

Construction Verification Grows Up...

The use of 3D BIM models constantly updated by multiple sources of data are becoming increasingly common in construction – but how do we ensure the finished article matches its as-designed “digital twin”? FARO’s Vito Marone discusses state-of-the-art construction verification techniques

We’re all aware that ‘digital’ is big right now. It’s big in our personal lives, big in our social activities, big in our homes and now – albeit almost the last to catch on – it’s big in the architecture, engineering, construction and operation (AECO) industry.

More often now, we see virtual 3D models embellished with data sources being developed through the design process no matter what sector of the built environment.

These ‘digital twins’ are just in their infancy at the design stage and the intention is that they mature through the construction process and into the operational life of the asset to test and analyse its use and performance.

The ultimate aim is that a digital twin continuously learns and updates itself from multiple sources to represent its near real-time status, working condition or position. So how do we check that what is physically constructed reflects the ‘as designed’ digital twin?

In order to fully appreciate what’s available to us now, let’s consider for a moment the traditional way of checking (verifying) what is actually constructed versus what has been designed. In most cases today, even when in possession of an up-to-date BIM-authored model, the checking of physical construction against that model is rarely as thorough as it should be. Often, an approach along the lines of ‘this is the way we used to do it’ is

carried over to checking against 2D drawings extracted from a model. Hence, we have a range of solutions from surveyors on site taking key measurements upon completion and marking up drawings through to surveyors on site measuring at key stages of construction and producing/updating digital drawings for comparison.

It’s fair to say that although methods such as these have seen buildings completed and functioning today through 2D documentation techniques, it’s not necessarily going to take us confidently into the new digital age.

The advent of BIM processes creating data-rich virtual models of buildings, roads, rail lines and waterways with links to specification, cost and time data sources is enabling a construction business environment much more akin to that of automotive or product manufacturing businesses.

It follows, therefore, that clients are beginning to use the valuable data for ongoing business operations rather than simply procuring a ‘building that their business takes place in’. Indeed, it’s sometimes now a requirement for construction teams to demonstrate that what was designed and signed-off, has been built in the real world and performs the way it has been designed to. Similarly, we as vehicle or electronics buyers, for instance, won’t stand for products delivered that don’t match the stated or designed performance – so why should building owners do so?

As an example of the industry shifting, it’s this very fact, alongside often quoted figures that there is generally a 30-40% energy performance gap between as designed and as constructed buildings, that led the UK government to include the need for construction verification via point cloud or LiDAR techniques in their BIM process known as BIM Level 2 (PAS1192-2:2013 Section 10.2).

