

Insight

Insight provides practical information on topical issues affecting the building, engineering and energy sectors.

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Breaking Ground: Technology in Construction



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Our January edition of Insight¹ contained a warning shot for the construction industry in 2019. It was not Brexit related. “Technology in Construction” may seem a more tempting article to read rather than one about tax; however, the VAT reverse charge has been labelled as “a timebomb for the industry with an increasingly short fuse”.² If you missed that article, please take some time out to review this.

Our January Insight did, however, point towards a more positive construction trend: technological initiatives currently being researched, developed and applied to increasing numbers of construction sites. Fenwick Elliott’s [Dr Stacy Sinclair](#) issued (in January 2019³) the first part of two articles discussing how digital technology, in particular Artificial Intelligence (“AI”), is being advanced such that the pace of development of AI software, in particular as part of the analysis and review of legal documents (such as, for example, construction contracts), renders this form of technology increasingly relevant.

In this article we focus on “on-site” tech.

Through our regular dialogue with construction tech companies and initiatives discussing current technological trends, it is clear there are legal issues relating to the output of such initiatives, which require to be considered carefully.

The present

Some (but not exhaustive) examples of where the journey in construction technology has reached to date are summarised below.

Digital technology

Digital technology has been a part of the construction industry for many years.

BIM continues to be a discussion magnet within the industry, with BIM Level 3 currently being grappled with.

E-invoicing is expanding exponentially providing significant efficiencies in evidencing cost records and payments across the supply chain. This increases data analytics possibilities, which are also being enhanced and improved.

Modern technology is being used increasingly to assist with capturing contemporaneous site records, such as site record apps, GPS trackers and, more recently (or certainly in increasing volume), the use of drones.

Modular construction

Offsite permanent modular construction continues its renaissance; the produce of which shows a marked improvement from the “prefabs” that

were commonplace in the ‘60s and ‘70s, and that some of our more experienced readers will find difficult to forget.

Offsite modular construction ticks many boxes for efficiency and productivity gains including:

- shorter works programmes (for example, site enabling/prep works being able to be carried out in parallel with building construction off site);
- reduced risk of events that interfere with the construction process (such as weather conditions);
- on-site interfacing issues;
- a more controlled environment from a health and safety perspective;
- sustainability and environmental benefits, including less wasted materials, less on-site noise pollution, and less “traffic” to and from site; and,
- if the lay out of the site allows for it, the possibility for some, if not all, of the relevant manufacturing to be undertaken on site.

This particular process of construction is ripe for the application of technology, as the majority of the work is undertaken off site in a stable factory environment.

For those interested in the significant advances that have been made in this field, examples of the more spectacular modular/prefabricated buildings in recent times are the Marriott Fairfield Inn, a New York City residential skyscraper, and Collins House, Melbourne.

The future

Robotics and AI

The “head-turners” for the future, which already have a small foothold in the present, are robotics, autonomous vehicles, and the application of AI throughout various sections of the industry. Beyond grabbing social media headlines, and the possibility of certain videos capturing the latest tech going “viral”, a key aim of on-site construction tech is to change the methodology and processes of construction, and improve productivity and efficiency. This includes advancements relating not only to construction methodology, but also materials used in construction (with improved sustainability), and health and safety.

Such technology provides opportunities to transform the process of construction, examples of which include:

- robots undertaking repetitive work required on a construction site;

- increased use of robotic manufacturing in modular and prefabrication factories, with the possibility that robotics could eventually be set up on-site in due course to undertake the manufacturing (before installation into its final location); and
- autonomous vehicles, i.e. self-driving transportation such as automated bulldozers, cranes and other site/plant vehicles, which could provide continuous round the clock productive work (site hours' restrictions dependent).

Far from taking jobs from people – there is already a skills and employee shortage in the UK construction sector – such advancements, properly developed and implemented, will improve the environment on-site and aid health and safety.

For example, fully automated cranes would remove the requirement for construction workers to perform what is a critical role, but one that is recognised as having a particular high risk relating to mental health issues. Further, there is the prospect of autonomous vehicles/robotics undertaking the more dangerous work activities, or work on the more dangerous parts of site.

Digital modelling and virtual reality

Digital modelling and virtual and augmented reality products now provide site workers with the opportunity to “walk the site” virtually prior to setting foot on-site. This will help facilitate bespoke health and safety introductions to specific projects, with the high risk and danger areas on particular sites being identified and highlighted by the project-specific software.

Such technology also has the potential to improve collaboration and communication between the parties on-site and at key interfaces. Just as positively, it has the possibility to promote better efficiency and greater optimisation in design (and possibly less defects and rework) and, on the flip side, help manage expectations (customer experience).

This type of initiative, together with the use of autonomous vehicles, as described above, offers the potential for significant improvements not just commercially but to site workers wellbeing with improved health and safety.

All of these technological advancements (and many more such as 3D printing, blockchain, biometrics, etc.), used properly, will aid efficiency, productivity, health and safety, and consequently improve margins and help enhance predictability as to the final outcome of a project (as regards time and cost).

Legal issues with technology in construction

With new technology, there will of course be the issue of how the associated risks are managed, both legally and practically.

Some legal issues in this field are legislative; some are the more traditional contractual considerations.

Legislation

Drones

Drone-related legislation is developing quickly.

