

# BIM coming of age

You may well have heard the term BIM before, the chances are you're going to be seeing it a lot more often, particularly in the construction industry.

**Building Information Modelling uses software to build a profile of a construction project with all manner of information from the materials used in the building, to the aerial work platforms required to maintain it.**

BIMs are 3D objects that can be inserted into design software and other project management tools used on construction projects and the subsequent maintenance of a building. An increasing number of crane and aerial lift manufacturers are creating custom BIMs for their own products so that architects and contractors can test and factor the equipment into a project while the design is still on the electronic drawing board. At the same time IPAF has been building a set of generic BIM models as an additional resource.

## Planning access equipment needs in advance

Building designers and engineers have been using Computer-Aided Design (CAD) software for more than three decades, but things have

moved on from the days of 2D digital drawings to 3D and now 4D building information models. BIM has many benefits, and not just for designers, but for construction and installation companies, facilities management contractors, and countless specialist trades. An entire project team can use PCs or tablets to access drawings, so everything is always up to date and shows the phasing of the project and any clashes in the design.

For many years, architects have been increasingly liable for the 'buildability' and practicality of their structures, while many European countries now require consideration to be given to the safe and efficient maintenance of such structures. BIM is a tool that helps architects to achieve this, and to demonstrate that they have achieved it.

To help architects and contractors construct working models of a building, suppliers of building materials and components have created digital and virtual versions of their products that can be added to a BIM library, enabling designers



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Using BIM models online



Most major manufacturers have converted their product ranges into BIM models

to drag the items onto their virtual design models. In this way, all the details of the finished building, right down to the instructions for the heating system, can be held in a single file that not only tells the project team what to specify and how to build it, but also provides future owners with a digital operator's manual for the intended lifespan of the building.

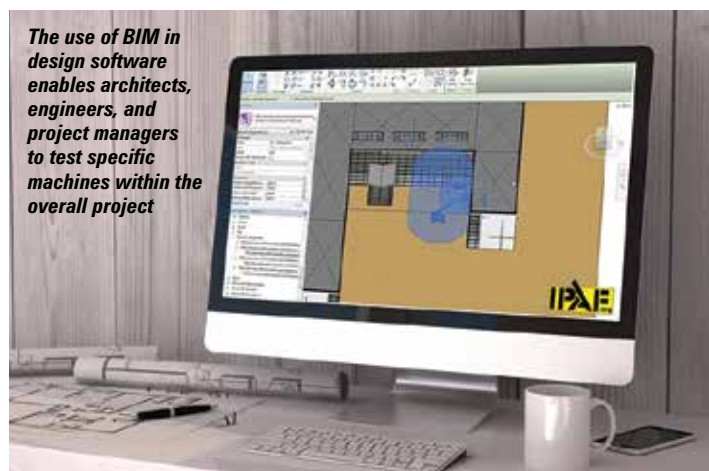
Over the past few years, this BIM approach has been extended to the equipment used for the construction and maintenance of a building. An increasing number of manufacturers have set up their own BIM libraries, and this has been particularly true for aerial lift companies as well as crane companies where the data can be tied into the lift-planning software used by an increasing number of crane rental companies. The International Powered Access Federation (IPAF) has also contributed seven generic

aerial work platforms to the UK's BIM database and says that it is committed to maintaining and updating this library with new machine types, including mast climbers and construction hoists.

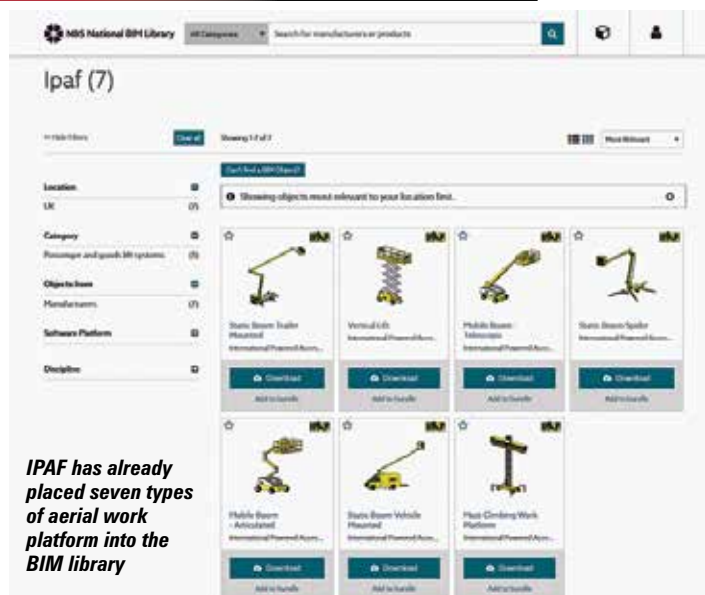
***"Architects are increasingly liable for the 'buildability' and practicality of their structures"***

