Artificial intelligence in the construction industry

Jeremy Newton, director at Currie & Brown, examines the use and potential benefits of artificial intelligence in the construction industry.

Technology has been with us since the very dawn of humankind. The wheel was invented more than 4,000 years ago, and the Egyptians are thought to have revolutionised transportation while building the pyramids.

In the 21st century, the pace of technological advance is quicker than ever. Artificial intelligence (AI) is playing an ever-increasing role in global economies, creating nothing less than a new industrial revolution. The construction sector is not immune from this disruptive change, bringing it both challenges and opportunities.

Here, too, technological advance is actually nothing new. Building materials have been lifted with ropes and pulleys for hundreds of years. Excavators replaced raw muscle and shovels for many purposes over a century ago.

But AI is of a different order. What, though, exactly is it? It is generally defined as being the ability of computer systems to perform tasks normally requiring intelligent human intervention. That is a very wide definition which extends far beyond robots.

It could, for instance, include the current trend towards off-site modular construction, which – as long as the project is not too bespoke – can bring economies of scale in design and manufacture, reduce labour costs, facilitate time savings, reduce wastage and improve quality.

More than 80 per cent of the Leadenhall Building in London, completed in 2014, was prefabricated in this way and then finished onsite. It is something we are sure to see a lot more of, subject of course to sufficient land being available for module fabrication.

3D printing has now developed to the point where it can actually be used to construct entire buildings – for instance, a five-storey property was recently fabricated with this technology in Suzhou, China. As its use is growing in the Middle East and the USA, it may not be long before properties comprising dozens of storeys are produced in this way.

However, both modular construction and 3D printing require the design to have been completed to a much more finalised state than can be accommodated using the more traditional, site-based approach.

Drones also have massive potential within the sector, helping site and construction managers to monitor activities, view restricted areas such as tunnels and assist with real-time design response and the surveying of sites and buildings. They have the advantage of being able to provide data immediately for use in tasks such as updating safety records or ordering materials.

The use of intelligent sensors is another area where AI is likely to have a profound effect. All buildings are impacted by physical stress, and these devices can provide real-time information, helping to predict future structural issues and influencing design and engineering going forward. Planned maintenance, too, can be scheduled in when necessary, avoiding the cost and inconvenience of unexpected disruption.
In the UK, the Cambridge Centre for Smart Infrastructure and Construction has developed an extremely small wireless device – the UtterBerry sensor - which is capable of providing remote monitoring of extremely inaccessible structures.

Modern technologies are also impacting on the sector away from construction sites. Business information modelling (BIM), for instance, allows designs to be completed earlier, subject to competent inter-design discipline regimes. The real benefit of BIM, if done properly, is to the owner-occupier (which may not always be the developer) who can use the model for accurate, cheaper and less disruptive facilities maintenance.

E-measurement and e-costing, too, can save time and staff costs, as long as they have buy-in across the supply chain. It’s imperative, though, that the data generated is carefully checked by a skilled eye, as bad information fed into any IT system will simply lead to poor data being produced at the other end.

As we go forward, the uses of AI could turn out to be virtually limitless. But is it a threat to the construction sector as well as an opportunity? Certainly, it could lead to fewer jobs on site as modular construction or 3D printing becomes more commonplace, but there is a general trend anyway towards fewer people wanting to enter manual trades.

What it will mean is better safety and working conditions, with shorter periods on site, less waste and, critically, a fall in the number of accidents. Though there will be fewer jobs on site, they will be performed by higher-skilled people who will be better protected.

Already, workers are using wearable sensors to alert site managers to a problem – if a crane operative high above the ground, for instance, suffers a seizure, colleagues will be able to respond instantly and the devices could even be programmed to notify the emergency room at a nearby hospital.

This transition to transformative ways of working will not be without challenge. One of the biggest issues at present is persuading clients and regulators, both of whom can be suspicious of change with a tendency to default to familiar tried-and-tested processes, that they should accept AI as the ‘new normal’.

The message has to be clear – proper use of AI in construction is not about cutting corners but about efficiency, cost saving, waste reduction and, most importantly, better safety, working conditions and, ultimately, buildings of better value.

Without doubt, technology will drive the future of the global construction sector. The opportunities it will provide will be immense and it is certain that, in 50 years’ time, the industry will look very different to the one we see today. We are truly in for an exciting future in construction.