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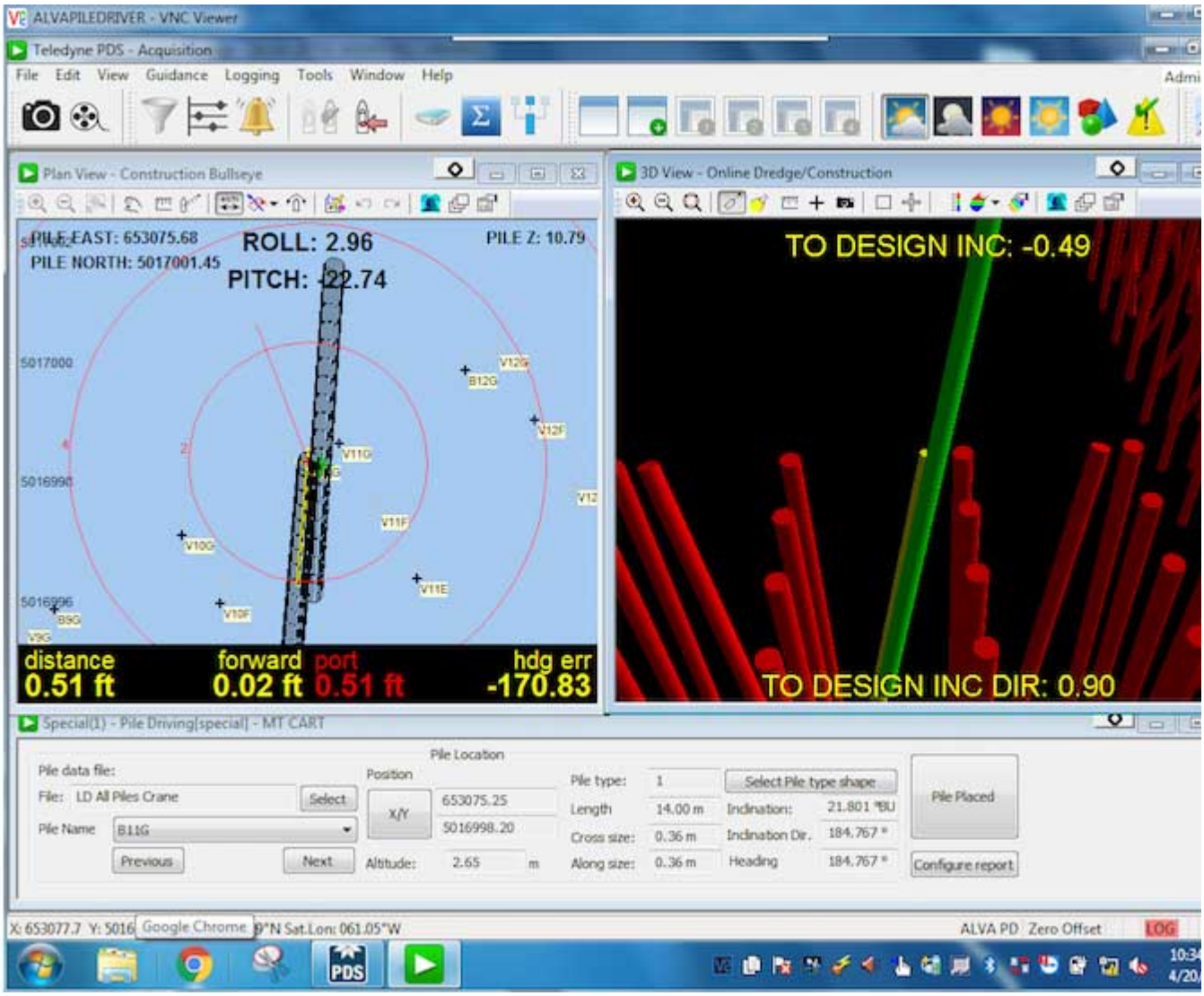
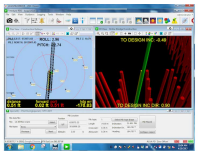
Contractor Reduces Marine Pile-Driving Time with 3D Controls



The 3D controls for the pile installation used a simple, color-coded graphic to indicate when the piles were positioned c
engaging the hammer.

