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Managing Director
ACS

A Business Built on BIM:

Autodesk® Revit® Architecture in a Modelling Service

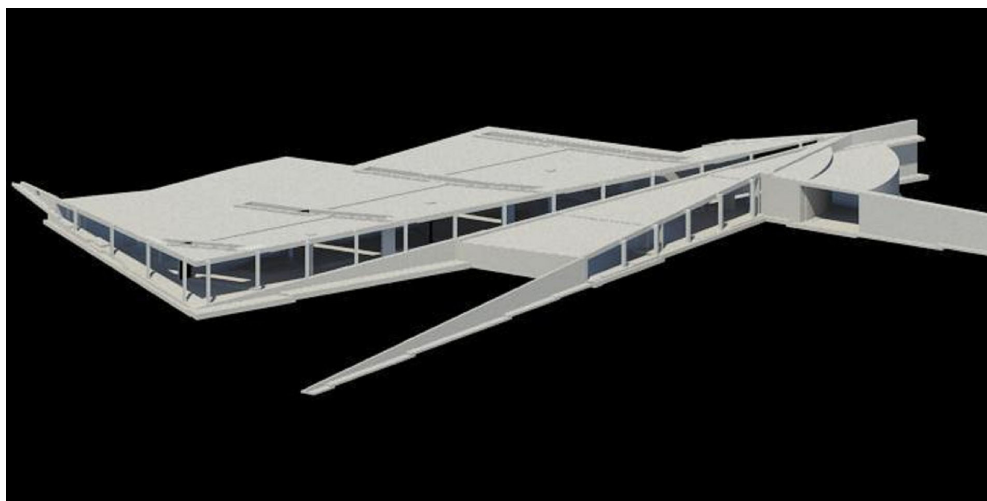


Image courtesy of ACS

Associated CAD Solutions (www.acscad.ie) has been providing specialist architectural and engineering services to the construction industry and associated design professions for over 12 years. Today this Cork firm specializes in leading edge BIM services to its clients using a range of smart technology centred on Autodesk Revit Architecture. Its clients and their BIM projects to date have been from all over Ireland and the UK.

"We use a combination of Autodesk Revit Architecture and other specialist software such as Autodesk® 3ds Max® Design and AutoCAD® to provide high end, intelligent and data rich 3D building models," said Michael Kenneally, ACS managing director. "Essentially we offer BIM expertise and experience on an outsourced basis to companies that want to implement BIM on a specific project but lack the staff or other resources to do so themselves. That collaboration can begin at the tender pre-qualification stage where BIM is mandated by the client or commissioning authority, an increasingly common requirement especially in public sector projects.

"The key thing in our experience is that it has to be a true partnership with the project design team, exchanging ideas and enhancing the collaboration process," Kenneally said. "As well as developing and ensuring the consistent quality of the BIM model we have frequently been able to add value through enabling, for example, accurate Bills of Materials take-off directly from the model and facilitating off-site manufacturing for best component quality. That can even extend to numerical control files for structural steel production."

The firm has experience of a number of 3D modelling software packages but settled on

Autodesk Revit Architecture as the most flexible for its business. "It enables us to deliver complex building model shapes in a shorter time frame to meet the demands of tight design and construction programme schedules," Michael Kenneally said. "Very importantly, it allows us to readily accept and work with models produced in other systems through the IFC file format. That ensures full 3D intelligent design collaboration between various design disciplines and separate professional firms."

The star BIM project in the ACS current portfolio is the Giants' Causeway Visitors Centre, an award-winning design by leading architects Heneghan Peng. Set in Northern Ireland's world heritage site with its famous hexagonal basalt stone formations, the new centre is an £18.5 million project of the UK National Trust, to be completed in summer 2012. ACS was commissioned to provide the BIM services for the project by main contractors Gilbert Ash, beginning with the creation of a 3D BIM from the original 2D drawings of the architects and engineers during the pre-construction design phase in 2010.

The Visitors Centre will be a state-of-the-art 1815 sq. metre facility structured around a structural steel and reinforced concrete frame with elevations in locally sourced basalt clad mullions and extensive glazing. "The BIM model is particularly important in this project because of the extremely complex shape of the building design, with extensive use of non-orthogonal design lines and shapes," Kenneally said. "The geometry of the concrete roof structure, for example, incorporates varying slopes, angles and fold lines and will support a grass roof finish to mimic the natural ridge line of the landscape."

