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# Study the Economy of Bubble Deck Slab by Using a Polypropylene Ball

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***Abstract – Now a day economy is very important in construction industry. Reinforced concrete slab is familiar construction part use in modern building construction. Concrete is commonly use in all construction industry, concrete play and important role in construction industry. The quantity of concrete require in construction of floor system is more, its affect the economy of structure. Bubble deck slab system is best solution of this problem. Polypropylene ball is manufactured by using a plastic waste material. This polypropylene ball is used in the center part of slab it helps to reduce quantity of concrete. [2] Some amount of concrete is replaced polypropylene ball. Bubble deck slab is light in weight it also help to reduce the dead Load of slab and increasing efficiency.***

***Keywords: Bubble Deck, Polypropylene Ball, Dead Load, Plastic Waste, Economy.***

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## I. INTRODUCTION

New progressive method of bubble deck slab is first promoted in Europe and it is popular in world. Concrete play and important character in construction industry .In a construction of reinforced concrete slab the quantity of concrete required is more the method of replacing concrete by recycle ball with less amount of concretes known as bubble deck technology [Mr. Devyanshu Jain, Miss. Nidhi Gupta 2017].By using a polypropylene ball in floor system some amount of concrete is reduce, slab is light in weight then the load transfer to the column, wall and foundation is less. Also reduce the load on entire structure. Slab is light in weight then the number of column required in construction is also less. Beam is not necessary in bubble deck slab floor system. It helps to reduce the cost of structure. Polypropylene ball is manufactured by using a plastic waste. This polypropylene ball is used even structure is demolished and renovated in feature, bubble deck floor system the quantity of concrete required is less as compare to reinforced concrete slab. It also contributes less $co_2$ in atmosphere in manufacturing process of cement. $Co_2$ is produced during the manufacturing of cement is also reduce.

## II. MATERIAL

- ***Polypropylene ball –*** polypropylene ball is manufactured by using a plastic waste. It also helps to reduce the wastage of plastic. Polypropylene ball is not response chemically with concrete and reinforcement bar, polypropylene ball have sufficient strength and stiffness to support the applied load in phase before and during concrete pouring.[ Sameer Ali, M., Manoj Kumar 2017] Size of plastic ball is 100mm dia.[ Sameer Ali, M., Manoj Kumar 2017]

- ***Concrete-*** self compacting concrete is use in bubble deck floor system .self-compacting concrete is spared easily without need of mechanical vibrator. Min grade of concrete use in a bubble deck slab is not less than m30. Depth of slab is 150mm.[ Sameer Ali, M., Manoj Kumar 2017]

- ***Reinforcement-***high grade steel of fe550 and fe500 is use in floor system. Top and bottom part of floor system use same grade steel. Reinforcement provide in both direction (traverse and longitudinal) in the form of mesh [Sameer Ali, M., Manoj Kumar 2017]

## III. LITERATURE REVIEW:

**1. Structural behavior of bubble deck slab and it application (2016):**

NEERAJ TIWARI, SANA ZAFAR have studied the bubble deck is more useful and efficient than conventional slab. Volume of concrete in bubble deck slab is less. The internal force and maximum strength in bubble deck were 40% lesser than solid slab due to reduced dead weight by use of HDPE sphere. Bubble deck is not succeful in pedestrian deck.

**2. Review on bubble deck with spherical hallow ball (2017):**

RITTK BHAWMIK, SAURISH MUKHERJI, APARNA DAS have studied theimportance of bubble deck slab against conventional slab. This paper summarized that 1kg of recycle plastic is replace 100kg of concrete it is therefore envirmental friendly, overall result the significance of cost saving is 2.5% to 10%.By using less concrete designer can save unto 40% of embodied carbon in slab . In this paper conclude that the.

Every 5000m2 bubble deck slab the owner saves.

1000m3 of on-site concrete.

166 concrete trip.

278tonne of co2 emulsions.

1798 tonne of foundation load.

**3. Voided slab design (2015):**

ASHISH KUMAR DWIVEDI has studied and provethat the voided slab is more efficient than traditional slab. Plastic voided slab system provide excellent alternative to solid concrete slab.Weight and cost saving as well as architectural flexibility can achieve with plastic voided slab.

**4. Numerical and experiment study on bubble deck slab (2016):**

M. SURENDAR, M. RANJITHAM have studied the load carrying capacity of bubble deck slab .Numerical and experimental result shows that bubble deck slab can withstand 75% of load carrying capacity when compare to conventional slab. Result compared with analytical result is better economical construction of slab in day to day life. From result 45.238kg of concrete can eliminate from 1000mmx1000mmx150mm of slab by using 100mm ball which result reduce in weight of slab.

**5. Experimental study on two way bubble deck slab with spherical hallow ball (2017):**

BHAGYASHRI G BADHE, S.M . BARELIKAR – presented the paper by trying different arrangement in placing polypropylene ball. That experiment found that bubble deck reduces the volume ofconcrete so weight of slab decreases. Arrangement of bubble is effect on load carrying capacity of the slab. Alternative arrangement of bubble is increase the load carrying capacity than conventional slab.

## IV. SCOPE OF BUBBLE DECK TECHNOLOGY USED IN FUTURE

1. Bubble deck technology used all type of building slab. Bubble deck slab is light in weight then it is especially use in sky scraper.

2. Bubble deck slab is light in weight then the load transfer to the column is less. The number of column required is less .It is use in parking area where the number of column required is less.

## V. ADVANTAGES OF BUUBLE DECK SLAB.

**1. ECONOMIC SAVING-**

- Some amount of concrete is replaced by polypropylene ball .amount of concrete required is less it help to reduce the cost of construction.
- Transportation cost is also reduces

**2. WEIGHT REDUCTION-**

- Bubble deck slab the amount of concrete required is less then dead load of slab is also reduces.
- Load transfer to the column, wall and foundation is less. The building foundation can be design for smaller dead load.
- No need of beam.
- Number of column required is less.

**3. GREEN DESIGN-**

- Polypropylene ball is manufactured by using Recycled plastic waste it helps to solve the disposal problem of plastic waste.

- 1kg of plastic is replaced 100kg concrete[Rittik Bhowmik, Sourish Mukhrrjee, Aparna Das 2017]
- Less emission- exhausts gases from production and transport specially $co_2$

## VI. LIMITATION

- Skill labour is required.
- Bubble deck slab technology is Not applicable where the thickness of slab is limited
- Punching share capacity is low

## VII. CONCLUSION

After having a view on all the literatures over Bubble deck slab we can conclude that

- Concrete required for bubble deck slab is less as compare to reinforced concrete slab. Weight of bubble deck slab is less as compare to reinforced concrete slab.
- Bubble in slab is light in weight then the load transfer to column wall and foundation is less .building foundation design for smaller dead load
- Overall construction cost is reduced by using bubble deck slab technology.
- We can also conclude that bubble deck slab is more beneficial and economical as compare to reinforced concrete slab.

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