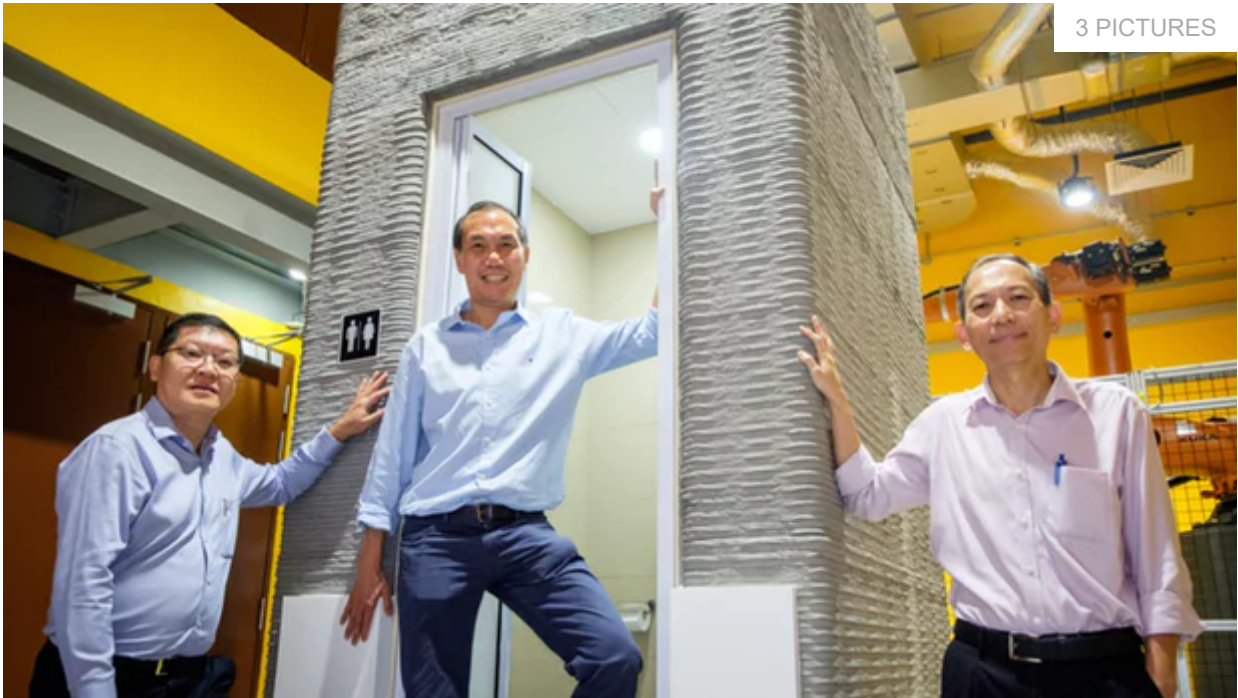


# 3D-printed bathroom units take shape in a single day



Nick Lavars 8 hours ago



(From right) NTU Associate Professor Wong Teck Neng; Lead Scientist and Associate Professor Tan Ming Jen and Er Lie Liang Tjen with their 3D-printed bathroom unit (Credit: NTU Singapore)

## VIEW GALLERY - 3 IMAGES

3D printing technology is set to have a real impact on the worlds of building and construction. Plans are already afoot for the world's first 3D-printed neighborhood, while we've already seen what 3D-printed offices, houses and even castles can look like. Adding to the mix of possibilities is a new proof-of-concept bathroom unit, which scientists in Singapore were able to 3D print in its entirety in a single day.

Key to the efficiency of the new approach, which was developed by researchers at Nanyang Technological University in Singapore, is a specially developed concrete mix, which includes eco-friendly materials such as geopolymers made from fly ash waste. The concrete remains watery enough to be properly distributed through the hoses and

nozzle of the 3D printer, but is able to harden quickly enough for the machine to apply another layer on top of it not long after.

This delicate balancing act allowed the team's 3D printer to extrude the makings of the bathroom, starting with a single W-lattice patterned layer on the ground, and then promptly adding layer by layer on top until the structural elements were complete.

According to the researchers, this approach results in a material and weight saving of up to 30 percent, and takes around half the construction time of typical prefabricated bathrooms made with concrete casting. These types of prefab bathroom units have been common in Singapore since 2014, when it became a requirement for certain construction projects that they are built off-site to save manpower and time.

The team printed two pre-fabricated bathrooms as part of the proof-of-concept experiment, producing one in nine hours and a second, slightly larger one in 12 hours. Once complete, tilings and fittings such as a sink, mirror, shower, toilet and drainage systems are added over a period of about five days. From there, the lighter, cheaper and more environmentally friendly prefabricated bathroom units can be transported to a construction site and transplanted into the building, bringing a range of benefits.



"By being able to print-on-demand, companies can save on their inventory costs as well as manpower costs, as they don't have to hold as much stock and their workers can be redeployed to do higher-level tasks," says Assoc. Prof. Tan Ming Jen, from NTU's Singapore Centre for 3D Printing. "This approach improves the safety of the workplace, since robots are doing the construction of the bathroom unit."

From here, the team is working on gaining approval from the relevant building authorities to trial the technology, and are also looking commercialize it through a spin-off company.

You can see the 3D printed bathroom come to life in the video below.

Source: [Nanyang Technological University](#)