The RC roof slab, cast on site, is designed to have an underside of polished concrete as an internal ceiling finish to provide a special architectural feature. This incorporates an intricate pattern formed by the recessed joint lines of the shuttering panels, modelled into the slopes and fold lines of the core roof slab. Each individual shuttering panel specification was generated directly from the Revit model. Kenneally explained: "An additional complexity of the design—and a challenge which would have been insurmountable without 3D modelling—is that all of the electrical services cabling are carried through ducting that is pre-cast into the roof structure."

"The time scale for the detailed design programme was very tight and meeting the deadlines was entirely because of the power and flexibility of Revit Architecture. It enabled us and the project team to identify design conflicts between the various elements in the pre-construction phase. There were in fact quite a few such design clashes at various interfaces between the structural and architectural elements at that early stage, largely because of the complex and unique nature of the design."

But the intensive checking and resolution process then minimized the potential time loss and cost impact of design changes during construction, Kenneally pointed out. "In some areas such as the complex RC roof slab any error like a dimension clash would have been impossible or extremely expensive to rectify. It might very well also compromise the architectural vision which is what will make this an iconic building on such an important heritage site."

The process included the structural steel modelling and detailing, also the responsibility of ACS, which was then integrated into the architectural model in Revit Architecture for final checking. "We were able to generate accurate sections through the building for the design and construction teams together with visual images for clarity of explanation to professionals and third parties. Sub-contractors were enabled to take accurate information from the BIM model as the basis on which to develop their specific details." When approved, these were taken back into the Revit model. Off-site fabrication and production was based on detailed drawings and materials and other data drawn from



Image courtesy of ACS

the master model. Similarly, the contracting team was provided with specific drawings and cross-sections for setting out on-site.

This was particularly useful in with the design team and specialist sub-contractors on the natural stone cladding and fenestration/glazing details. The vertical surfaces are essentially a stone cladding envelope with a pre-defined geometrical pattern as a key design feature. Teasing out the design details well in advance enabled the maximum amount of work to be accomplished in the workshop rather than on-site.

"From our point of view in ACS this project is winding down even though construction only commenced a few months ago," Michael Kenneally said. "Now that work is underway on-site we are involved only with occasional queries from engineers or others setting out the works on-site. That illustrates the extent to which the 3D modelling approach of BIM and the comprehensive capabilities of Autodesk Revit Architecture result in the vast bulk of the design detailing being accomplished in the model and on-screen before a foundation trench is even dug."

The BIM model for the new Giants Causeway Visitor Centre will become the database platform for facilities management and maintenance services in the future. This was mandated by the National Trust as client, anticipating the requirement for all UK public sector projects to use BIM by 2016. It will provide a totally comprehensive record of every aspect of the building construction, materials, services and

permanent fittings in rich detail to facilitate all aspects of the future administration of this unique cultural facility throughout its life.

ACS Profile

Founded in Cork in 1999 by directors Michael Kenneally and Victor Lee, ACS has specialised in CAD services for engineering and architectural professionals and their projects. The business has grown successfully through continued investment in technology and people and today offers a cutting edge Building Information Modelling (BIM) service. This is firmly based on the firm's record in architectural and steel detailing services and offers a fully integrated architectural and structural steel BIM service, creating intelligent 3D models to support a more efficient engineering, procurement and construction process.

The ACS team is made up of qualified engineers and technicians in both engineering and architectural disciplines, working with state of the art CAD and related systems. Autodesk Revit Architecture is the principal software tool set, for the BIM development work of the ACS team (and inter-operation with other systems) and also for project management and collaboration with its clients and other professionals.

ACS clients in recent years include: Arup, BAM Contractors, Conoco Philips, Cronin Buckley, Duggan Steel, Eli Lilly, Fisher Engineering, Gilbert Ash, Gregg & Patterson, Pepsi, Pfizer, Remnant Engineering, Total Steelwork & Fabrications.

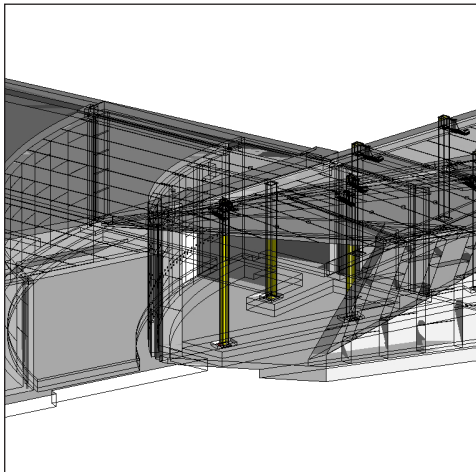


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