EXPERIMENTAL INVESTIGATION OF SOLID BLOCKS BY ADDING GRANITE WASTE STEEL POWDER AND COAL POWDER.

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ABSTRACT

A concrete block is primarily used as a building material in the construction of walls is sometimes called a concrete masonry unit (CMU). A concrete block is one of the several precast concrete products used in construction. In use, concrete blocks are stacked one at a time and held together with fresh concrete mortar to form the desired length and height of the wall. The raw materials of blocks commonly used to make concrete blocks is a mixture of powdered Portland cement, water, sand, and gravel.A typical concrete block weight partially replaced by there raw materials by waste products may decrease the cost and also reduce environmental pollution. Indonesia coal, waste iron dust, and granite waste are used. Coal is a partial replacement of cement, granite waste is fully replaced by gravel. cement is replaced by superfast cement. In those combination mix is automatically adjusted to compensate, the temperature, pressure and cycle times are all controlled and recorded manually to ensure that the blocks are cured. Properly in order to achieve their required strength.

I. INTRODUCTION

This project report justifies the manufacturing of cement concrete blocks, solid or hollow for various purposes as walling, non-load bearing member of a structure parapet walls coping precast flooring, etc. The block density of a concrete block will be calculated by dividing the overall volume including holes or cavities.

PRECAST CEMENT CONCRETE BLOCK is factory made product. It is possible to prepare well-made pre-cast products by keeping a high standard of finishing. Due to the problem of pollution control and shortage of land for brick manufacturing, the precast concrete block construction is becoming very advantageous for building construction day to day. The block construction of concrete block will continue to evolve as architects and block manufacturers to develop new shapes and sizes. In this paper cement, sand, coarse aggregate and waste materials like cast iron waste, granite waste. Coal is used extensively as a partial replacement of

cement. It increases strength. Cast iron dust is very well known to increase the strength of the block. Granite waste is a by-product from the sizing process during granite activities.

II.LITERATURE REVIEW

Prof. JayeshkumarPitroda (2015)

COAL FLY ASH: Studied that the replacement of cement with coal fly ash in the proportion of 10%, 20%, 30% & 40% by weight for the grade of M25 & M40. The research concluded that the compressive Strength reduces when the cement is replaced with fly ash. As fly ash percentages increase compressive strength and split tensile strength decreases.

THOMAS.GANIRON (2014)

Studied physical, chemical and mechanical properties of coal fly ash cement concrete. This research had done for 30% of coal fly ash replacement. Results were taken for 7days and 14days and concluded that coal fly ash can be used effectively a material in concrete.

GIRISHSHARMA (2008)

Studied in his work "Beneficial effects of steel slag on concrete " with the aim of replacing steel slag of M35 grade with (fine & coarse), the percentage from 0% to 55% and tested on its 7th and 28th day after curing. This deep analysis concludes that there is constant increment when replaced with that of steel slag and can be used practically. The decrement in mentioned after 55% in case of coarse aggregate.

P.JYOTSNA DEVI (2007):

A Study on the flexural and split tensile strengths of steel fiber reinforced concrete at high temperatures "mixing with 1% volume of steel fibers to evaluate its performance at normal (M30) and at high strength concrete (M60).They introduced good results with that of steel fibers flexural resistance can be increased. The tests are carried out for 7, 28 and 91 days.

III. MATERIAL INVESTIGATION

CEMENT 3 grade ordinary Portland cement (OPC) conforming to IS 8112-1989. Ramco cement purchased in "Santhi traders", pattukkottai.

