



The Power of Real-Time Surveying



Geomatikk Survey's Svein Ivar Vestbø looks back at the helicopter that flew him and his colleague, Even Sellevol, up to the power lines in the mountains of Leikanger.

An unexpected discovery helps a Norwegian survey company redefine real-time surveying and reap the benefits of new business opportunities

In Norway's Sogn og Fjordane County, energy companies often use traditional survey methods to adjust the sag of newly constructed power lines. But for a power line in the mountains of Leikanger, the precipitous landscape and long span were too much for traditional techniques. Using advanced total station technology, a Norwegian survey company helped adjust the lines

Solution

- Trimble SX10 Scanning Total Station
- Trimble R10 GNSS System
- Trimble Business Center Software

quote

“The ability to switch between total station surveying and scanning with one instrument allows us to be more efficient, both in time and costs. The SX10 is giving us the ability to take on projects that require real-time surveying and opening up a whole range of business development opportunities.”

Even Sellevoll, survey engineer, Geomatikk Survey



Location
AMSTERDAM

in real time, shortening the project from several days down to one and securing repeat business.

In August 2017, Geomatikk Survey was commissioned to measure and adjust the sag of a new, 450-m-long section of four power lines that their customer, BKK Enotek, had just installed. The survey crew originally planned to use the company’s newly acquired Trimble SX10 scanning total station to acquire the needed measurements and process the data in the office to calculate how much adjusting the lines needed. But then...

“When we pointed the SX10 at the first power line, the sensor automatically locked on to the line itself, without a prism,” said Even Sellevoll, a survey engineer with Geomatikk Survey. “We didn’t know that it would do that. That discovery meant that we could not only more easily and accurately survey the lines, we could adjust their sag in real time, directly in the field.”

Sellevoll and a colleague Svein Ivar Vestbø initially used their Trimble R10 GNSS receiver and SX10 total station technology to establish project control. Then, standing beneath the utility tower at one end of the line, they aimed the SX10 directly overhead and collected a point where the cable connects to the tower, a process they repeated for each power line. Setting up underneath the other tower, they acquired four more connection points. With the instrument’s controller, they determined a chord between each power line’s end points and established a vertical offset from the chord down to the



The Geomatikk team used the Trimble R10 and the SX10 to establish ground control.

existing power line. Given the length of the cables and their above-ground height of 25 m, BKK specified that each cable's sag needed to be 6.26 m below the chord at the lowest point.

Measuring to an accuracy of 3 cm, the Geomatikk Survey team determined that each of the four power lines was hanging between 1.5 m and 2 m below the acceptable sag limit.

To calibrate the tension, Sellevoll aimed the SX10 at a line. When it locked onto the cable, he telephoned a BKK crew positioned in the valley's transformer station. He then followed the cable's movements in real-time, guiding the tensioning crew until the line's sag was in the correct position. He repeated this process for the other three cables.

Although a scan of the power lines wasn't required, Sellevoll and Vestbø used the opportunity to test the scanning capabilities of the SX10 and provide detailed 3D-derived documentation to their client.

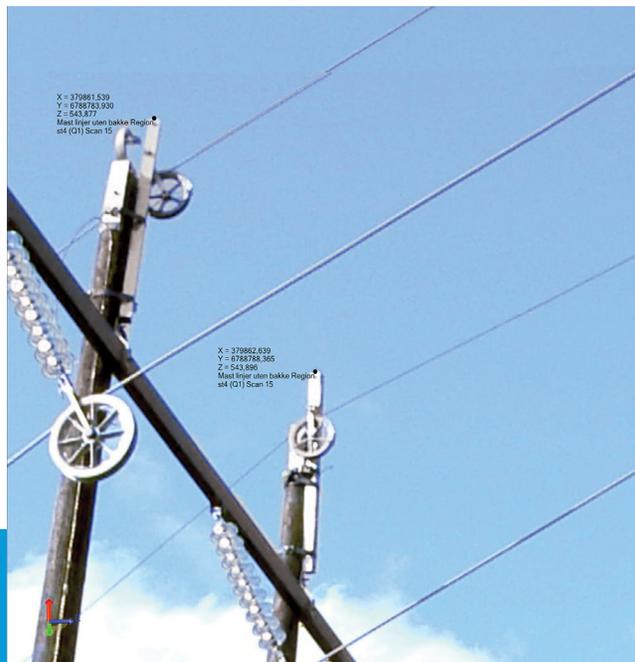
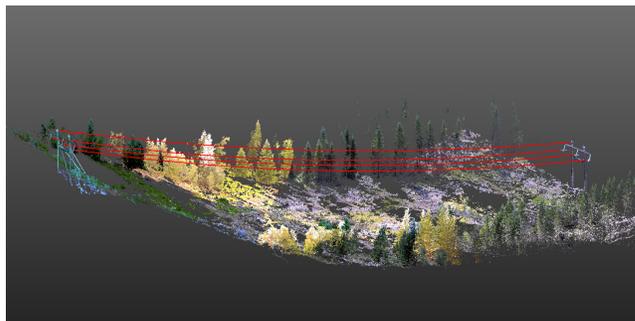
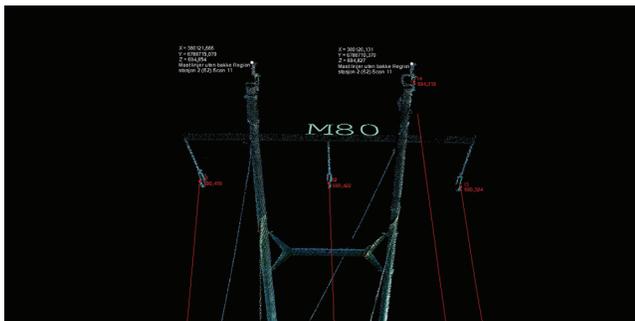
Setting up near each tower, with the cables about 18 m overhead, they scanned the entire span in two scans, one from the top of the slope and one from the bottom. Collecting 26,600 points per second, each scan took about 10 minutes to complete.

Back in the office, the Geomatikk Survey team needed just one day to use Trimble Business Center software to integrate the point cloud and survey data, and then produce a vector-based report to verify that the power lines were adjusted to BKK specifications.

Based on their success in Leikanger, BKK commissioned Geomatikk Survey to perform sag measurements on a different section of the power line. Not only was the new technology a game changer in the field, it is proving to be a valuable business development tool.



The Geomatikk crew acquired two scans of the power lines. Here the SX10 scans from the bottom of the slope while Even Sellevoll monitors the controller.



Top left: The point cloud of one of the power line towers.

Top right: Capturing 26,600 points per second, the Trimble SX10 collected a 3D scan of all four power lines and two towers in 20 minutes.

Bottom left: Even Sellevol uses the Trimble R10 to spatially ground the project data.

Bottom right: The Geomatikk team used the SX10's digital camera to snap a photo of the top of one of the power line towers.



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