3D printing could massively disrupt construction, but adoption must be weighed against the moral cost

By Otto Botha

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While the global construction industry has typically lagged other sectors in the adoption of new technologies, 3D printing has the potential to be significantly disruptive and could possibly address challenges such as time-consuming labour, material waste, building delays and dangerous operations involving people.

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However, the benefits of this technology, which could have a direct impact on vast majority of the labour force on a construction site, must be carefully weighed against the moral and societal obligations of creating and maintaining jobs in the industry. This is particularly important in the context of the South African socioeconomic landscape.

Currently, there are two main types of 3D printing, with the first – plastic printing – having already seen relatively wide adoption across various sectors of industry. 3D printing has, for example, been used by temporary works companies to print one-to-one scale prototypes of clamps and other components as part of their product development process. The prototypes are then fine-tuned to work with existing equipment, before being manufactured out of their normal materials. This process is far quicker and faster than the conventional method of producing and testing prototypes.

Limited global adoption

The second type of 3D printing is concrete printing, which enables entire structures and buildings to be printed in concrete. This is the far more disruptive type of 3D printing for the construction industry, but yet has seen limited adoption across the globe. Some countries in Europe and Asia have started using it for selected projects, but it is far from taking over entire construction industries.

In South Africa, 3D printing has not seen any uptake by the industry, but local universities, such as the University of Johannesburg, are doing extensive research and testing on the concept. So, while we do possess the capability, it remains within in the realm of academia – for now.

Potentially, concrete printing would have a significant impact on the construction sector, if fully implemented. The effects would be both positive and negative, but it is also worth noting that 3D technology does have its limitations.

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In the South African environment, 3D concrete printing could be a game-changer for low-cost housing delivery, which has long been plagued by a variety of challenges, including quality and execution issues. 3D printing could – with limited resources and plant and labour requirements – create houses that are 100% built per design and could be constructed

quickly and around the clock.

Unfortunately, the impact on labour would be devastating. In South Africa – which is grappling with an unemployment crisis – companies are incentivised to employ an array of skills on any construction site, from general labourers to artisans to execute a project. 3D printing can essentially replace all these skills with one or two people onsite who would operate the printer.

There are, however, some notable limitations to concrete 3D printing. For example, scalability is limited, in terms of both height and footprint for building constructions and the current costs of equipment and skills to operate a high-tech 3D printer can be prohibitive.

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Balanced approach

It is advisable to use this type of technology in a responsible manner that is balanced against the efficiencies and cost savings that it delivers. Ideally, it should be used where it is fit for purpose, such as where the need to rapidly deliver a large volume of safe and secure residential accommodation outweighs the need to create employment. On other projects, construction should continue in the conventional way, with emphasis on creating jobs.

As it is, industry is still a good number of years away from adopting and implementing 3D concrete printing and it will certainly not disrupt the old school way of doing construction with the next three to four years. It is likely to gain more traction within the next 10 years, but the rate of adoption will probably be limited unless there is a drastic revival of infrastructure spend in South Africa and even in the rest of Africa.

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