Table 4.1 cement ingredient

Description of cement	Test results obtained	Requirements of IS 8112-1989
Initial setting time	65 minutes	Min. 30 minutes
Final setting time	270 minutes	Max. 600 minutes
Fineness	412.92.m^2 /kg	Min. 225 m^2/kg
Soundness of cement	0.2mm	Max. 10mm
Compressive strength of cement mortarCubes at:3days,7days, 28days	25. 53 N/mm^2 33.97 N/mm^2 47.94 N/mm^2	23 N/mm^2 33 N/mm^2 43 N/mm^2

III. MIX PROPORTIONS

After all the ingredients were ready the mix was done in these investigation mixing done manually and also three mix proportion were used to find the suitable proportion.MIX PROPORTIONS FOR CGI BLOCK

Mix	Cement	Coal powder	M-sand	Iron dust	Aggregate chips	Granite chips
M1	2	1 .23	3	1.3	4	1.8
M2	2	1 .24	3	1.4	4	1.9
M1	2	1 .25	3	1.5	4	2

Table 5.1 Mix proportion for CGI block

MIX PROPORTIONS FOR BLOCK

Mix	Cement	Aggregate chip	M-sand
M1	4	8	3
M2	4	8	3
M3	4	8	3

Table 5.2 Mix proportion for block

EXPERIMENTAL INVESSTIGATION

1. Specific gravity of fine cement = weight of cement

Weight of kerosene of same volume

2. Specific gravity of cement = (W2-W1)

(W4-W1) – (W3-W2)

Where,

W1 = Weight of the Specific gravity bottle

W2 = Weight of the bottle + 1/3 of cement

W3 = Weight of bottle + 1/3 of cement + water

W4 = Weight of bottle + water

The weight are measured in grams.

PROCEDURE:

- An empty specific gravity bottle was taken and weighed as W1g.
- The one-third of the weight of cement from the amount of cement fills the entire specific gravity bottle was taken in that bottle and weighed as W2g.
- The remaining bottle was filled with water and weighted as W3g.
- The bottle was cleaned and filled with kerosene only and weighed as W4g.
- The weight of the one-third of the cement-filled by the specific bottle is calculated as (W2 –W1) g and the weight of the kerosene of remaining two-third portion is calculated as (W4-W1)-(W3-W2)g.
- The specific gravity of cement is then calculated by taking the ratio of cement to the weight of the kerosene that has occupied the same volume. RESULT: The specific gravity of cement =2.61

IV. ORDINARY TEST INVESTIGATION

4.1 FALL IN BROKEN TEST

In a normal clay brick is falling to the 1m height in the vertical portion is not broken. In always the same test is satisfied for concrete blocks.

- This test refers for in traveling of brick materials is the transport of any vehicle to adopted for breaking strength is tested.

4.2 SOUND TEST

- In normally for ordinary brick is tested on sound test is very important.
- So this follows on ordinary brick is finger to tilted in bell sound is produced.
- This sound is referring by the dried condition and no voids of bricks are referred.
- In always the same test is full fill to satisfy for concrete blocks.

4.3 ANALYSIS OF TEST RESULTS

After casting the concrete blocks, they were analyzed for using as a block. Various tests were carried out to check the properties of the blocks. And the results of that test were analyzed with the existing and standard results. The following tests were carried out to check the concrete blocks.

4.4 COMPRESSION TEST

This test was carried out by a universal testing machine. This test was carried out on the 7, 14, 28th days from the date of casting. While testing the concrete blocks great care must be taken, because concrete blocks never failed catastrophically, it just compressed like squeezing rubber. So load was applied up to full compression. When concrete blocks failed at the higher load, the structure was not fully collapsed.

