



Oliver Brooks is Technical Director at KOREC (www.korec.com) and can be contacted by email at: oliver.brooks@korecgroup.com

BIM: The surveyor's role

The surveyor is often one of the first to be involved in the Building Information Modelling (BIM) process by collecting data for construction design. But it doesn't stop there, as Oliver Brooks explains

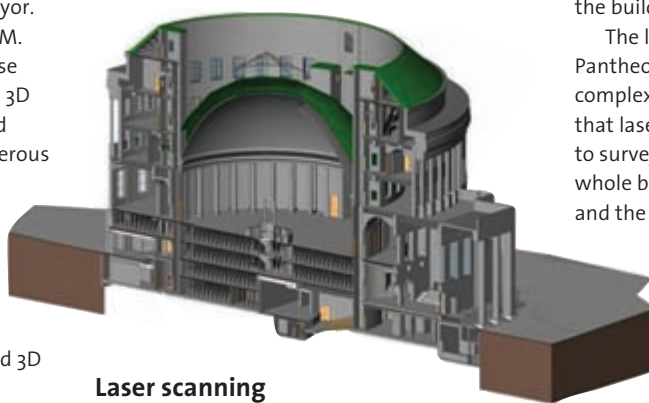
Today's construction projects feature increasingly complex designs and more demanding schedules. Contractors must find ways to increase productivity and reduce and even eliminate rework. Building Information Modelling (BIM) is rapidly becoming a mainstream process that helps deliver productivity gains and improved efficiencies.

Following the government's Chief Construction Advisor, Paul Morrell's final report which was presented earlier this year, the Cabinet Office has published the Government Construction Strategy which requires collaborative 3D BIM on all government building projects by 2016.* The adoption of BIM now becomes a necessity.

A vital role

So what is the surveyor's role in BIM? Look at any workflow chart representing the processes and professions involved in BIM and more often than not there is no mention of the Surveyor. But the Surveyor can play a vital role in BIM. With many of today's renovation and reuse projects there is a distinct lack of detailed 3D information about the existing layout and structure of the building. Before the numerous professions involved in the project can start designing, fabricating and planning with BIM a 3D model is required. It is here that the surveyor can use his expertise together with modern technology to rapidly measure the existing building to create the detailed 3D point cloud which can then be modelled.

Traditionally the surveyor has collected data using a Total Station linked to a handheld controller. This is a two-man operation (sometimes one man if robotic total stations are used and are secure) with, on average, five points collected per minute. The typical output is a 3D layered CAD drawing which, for use in BIM, is limited due to the time required to create a full 3D model.



Laser scanning

With the rapid adoption of laser scanning technology the surveyor today has the ability to record up to a million points a second. The laser scanner works in the same way as a total station, i.e. it measures distances using a laser and horizontal and vertical encoders measure the angles; from these measurement 3D coordinates are calculated. The only real difference is that the laser scanner can collect several millions points per minute

and for the creation of detailed 3D models this is essential.

Laser scanning is a one man operation as scanners, such as the FARO Focus 3D, weigh less than 5Kg and so are extremely portable enabling multiple setups to rapidly collect precise point clouds. These point clouds can be automatically registered in the office software using reference spheres and the scanner's compass and altitude sensors, reducing the time required to process the data. Hence precise, detailed 3D models can be created in days not weeks.

One project where laser scanning has been used to create a 3D model for BIM is the refurbishment of the Manchester Central Library. The project architects, Ryder Architecture (who together with the University of Northumbria formed the BIM Academy), commissioned Bury Associates to carry out a full measured survey and supply a 3D model of the building (as pictured left).

The library's design was based on the Pantheon in Rome and as such it is a very complex structure over many floors, meaning that laser scanning was the only feasible way to survey it. Using a FARO Focus 3D scanner the whole building was surveyed in just a few days and the 3D Revit model created.

From 3D model to construction

So the surveyor is often one of the first to be involved in the BIM process collecting data to create the 3D model but surveyor can also be involved in the construction phase once the building has been designed.

The challenge of getting the BIM model to the field is often solved by converting the 3D information to 2D paper plans which are then used to identify and set out positions on site. But it's essential the design is correctly positioned on site as the knock-on effect of incorrectly set out points is obvious. Rework

incurs cost, and the later it occurs in the construction process the higher the cost. Therefore solutions that take the actual 3D BIM model out onto site allow the surveyor to make better decisions in the field. Once such solution is Trimble Field Link which is an onsite software solution running on a ruggedised tablet PC connected to a robotic total station.