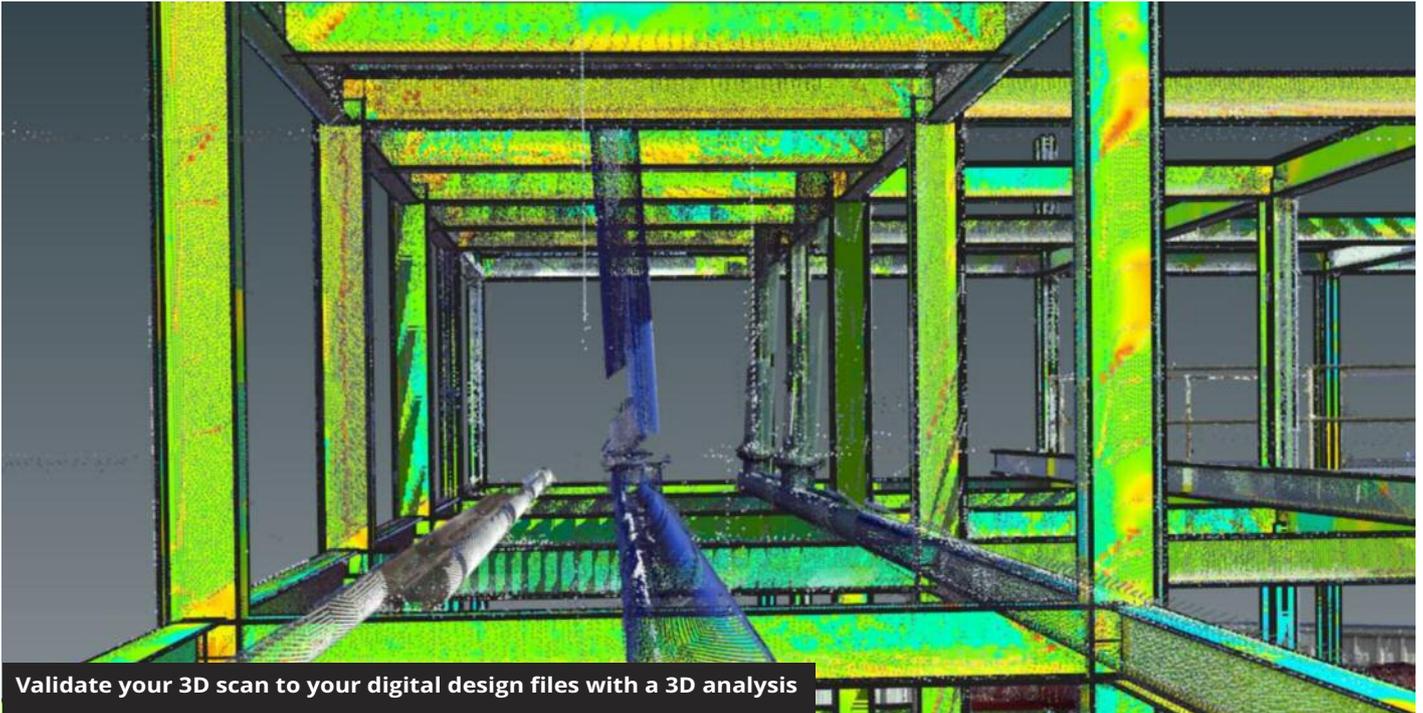
“In a nutshell, technological advances now allow construction companies to much more precisely and quickly verify using easily captured digital representations of the real world against designed and modelled building works.”

So how does the modern construction company deal with these digital requests for verification?

FARO’s Vito Marone says: “While this is a state-of-the-art process and a big shift in the construction industry, what we’re doing here is bringing 20-30 years of our experience from the manufacturing industry to construction.”

Assuming readers are comfortable with the process of ‘laser scanning’, FARO’s BuildIT software provides the ability to compare that measured survey with a 3D model or indeed another scan or analyse the scan itself.

Marone outlines a very intuitive, simple



Validate your 3D scan to your digital design files with a 3D analysis

process using their new BuildIT software – “currently the software has several features that it does very well, but there’s more to come in planned future versions”.

Once you’ve pointed the software to the design model and the measured survey and/or the input device, the results are quickly displayed in the most appropriate way you choose. With the standard features of version one, “the return on investment (ROI) is through the roof,” says Marone.

In a nutshell, technological advances now allow construction companies to much more precisely and quickly verify using easily captured digital representations of the real world against designed and modelled building works.

It’s not a static process either; the software can be used in ‘real time’, feeding in measured data, analysing it and then, using a ‘tracer’, project a pattern on the surface where areas are out of tolerance.

Beyond this, in marrying the software and hardware together (including non-FARO hardware) contractors can continuously record what has been built for various

purposes. It’s useful for delving in to the past too: the software maintains a record of the measured surveys and can allow users to see what was built and when then how it was covered up during the construction stages.

The output from the software (in various forms from traditional printed reports to real-time projection on to site elements) can be used by various parties for tasks such as incremental sign-off of construction work, conformity to building standards and generally to determine the correct location of larger items such as walls, ducts, doors etc.

With a multitude of uses in applying this manufacturing industry approach to the many facets of the construction industry already in mind, it’s exciting to begin to think about just how many people will be helped, how many days or weeks will be saved in construction programmes, how much less material will be wasted and how much better our industry will be.

In summary, Marone says: “What we have released is a very complete first version of our software for the construction industry. It’s also a toolkit and we’re really very excited to see what the industry will do with it.”

Construction verification is a fundamentally important part of the new era of our digitally enabled environment. It’s the process of developing and updating the digital twin that is helping to drive huge inefficiencies out of our industry and enabling us to create more technically complex solutions for our modern world.

More info at: www.faro.com

Test a [free trial](#) option of the FARO BuiltIT Construction Software.

FARO®

Anke Abendroth
Content Marketing Manager EMEA

FARO UK

Tel: +49 (0)7150 9797 – 311

anke.abendroth@faro.com

www.faro.com

www.twitter.com/faroeurope