Dual Extrusion

When Nature Calls: The World's First 3D Printed Bathroom

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Nanyang Technological University (NTU) researchers created the world's first 3D printed bathroom which took nine hours to print in concrete casting.

Researchers from Nanyang Technological University (NTU) in Singapore created what they're calling the world's first 3D printed bathrooms. Essentially, they're small 3D printed unfurnished rooms.

Professor Tan explains the benefits of the process, saying: *"By being able to print-on-demand, companies can save their inventory costs and manpower costs as they don't have to hold as much stock and their workers can be redeployed to do higher-level tasks. This approach also improves workplace safety since robots are doing the construction of the bathroom unit."*

It took just nine hours to print the small bathroom which is 1.6 x 1.5 x 2.8 m in size. It took another day to print a second bathroom which was double the size.

After printing was complete, the researchers needed five days to furnish the structures with flooring, tiles, showers, and, of course, piping, drains, and a toilet.

Although this process doesn't sound particularly quick, the researcher's claim takes half the time and money to 3D print a bathroom than it does to construct a prefabricated concrete cast bathroom which costs up to $7,000.

3D Printed Bathrooms Have Many Benefits

Prefabricated bathrooms are regularly constructed in factories and brought on-site to be assembled for HDB flats and condominiums that are non-landed residential Government Land Sale sites in Singapore.

However, this is a labor-intensive process and results in high carbon emissions, transport costs, and unnecessary wastage. By using 3D printing, it's possible to reduce these issues and build on-site, drastically reducing labor costs.

Mr Lie Liong Tjen, Sembcorp Design and Construction, and Sembcorp Architects & Engineers' team leader, offers another benefit, saying: *"Conventional construction of prefabricated bathrooms with concrete or lightweight wall panels always limit the possibilities of design. 3D printing can build curvilinear profiles (along with) rectilinear forms."*

Furthermore, thanks to additive manufacturing technology, it was possible to print a lattice shape and make the bathroom 30% lighter than prefabricated bathrooms.

The process of developing 3D printable materials was time-consuming and required expertise from mechanical, civil and material engineering, architecture and robotics researchers. Together, they've worked on developing concrete mixtures for 3D printing since 2015. These mixtures use leftover ash from a coal power plant, sand, and clay.

The resulting bathroom underwent required tests for strength and robustness and was unveiled at the NTU School of Mechanical and Aerospace Engineering.

Source: Straits Times