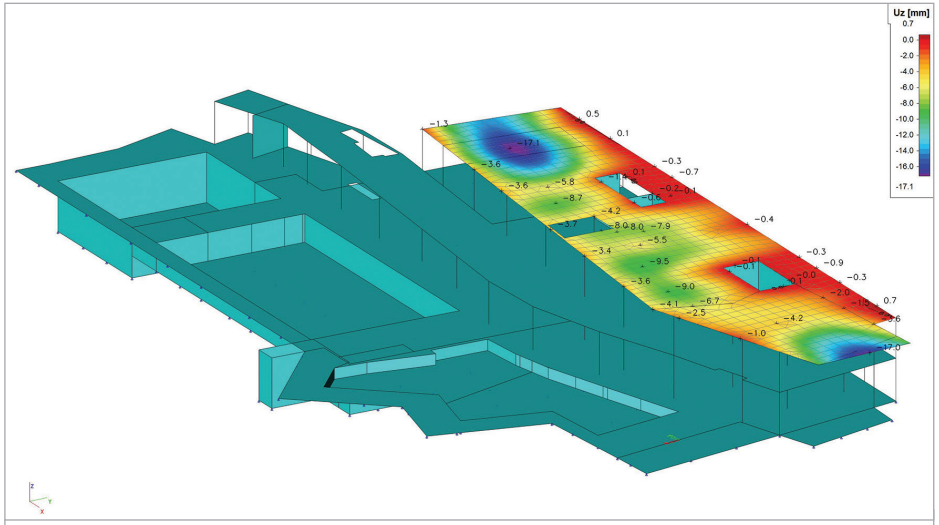
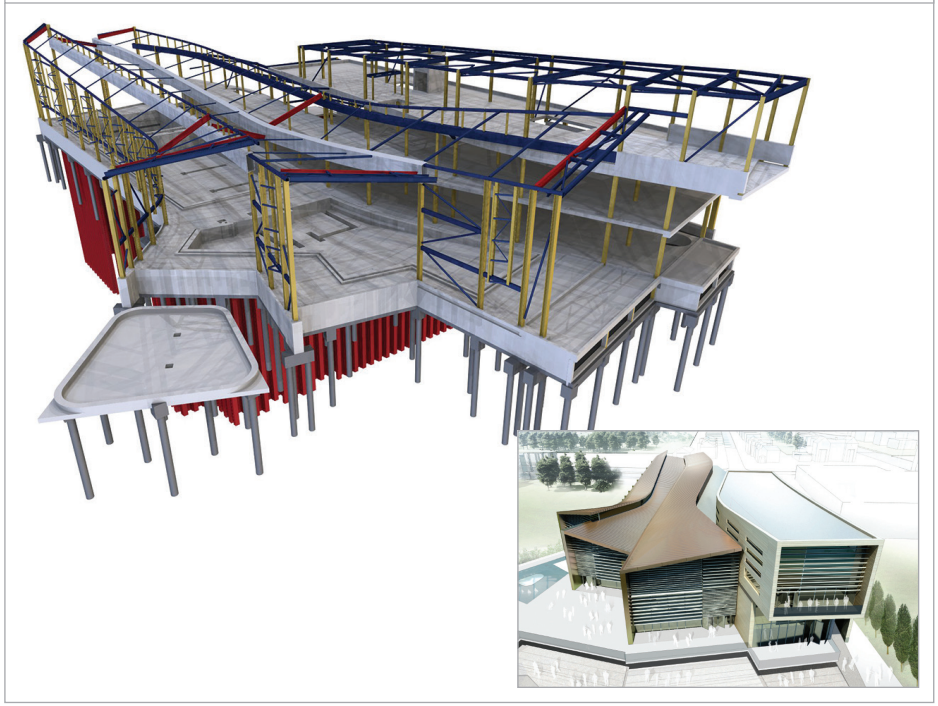
Worthing New Pools - Worthing, United Kingdom

Nomination Category 1: Buildings





Software: Scia Engineer

Worthing New Pools

This iconic building has been commissioned to replace an aging 1960s leisure centre and breathe new life into the architecture of Worthing's sea front. Wilkinson Eyre Architects, supported by AECOM, won the architectural design competition with their design. The sculptural form echoes the sand and driftwood of the shoreline. The new leisure centre brings inspirational design into a facility at the heart of the local community.