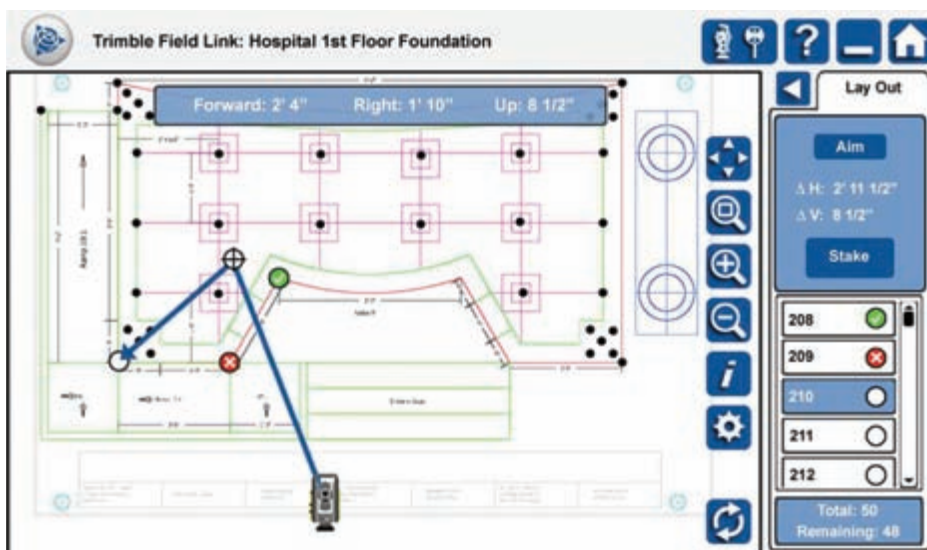
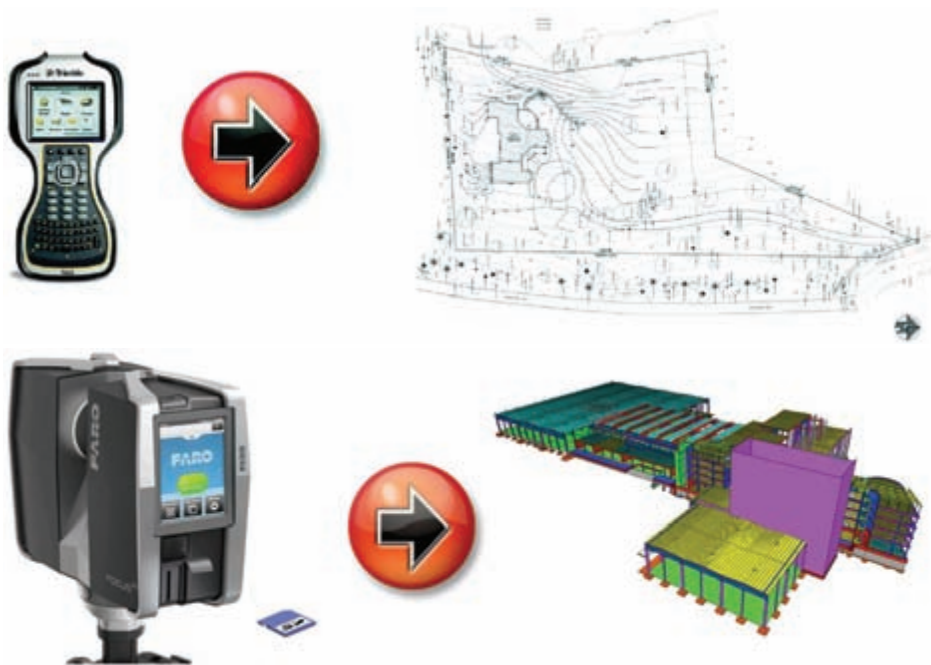
It has been specifically designed for construction setting-out using trade-specific feature libraries and terminology. Its extensive reporting functions generate daily setout summary reports, deviation reports and field condition reports in addition to being able to view the 3D model live in the field and select specific layers and features to setout.

As-built tool

Once construction has begun, laser scanning can then be used but this time as an as-built tool to highlight uneven surfaces that could cause issues with construction during later stages. Scans taken at different stages of construction can also be used for volume calculation by analysing the differences between 3D models. Scans can also be used to create a time lapse model of the construction phase. The position of assets, pipes, ducts, etc, can be recorded and modelled before the walls go up and cover these features. Vital information for the continuous management of the building once construction or refurbishment work is complete.

Therefore it is clear to see that the surveyor has a vital role to play in BIM projects today and tomorrow.

**Full details and background documents are available for download from the Department for Business Innovation & Skills website at <http://www.bis.gov.uk/policies/business-sectors/construction/research-and-innovation/working-group-on-bim>*



MARCH 2012

SPRING COMPANY SHOWCASE

Our regular 'Company Showcase' feature is the opportunity for suppliers of goods and services from all branches of the geomatics industry to acquaint readers with their latest offerings. Innovation is key to success in today's geomatics market place... one where traditional boundaries are being blurred by the latest trends in convergence and functionality, and it is vital that users can take advantage of these technological advances.

BENEFITS:

- Over 12,000 copies will be printed and distributed to GEO's subscribers, and to new active readers at industry events
- The showcase will appear prominently on Geoconnexion.com's Home Page, which has the highest number of unique visitors in the market at over 110,000 per month, with over 1.2 million hits
- The Showcase will also be sent to our email database across the globe

Geo:

Geoconnexion International Magazine

Bookings for the Spring Showcase now being taken – don't miss this exciting opportunity!

email: mickiknight@geoconnexion.com

Spring Showcase entry deadline: 27 January 2012