

Keeping Everyone in the Loop



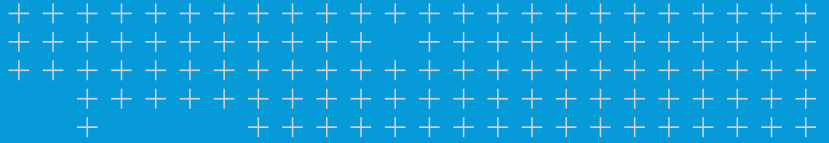
Work on the Bergen Light Rail Project is not delayed by winter weather. The all-season Trimble SX12 operates in the cold without issues.
Photo credit: NCC

How a light rail project uses
up-to-date 3D models in the
field to improve collaboration
and reduce errors

Trimble's advanced scanning total station
expedites surveying with a high-precision
laser pointer and integrated cameras

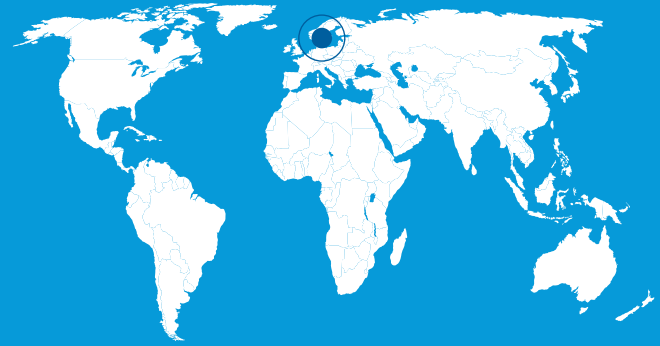
Solution

- Trimble® SX12 scanning total station
- Trimble TSC7 controller
- Trimble Access field software
- Trimble Business Center office software
- Trimble Connect collaboration software
- Trimble Sync Manager™ desktop app



overview

The complex Bergen Light Rail Project in Norway is being completed using innovative sustainable construction practices including paperless design. To receive and work with their client's IFC-formatted 3D models, Nordic construction company NCC utilizes a Trimble SX12 scanning total station and a TSC7 controller. Easy access to models in the field helps workers visualize the desired results and implement the design accurately.



Location
NORWAY



In 2019, Bybanen Utbygging, an agency within Vestland County Municipality, selected NCC as the builder for two sections of the Bergen Light Rail Project. NCC completed the D16 Fyllingsdalen section in mid-2021 and is currently working on D14 Mindemyren.

The D14 project consists of replacing existing infrastructure, establishing a project-design line for 1.6 km of light rail double track, building new underground infrastructure and a new road alongside the track, as well as the realignment of watercourses. In addition, NCC's responsibilities include approximately 800 storm water, wastewater and drinking water manholes and a multitude of concrete constructions, such as a highway bridge, a tunnel portal, and supporting walls.

Bybanen Utbygging supports "greener" light rail design, construction and operations, with an emphasis on environmentally friendly solutions. With this in mind, the county decided to go "paperless" and provide all building information to contractors via 3D models.

The construction process starts with the measurement of existing structures, then the majority of soil and existing infrastructure is removed, and new soil and infrastructure are put in its place to upgrade the entire area. NCC selected a Trimble SX12 scanning total station and a TSC7 controller running Trimble Access software to efficiently handle the all-digital workflow and expedite data capture and new construction in this active industrial and commercial area.



During portal construction on the tunnel leading to Fyllingsdalen, the Trimble SX12 is used to set the beams and supports at exactly the right height from the floor so no further adjustment is needed as construction progresses. Photo credit: NCC

POWERFUL TOOLS DELIVER RESULTS

The Trimble SX12 combines the capabilities of a high-accuracy robotic total station and a high-speed 3D laser scanner in one piece of equipment, providing flexibility and efficiency for a variety of activities. Several performance upgrades included in the SX12 made it an attractive solution for the Bergen Light Rail Project.

The green focusable laser pointer is a major enhancement that yields the smallest spot size in the industry, just 6 mm at 100 m. Also, integrated cameras in the telescope produce sharper images with richer colors and less

noise. The narrowest field of view can be used to create extremely detailed metric panoramas with a pixel size of less than a millimeter at 50 m.

“We chose to buy the SX12 because the three integrated and calibrated cameras in the telescope, combined with the green laser pointer, allow a single operator to perform concrete stakeouts straight from IFC files provided by the client,” said Richard A. Olsen, Chief Survey Engineer with NCC. “The cameras are very useful in situations with lots of traffic, fences and other obstacles that can interrupt line of sight, enabling the operator to see where the obstacle is and take necessary action to rectify it.”

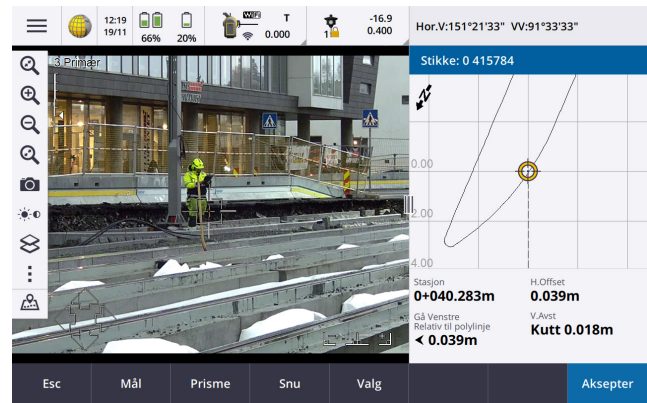
The integrated software also streamlines the post-processing workflow and the distribution of revised models. Trimble Business Center is used to export laser scan data and perform network corrections and traverse calculations. The IFC files are loaded into Trimble Connect, and Trimble Sync Manager synchronizes jobs and data between the TSC7, Trimble Connect and Trimble Business Center. With the right tools in the field, workers easily extract the most current measurements, contour heights and other details on demand, which makes the workflow from model to stakeout a shorter process.

“Trimble Access is the only data collector software we have found that is able to handle the IFC-formatted models being used on our project,” said Olsen. “It’s easier to stay current with changes since we load the fully revised model on the TSC7 controller. Our ability to collaborate and plan on a digital platform is key to meeting the client’s and other third parties’ expectations.”

The innovative BIM model approach results in a greener construction process and allows everyone involved to visualize details and the project in its entirety. The extensive use of 3D models creates an effective platform for the exchange of information between designers, engineers, contractors, owners, and other interested parties.

Top right: Screenshot from the Trimble TSC7 while surveyor stakes out/checks curb stone.

Lower right: The Trimble SX12 scanning total station is used to stake out concrete on a storm culvert. Photos credit: NCC



“Using the SX12 laser scanning function to document conditions in the field, we quickly produce an easy-to-interpret visualization, send it to our client, and resolve minor issues without a site visit.”

—Richard A. Olsen
Chief Survey Engineer, NCC



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