Concept

The signature element of the structure is the pool hall, with steps and curves achieved in a complex steel frame. Clad in copper and glass with a timber soffit, the pool hall is set alongside the timber-clad concrete frame of the leisure centre.

Asymmetric Curved Beams

The lines of the pool hall 'flow' towards the shore, supported by two doubly-curved, doubly-asymmetric, welded box sections. These are 1.3 m deep, span over 50 m and weigh one metric tonne per metre. They carry axial load, biaxial bending and torsion due to curvature. Cross-section properties were explored and optimised using the 'general cross-section' module within Scia. In addition to section checks and stability checks, Scia was used to calculate the permanent deflection that could be precambered. Checks were also made on distortional deformations, using a detailed model of the beam as a series of plates. High level clerestory glazing sits above the beams and is framed in steelwork. Movement joints were introduced in the clerestory rail to ensure that vierendeel action did not attract excessive axial load to the rail.

Stability without bracing

The North and South elevations are entirely glazed, leaving no room for diagonal bracing against the westerly wind. Lateral stability is achieved with a network of slender SHS struts concealed within the timber roof zone. These transmit axial lateral loads to the adjacent concrete frame. At the steps in roof profile, the eccentricity is resolved by taking an additional torsional moment into the fabricated box beams. This achieves a structure without either diagonal bracing of the heavy members of a portal frame.

Movements and interfaces

The steel frame supports extensive glazing, a timber roof, and copper cladding. The lateral stability system gives a relatively flexible structure. As glazing in particular is sensitive to movements, the full 3D steelwork geometry was analysed to predict the deflections under self-weight, imposed loads and wind loads. The roof geometry gave rise to interactions whereby lateral loading created vertical deflection, and vice versa. It was also critical to provide a sliding bearing for the timber roof panels, to ensure that thermal stresses could not build up and cause fixing failure. A 'movements and tolerances' report used graphics from Scia to communicate the movements that follow-on trades were required to accommodate at interfaces.

Concrete frame - dynamics and non-linear analysis

On the second floor of the leisure centre, long spans combine with a fitness studio to create a dynamically sensitive area. Modal analysis was carried out and the slab designed appropriately to eliminate dynamic effects from rhythmic activities.

The south elevation of the leisure centre cantilevers over the beach promenade. To achieve a picture window with unrestricted views of the sea, columns were omitted and replaced with a grillage of cantilevering beams. At the longest span, a 9 m concrete cantilever required a full non-linear cracked section analysis, with actual reinforcement modelled. This demonstrated that long-term deflections will be within acceptable limits.

Collaborative communication

3D analysis and draughting were crucial to communicating the design to the fabricators. A combination of Scia Engineer, Autodesk Revit and Rhinocerous were used by the design team, with both the steelworker and timber subcontractor developing 3D models of their packages from design team information.

AECOM

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Project information

Owner	Worthing Borough Council
Architect	Wilkinson Eyre Architects
General Contractor	Morgan Sindall
Engineering Office	AECOM
Location	Worthing, United Kingdom
Construction Period	09/2011 to 05/2013

Short description | **Worthing New Pools**

Worthing New Pools is a landmark development on the south coast of the UK. The striking form reflects a desire to provide not just a community leisure centre, but an iconic building that will attract interest and investment to the local area.
The centrepiece of the RIBA competition-winning design is the steel framed pool hall, supported by doubly curved, doubly asymmetric box-beams spanning over 50 metres. These create a flowing roof profile reminiscent of ridges in blown sand on a beach.
Complex and irregular geometry combine with a mix of steel, timber and glass to create a sculpted and striking building. Clear communication of the geometry and the predicted movements at interfaces was essential to the successful delivery, and relied heavily on the use of Scia Engineer.