

STORE OF THE FUTURE // SEPTEMBER 24, 2024

# Walmart explores 3D printing as new way to construct retail buildings

By Mitchell Parton



Alquist 3D

BEFORE BECOMING A MAINSTREAM METHOD OF COMMERCIAL REAL ESTATE CONSTRUCTION.

Walmart partnered with Colorado-based construction company Alquist 3D this summer to build an almost 8,000-square-foot addition to its store in Athens, Tennessee, space that will be used for online pickup and delivery services. This is the first time the retailer has used 3D-printing technology at this scale and a rare use of the technology in a commercial context. 3D concrete printing, using large robotics pumping out concrete mixtures to construct buildings, has often been explored as a potentially less expensive and faster way to build homes. One of the biggest examples is a new [community of 100 3D-printed houses](#) near Austin, Texas, by a robotics startup called Icon.

Founded in 2020, Alquist 3D moved its offices last year from Iowa City, Iowa, to Greeley, Colorado. The company is also working to build homes and modular infrastructure for the city. “We are trying to create capabilities that can make better, greener, stronger, cheaper, faster structures,” Patrick Callahan, CEO of Alquist 3D, told Modern Retail. “Could be anything from commercial buildings to standard real estate to infrastructure, green space elements, you name it.”

Though the technology is so far predominantly used to build houses, the Walmart project showcases how 3D printing could also become a new way for retailers to quickly construct buildings like this addition. Callahan said other retailers have also reached out to Alquist and that the company is interested in working with more retail clients, and the company has more work with Walmart to come.

Mike Neill, vp of construction for Walmart U.S., said the retailer looked into several printing methods and companies and landed on Alquist based on its knowledge of 3D materials, robotics and interest in the project. “Walmart is always looking to innovate and leverage developing technologies,” Neill told Modern Retail in a statement. “As we dug deeper into the opportunities within 3D concrete printing, we decided it was a direction worth exploring.”

Callahan sees several benefits of 3D printing a building over traditional construction. While he said the Walmart project ended up around the same cost of traditional construction — he declined to disclose specific prices — he believes it could be less expensive when the technology is fine-tuned, and mistakes are avoided, especially as the projects only require a few people on site. It could also be faster; it took 45 days of printing but Callahan believes that could be cut down in half. The material, he added, is more sustainable, using recycled and near-carbon-neutral materials, and the company is building toward using completely carbon-neutral materials. The buildings are also more resistant over time, he said, as the concrete is so strong it may require less insulation and structural engineering than traditional builds.

Only a small number of 3D-printed buildings exist so far; a 2023 report from 3D printer manufacturer COBOD only found 130 3D-printed buildings at that time, and 55 were newly constructed in 2022. But it’s especially compelling for homebuyers, as housing prices have skyrocketed. Earlier this year, Austin startup Icon said its new Phoenix multi-story construction system would cut the cost of the average American home’s wall system by up to \$25,000.

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Alquist won the bid for the Walmart project in the spring, and it took place over the summer. Early on, the project faced numerous setbacks due to weather and tech, especially while the teams were still learning how to print such a large project for the first time in a new environment. Because the concrete material sets quickly, it is difficult to correct any issues when layering the concrete.

“When we had an issue early on, and say, you had a flash in the material and it wasn’t printing correctly, if you weren’t like a NASCAR crew in pausing and cleaning up your hoses and your pump, you could lose all of your hoses because the material would literally harden in the hose,” Callahan said.

Controlling the temperature of the concrete material was especially difficult in the Tennessee summertime heat and humidity, where Alquist had to switch to printing only at night, at which point things went more smoothly.

Julie Hyson, who oversees portfolio clients, services and industries in the Americas for commercial real estate firm JLL’s project and development services arm, said she has yet to hear of any clients expressing interest in concrete printing.

“It’s in its infancy,” Hyson said, adding that 3D printing still has to evolve to meet the demands clients have on aesthetics and quality control. There are also different hurdles in getting new innovations to scale, such as permitting, code compliance and conversations with unions. “I don’t think this is something that’s a crazy long shot; advancement happens much more quickly now, and I imagine at some point in time, this will be a method that people really consider.”

But Hyson said companies are broadly interested in innovation within construction. “Anytime something can make it better, faster, cheaper, safer to get from point A to point B on any portion of a construction project, there’s a lot of interest and investment in that.”

Matt Abeles, vp of construction technology and innovation for construction trade organization Associated Builders and Contractors, also said that while high initial costs, limited materials options and regulatory uncertainty may slow widespread adoption, it has the potential to “revolutionize” construction, addressing workforce shortages, reducing materials waste and increasing project efficiency.

“As the technology evolves and becomes more affordable, it’s likely that contractors will continue to apply the technology more routinely,” Abeles said in a statement.

From drones to self-driving cars and cooking robots, large retailers like Walmart are in a race to find the next technologies to help streamline all parts of their business and reduce the need for as many human workers. In some of its warehouses, Walmart is using self-driving forklifts from a company called Fox Robotics to automate parts of its supply chain.

For Callahan and his team, the goal of the project was to prove concrete printing could demonstrate commercial viability. Though the team went through plenty of challenges, Callahan said the company was

“The second half of the print, we showed the consistency, we started to show the cost savings, we showed the speed, we showed the safety, we showed certainly the green factor, the beauty of the building and the [resistance] is obvious,” Callahan said. “Now, what they want to see is through one entire build, how fast can we actually go and how much can we actually save now that we’ve learned all of these lessons.”

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