Designers can now set out in their BIM models a requirement, for example, for a 10 metre boom lift for fixing steel during construction, or even changing light bulbs at specified service intervals. Either way, the platform selection can be specified in the building's digital file, both for the construction process and the building's life afterward, with the chosen platform's precise requirements specified and visualised in the BIM file.

IPAF chief executive Peter Douglas says: "IPAF's role is to promote safe working at height and to promote



The use of BIM in design software enables architects, engineers, and project managers to test specific machines within the overall project



**IPAF has already placed seven types of aerial work platform into the BIM library**

mobile elevating work platforms as the safest way of doing that. By adding powered access into the BIM library, we have made it as easy as possible for designers and contractors to know what machine to use and how to use it properly. Planning ahead is a key component of working safely at height using powered access, so what better way to do that than to fully model how machines will be used on-site at the design stage of any project?"

**'6D BIM' plots lifetime access requirements**

While the construction phase is important, the operational phase of a structure lasts far longer, and the use of BIM modelling could provide even greater benefits. An interesting example is the new HSBC bank headquarters in Sheffield, UK, built during Phase One of the Yorkshire city's Heart of the City II regeneration programme. The bank is the anchor tenant for the office and retail scheme, a £70.5 million project designed by Leonard Design Architects and built by BAM Construction.

BIM was used extensively on the 30,000 square metre development on an irregular, sloping site in the middle of the city, with limited space on all sides. BAM and Leonard used 3D modelling for the structure, Mechanical & Electrical, and facade installation, and included clash detection between trades.

The positions of the mast-climbing platforms and ties, used for fitting the cladding and glazing, were also set out in the BIM model. But the standout digital innovation was the use of aerial work platform models to plan for the building's operational phase, the so-called 6D BIM. Leonard used the digital aerial lift objects that had been uploaded into the NBS (National Building Specification) BIM library by IPAF, as director John Morgan explains: "The client's original plan was to fit a window cleaner system (BMU - Building Maintenance Units) around the building. However, permanent access solutions didn't lend themselves to this project due to factors such as a large open terrace and deep overhangs."



*BIM models are being used on the new HSBC building to plan ongoing maintenance methods*

**Mobile access more cost effective than BMUs**

"Typically, window cleaner systems cost more than they pay back during operation. So instead, we tracked aerial work platforms around the building using the BIM model, proving that access for them was always possible for the window cleaning work. This was the result of numerous workshops and coordination meetings to identify the most cost-effective and suitable method."

Morgan added: "It was extremely useful being able to access the objects in the NBS library and meant we could quickly assess which machine would be appropriate for this site, including the maximum reach. By reviewing the reach, we could accurately plot the location where the platform would be in use, using its maximum reach guidance to ensure the whole facade could be accessed safely and conveniently."

"Additional research and studies were performed with the manufacturers to appreciate the stability of the machines, given the steep slopes around the project. Soft landscaping locations were reviewed, as were external furniture locations, and tweaked where required. Overall, very few areas required major replanning as the reach of the platforms meant the façade could be accessed from the paved areas. The use of this technology is a fundamental part of our design. The benefits of including as many operational components into our BIM model as possible means we can assess how the end-user will maintain and use the building very early on in the design process."

"BIM libraries are an essential part of this, especially BIM Level 2 projects which require a high level of data to be inputted and passed on to the end-user. Having manufacturer information readily available in the BIM models is of huge benefit when it comes to compiling user manuals."

IPAF uploaded the first seven digital platforms into the NBS BIM library several years ago but has since added three further machine types. According to the NBS, there were around 600 downloads of the IPAF object in the past year.

