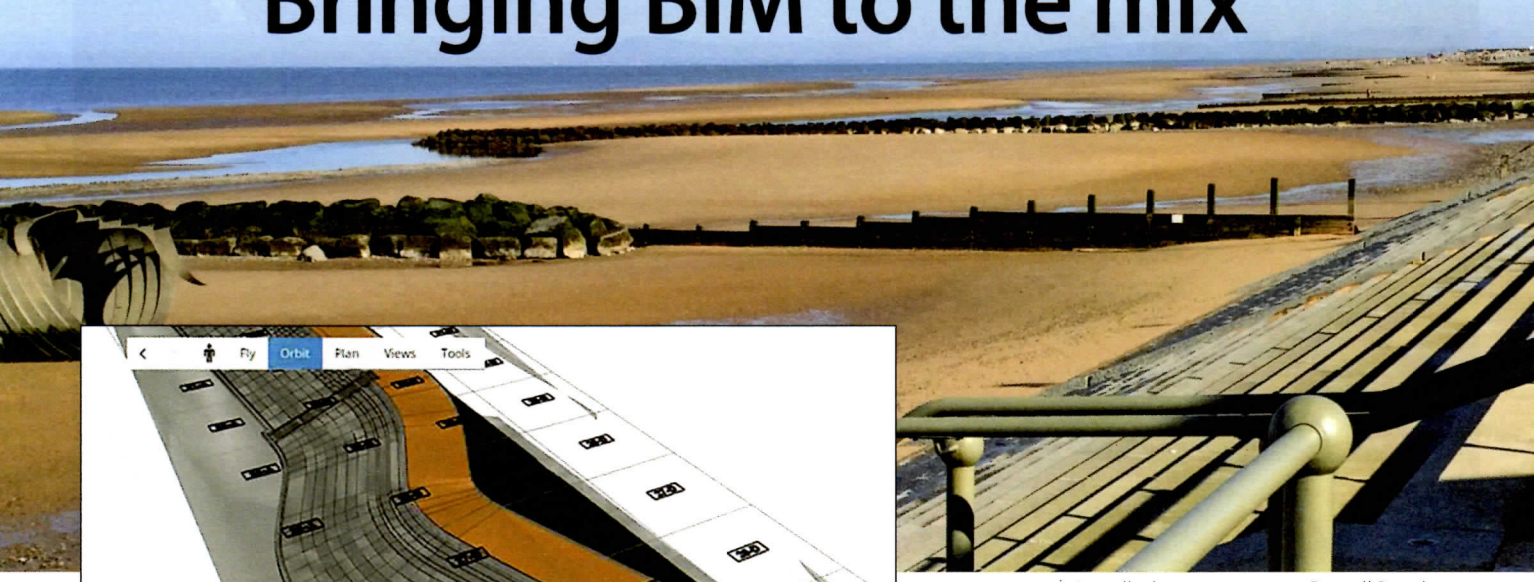
Bringing BIM to the mix



Installed precast step on Rossall Beach.

Left: Rossall Coastal Defence – overlaying 3D grid over original model.

BIM has already brought vast benefits to the construction industry. It has embedded 3D modelling firmly into the construction process, and unlocked the power of building data. It is delivering dividends to contractors, including cost reduction and greater efficiencies, and means less risk, fast error detection, more collaborative processes and better management. ***Rob Umphray*** *of* ***Sitedesk*** *discusses its use for a major coastal defence project in north-west England.*

Concrete is one of the single most used building materials in the world. Yet, despite the fact that it is integral to everything from motorways and bridges to hospitals and offices, the benefits of BIM may not yet be fully leveraged by the concrete industry.