The best place to check for the most up-to-date review is the latest government consultation on the use and regulation of drones in the UK which can be found on the gov.uk site at: <https://www.gov.uk/government/consultations/drone-legislation-use-restrictions-and-enforcement>

The most recent legislation is important as it has introduced increased fines, added the potential for imprisonment for breaches of the regulations, and increased police powers of inspection of drone users and premises where drones are stored and kept.

Data protection

Robots and machines with AI capabilities will pick up and process information from the environment

they are being worked in, and will involve, for example, the use of microphones and cameras.

Companies using such technology will, therefore, have to ensure that the necessary measures are taken to ensure any personal data collected is handled in accordance with relevant data protection laws. Note that the data collected may either be intentional and “signed up to” by the relevant parties, or inadvertent.

Contractual legal considerations

The following factors will all require to be taken into account by any lawyer advising on projects that make use of the type of technology being discussed moving forward as it will involve complex machines working in complex environments.

Defects

Issues will undoubtedly arise from subcontracting to robotics providers as to who or what is responsible for errors and substandard work, e.g. on-site operation or the machinery/software.

There is also the question of quite how “self-learning” robotics will “learn”. For example, will the performance of machines be unpredictable and not directly evolved from the human input on-site as anticipated?

Intellectual Property Rights (“IPR”)

Considerable thought and negotiation will be required in relation to IPR.

For example, who will benefit from a robot’s learning on a specific project?

There are clearly competing interests here: the robot supplier will provide the robot and requisite software; the client/contractor provides the data and human input on-site that allows it to learn. In the early stages of utilisation of this technology, there will likely be non-productive/abortive learning issues. In follow-up projects, however, there should be increased efficiency from the earlier experiences. This “learning” will have a value.

One answer to this will depend on whether or not robots will be supplied as part of a traditional supply chain, with the robot supplier company being a subcontractor. In this case the contract will likely require some sort of licence agreement. On the other hand, were the client or contractor to buy the robot and associated software, ownership of the “learning” appears less problematic, although there will then, of course, be consequential questions or issues arising from what support will be required by providers and what obligations there will be to maintain the robot. What about software updates?

Changes in law (which again will be difficult to predict as the technology develops: note how quickly legislation has moved in respect of drones)? Set-up and training?

Health and safety

There is a clear dichotomy here. On the one hand, the potential gains for on-site health and safety are significant, as discussed above. On the other hand, complex and mobile machinery will work very closely, and often overlap, with traditional on-site operatives.

Health and safety policies will require to be reviewed, and most likely revised, to ensure safe interaction between humans and machines.

Confidentiality

Robots that pick up and process information from the environment they are being worked in will, by default or by design, collect confidential information for ongoing projects, such as plans and designs and other potential on-site innovations.

A client/contractor will want to ensure that such information is not being passed back to the supplier without permission. Properly considered confidentiality provisions and/or licences to use such information will be required.

Cyber-risks and cyber-security

Closely associated with the issue of confidentiality, cyber-risks (for example, robots being targeted by terrorists, criminals and malicious and/or politically motivated attacks) will require to be a paramount consideration.

Mitigation, by ensuring that sufficiently strong cyber-security packages are put in place, is one part of this; other elements will be appropriate insurance cover and indemnities in supplier contracts.

However, with robotics suppliers at this stage in development being of mixed size and experience, when dealing with smaller companies, with limited financial strength, they may be unwilling to accept the standard risk profile of construction companies, or unable to provide the necessary insurances.

Other considerations

For companies that specialise in new, innovative products, some of which may not reach production stage, come other practical issues. For example, potentially, a higher risk of a supplier becoming insolvent during a project.

A contract for the supply of a robot would require this scenario being dealt with and will include issues of who owns/controls the robot. How would you transfer the AI learning and general robotic functions to a new supplier should a termination event occur?

Conclusion

The well-documented skills shortage in the construction industry is likely to be exacerbated by factors including Brexit and an aging workforce.

Poor productivity rates are another longstanding concern within the construction industry, particularly when compared with the manufacturing sector.

The continuing development of robotics is potentially hugely exciting for the construction industry; a potential game changer which may help resolve, or at least improve, both the above issues.

This future will bring new risk profiles to construction contracts and additional contractual provisions to deal with matters such as intellectual property rights, data protection, confidentiality, health and safety and cyber-risk.

However, the real question is how will this technology develop and what will be its impact on-site?

The discussion is still in the realm of possibilities, rather than that of certainties. However, as other industries adopt such technology it is difficult to envisage the future of construction without increasing input from AI, robots and autonomous vehicles.

The legal issues, and the solutions to them, will evolve in line with the technology.

Some readers may recognise some of these themes from the recent seminar held by Fenwick Elliott at the ME Hotel: “Breaking Ground: Digital Technology in Construction and Law”. This was the first in what will be a series of technology in construction reviews and presentations and was generally well-received by our attendees. If you are interested in such topics please do contact us with your details so we can contact you with further information in this area.

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Footnotes

1. <https://www.fenwickelliott.com/research-insight/newsletters/insight/82>
2. A quote from Alasdair Reisner, Chief Executive of CECA.
3. <https://www.fenwickelliott.com/research-insight/newsletters/international-quarterly/ai-construction-law-partnership>