

A Faster Path to Rebuilding After Hurricane Maria



The Trimble SX10 captures scanning data at a tank farm. In addition to operating as a conventional total station, the SX10 can capture precise scanning data.

A catastrophic storm inflicted serious damage to Puerto Rico's liquid fuels supply system.

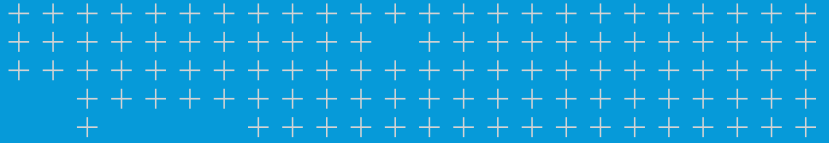
By using Trimble technology, a San Juan surveying company helped to speed the reactivation of key energy infrastructure.

Solution

Trimble® SX10 Scanning Total Station

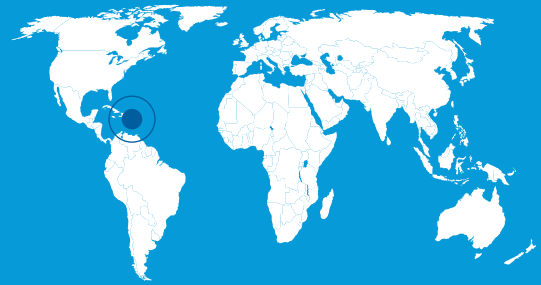
Trimble Business Center Software

Trimble RealWorks Software



overview

When Hurricane Maria struck Puerto Rico it delivered a devastating blow to the island's energy infrastructure. Before critical fuel storage tanks could be reactivated to supply essential needs, the massive structures needed to be inspected to assess any damage caused by Maria. In order to quickly provide the required information, a leading surveying firm used laser scanning to capture comprehensive data on tank interior and exteriors. The results enabled tank operators to ensure safety and integrity in their work to recover from the crippling storm.