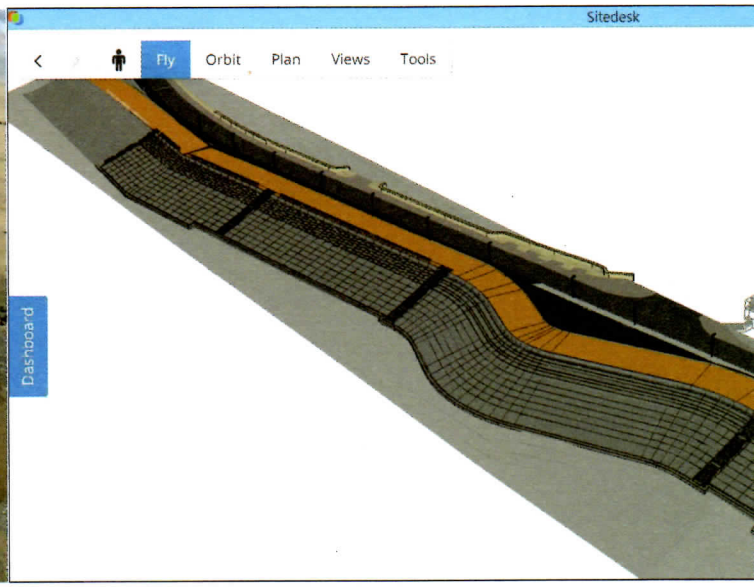
What could it bring to the mix? In the precast concrete sector, it certainly provides the scope to transform all kinds of processes. Precast concrete manufacturers should start to tackle BIM more actively and apply it to all workflows – from design and manufacture through to delivery – to release all its potential. However, while standard precast products lend themselves relatively easily to being defined as BIM objects and delivered along with their data into a BIM system, suppliers of ready-mixed concrete and its materials sometimes struggle to see the route forward.

A sea change in approach

Wyre Council collaborated with Blackpool Council and Fylde Council in north-west England for a major coastal defence scheme to protect communities from some of the roughest seas and highest waves in the UK. It aims to protect 7500 properties in Rossall, as well as a further 4500 in nearby Anchorsholme.

The project has required vast quantities of material and combines concrete with natural rock and other materials. The specialist concrete elements were made by Macrete in Northern Ireland and include sloping revetment units, each weighing 12–13 tonnes, wave breaker units, wave-return

Completed section of lower rock revetment looking south.



Model of the coastal defence scheme showing the wider context of the scheme including the access road.

> "When the output is a large, heavy, highly accurate structural sections such as those used at Rossall, future decisions are fully informed."

walls, a raised promenade, the rear flood wall and precast steps situated every 100m along the 6km length.

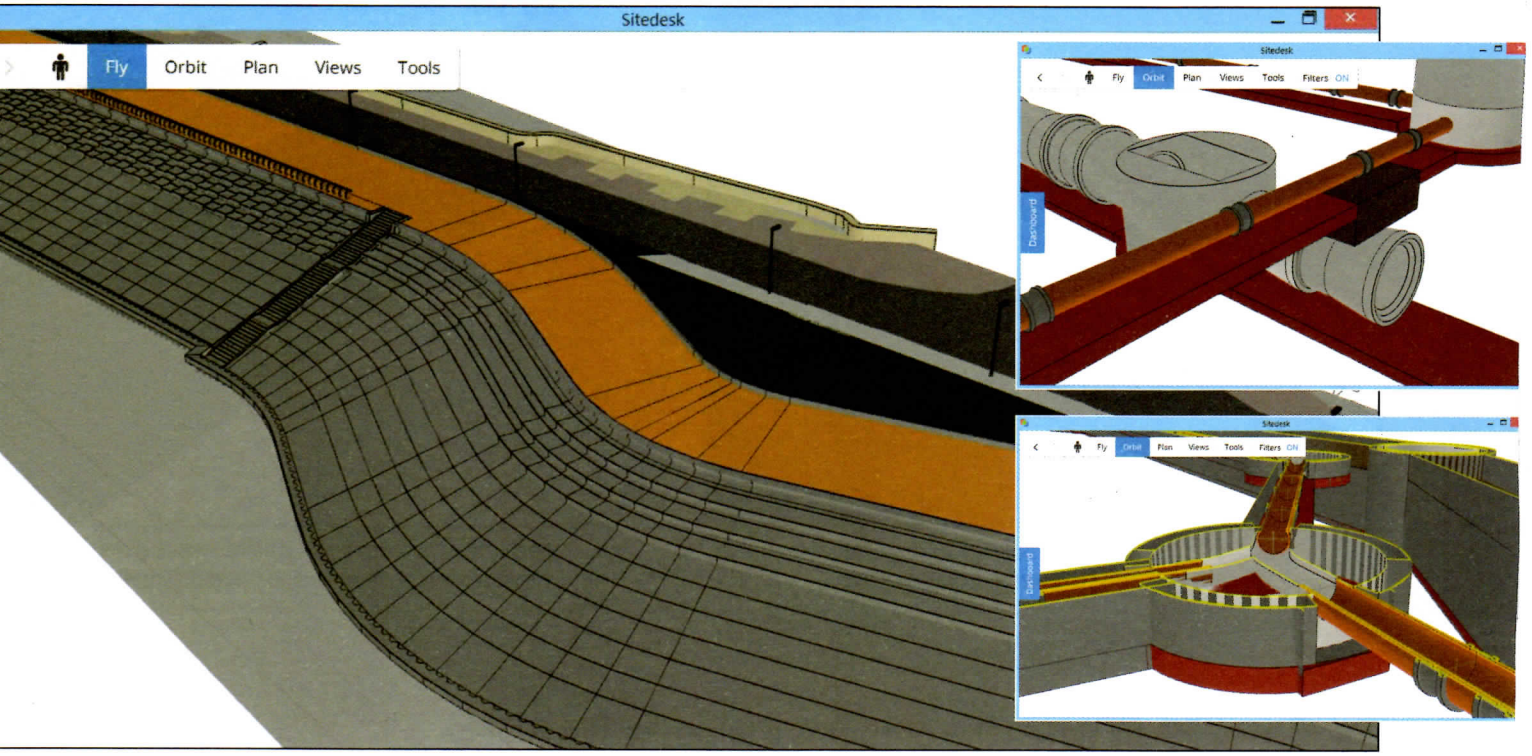
Carl Green, head of engineering services at Wyre Council, started leading the council's part of the project before current BIM specifications were published. He and his team recognised that implementing such processes would significantly help in delivering the desired outcomes of the project for its entire life cycle. BIM wouldn't just help construction, but would provide a digital asset for future renewal and repair. As Green says, "I was determined that the next generation of people who would be renewing the defences in 50 years' time wouldn't face the same challenges as my team."