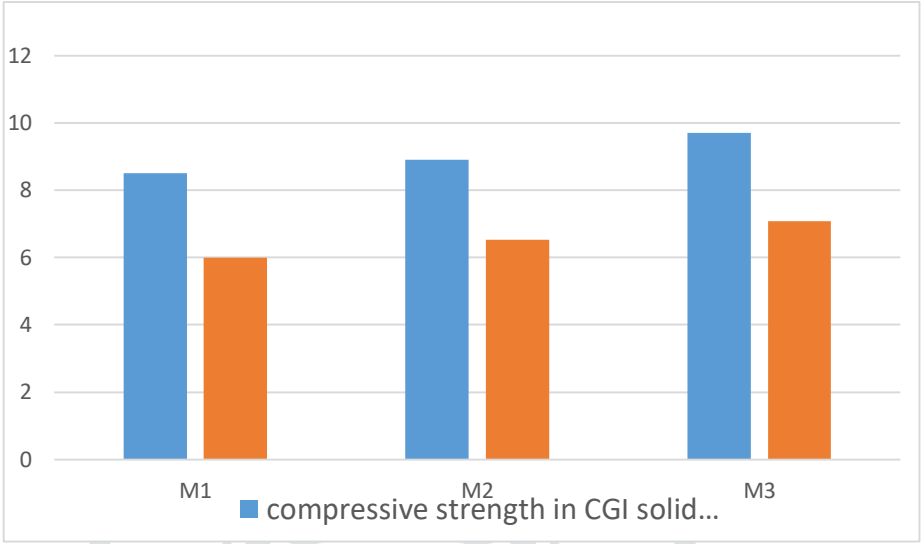

Fig 1. Compressive strength

4.5 WATER ABSORPTION TEST

Water absorption test is used to find out the water absorption ratio. Because the blocks which are absorbing more water cannot be used in water logging area or exterior walls which is open to the sky. The blocks from all the proportion were tested.

4.6 WEIGHT TEST OF CONCRETE BLOCKS

Lightweight blocks are also important objectives of this project. So, all the blocks were tested whether they are having less weight or not. All the blocks were weighed in a well-conditioned electronic weighing machine. The ordinary convention blocks weight varies from 3 to 3.5 kg. but the concrete blocks weight varies from 8 to 9 kg. the maximum weight is less than 8kg only. In this above proportion concrete blocks based blocks are having 1/3 rd of the weight of the conventional blocks only. So these blocks are lightweight and it will also reduce the total cost of construction due to the reduction in dead load.

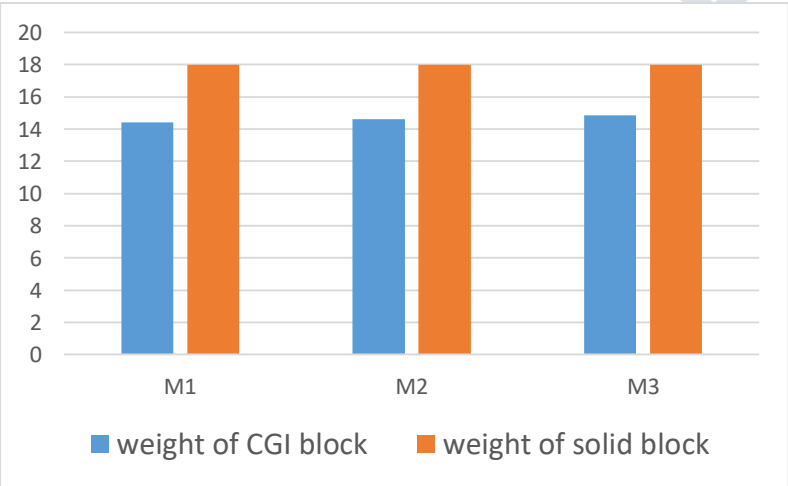

Fig 2 : Weight Test Chat

V.CONCLUSION

In the experimental investigation compare the block with super fast cement, Granite waste, iron dust, and coal are the replacement of cement, sand, Gravel gives better result than the normal block which increases compressive strength. Coal is the product to obtain durability and environmental benefits. CGI blocks are considering the economy in material and the consumption of by-product and waste material such as granite waste and cast iron waste. Compressive strength of CGI blocks comparatively more than the traditional clay brick. Among the papers that we studied half of them were lightweight and the other half were interlocking. Most of the people used glue instead of using mortar. If interlocking blocks are not light in weight they are difficult to place but if they are light in weight then they are easy to place. Even it has low maintenance. EPS beads and fly ash are easily available so they can be used as a lightweight material. Interlocking is not only effective in modern terms but in a traditional way also. Use of interlocking concrete blocks the cost of labor is also negligible. With interlocking of concrete blocks, we can improve the aesthetic view of the building. And also the failure at the joint is reduced.

VI. REFERENCES

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