Location
PUERTO RICO



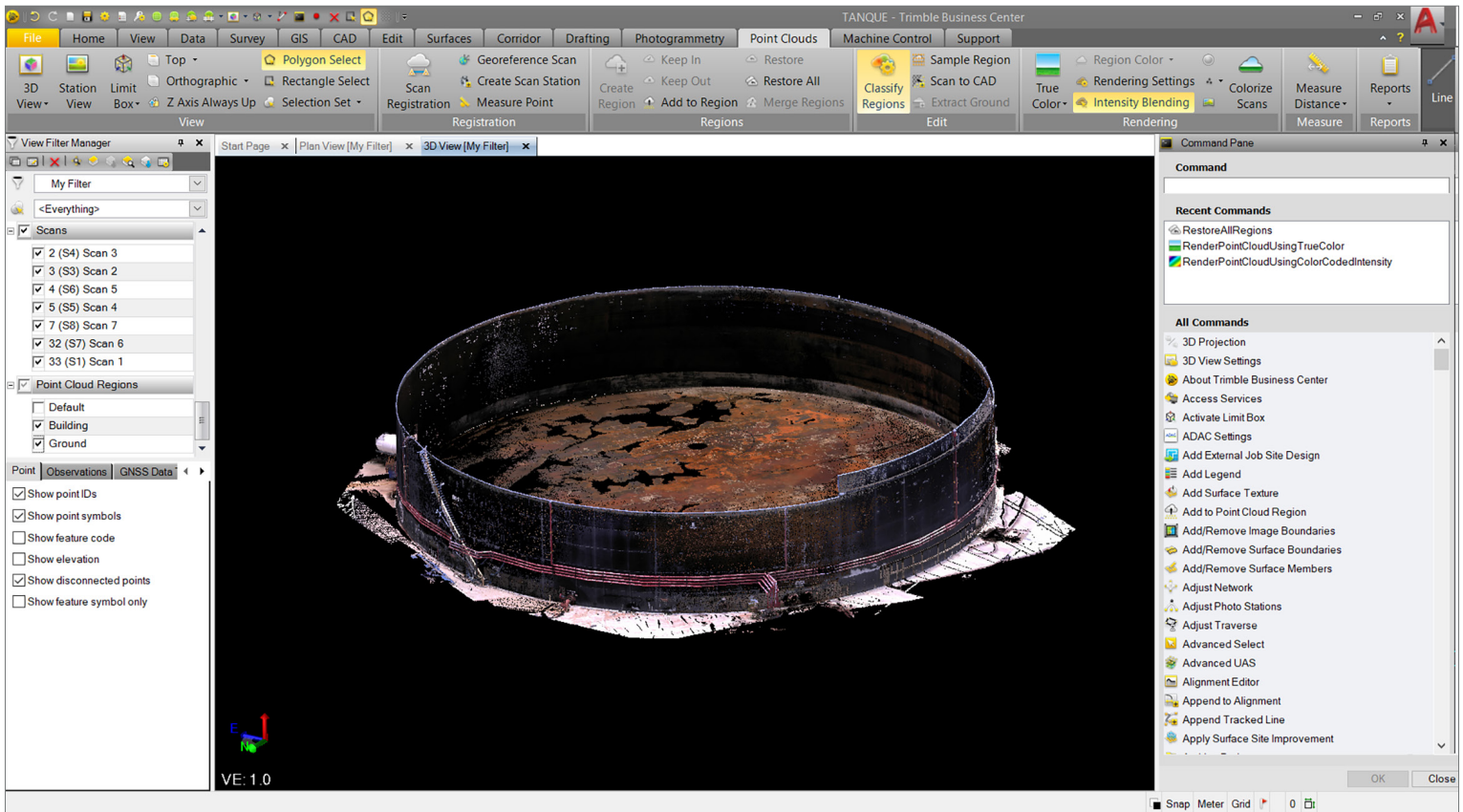
The effort to restore the flow of gasoline, diesel and other fuels to Puerto Rican residents and businesses hinged on getting the terminals and tank farms at Yabucoa back into operation. While major damage including collapsed roofs could be easily assessed, subtle issues such as small deformations in a tank could have consequences when the tank was refilled. The tanks would need detailed inspection and there was no time to spare.

Tank farm operators contacted Carlos Fournier, president of Mforce Surveying to collect data on tanks up to 250 feet in diameter. With a strong background in surveying, Fournier knew that laser scanning would be the best way to approach the work. "3D scanning is very valuable on sites like these," he said. "We can collect comprehensive data on complex structures. The fieldwork moves efficiently, and the comprehensive data eliminates the need to revisit the site." To handle the work at Yabucoa, Mforce selected the Trimble SX10 Scanning Total Station.

ON-SITE EFFICIENCY

The crews planned the work carefully. For each tank, they determined optimal locations for the SX10, selecting four or five intervisible setup points that provided a complete view of the tank. At every point they established georeferenced coordinates by using a Trimble R8 GNSS receiver in conjunction with Puerto Rico's VRS network. Then the crews set up the SX10 and used the surveying workflows in Trimble Access software to capture high-accuracy point clouds of the tank exterior. When surveying out-of-service tanks, the Mforce team could also work inside the tank by using the SX10 to capture data needed to examine the condition and flatness of the tank floor. The crews needed just five days to complete the work to establish control and scan five tanks.

Fournier downloaded the field data from Trimble Access into Trimble Business Center Software (TBC). "With TBC

