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Geotechnical Analysis of Bubble Deck Slab

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Editorial

In the civil engineering industry, particularly in earthquake-affected buildings and tall buildings, decreasing the overall self-weight of the structure is regarded a main objective and significant difficulty. To achieve this purpose, various approaches were used, one of which was to place voids in particular locations throughout the construction, similar to a voided slab or a Bubble Deck slab. The primary goal of this study is to investigate the structural behaviour of Bubble Deck reinforced concrete slabs when subjected to a uniformly distributed static load.

In its simplest form, a slab is a horizontal flat plate with parallel top and bottom sides. Reinforced concrete beams (often cast monolithically with slabs), reinforced concrete walls, masonry walls, structural steel components, directly by columns, or continuously by ground are all examples of slab supporting systems. Bubble Deck slab construction technique is presently used in a variety of industrial projects. Many countries, including Malaysia, have adopted this strategy. There were few implementation difficulties identified, and the majority of respondents were enthusiastic about using this technology. To reduce the void in this Voided Slab (Bubble Deck) technology, recycled plastic hollow balls are used.

The basic principle is that hollow plastic spheres are incorporated into the floor and clamped in a factory-made reinforcement structure to virtually eliminate all concrete from the middle of a floor slab that isn't performing any structural function, resulting in dramatic structural weight reduction.

Kinds of bubble deck slab

Filigree elements (Type A): Bubble deck Type A will be a blend of developed and unconstructed components. A 60 mm thick substantial layer and a piece of the completed profundity are precast and welcomed nearby with the air pockets and steel support unattached. The bubbles are then held in place by interconnected steel mesh and supported by temporary stands on top of the precast layer. This sort of bubble deck is ideal for new construction projects where the bubble placements and steel mesh pattern can be determined by the designer.

Reinforcement modules (Type B): The deck of bubbles Type B is a steel mesh reinforcement module with plastic bubbles that is pre-assembled. These components are delivered to the job site, laid out on typical formwork, joined to any additional reinforcement, and then concreted in place using traditional techniques. Because these modules may be stacked on top of one another for storage until needed, this kind of Bubble Deck is ideal for construction sites with limited space.

Planks that have been finished (Type C): The deck of bubbles Type C is a shop-fabricated module that comes complete with plastic spheres, reinforcement mesh, and concrete. The plank-shaped module is made to the final depth and supplied on-site. It is a one-way spanning design that needs the use of support beams or load-bearing walls, unlike Type A and B. Shorter spans and a tight construction timetable are ideal for this type of Bubble Deck.

Configuration of bubble deck slab

1. The overall floor area is broken down into a succession of carefully prepared component sections that can be up to 3 metres wide depending on site access.
2. The top and bottom reinforcement meshes, which are sized to suit the project, are connected together with vertical lattice girders, with the void formers trapped between the top and bottom mesh reinforcement to establish their ideal position, resulting in a bubble-reinforcement sandwich.
3. To provide permanent formwork within part of the entire final slab depth, the bottom layer of 60 mm pre-cast concrete is cast, encasing the bottom mesh reinforcement.
4. Individual parts are then ‘stitched' together on-site, with loose reinforcement merely put across the joints between them.
5. Concrete is poured and hardened after the site is finished.
6. This technique creates a seamless biaxial floor slab by providing structural continuity across the whole floor slab the joints between sections are thus redundant without having any structural effect.

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