

Turner Innovation

ROBOTICS FOR AUTONOMOUS LAYOUT

Turner field tests robots that bridge the gap between BIM and the field - printing layout plans directly from the latest digital drawings - and eliminating many of the manual steps associated with the transfer of building plans to onsite crews.



Robots, bionics, and autonomous machines have enormous potential to make construction safer and more efficient. As such, we actively pursue solutions that leverage these technologies to help the company build smarter.

One of the ways Turner accomplishes this is through the Innovation team's strategic pilot program which engages early-stage startups like Dusty Robotics - the company behind the development of the FieldPrinter an autonomous layout robot.

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Initial pilot tests of Dusty's FieldPrinter were conducted at Turner's New Natural Resources Headquarters project in Sacramento, California to systematically compare

*Above: The Dusty Robotics FieldPrinter layout robot was implemented on the New Canaan Library in Connecticut. The team used the robot to layout wall and soffit locations, ductwork openings, and print ceiling heights and door numbers directly onto the slab. **Using the robot allowed the team to complete 42,000 sq. ft. of layout in five days with a single person.***

traditional layout to an automated solution. "The pilot program was a natural fit for this project," said Alan Sanoja Virtual Design and Construction (VDC) Project Manager for the 20-story office tower. "We've modeled the project extensively with BIM and our office floors have a lot of repeatable layouts providing optimal conditions to test the robot's capabilities."

During field tests the robot primarily performed interior wall layout for offices and reflected ceiling plans within test areas. Then, the project's trade-partners performed traditional layout to help validate the robot's markings for accuracy.

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Field tests are crucial to any pilot and help us to validate whether a new technology can be a difference maker in delivering value to our project teams and clients.

In addition to printing wall layout and reflected ceiling plans, the robot marked points for MEP hanger locations, printed dimensions with text for framers, and printed room labels directly from the latest drawings. Under optimal conditions, the robot could lay out roughly 4,000 linear feet of drywall per day, and according to Tessa Lau, Dusty's co-founder and CEO, subsequent generations of the robot will be significantly faster.

Early impressions of the FieldPrinter were extremely positive, and the Natural Resources team saw a lot of potential in the autonomous solution. "While there was more time spent upfront to prep the robot, once it started working it was significantly faster, more accurate, and more efficient than a human at performing layout," remarked Jim Hull, Sr. Project Manager. "Instead of laying out offices one at a time, the robot determines the most efficient route to layout multiple offices simultaneously."

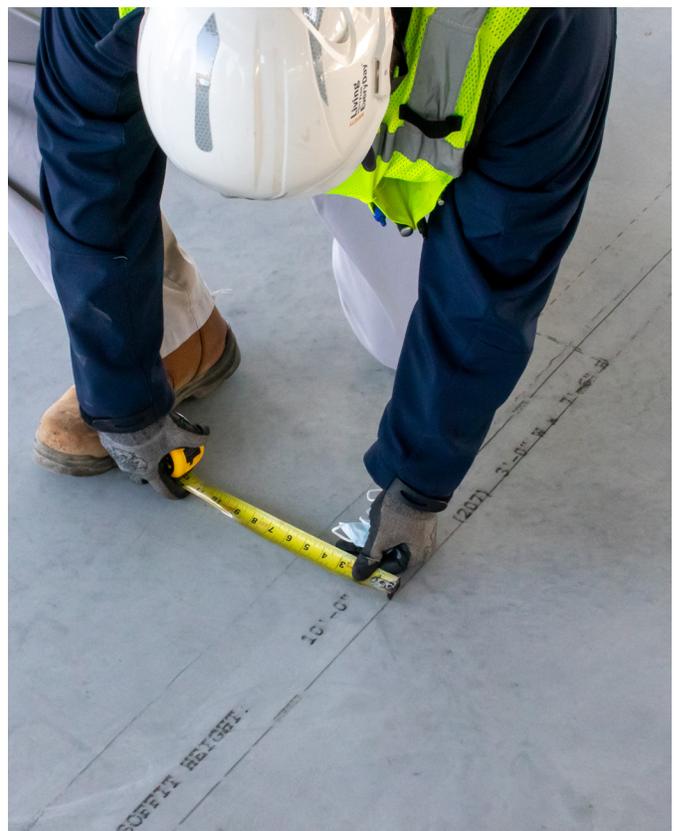
The robot is also able to layout multiple trades at once. This helps the robot to complete layout processes ten times faster than traditional methods and allows Turner to identify and resolve issues between systems sooner.

On one Turner project, implementation of Dusty Robotics' FieldPrinter led to a 5X increase in layout speed. Importantly, the layout was 100% accurate thereby eliminating any need for re-work. Use of the tech on the project was cost neutral.

Engaging with innovative construction technology start-ups is one way Turner stays at the forefront of innovation and plays an active role in advancing innovation in the industry. Piloting with early-stage startups gives Turner early access to bleeding-edge technologies and provides the opportunity to influence the development of solutions that can help architects, engineers, and construction managers overcome the unique challenges of the built environment.



Above: An early prototype of FieldPrinter is prepped for testing.



Above: The robot's markings are validated for accuracy.