The purpose of BIM is to capture and make accessible vital data about all elements and structures, from build throughout the entire life cycle. During design as well as construction, it places the fine detail about every element at the contractor's fingertips, while ensuring future operators and maintenance crews gain the deep insights to inform maintenance and upgrade decisions. For the precast units, this incorporates essential information, such as when each unit was made, the exact specifications of each unit as well as technical data about each concrete batch and when it was formed and cured.

The seeds of the end-user benefit are sown during the production phase. Using 3D modelling techniques to design and support the production of precast concrete units has some parallels with 3D printing of materials and results in an item with which all essential data is supplied and integrated into the wider project data model. It makes delivery and installation of the precast units simpler as well as streamlining investigation and resolution of future issues. When the output is large, heavy, highly accurate structural sections such as those used at Rossall, future decisions are fully informed.

For example, if an issue were to develop in a single unit in future, it will be simpler to identify any and all other units that came from the same batch, combined with location data highlighting where each unit has been installed. BIM makes it easier to identify any future risks earlier, as well as provide decision-making information that

Construction team using Sitedesk on-site at Rossall Beach – Rossall Coastal Defence Scheme.



Above, main: Model zoomed in to show detail of the design.

Inset top: Services that are normally hidden can be viewed in the correct contexts and locations.

Inset bottom: Section showing how pipes run and converge in a chamber.

allows action to be taken to address issues before they become problems.

The information that is required for future management and maintenance is defined right at the outset. Green explains, "As a group, we looked at our own requirements during the pre-design, design, construction and operational phases, and decided on the data that we would need to capture at each stage to meet these requirements and optimise asset management and minimise maintenance costs throughout the life cycle of the project." These information requirements (now termed under the BIM Standard as employer's information requirements or EIR) were then passed on to every supplier and subcontractor.

The object of the exercise

BIM will not only impact manufacturers of bespoke precast units but also offers a significant potential business opportunity to those who create standard concrete components, or families of products designed with a range of variations too. Within the process, each standard component can be defined as a BIM object, along with its key information. Concrete manufacturers can publish their products to a library, such as the National BIM Library or the BIMstore. Designers can then download objects containing information about the items to integrate into draft models.

Objects can carry whatever relevant data is appropriate, such as sizing and volume densities, helping to shorten design time and quickly understand quantities. Best of all, designers will be working with your objects from early in the design process, which may help confirm the order for your business. Fills and concrete pours can be added as layers to a 3D model together with information about their depth, volumes and quantities, so BIM is equally applicable to 'wet' concrete too.

The process provides greater visibility of the manufacture, logistics and construction processes, allowing all parties to minimise costs and risks. Any issue that arises from manufacture to site will be identified earlier, allowing remedial action to be taken to help keep both the supply chain and project build on track.

The smart use of BIM across the board distinguishes the Rossall scheme from many others. Here the local authorities were able to focus on form as well as function. They held a direct dialogue with the concrete industry to incorporate its processes and thus push the limits on what was possible. This close collaboration and exchange of information is the cornerstone of the process. It is something from which the concrete world as a whole can benefit.

The bottom line is BIM can help you win work, save time, money and help reduce risks. The time to get on board is now. ■