

Seismic II – Platform-based approach for construction

Challenge

The objective for Seismic I was to develop a platform-based approach for construction projects that used the latest in digital and manufacturing technologies. Its purpose was to deliver higher performing and better-quality buildings that could be mass produced and delivered within shorter timescales. In education this was seen as a key driver, with construction activity required to work around school holiday periods and an imperative to improve and expand existing stock.

Following the successful first phase, the Seismic II project was developed by a consortium comprising consultancy blacc, offsite manufacturers Algeco, McAvoy, Tata Steel, the Manufacturing Technology Centre (MTC), the National Composite Centre (NCC) and Specific (part of Swansea University). The aim was to develop core components that could be used with the original Seismic frame – wall, flooring, ceiling and roof elements – thereby offering a full solution for clients across a range of sectors.



Seismic demonstrator building



Consortium led project

Sustainable solution

The National Composites Centre researched the best materials for the platform, focusing on new, innovative composites to support offsite construction. This included investigating alternative materials to reduce the part count to add further efficiency during construction.

One output was the design and manufacture of a window shroud, which improved thermal performance. Three simplified shrouds were manufactured and mounted on the ground floor windows of the demonstrator building with the following benefits:

- Shrouds displayed the design simplicity and flexibility possible using composites
- The shrouds saved time in both detail design work and assembly – showing benefits of part consolidation.



Manufacturer: Creative Composites



Three simple shrouds manufactured for the demonstrator building

This supported work by Specific to assess Seismic's carbon impacts in design, materials, manufacturing, component performance and logistics. This found that Seismic was 70% lower in operational and embodied carbon when compared with traditional construction through design efficiency, material selection and manufacturing effectiveness.

A standard Seismic module comprises 581.3 kgCO₂e per m², well below Construction 2025's target of 1,300 kgCO₂e per m². And, because Seismic can be reused, either by relocating modules to other sites or by refurbishing individual components and cassettes, it adds a 234 kgCO₂e per m² clawback.

This brings the platform well beyond the lowest stretch targets being discussed in construction today.

Because most work takes place offsite, there is also improved health and safety, with tasks such as working at height, heavy lifting and hot works no longer required.

Proof of Concept

A demonstrator building at the BRE Innovation Park combines components from all three manufacturers in one (Algeco, McAvoy and Tata Steel), and merges two interoperable Seismic platform systems. While a normal project would not usually be delivered in this way, it proves that the concept works; everything was produced in different locations before being seamlessly combined on site.

This is innovative in itself – no other project has involved competitors collaborating on a solution before connecting them at final construction stage.

Manufactured and constructed in 10 weeks, future rollouts will be delivered in as little as six weeks, thanks to reduced design time, with full testing and analysis already complete, reduced procurement due to the ability to hold stock, and reduced build times due to efficiencies in the repetitive manufacture process.

These benefits are passed onto the client through faster delivery, improved quality, and cost certainty.

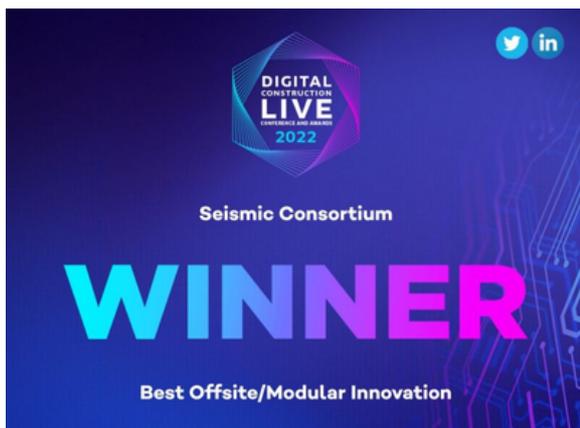


Impact

Designed in line with the government's Construction 2025 targets, award winning Seismic II exceeds them in every way. Delivering a building that is 75% faster to complete, 70% lower in carbon impact and 47% better value than traditional construction.

One of the main outputs of the project was an “MMC readiness matrix” via the MTC, which helps modular manufacturers audit their existing approach and provides a framework for improvement. This helped Algeco understand how to increase its daily output five-fold.

MTC also analysed the future skills that would be needed in the workforce, including opportunities for progression and any new roles and responsibilities required to drive MMC.



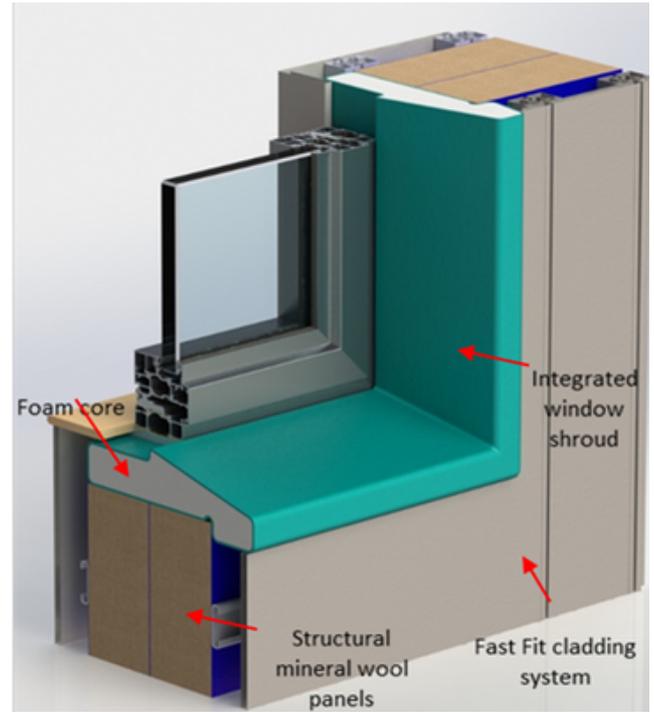
Because it is a platform, other manufacturers can come onboard and produce components based on the Seismic system. This creates greater market certainty, removes risk for manufacturers, and will help increase MMC capacity by allowing:

- Manufacturers to bulk buy materials and components at attractive rates and maintain stocks, allowing for improved margins and faster turnarounds.
- Module frames and components to be built on a rolling basis before projects are commissioned, fully utilising factory capacity. They would be sent to sites as and when needed, after being tailored to the client's desired finishes and performance requirements.
- Sites to be prepared in parallel while work takes place in the factory, reducing programme time.

Next steps

Further work to improve the thermal efficiency of the building includes a future design proposal for an integrated shroud and cavity closer by the NCC, made from composites.

Following consortium input and lessons learnt from the simple shroud design, the composite integrated shroud will improve thermal efficiency, reduce assembly time and increase consistency whilst performing a structural duty.



Cavity closer prototype

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Platform construction is key to increased reuse, disassembly and recycling of materials, and these are all essential to reduce whole life carbon.

Seismic has proved that composites can play a key role in the design of an energy efficient building. ”



Carys Holloway, Technology Programme Manager, NCC

Seismic II is a collaboration between the National Composites Centre and:

TATA STEEL



algeco



mcavoy
Smart Offsite

mtc
Manufacturing
Technology Centre