

# A Review on Bubble Deck Slab to Remove the Unused Concrete

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**Abstract**— The main problem in the traditional slab is that portion or amount of the concrete in the tension side of the slab is left unused and don't have any part in providing strength to the slab. So, the main aim of the "Bubble Deck Slab" is to remove the unused concrete and to lower the dead load of the have and it have many advantages.

## I. INTRODUCTION

A bubble deck slab is based on new patented technique and developed in Europe. Bubble deck is a revolutionary biaxial concrete floor system method. In this method replace in High-density polyethylene hollow spheres the ineffective concrete in the center of the slab, thus decreasing the dead weight and increasing the efficiency of the floor and plastic spheres eliminate 35% of a slabs self-weight.

These biaxial slabs have many advantages over a conventional solid concrete slab removing constraints of high dead loads, reduced material use, enhanced structural efficiency, decreased construction time, reduced total project costs by 3% and is a green technology and pre cast slab floor.

## II. MAIN PRINCIPAL

In this method are new innovative and sustainable method, Result of Bubble deck slab floor can provided the required load bearing capacity and saving 40 to 50 percent consumption in the floor construction. In this technology uses plastic spheres and the spheres are made of recycled industrial plastic to create air voids while providing strength through arch action.

Bubble deck slab technique is allows the hollow slab to act as a normal monolithic two-way spanning concrete slab.



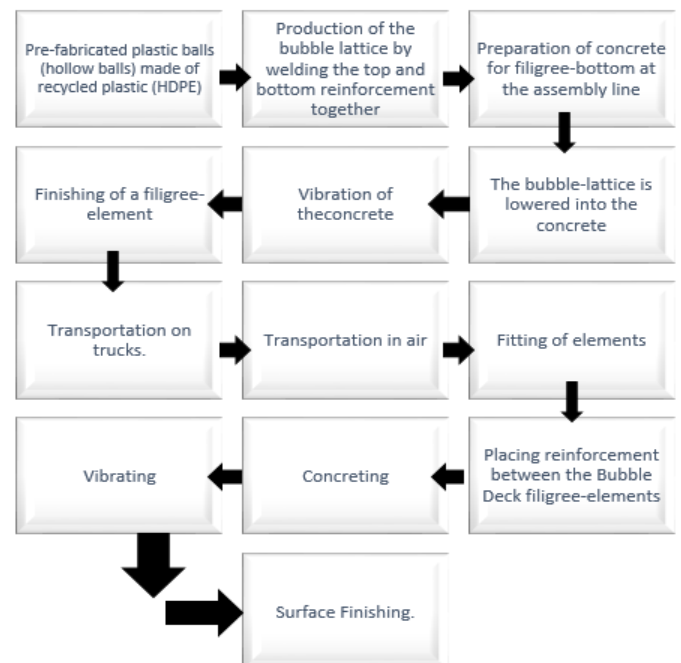
## III. MATERIAL USED

Main materials is composed in bubble Deck are steel, concrete & plastic spheres

S no	Material name	Type of Materials
1	Steel - Fy60 Higher intensity	Steel is construct in two forms -meshed layers for lateral bear all and straight-sided shape. girders for having an alignment bear all of the bubbles
2	Plastic Spheres -HDPF	high-density polyethylene recycled for hollow spheres
3	Concrete (CSA)	standard Portland cement maximum aggregate size of 3/4No plasticizers are necessary for the concrete mixture

## IV. PRODUCTION

Bubble Deck Slab production steps are as –



### BUBBLE DECK SLAB V/S SOLID SLAB

Percentage of Solid slab	Strength	Bending Stiffness	concrete volume
Strength	100	105	150
Bending Stiffness	87	100	300
Volume of Concrete	66	69	100

