GOING
VERTICAL

CHRIS EMERY DISCUSSES HOW TECHNOLOGY CAN INCREASE PRODUCTIVITY AND REDUCE CONFLICTS AND MISTAKES IN UPWARD PROJECTS, IMPROVING DELIVERY TIMES AND BOTTOM LINES WHILE CAPTURING A TRUE DIGITAL TWIN

The idea of the sky being the limit has never been truer for the construction industry. In cities across Europe, there are already more than 500 skyscrapers, with nearly another 100 in planning or under construction. The number of tall buildings in Europe is continually increasing and at a rapid rate, as major cities try to keep up with demand for more living and working space.

We're facing the challenges of innovating new and better ways of building taller, while still having to adhere to requirements set by timelines and budgets, as well as the ever-increasing need to reduce material waste, cut carbon emissions and provide meaningful data. How can we overcome the complexities of vertical construction and deliver on-budget, on-time, sustainably built buildings that are fit for the future?

Part of the answer lies in technology, and this technology already exists and delivers benefits for forward-thinking construction firms across Europe.

Time is money
Building upwards requires a significant investment of time in design and planning to ensure the structure, while being built

and once complete, is stable and safe. To make sure project delivery teams are sticking to that meticulously crafted design, regular verification of the as-built form is critical. Without this, misplacements and deviations are easily missed, which can have a knock-on impact on progress ahead of the next scheduled scan and check, where the scale and eventual cost of the issue escalates. Verification technology also enables us to account for and adapt to unanticipated design variations almost instantly.

Verification technology has been available for years, but it has been a lengthy and expensive process. Many construction firms have needed to outsource the equipment and expertise to third-party scanning teams, meaning there would often be months between scans, due to budget constraints not permitting frequent data collection.

The reality is that without constant validation and verification on-site for every part of the build, mistakes or variations that are not tracked will inevitably lead to waste, delays and overspend.

With industry reports suggesting that 5-12% of construction budgets are being used in fixes and rework, this is a clear area

where improvements can be made so budgets aren't exceeded. A new workflow specifically for vertical construction projects has been introduced to the market just this year. A high-quality scanner combined with a robotic total station provides one device that is quick, easy to use for site engineers and feeds into powerful software that can provide reports on items out of tolerance in near real-time. For example, the GTL-1000, alongside Topcon's MAGNET and ClearEdge Verity software, enables this verification at any and every stage, while compiling a digital picture of the as-built structure. With this, reworks can become a thing of the past.

Responsible use of resources

If we look at reducing reworks through regular validation, we can instantly expect a reduction in material waste from issue areas being removed and reconstructed. Couple this with reduced time using plant and equipment for reworks, and the project could also expect to see resource savings, not only in workforce time, but also in energy usage.

As reworks have such a significant impact on budgets and timescales, there's opportunity to readjust the flow of finances into improvements on site and for the final structure. Funds can be funnelled into better quality materials that are more sustainable, more easily maintainable or are even self-regulating or healing to reduce maintenance costs for the future.

With the workforce remaining focused on optimal tasks, rather than reworks, timescales are less likely to spiral, keeping team members focused and working appropriate hours, rather than fatigued and working around the clock. This will keep site safety at the top of the agenda and allows

for a happier, more productive team.

Time savings on mistakes also give the project more flexibility and breathing space to adjust to late design changes.

Multi-stakeholder collaboration

There's a perception in the industry among many, but not all, that there's too much risk involved in sharing intellectual property – that a company's data should remain the sole property of that company and releasing that information could mean some sort of financial loss. However, a report compiled by PlanGrid found that: 'Globally, an average of 52% of rework was caused by poor project data and communication, representing a worldwide cost of US$280bn in 2018.' There's a clear cause and effect presented here that not sharing data results in financial loss, rather than the other way around.

Furthermore, if it were possible to calculate the emissions caused by these reworks across the globe, just imagine the impact we could have on global carbon reduction targets if we were able to better manage projects to avoid reworks.

But we can. Software exists that shares designs, design updates and scan-data all in real time with teams in offices and on-site, no matter where they are in the world. This ensures everyone is essentially singing from the same hymn sheet to avoid any crossovers of old and latest data sets. And technology exists to ensure all of the machinery being used is working from the same data, too – Topcon's MAGNET suite is just one example of full project delivery team connectivity.

After construction

Once constructed, ongoing maintenance of tall buildings is key. With these structures

always surrounded by other buildings in heavily populated areas – to make the most of the sky space for residents and businesses – any decay or failure could be catastrophic. Appropriate data captured during the construction of the building and once finished can be shared with building facilitators to ensure appropriate maintenance of the building throughout its lifecycle. This data can be the whole history of the structure, including the exact dimensions of steel beams, any items marginally out of tolerance that were approved, and provides a full digital twin for future planning for extensions, adjustments or demolition.

We know there is technology available to better improve the construction process of tall buildings, but take-up of this technology is slow. But Topcon's own research found current corporate culture is one of the biggest barriers to the adoption of new technology and working processes, second only to financial implications.

The adversity to risk and belief that change isn't necessary in the industry is fuel to the fire that investment in new technology isn't worthwhile. Topcon sits at the intersection of infrastructure and technology specifically to work in partnership with the construction industry to ensure these technologies deliver real, tangible results. As more businesses realise the opportunities and possibilities of technology and step away from old processes to lead the way, I hope and expect that we will see more consultants, contractors and full project delivery teams backing the technology that can help us reach new heights.

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