



The light weight floor slab system

In many cities as well as small towns the living space has to be expanded vertically and multi-storey houses are becoming standard. However, one of the most difficult problems is to find a ceiling slab that is affordable and easy to build. Timber ceilings have become expensive in most places and they do transmit a lot of sounds unless they are very well done. Concrete slabs are complicated, slow to build and expensive. Existing systems of “beams and filling elements” tend to be in the hands of big industry and in most cases are not easily available.

Thus, several members of EcoSouth have put their minds toward creating an easier and less expensive system. We would like to present to our public some of the solutions developed and put in practice.

CECAT in Cuba developed a modular system that provides a concrete slab, based on beams and vaults between them. As the beams are poured on site, together with the concrete that forms the vaults, the result is a slab that acts monolithically, which is an important safety factor in earthquakes.

What is the difference to other systems?

This system actually saves on steel and on concrete in relation to all other systems that we know. As the total height of the slab is high (typically 18 to 20cm), a relatively small amount of steel is needed, but at the same time the vaults reduce the mass and weight and therefore save on concrete. The final appearance of the ceiling from underneath is very good, and in first

commercial applications in Nicaragua and the Dominican Republic simple painting rendered an attractive look.



The view from inside with painted vaults

The forms for the vaults are of micro concrete produced on a “tevi” vibrating table as used for the production of tiles. They should be about 12 to 14mm thick and are placed on a mould that gives them the ideal curvature. Several experiments were made and it was found advisable to use those forms as lost casing and not demould them from the slab, as they guarantee a smooth ceiling surface. At the beginning the builders found it relatively cumbersome to place formworks for the beams and then the vault forms on top, but after some initial training they mastered the technology and became proficient. However, Grupo Sofonias Nicaragua introduced the partial prefabrication of the beams. The beams are prepared on the construction site and then placed on the walls. Of course they need to be supported until the concrete has hardened. Now the installation becomes much more efficient and easier to manage.





Simple support structure saves cost

The cost advantage

A major cost in concrete ceiling slabs is the casing. Well qualified workmanship is needed and combined with the cost of timber makes for a high price to start with. The timber has to stay in place for a long time, if taken away at an early stage the slab will creep.

Optimization of concrete slabs is tricky. If you make them thin, you save on concrete, but need extra steel. If you make them thick you save on steel but need more concrete.

The base of this system is to combine both, have high beam elements that save on steel and combine it with elegant vaults that reduce the amount of concrete. Only minimal support is needed for the beams until the concrete has hardened, and while good workmanship still is mandatory, the time to prepare the casing is shorter.



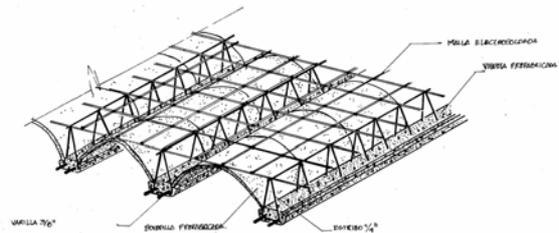
Start to pour the concrete.....

Limits of application

The present system is mainly suited for small rooms as they occur in houses, hotels and many other buildings. The beams are calculated and tested for spans up to 4 meters in domestic use (workload of 200 Kg per m²), if the span is larger or the workload higher (like for instance in libraries or restaurants) the steel reinforcement of the beams has to be recalculated and probably raised.

Ceiling slabs are always a case for good workmen. The beams have to be levelled carefully and sufficient well aligned support poles placed underneath. The placing of the micro concrete vaults is simple; however care has to be taken to leave a smooth and level surface underneath. If this is done, the ceiling does not have to be plastered, the joints can be filled with putty and a coat of texturized paint will make for a good appearance.

The vaults have to be covered with 4 cm of structural concrete and it is recommended to place the flooring on a thin bed of sand, in order to minimize the walking noise from passing from the upper floor to the lower one.



Floor slab system produced by SME ?

This system has been conceived specifically for production in small workshops. The vaults are using the micro concrete technology and are vibrated on the same table as the roofing tiles, then they are placed on special moulds. The beams are produced in standard sizes, but they can also be made to the exact dimensions of the rooms to be covered. All elements are manipulated by hand, none of them weighs more than what two people can easily carry.

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