10% replacement of fly ash has less compressive strength. The maximum compressive strength is achieved at the replacement of 15 % fly ash. The maximum split tensile strength is achieved at 15% replacement of fly ash. It is found that, after increasing the aluminium powder in concrete it gradual reduction in compressive strength and split tensile strength. The compressive strength are higher when the fly Ash (15%) and Aluminium powder (0.25%) are combined together.

3. Clarke J.L, (1993)

According to author, the tensile strength of concrete is important consideration in building structure for

cracking. When the light weight aggregate are used to create the light weight concrete gives lower flexural and tensile strength in compare with normal concrete of same compressive strength. Author said that the normal concrete has lower hardening factor normally, 80% of 28 days strength with in 7 days. The light weight concrete has a faster hardening factor in the initial setting stage. This is assumed to be a significance of the strength limiting effect of the light weight aggregate.

4. N. Siva LingaRao, (2014)

N. Siva lingaRao, determined that Structural lightweight concrete is defined as concrete made with low density structural lightweight concrete mixtures developed in the laboratory for the purpose of finding a suitable mixture for use on a historic building rehabilitation in her project. He said that 60 percent additional of conventional aggregate with cinder by volume along with cement replaced by 10 percent of silica fume by weight, yields the target mean strength of M20 concrete. It is worth to be noted that there is a slight rise in strength and other properties due to protracted curing periods and the unit weight of the cinder concrete is varying from 1980Kg/m³ to 2000Kg/m³ with different percentages of cinder. It is also noted that there is a decrease in density after extended curing periods.

5. Mr. Ashish S. Moon, (2015).

In this research paper the author use foam concrete. It does not contain any coarse aggregate it use only fine aggregate and foaming agent. In LWC they said that the foam concrete requires no compaction. The concrete can flows with ease and the concrete can filled irregular cavities. Lightweight foamed concrete is generally used where there is low capacity strength building are constructed. From her study it is clear that the foam

concrete has low thermal conductivity and it has self-compacting property. Hence workability of concrete is increases. The main aim of this project is to classify lightweight concrete into foamed concrete.

(III) Material are used in LWC blocks are listed below

- Cement: cement is the most important constituent of lwc blocks. Cement is used as a binding material. The cement which is use in this project is ordinary Portland cement.
- Fine aggregate: The fine aggregate which is used are free from silt and clay.
- Aluminum powder: The aluminum powder is used as a foaming agent to create light weight block.
- Water: The water which is drinkable is used for creating LWC blocks.

Methods of producing LWC blocks

- No fine aggregate i.e. replace of fine sized aggregate
- Light weight aggregate i.e. using cellular porous coarse aggregate
- Aerated concrete i.e. adding air or gas in concrete

Test conducted on light weight Concrete block are listed below

- Compressive strength test: compressive test was conducted on light weight concrete block for measured the maximum compressive strength of block. The

compressive test was conducted for 7days and 28days after curing.

- Water absorption test: water absorption test was conducted for measuring voids in concrete. First the sample was soaked in water for 24 hours and then weight the concrete block. For finding water absorption the difference between i.e weight of sample before soaked and after soaked in water.
- Density test: Density of sample is measured by the average ratio of weight of sample to that of volume of sample. In this test first the sample is weighting with a scale then take the average weight of the sample.

Procedure for making light weight concrete block are

- In first step prepare the mould for concrete block pouring. Then apply oil to the inner surface of the mould to avoid the combination between mould and concrete.
- Then prepare the foam percentage according to the percentage of sample.
- The firstly mix the dry material i.e. cement and sand together until it reaches to the uniform colour.
- Then add water and foaming agent and mix thoroughly until proper slurry is formed it takes around 3 to 6 minutes.
- Then poured the foam concrete into the mould. Pour the sample in three layers with blows each layer by 25 nos. with the help of tamping road.
- After pouring concrete then level the surface properly. Then place the concrete mould seriously.

- After 24 hours remove the block form mould and placed the block for curing for 7 days and for 28 days.
- After 7 days and 28 days then sample is ready for testing.

Classification of lightweight concrete are as fallow

- Structural concrete
 - Moderate strength concrete
 - Low density concrete
1. Structural concrete: structural concrete has a greater unit weight than low density concrete. Structural concrete has low thermal efficiency. The compressive strength of structural concrete is 34.47 n/mm^2
 2. Moderate density concrete: It consist of moderate compressive strength and thermal Insulation. The compressive strength is 6.89 N/mm^2 to 17.5 N/mm^2 approximately.
 3. Low density concrete: It consist of low unit weight and the compressive strength is Approx. 0.7 N/mm^2 to 6.9 N/mm^2 .

Advantages of light weight concrete block

- It has low dead load as compare to normal concrete.
- It has high thermal insulation properties.
- It improves workability.
- It is economy in construction.
- It consumption local available material mainly.

Disadvantages of light weight concrete block

1. It is very complex with water content in the mix.
2. Proper care is to be taken to controlling water content, mixing and supervision.
3. It requires longer mixing time than normal concrete.

Scope :

4. It is useful for construction of windows, garden walls, stair case etc.
5. It is used where to minimized the dead load of the structure.
6. It is appropriate for where thermal, freezing action is higher.

IV. CONCLUSIONS:

It can be concluded that the foam concrete has anbest alternative material for building or constructionindustries. The foam concrete has

many properties such as it requires low investment,it has low thermal conductivity. The building structure which made up of foam concrete has low maintenance cost.

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