

Resource efficiency in concrete frame structures

Resource efficient “cleantech” solutions are required and nowadays available even in traditional fields such as concrete frame structures. The Cobiax void former technology offers an interesting contribution from a technical, ecological as well as from the economical perspective.

Application example: NUI Galway new Engineering Building

Founded in 1845 the National University of Ireland, Galway is now a thriving institution with over 16'000 students, including students from over 40 countries and has a distinguished reputation for teaching and research excellence in the fields of arts, social science, Celtic studies, business, public policy and law, engineering and informatics, medicine, nursing and health sciences, and science.



The 14'200 m² new Engineering Building designed by RMJM and Taylor Architects and the structural engineer Arup Consulting Dublin, will accommodate the College of Engineering and Informatics, housing 110 staff and approximately 1'100 students. It will include green-building initiatives, and

with its exposed construction design will itself be used as a teaching tool for the students.

High-tech renewable energy systems, environmentally-friendly heat generation using carbon-neutral biomass, rainwater recycling, ground-source heat pump and low-embodied energy construction materials wherever possible will underpin the building's green credentials and provide working examples for engineering students to study. The building has been conceived as a pavilion in a park, referring the University's original quadrangle building, built in local limestone in a Tudor Gothic architecture style, which is a replica of Christ Church at the University of Oxford.

Cobiax project features

Among the low-embodied energy construction materials the Cobiax void former slabs contribute to an optimized use of concrete and reinforcement steel. The Cobiax slabs are executed as semi pre-cast elements thus eliminating the need for formwork and allowing an increased construction speed for the General Contractor BAM. Furthermore, the pre-cast option allows a better control on the visual quality of the slab's soffit. The Cobiax void formers are directly placed into the semi pre-cast elements during fabrication by Oran Pre-Cast in the plant located nearby the project site.



The presence of the void formers does not only allow to optimize the usage of building materials furthermore the incurred dead-load reduction allows a better vibration control which was a critical element for this building. In addition the dead-load reduction allows optimizing the size of the vertical elements and the foundation. The following remarkable key facts were achieved within this project realization:

- 14,200m² of total slab surface
- spans up to 13m
- 280 to 510mm Cobiax flat slab
- a dead-load reduction of 2,500t
- concrete savings of 1,000m³
- a 210t reduction in CO₂ emissions



Architecture and Engineering

Mainly all slab soffits are exposed to make use of the thermal mass of concrete. For that reason the architects demanded maximum tolerance of 5 mm and a smooth surface for the pre-cast elements. The location and shape of panel joints were predetermined.

The south wing of the building impresses with a large glass front and an amazing 7.5 m long cantilevering corner rising highly up into the sky. It looks as light as a feather with its three floors resting only on slender steel columns at 10 m above ground level. This challenging architecture required both light and strong structure. The

ideal solution was found in using a composite steel frame in combination with voided concrete slabs.



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