The future of construction logistics

The world is changing fast, but the industrial world can only change as fast as logistics will allow. Gerald Morgan reports.

In the years between 1811 and 1816, a workers' uprising occurred in England. The Luddites were a group of workers aggrieved by the use of weaving machines being introduced in textile mills to deskill their jobs and thus make them redundant. Two hundred years later and here we are again. This time, however, the cloud looming ominously over industry is a pixelated one, as machines learn algorithms ready to replace repetitive human actions and decisions, and with it take away our jobs.

Ever since humans invented writing we have been sharing data, and every year since then our data pool has continued to grow exponentially. More recently, since the age of computing began, we have found ways to use this data to do things only imaginable just a few decades ago. The age of computing has also meant that the world of logistics has seen huge development. People and goods now travel further, faster and by more means than ever before. The challenge now is to work out how we use that data to find new ways of working, how to use digital technology to drive efficiencies through process and to find the smartest solutions for expediting construction whilst continuing to keep costs down and improve safety.

What does the future look like for us? What will help us ensure the components required to form buildings are handled efficiently? Help us bring together all the people and equipment required to create efficient building techniques to overcome the challenges we experience now? What innovations will be in our standard toolbox of the digital age? What are tomorrow's solutions? Fast-forward 20 or even 10 years and we could be looking at a very different profession, where automated manufacturing techniques developed from building information modelling, 3D printing and other modern methods of construction are common: a scenario not too dissimilar to the journey made already by the automotive and other manufacturing industries.

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Tracking materials and ensuring the right equipment and materials are received at the right place at the right time is good logistics and is generally achievable, but with advanced technology and the smart use of data and digital modelling there are vast opportunities to make incredible leaps towards realising new and improved logistical efficiencies. This is where artificial intelligence (AI) and the Internet of Things come in.

With a building having been modelled using a digital platform, each component can be fabricated and shipped from anywhere in the world to the point of use. By using AI software with a position-tracking application, the shipment can be constantly tracked all the way to the point of use and even alert the relevant site team when materials have arrived on site and detail precisely where on site the equipment can be found. This is a step change from GPS, which is an outdoor positioning system and will be achieved using a technology now being developed called IPS (indoor positioning system).

Furthermore, these shipments can be intelligently and automatically picked and packed to contain all of the necessary components required for a particular task, allowing consolidation in its truest sense to be achieved. This has obvious benefits in reducing congestion and material handling, but will also allow materials to be delivered at precisely the time a programme dictates. Imagine electric, driverless vehicles silently breezing through the streets of the city delivering materials to site in the dead of night, self-unloading, with drones delivering materials to predetermined landing pads at the workface just in time for the next day's work.

This timing could also be remotely managed, first with automatic demand forecasting, but with an added layer of physical checks before approval of delivery is granted. Using 360° cameras within construction areas to photograph work zones and uploading images regularly will allow managers to monitor progress remotely, providing the advantage of up-to-date condition reports. These cameras may well be robot programmed to scan work areas at predetermined times or as the programme dictates.

Before installation there is the co-ordination of services and works sequencing. With a building modelled digitally the use of wearable technology in the form of smart helmets will allow us to look at ceilings and see the planned services in place, identifying clashes taking co-ordination meetings from the meeting room to the floor plate. Once installed, this same technology will allow us to 'see through' walls and ceilings, monitor flow rates and use thermal imagery to check the operation of services. Smart high-visibility jackets compatible with Geo-fencing will alert the wearer that he or she is close to a digital exclusion zone.

When it comes to installations, advances in bionics will also have developed sufficiently to be regarded as an essential element of personal protective equipment but with the added benefit of making

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people stronger. Using exoskeletons, operatives will have no problem lifting large mechanical and electrical components into position, holding them there bionically and fixing them into position, one person doing the work of two without the aches and pains caused by fatigue that slows their progress.

The question therefore may be to what extent AI can replace human endeavour.

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What does the future hold for construction logistics?