Image Courtesy of Alva Construction



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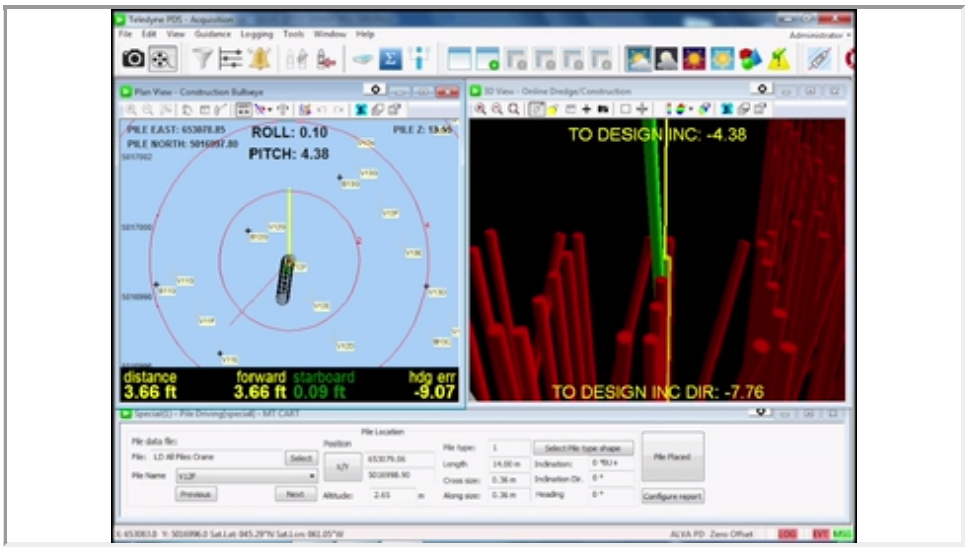
Judith Powers

Faced with a difficult marine pile installation, Alva Construction Ltd., Antigonish, Nova Scotia, found a way to simplify pile positioning and visualization using a version of Trimble Marine Construction (TMC) software, custom-designed for the project.

The project called for the replacement of a fishing-boat wharf in Little Dover, Nova Scotia. With completion scheduled for November 2017, the project includes more than 40 meters of cribbed timber piling in addition to 80 meters of timber piling wharf with concrete cap and deck. There are 180 piles in the section: 132 vertical and 48 batter piles, which are driven at an angle.

Positioning the piles and adjusting the angles of the batter piles previously had been accomplished by crew members in a raft, which, in addition to being time consuming, presented an element of danger to the crew. When Reg Tramble, engineering manager for Alva Construction, was looking for a more economical method of positioning the piles, he met with engineers in March at the Trimble GPS booth at the CONEXPO-CONAGG trade show in Las Vegas.



Tramble's local SITECH dealer suggested that, at the show, he contact Lou Nash of Lakeland, Fla.-based equipment dealer Measutronics. "We use GPS machine control on our excavators and dozers and were trying to get the system to work on our floating crane," says Tramble.

Trimble was demonstrating its new TMC software, a rebranding of Teledyne's PDS (port-dredging survey) software, which was the result of a partnership announced by Trimble and Teledyne at CONEXPO. On display were screen shots from a dredging project that showed a colorful, 3D real-time image of the dredge, waterway bottom and changing project statistics, such as the amount remaining to be dredged, the amount already dredged, equipment position and bucket position.

At the show, Tramble brainstormed with Nash about creating a pile-driving version of the system, using the Trimble GPS system and TMC software in a dedicated application. A systems integrator and equipment dealer at Measutronics, he has been creating marine construction solutions, including for pile driving, for 20 years. The two came up with a plan for what Tramble needed, and Nash agreed to create the software and install the system on Alva's barge-mounted Terex crane, which is fitted with a fixed-lead Birmingham VTL (vertical travel lead) pile-driving system and Pileco diesel hammer.

Back at Measutronics headquarters, engineers created a mock-up of the proposed system for placement of the GPS receivers and antennas, angle sensors and other hardware on the equipment and in the cab. Teledyne programmers in Rotterdam wrote new software for the drivers that ingested the data from each sensor, and TMC systems specialist Nathan Keys worked with Nash to create operator screens that show a simple, accurate method of positioning a pile before and during engaging the hammer, along with monitoring and displaying other statistics of the ongoing project.

On the screen, the selected pile is displayed in green and the design location is displayed in yellow. "Basically, they want to move the green pile onto the yellow one," said Keys.

Using the joysticks, the operator moves the green pile toward the yellow one, fine-tuning it at the end by watching the changing numbers that display the distance to the correct heading and inclination. Once all the numbers are at zero, the hammer is engaged.

The system was ready to go 10 days after CONEXPO closed, and Measutronics installers took it to Nova Scotia. "Our crew came up with a mounting system that protected the [external] equipment, mounted on the lead," says Tramble. This included the two GPS antennas and the pitch-and-roll sensor. The cab-based equipment included a laptop computer to run the TMC software and the Trimble GNSS receivers, which provided position and heading.

After the equipment bracket was in place, followed by three days of installation, calibration and training by Measutronics, the system was put to work.

"We were already working on the project, and it was 65 percent complete before the system was installed," says Tramble. "This gave us a comparison between pre- and post-install times. For the vertical piles, it took 40 to 50 percent less time. For the raked [batter] piles, we were still on a learning curve and saw a 25 percent decrease in time, but I think it will go up to 50 percent in the long run," he says.