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STRENTH OF RC BEAM USING WASTE MATERIAL (plastic)& ADOPTING BUBBLE TECHNOLOGY

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ABSTRACT—

The utilization of these wastes(plastic) as an aggregate origin for concrete will help to clean the environment and help a cheaper and renewable aggregates source for construction industries. In the last few years the structure design process is based on superior the materials, their size and fabric, such that it resist under soundness of the structure. In modern Engineering, the formulator requires light weight, extra interpretation and few-cost structures. So, by Structural design in bubble method in use of plastic ball, the best possible structure beam to withstand the service load is achieved. Bubble technology is achieving the best with the so many resource while satisfying the structural beams. In bubble technology researchers used simple prismatic member as calculation of FEM is easy. In paper, they generally explain the simply supported structure domain with multiple point load & uniformely distributed load at whole beams. But in general the loads can be varied throughout the length (L/3, L/5, L/8 etc.). . In this project, M25 concrete mix is used to make beams. The trial mix is tested for compressive strength & split tensile strength. Flexure l test is done is done for 3 and 28 days of curing of the beams Which was actually a difficult problem to minimize the weight. In practical, load on the structure may be inclined, vertical and horizontal which again was a major to help this type of problems. However, after changing some line, all the above problems were solved and gave expected results.

INTRODUCTION

Make a beam and use some waste material as like plastic. It concerns generate voids or bubbles within the concrete beam, Adequately removing the non-functional concrete mass from the middle portion of the beam. These voids are formed by placing spherical non regular or ellipsoidal plastic balls or bubbles within the concrete during the casting process.

In building constructions, the beam is a very significant building member to make a horizontal beam. And the beam is one of the longest member consuming concrete. The main problem with concrete constructions, in case of

horizontal beam, is the large weight, which limits the span. For this reason major developments of reinforced concrete have on enhancing the span reducing the weight or overcoming concrete's natural weakness in tension. In a general way, the beam was designed only to resist vertical load. However, as people are getting more interest of residential environment recently, noise and vibration of beam are getting more important, as the span is increased; the deflection of the beam is also increased. Therefore, the beam depth should be increase. Increasing the beam thickness makes the beam large weight, and will increased. column and foundations size. Thus, it makes buildings consuming more building materials such as concrete and steel reinforcement. To freeze out these disadvantages which were caused by increasing of self-weight of beam, the Bubble Deck beam system, also known as void beam was suggested. The coinage of a new type of hollow core beam was a breakthrough at the turn of 20th and 21st centuries. During the second decade there have been many search on the reasonability of using the hollow core bubble technology. Bubble beam Technology is a method of practically excluding all concrete from the middle of the beam, which is not serving any structural function, thereby operatically reducing structural dead weight.LWC beam does not disintegrate faster. It shows lesser disintegration due to its enhanced deflection behaviour.

Objective of the research

1.use of waste material plastic

2. Saved amount of concrete as feet instead as use of waste material (plastic)

3.Experimental study on bubble beam

4.compair b/w RCC beam and plastic as concreate substitute bubble

5.Make a light density beam

Preparation of Moulds:-Moulds are made by very cautious and it require extra time. Grese are spreade on surface for cleaning purpose. Moulds should be stretch properly and bolting should be done gingerly.

HOW TO FILL BALL IN MIDDLE OF BEAM

It is very difficult to placing plastic ball in middle of the beam. In framing construction middle of beam, make hollow pipe. And then placing the concrete and plastic balls are placing in middle through the help of pipe. Therefore pipe are slowly slide & balls are pushed in middle of the beams

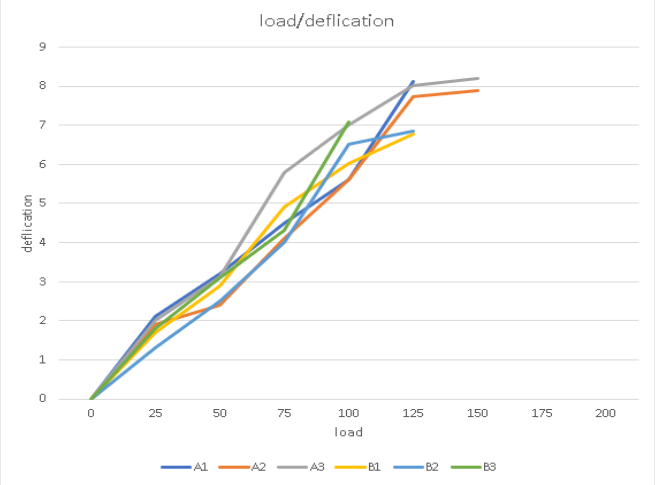
Results and Discussion:-Setup actual and modal experiment in laboratory. The Beams are simply supported. Put the beam in utm and setup the experiment by two steel Rollers . universal testing machine is started and load is slowly increased and note down all the load / deflection of the beam. In this experiment 6 beams were tested and get result , three bubbles (conventional) and three with bubbles

Table Bubble beam and conventional beam Samples

S.no	Specimen name	length (mm)	c/s of Beam	Bubble diameter (mm)	Average Weight (kg)
1	Conventional beam A1,A2, A3	700mm	150×150		40.27
2	Bubble beam B1, B2, B3	700mm	150×150	25mm	32.63

The conventional beam carried a average load of 127.3 KN and cause 8.07 mm deflection. Whereas bobbled beam carries a average load of 105KN and 6.91mm deflection.

