Automation in construction

Stuart Smith, director in Currie & Brown’s Salt Lake City office, analyses the advantages and challenges of the increasing use of automation in the construction industry.

It is fair to say that the construction sector is not, and probably never has been, at the cutting edge of technology globally.

Many of the building and design techniques we see employed today have changed little since the Romans were building the Colosseum or the Normans their great cathedrals.

Techniques and building models perfected over the centuries have served us well, but the world is shifting. A need for increased efficiency and economic disruption, such as ever-greater client demand for cost saving, is encouraging new and inventive thinking across the industry.

Automation in particular is now seen as a way of bringing positive but transformational change. It is impacting in a number of important ways: driving efficiency; increasing accuracy and quality; and reducing human input, which in turn means increased safety and fewer errors.

Another factor encouraging this trend is a shortage of qualified labour in the construction industry, not least here in the United States. If machines and robots can do some jobs as well as, or even better than, humans, then - with appropriate controls - why not introduce them as an additional resource?

The idea of using technology to support the industry is not in itself new: computer aided design (CAD) and 3D modelling techniques have been commonplace for some years and have become ever more sophisticated, with buildings now capable of being simulated in very fine detail.

Increased computing and processing power over the last decade has brought more functionality, while GPS means that project designs can now be superimposed onto the landscape out in the field, illustrating infrastructure such as planned transmission lines, roads and pipelines below the soil. Augmented reality tools are set to enhance this even further.

Automation is the next logical step. The sector is still at a relatively early stage in this, but it presents huge opportunities in terms of improving efficiency, accuracy, quality and, because of reduced human input leading to fewer human errors, safety.

There is no denying that it will be disruptive. A recent report published by the management consultancy McKinsey & Company estimated that 49 per cent of all construction tasks are now capable of being undertaken by a robot, with a higher percentage in specific occupations. The Midwest Economic Policy Institute reports that the transition could impact on 2.7 million jobs in the sector within the United States by 2057.

We are already witnessing automation in areas such as the fabrication of off-site modules, many of which are sophisticated and highly attractive. Modular construction of pipe and tubular structures is also becoming more common. Long-performed tasks such as automated seam welding and CNC bending machines in pipe fabrication are starting to be integrated with building information modelling (BIM).
In addition, basic bricklaying robots are now being deployed and we are seeing more and more drone inspections. In Wyoming, a wind farm site is being prepared through the use of robotic earthmovers.

All of this is still at a relatively early stage. Automation is still not really used for complex and detailed work, and it is likely to be some time before the technology has developed enough to allow this to happen. But simpler, more repetitive jobs, such as digging a hole in an open field, moving dirt or even laying long pipelines, are prime candidates for its application.

While the construction sector has opened its eyes to the dramatic possibilities offered by this new technology, in some cases current regulation is behind the times and so stalling progress.

An example of this in the United States is the law governing drones: line-of-sight is still required to control them. This makes it virtually impossible at present to use them, at the maximum potential or efficiently, for linear projects such as transmission lines. The legislation needs to change, and it will.

Other challenges will also need to be addressed. Despite the massive possibilities automation offers the construction industry, parts of the sector remain suspicious of change and can be slow to update working methods.

Problems may also emerge around the amount of capital spend needed to invest in the technology, particularly by contractors who may already be suffering from financial pressures such as debt or low margins.

The impact on labour has also yet to be fully seen. We may well be met with hostility from unions, and there may be a reduction in demand for local services that are physically based around construction sites on larger projects, as less manpower means less spending.

A reduction in local site headcount will have an impact on local tax intake generated by wages, which may have public spending and policy implications.

Overall, though, the picture is an optimistic one. The advantages far outweigh the disadvantages. As the technology develops, then the economics of construction projects will come to model themselves around it.

Within a decade, some tasks currently carried out routinely by humans will become unimaginable without automation. That may seem a scary thought, but it should not be. Automation is likely to be a game-changer and, in truth, the industry will be better for having these new tools and technologies. Together they will be our friends, and we should value them as such.