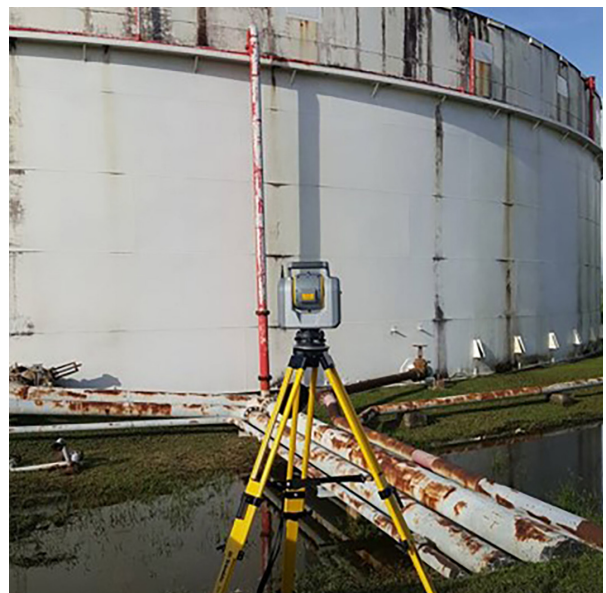


A completed tank point cloud is displayed in Trimble Business Center software. The software combines data from GNSS, total stations and 3D scanning to produce integrated, georeferenced information.

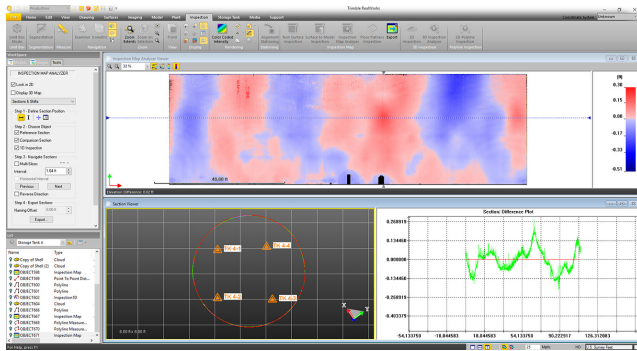
we combine the GNSS positions with the total station and scanner measurements,” Fournier said. “Because the SX10 data was already georeferenced, we did not need to register or combine the scans. That step was already done, which saved a significant amount of time and effort.”

SPECIALIZED TOOLS FOR DATA ANALYSIS

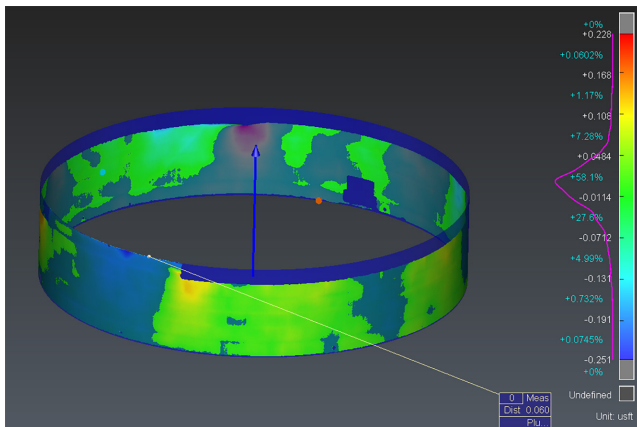
Fournier used Trimble RealWorks software to examine the tanks. The RealWorks Tank module can model a tank and develop heat maps and other analyses that reveal issues in roundness and verticality of the tank shell. Mforce technicians used RealWorks to produce deliverables based on American Petroleum Institute (API) Standard 653 specifications for tank inspection. Information from the Trimble system was also shared with Autodesk Revit software for additional modeling and engineering analysis.



The Trimble SX10 collects data to produce a point cloud of storm-affected storage tanks. An entire tank can be scanned in less than one day.



Tank inspection tools in Trimble RealWorks software reveal changes in roundness and verticality in tank shells.



Best fit cylinder analysis provides visual tools for deformation analysis.

The accuracy of the SX10 scanning was essential for the work. “When you looking for deflection of one or two inches on a tank over 200 feet in diameter, you must have complete confidence in your measurements,” Fournier explained. “Some of the deformations occurred high up on the tank walls and could not have been detected without the accurate scanning.” The tank farm operators used the results from Mforce to make informed decisions about repairs and maintenance work on the tanks.

Fournier’s experience at Yabucoa is part of his strategic approach to the company’s growth. Scanning is a key part of Mforce’s success, with projects including tanks, buildings, civil infrastructure and the Arecibo radio telescope.

“The SX10 opens up a lot of opportunities to combine surveying jobs with 3D modeling. Surveyors should embrace this technology and use it to expand their businesses and the profession overall.”

– Carlos Fournier, President, Mforce Surveying, PSC



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