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A concrete technology

Using factory-made slabs for roofs is economical



EFFICIENT: Hollow core concrete slabs being used in a building

- A hollow core slab has high load capacity without as many supports or girders.
- It has excellent fire resistance.
- Panels can be painted, eliminating the need for ceiling treatments.
- It offers superior sound and thermal insulation.
- It is cost-effective, resists moisture and humidity and reduces building height.

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In the world of concrete, hollow core systems that have been around for about 25 years in different countries have arrived here, thanks to the boom in the construction industry.

John Durham, Technical Director of Hollow Core Systems (India) Private Limited and TermoDeck International Limited, made a presentation on an energy-efficient system promoted by the company, at the recent national convention of the Builders Association of India in Kochi.

The concrete slabs in the required specifications are set in the factory and brought to the site of construction. Fixing of the slab requires just about four workers, said Mr. Durham. A 500 sq. ft. floor can be fixed in a matter of hours. A bigger area may take a day. The traditional process of laying a roof takes days for the arrangements and at least 10 days for the wet concrete to set in. But with hollow core slabs it can be finished in just about a day.

Weight reduction

The system is environment-friendly as it totally eliminates the need for bamboo props that are

required to give support to concrete laying by the traditional method, said Mr. Durham. The high-technology method of making the hollow core slabs reduces the weight of the concrete by 60 per cent. Water content in the concrete is reduced by 70 per cent and the span of the concrete is big.

The casting bed is 1.20-1.40 metres wide, and standard thickness, between 15 cm and 50 cm. No plastering is required on the slabs because of the fine finish. It can straightaway take a coat of paint.

The slabs have tubular holes — cores — running through their length. The slabs take their name from this hollowness inside and the main purpose of the hollow core is to decrease the weight. The materials used are comparatively much less, though there is no compromise on strength. The slabs are made on steel strands running longitudinally.

The concrete beams between the holes carry the steel rods that provide the compressive stress that holds the slab together under heavy loads. The slabs are made according to a project's requirements. The pre-cast slabs can be cut according to the client's requirements too.

Energy efficient

The hollow core slabs are made energy-efficient by using the TermoDeck technology. This has been used in many buildings, especially in Europe and now in West Asia, especially in Saudi Arabia and Dubai. It reduces the energy use for heating or cooling of buildings.

Experts give the example of the Elisabeth Fry Building, University of Anglia Norwich, England as a most energy efficient building, which uses hollow core slabs and Termodeck technology.

The TermoDeck system is a fan-assisted heating or cooling system that uses the high thermal mass of hollow core slabs through which warmed or cooled air is distributed.

It takes advantage of the free thermal storage capacity, which exists in the concrete hollow core floors and supporting structure of the building, said Mr. Durham.

Low intensity energy inputs intermittently applied over 24 hour cycles maintains the concrete at the correct temperature, giving much lower overall energy requirements for the building, when compared to conventional high voltage air conditioning. The company adopted this solution, which integrates conventional air conditioning systems with the building structure, to provide a high quality air-conditioned environment at substantially reduced costs, said Mr. Durham. Many buildings in West Asia have used this system to suit their environmental conditions.

The concept is that the building mass, built using hollow core, is used as an energy store which dampens the effect of fluctuations of temperature outside, resulting in reduced energy needs for heating or cooling the air and for moving it round the building.

The air passes through the hollow cores. The long contact between the air and the slabs helps the slabs either take in the hot or cold air that is allowed to pass through the system. The slabs then release the energy absorbed from the air into the rooms.

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