



EQUIPMENT USED

- Trimble® FX™ 3D Laser Scanner
- Trimble RealWorks® Software
- Trimble LASERGen™ Software Suite

Trimble FX Scanner Charts a New Course in Open-Sea Scanning

This wasn't your usual scanning project: A dredging company wanted to know whether it would be technically and economically feasible to convert one of its ships—a stone dumper—into a cable layer. The challenge: Accurate line plans of certain parts of the ship were no longer available and re-measurement was required. On top of that, the ship was deployed on a major 24/7 offshore project in the Baltic Sea and would be virtually impossible to dock so the surveyors could complete the job onshore. The solution: Dutch firm Stemar Engineering bv was hired to take critical measurements at sea.

ABOUT THE CONTRACTOR

Stemar was founded in 1975 and has an excellent reputation as a service engineer for heavy industry. The company is based in Alkmaar, 45 km (28 mi) north of Amsterdam and its clients include the process, steel and offshore industry, as well as shipbuilders and petrochemical companies. In 2005 Mark Rood and his partner took over the firm, expanding the client portfolio from predominately Dutch to companies worldwide. "They (our clients) know they can rely on us for the design, engineering and construction of factories, pressure vessels, drilling rigs and ships," Rood says.

Stemar flew to Finland for this project. Blue Offshore, a marine installation contractor and cable-laying specialist, had conducted a feasibility study on behalf of Tideway for the conversion of the stone dumper into a cable layer. The converted ship would be deployed at the wind park on Thorntonbank, 30 km (19 mi) off the Belgian coast from Zeebrugge, to interconnect to the transformer station at sea. Forty-eight new turbines would be installed, each capable of producing 6 megawatts of peak power. When complete, the Thorntonbank would supply

325 megawatts of green electricity to the Belgian grid.

"When we were hired, the stone dumper (aptly named Tideway Rollingstone) was active 24 hours a day, 7 days a week in the construction of the Nord Stream pipeline in the Baltic Sea," Rood says. "Since the daily rate of that type of stone dumper is very high, there was no possibility of the ship being held at port for us, even for half a day. We were lucky to have a Trimble FX Scanner."

CHOOSING A SCANNER

Stemar had purchased the scanner in April 2010, after carefully comparing competitive instruments from other manufacturers. The scanner is specifically designed for use in industrial, offshore and shipbuilding platform environments where fast, clean, accurate data is necessary. It rotates on a horizontal and vertical axis and measures the position to all objects in a 360° wide and 270° high field of view. The instrument can measure and store more than 216,000 3D points per seconds.

"We chose the Trimble 3D laser measurement device because it delivers the purest scatter plot (point cloud), which is a huge plus in the process industry," Rood says. Its compact size and light weight (11 kg or 24 lbs) also allowed Stemar to set it up quickly on its tripod or support stand and easily move around, enabling them to carry out many measurements in a short time.

FROM PORT TO PLOTTING

Stemar flew a team to Finland to measure the Tideway Rollingstone. At the time, the ship was travelling day and night back and forth between the port of Kotka, where stones were dumped in the hold, and out to sea where the cargo was dumped. The hold could only be measured when the empty vessel was returning to port.



At 10 p.m. Rood and his team were picked up at their hotel near Kotka, about 140 km (87 mi) east of Helsinki on Finland's southern coast. They took an hour and a half ride to the wharf, where they waited another hour until the pilot boat arrived to take them to the Rollingstone.

"It was just before 5 o'clock in the morning when the pilot boat pulled alongside the stone-dumper," Rood says. "The entire cargo was poured into the sea and a ladder was thrown down to let us climb onboard with 25 kg (55 lbs) of equipment. We had already calculated that six scans would be needed to measure the entire hold, so we got to work right away. Unfortunately, our stand had not been flown over and we first had to find one on the ship, which luckily proved not to be difficult."

Rood and his team scanned the cargo area non-stop from the moment they climbed onboard until they returned to port. "By the time we finished the last scan, the ship was docked again," Rood says. "It was 7 o'clock in the morning and the conveyor belts were pushed above our heads to dump a new load of stones into the cargo hold."

While the stones were being dumped in the hold, Stemar's team took an additional eight scans of the sides and stern of the ship. In the process they made an outflanking movement, and covered a U-shaped track with a path length of 80 m (262 ft). The entire job was complete before the ship was loaded again, allowing the Rollingstone to maintain its tight schedule.

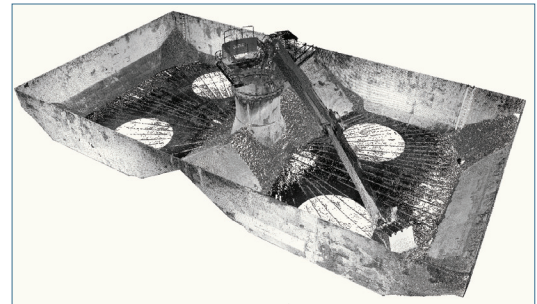
It was a major advantage that the Trimble FX Scanner is not compensated since everything was measured on the ship, Rood says. "Devices with dual axis compensators consume extra electricity. The scanner is set up

on the ship itself, so the rolling and pitching do not affect the results. "Thus, a stabilization system for our application was totally unnecessary, and we were able to use the full charge of the battery for scanning."

BACK ONSHORE

Back in Alkmaar they processed and recorded the data. The registration involved the seamless connection of the different scans using targets or benchmarks set at the beginning of the measurements on the ship. Stemar used Trimble RealWorks® Software, which they also used to view the data and for the conversion of the point cloud into 3D CAD models or surfaces that allow designers to work in the latest CAD programs. In parallel with this, Stemar used the Trimble LASERGen CAD plug-in to utilize the point clouds inside AutoCAD. The CAD plug-in can be used for designing and checking the new model fits the existing conditions, which provides customers with added confidence and lowers the risk of costly rework.

The 3D model of the ship compiled from the 14 scans was not only very clean, but also very accurate, Rood says. "We used the thickness of the steel hulls to check this, and according to our scans, the steel panels were 17 mm thick, while the actual thickness was 20 mm. Our measurements were therefore accurate to 3 to 5 mm.





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Given the circumstances, that is pretty impressive.”

CHANGE OF DEVELOPMENTS

The planned conversion of the stone-dumper to a cable layer was fairly substantial. At the place where the panel and the crane are located, a 4,000-ton carousel was to be fitted with electrical cables. To unwind this carousel evenly, a tensioning device also had to be provided. Space was to be made for a diving robot, which meant that Stemar’s brief was not limited to measuring. “Blue Offshore asked us to make a new deck layout and provide all the associated modifications to the ship,” says Rood. “Our design plans served as the basis for a detailed cost estimate, but shortly after the measurement of the vessel Tideway abandoned its plans for the Rollingstone. That decision was all to do with recent developments in the market and was independent of the feasibility study in which we cooperated.”

STEMAR AT THE HELM

The measurement of a stone dumper like the Tideway Rollingstone would typically be awarded to a specialist offshore surveyor, but a technical company like Stemar, which focuses on design and engineering, had the knowledge and experience to take command.

“The Trimble FX Scanner is perfect for these kinds of measurements,” says Rood, who had trained his employees in its use. “By taking the measurements ourselves, we keep the communication lines short. That means faster and better service for our clients.

“The scanner offers our engineers maximum security in all cases,” he adds. “Everything in the field of view is measured with the same accuracy. Sometimes details that seem irrelevant during the scan prove to be very important in the design phase. With the Trimble FX Scanner, you can be assured that you will never be short of measurements.”