IPAF's head of safety & technical, said that members are now working with their customers to demonstrate how the virtual BIM work platforms objects can be used. "This starts with planning from the ground up. Project teams can use a BIM

model to plan any work at height that is required, and then establish where a mobile work platform might be more appropriate as an access requirement, and then they can decide the best model type for the job. They can also use the BIM model for the programming, deciding when working at height is conducted, ensuring it is not clashing with, for example, other trade packages or materials deliveries. This should all help create a safer work site."

**BIM modelling cost savings**

Parker says that IPAF's BIM initiative has so far generated interest across northern Europe and the Middle East. "On the Ringeriksbanen road project in Norway, we have received feedback about cost savings from smarter scheduling by using the objects in their BIM modelling. There is increasing awareness of how BIM can be used with aerial work platforms, or of the benefits in terms of time and cost, and safety. IPAF is committed to maintaining and expanding the existing range of BIM models, using case studies to demonstrate how the wider industry can make use of them, and outlining how the use of BIM fits into good planning for safe work at height using powered access."



**IPAF's Brian Parker**

"In the UK the Health & Safety Executive (HSE) has issued a guidance note, writing employer's information requirements (EIR), which implement BIM on a project. The document has been drawn up by the HSE BIM4 group, whose members include National Grid, Network Rail, and Arcadis, and encourages the use of BIM to support improved safety practices and achieve compliance under the 2015 CDM Regulations. It encourages 3D models in the design phase to provide visual pictures and animations and 4D animations that show construction progress."



# Tadano releases new BIM models

Tadano has released new BIM data for many of its cranes. The 3D renderings can be found on [bimobject.com](http://bimobject.com), a BIM platform developed by Swedish company BIMObject.

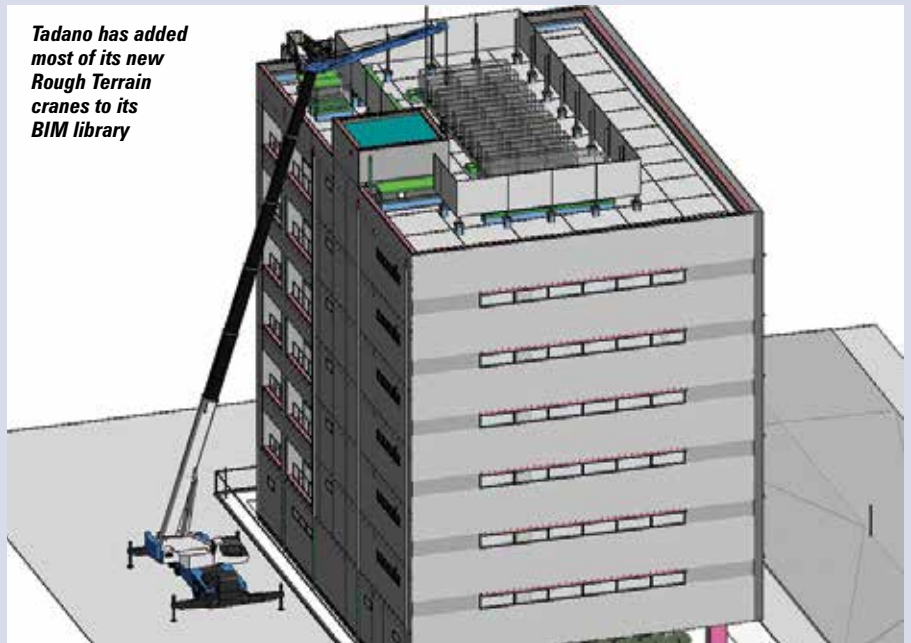
Kiewit Engineering Group is one contractor taking advantage of the information. It is using data rich, intelligent 3D models in its Virtual Design & Construction (VDC) process.

VDC construction manager for Kiewit, Ben Constable says: "The use of 3D models, and the information associated with them, will help our construction teams with work planning and scheduling in ways simply not possible with 2D conventional drawings. Many processes still centre around 2D paper plan sets, the industry needs to develop more information in 3D from the start."

Constable says that placing the VDC process at the core of their business is essential for dealing with risk as well as work planning, scheduling, and cost control and says it is paramount for their expectations moving forward.

"We expect crane industry tools and materials that have interoperability with other 3D modelling elements to be visually

*Tadano has added most of its new Rough Terrain cranes to its BIM library*



accurate, easy to use, and lightweight in terms of computer modelling resources," he says,

adding: "Tadano's recent approach to digitalisation can help solve the problems we are facing.

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