### Slab Thickness According to Bubble Diameter and Spacing

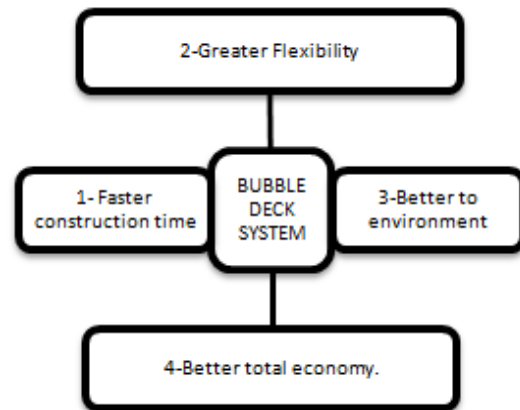
BD VERSION	BUBBLE DIAMETER	THICKNESS Min.	SPACING Min c/c
230	180 mm	230 mm	200 mm
280	225 mm	280 mm	250 mm
340	270 mm	340 mm	300 mm
390	315 mm	390 mm	350 mm
450	360 mm	450 mm	400 mm
510	405 mm	510 mm	450 mm
600	450 mm	600 mm	500 mm

### V. TECHNICAL CERTIFICATIONS

Technical certification Certified by several European authorities Bubble Deck slab are as:-

- The Netherlands- In 2001, Bubble Deck was incorporated into the Dutch standards NEN 6720 by the Civieltechnisch Centrum Uitvoering Research en Regelgeving(CUR) Committee 86. Bubble Deck also received the KOMO Certificate K22722/01 in 2002 from Kiwa N.V., an official European Organization for Technical Approvals (EOTA) member.
- United Kingdom- The system was approved by the Concrete Research & Innovation Centre (CRIC) in 1997 for inclusion in the BS81 10 as a normal biaxial, flat slab supported by columns.
- Denmark- In 1996, the Directorate of Building and Housing from the Municipality of Copenhagen stated that
- Bubble Deck could be designed according to the existing principles and standards.
- Germany- The Detaches Institute fur Bautechnik acknowledged that the new system could be designed with the existing technical methods and codes, and was approved in the DIN 1045 (Bubble Deck Engineering Design & Properties Overview).

### VI. KEY BENEFITS



### VII. ADVANTAGES IN DESIGN

- Dead weight reduced (Up to 35% allowing smaller Foundation).
- Relative strength increased
- Columns span larger than up to 50% for traditional slabs
- Columns quantity are less.
- Under the ceiling have no capital no beams or ribs
- Eliminated Load bearing of walls.

### VIII. ADVANTAGES TO ENVIRONMENT

- Material Consumption less: - cement, aggregate, water, steel Replaces Plastic to Concrete -1 kg = 100 kg up to.
- Less energy consumption: - in production, transport and carrying out.
- Savings in CO2 emission up to 8% (less emission required).
- No horizontal scaffoldings is needed for semi precast.
- Components can be easily recycled – balls stay intact.

### IX. ADVANTAGES TO ECONOMY

- Materials can be substantial and saving for economically.
- Reduced Transportation cost, truck trips and more transport facility
- Reduction in erection cycle up to 20-40%. (Faster Construction time)
- Installation work is simplified.
- Flexible and lightweight construction & building work for Economy
- Buildings can be made more changes are less costly
- Longer Lifespan of buildings are and easier change of use.
- Bubble deck slabs are fire proof and safety for earthquake benefitted for weight reduction.

### X. CONCLUSION

The conclude of the bubble deck slab is the portion of the concrete that is left unused in the tension side of the slab is getting replaced by the High Density Poly ethylene (HDPE) this balls can be made of the recycled plastics. There are a lot of advantages of the “Bubble Deck Slab” and they are a traditional slab system such as reduction in the dead load, many improvement in the overall economy and more strength parameters of the slab.

#### **XI. ACKNOWLEDGEMENT**

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#### **REFERENCES**

1. [www.treehugger.com](http://www.treehugger.com)
2. [www.bubbledeck.com](http://www.bubbledeck.com)
3. [www.bbdna.com](http://www.bbdna.com)