



Comparison between Conventional Flat Slab and Voided Slab with U Boot Beton Technology

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Abstract: ¹The flat plate slab is gaining popularity among architects. The flat plate slab provides a way for architect to achieve completely flat ceiling with no beam protrusion. There is also improvement in the construction speed and cost savings from using this system which requires only simple formwork. But when load acting on the slab is large or clear span between columns is more so it is required to increase the slab thickness; hence the self-weight of slab is increased due to increased volume of slab and also more amount of steel is required to resist this increased weight of slab. ²This paper deals with voided slabs using U-boot beton technology made by recycled polypropylene. The technology is designs for light weight slabs in RCC. It is solution to build slabs of large spans with more bearing capacity.

Key words: U Boot Beton, Flat Slab, Voided Slab, Design of slab, Weight Reduction.

I. Introduction:

A voided slab is a concept that simply removes the excess concrete from the expensive part of the structure slab. This research paper gives the comparison between conventional slab and voided slab system with u boot beton technology. The slab is load carrying structural member in building consuming concrete. The slab thickness is increasing if span and acting loads are increases. In present study attempt is made by inserting u boot beton at middle portion of slab and reduced volume of concrete which will reduce weight of concrete directly. The comparative study is performed between analysis of voided and conventional slab system. This system shows that dead load of structure is reduced without any major effect on load carrying capacity of slab. ³U-boot is used for structural elements of different types such as slabs or foundation. U-Boot Beton is a recycled polypropylene formwork that was designed to create two-way voided slabs and rafts. It is used to create slabs with large span or that are able to support large loads without beams.



Figure:1 U-boot beton box

II. Parts of U-Boot:

A. Spacer Joint:

Spacer joint is used to join two/more U-boot betons while fixing on the shuttering so that there cannot be any change in the distance between gaps while pouring concrete.

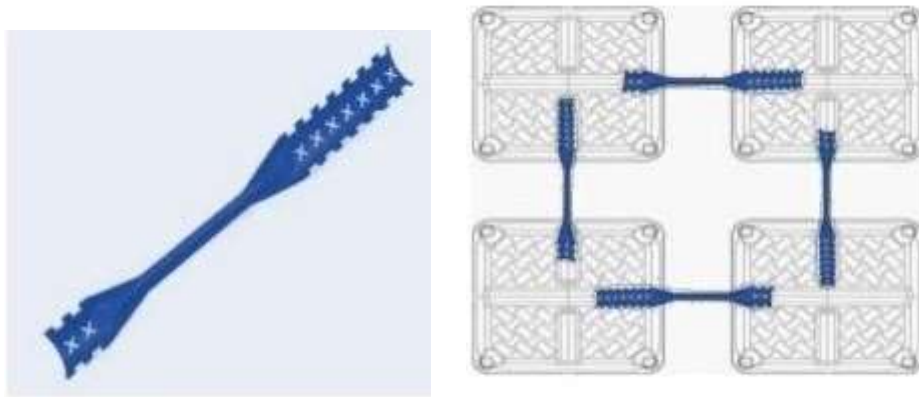


Figure:2 Spacer Joint

B. Connection Bridge:

The connection bridge is necessary in order to join two U boot betons longitudinally, wherever the length of the beton needed to be increased.



Figure:3 Connection Bridge:

C. Closing plate:

Closing plate is used to close the U-boot beton box, which can resist the flow of concrete into box. The closing plate and its quality plays a major role, so it cause problems if concrete tends to move into beton from damaged plate after concrete is placed.



Figure4: Closing plate

III. Experimentation:

i. Methodology

Design the conventional slab normally M25 grade of concrete and design the reinforcement according to IS code 456-2000 and analysis it.

In the U-BOOT slab firstly prepare the design of U-BOOT slab.

After designing U-BOOT slab, design the different arrangement of the U-BOOT.

Compare the result of conventional and U-BOOT slab.

Conclusion by deciding best feature of slab between both conventional slab and voided slab by U-BOOT BETON technology.

ii. Design Procedure

Design of Traditional Flat Slab

Size of panel=9X8 Live load

=1.5kN/m Floor finish=1 KN/m

Grade of concrete=M25 Grade of

steel=fe500

Size of column =400X400

Floor to floor height of column=3.5m D=285mm

d=260mm

Design of Flat Slab by Using Plastic Voids

Size of panel=9m X 8m Live Load

=1.5 KN-m Floor Finish

=1 KN/m Grade of steel=Fe500 Grade

of concrete=M25

Size of column =400X400 mm

Floor to Floor height of column=3.5 m Provide D=285 mm

Effective depth= 240mm



IV. Results

Sr.no.	Parameter	Flat slab	Voided slab	% Reduction
1.	Dead load	7.12 KN/m	6 KN/m	8.53%
2.	Effective Depth	260mm	240mm	8.57%
3.	Moment at mid span	590.67 KN-m	471 KN-m	11.27% %
4.	Moment at column strip	114.78 KN-m	99.38 KN-m	7.19%
5.	Ast at mid span	837.76m ²	314.93 m ²	45.35%
6.	Ast at column strip	1110.16m ²	1043.05m ²	3.11%

Cost comparison

1. For Flat Slab

Sr.No.	Parameters	Quantity	Rate	Amount
1.	Cement	7.9 cu. m	280/bag	62440/-
2.	F.A.	7.9 cu.m	4000/brass	12000/-
3.	C.A	15.8cu.m	2200/brass	13200/-
4.	Ast	-	-	-

2. For voided slab

Sr.No.	Parameters	Quantity	Rate	Amount
1.	Cement	6.64cu.m	280/bag	52640/-
2.	F.A.	6.64 cu.m	4000/brass	10000/-
3.	C.A.	13.29 cu.m	2200/brass	11000/-
4	Ast	-	-	-
5.	U boot beton	120 No's	7/-	840/-

V. CONCLUSIONS

1. By removing the unnecessary concrete and reducing self-weight of slab, the longer spans can be achieved in voided slab system.
2. The ability of voided slabs to achieve longer spans leads to more beneficial open space and allows us for more design flexibility as fewer columns are required.
3. Lighter Floor Slabs means smaller columns and less reinforcing steel, Smaller columns can also lead to large reduction in overall amount of concrete and steel used in building, consequently allowing for larger savings in structural costs of the building.
4. Reducing weight of slabs can lead to a large reduction in overall seismic force, as weight is a leading factor in determining the seismic force.
5. U-Boot Beton is made up of recycled polypropylene and also its ability to save material allows building to have smaller impact on the environment, all these aspects lead to a high degree of sustainability and an environment friendly design.

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