Limitations-



Beam type	Load (KN)	Displacement (mm)	Failure
A_1	122		Shear
A_2	132	7.89	Shear
A_3	128	8.20	Shear
B_1	112	6.78	Shear
B_2	106	6.86	Shear
B_3	97	7.09	Shear

It is not use in vibration like structure because plastic ball is compressed and gap is crated which is a long time after water as moisture enter and start corrosion in inner part of structure

In beam, Shear stress is maximum in neutral axis but in general case neutral axis are exist in middle of the cross section Hence it is not possible to use vibration use structure as beam in road pool and mechanical machine .It is not use in high temperature resisting building as like brick kilns and cement manufacturing ball mill as so many structure

where temperature is higher than normal room temperature or less than 27° C .Punching shear capacity is small. Skilled labour is required. Not applicable to beam having small depth

CONCLUSIONS

Concrete usage is to save approse 4 kg of waste plastic replaces 100 kg of concrete .and hence save our cost and concrete as cement which reduce global co2 emission. This technology is environmentally green and sustainable. It reduce the dead weight up to 20 to 25 %. Bubble Deck configuration gives much improved capacity, stiffness and bending moment capacity of beam. when the same amount of concrete and the same steel is used as in the solid beam . By using the hollow balls, the load bearing capacity in Bubble beam can be achieved approximately same or slit less than as fully concrete beam but cost and environmental prospective better . Thus, the Bubble beam technology is more productive and workable than conventional beam construction techniques.

REFERANSES

1. Aziz Z. A.; Heng C. L. (2021). Bubble Deck Slab System: A Review on the Design and Performance

2.Gajewski, T.; Staszak, N.; Garbowski, T. (2023). Optimal Design of Bubble Deck Concrete Slabs: Serviceability Limit State. Materials.

3. Lalit B. (2020). Comparative Analysis of Flat Slabs & Conventional RC Slabs with and without Shear Wal

4. Garg1 A., Goyal1 A., Tushar1 P, Jangid1 C., Mohit1, Hussain2 A. (2019). Bubble Deck Slab Construction and its Applications.

.

5. Bjornson, Gubmundur. "Bubble Deck: Two-Way Hollow Deck"; 2006

6. Lait T. (2010). Structural Behavior of Bubble Deck* Slabs And Their Application to Lightweight Bridge Decks

7. Lakshmipriya[1] N., and Karthikpandi[2] M. (2018). Study and Model making of Slab using Bubble Deck Technology.

8.STRUCTURAL OPTIMISATION IN BUILDING DESIGN PRACTICE: CASE-STUDIES IN TOPOLOGY OPTIMISATION OF BRACING SYSTEMS

9. “Bubble Deck Engineering Design & Properties Overview”. Bubble Deck Voided Flat Slab Solutions- Technical Manual and Documents (2007).

10. Lalit B. (2020). Comparative Analysis of Flat Slabs & Conventional RC Slabs with and without Shear Wall.

11. A study on behavior of bubble deck slab using ansys Rinku John1 , Jobil Varghese2 1 Student, Department of civil Engineering, MBITS 2 Assistant Professor, Department of Civil Engineering, MBITS

12. Mohan A. and Sukumaran A. (2018) Performance Analysis of Bubble Deck Slab Using Elliptical Balls, International Journal

of Engineering Research & Technology (ijert), (Volume 6 – Issue 06).

13. Garg1 A., Goyal1 A., Tushar1 P, Jangid1 C., Mohit1, Hussain2 A. (2019). Bubble Deck Slab Construction and its Applications.

14. EXPERIMENTAL INVESTIGATION: BUBBLED BEAM 1Prof. Shraddha Asalkar, 2Mr. Laxmankumar Solanki, 3Mr. Shubham Jaiswal 1Assistant Professor, 2Student, 3Student 1Civil Engineering Department, 1,2,3Dr. D. Y. Patil Institute of Technology, Pimpri,Pune,

15. Bubble Deck Slab Construction and it's Applications Archit Garg1, Ankur Goyal1, Tushar Prince1, Chetan Jangid1, Mohit1, Athar Hussain COMPARATIVE

16.ANALYSIS OF THE BUBBLE DECK SLAB AND CONVENTIONAL SLAB Anthony Obododike Ekwuno Managing Director Tobeko Consulting Engineers Pty Ltd, Gauteng, South Afric