

THE AUSTIN ADVANTAGE

40 WORKDAYS SAVED
FOR THE LARGEST
INFRASTRUCTURE
PROJECT IN NORWAY



GENERAL INFORMATION

Location: Oslo, Norway

Project Type: Underground Construction / Tunnel

Products Used:

- E*STAR
- Emulex

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THE HISTORY

The Follo Line Project was, at its start, the largest infrastructure project in Norway and included the longest railway tunnel in the Nordic countries. The main construction work started in 2015, with completion planned in December 2021.

Although the main part of the twin tunnel was intended for the TBM machines, the smaller service, or connecting tunnels, were planned to be done by Drill & Blast (D&B).

THE CHALLENGES

In 2016, one of the service tunnels connecting the project to the existing railroad in the Oslo Port had to go under the access tunnel for the port's underground oil depot. The access tunnel was equipped with pipes used for transfer of oil coming by ships into the depot, as well as to the trains transporting it for processing. Due to the importance of the equipment in the access tunnel there were very strict limitations for vibrations.

THE GOALS

1. Keep vibrations under strict limits
2. Exceed production timelines



THE CHALLENGES - CONTINUED

The limit was 10mm/s and the construction company planned to continue D&B up to 40m from the crossing, before using the Drill & Split (D&S) method to prevent exceeding the limits. However, at a distance of 55m the contractor exceeded the vibration limits almost four times (38 mm/s). It was decided to start Drill & Split early, but that meant a significant loss of time and money. The D&B advance was 1.5m per day compared to D&S that was only 30cm per day.

THE AUSTIN SOLUTION

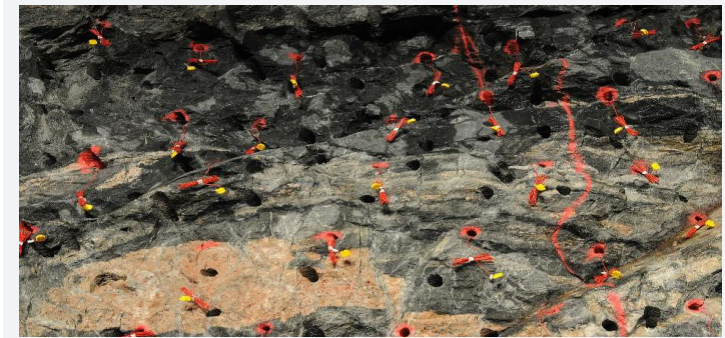
As an explosive and detonator supplier of the project, Austin Norge offered a solution to this challenge. The blasting pattern was revised using Emulex cartridge products and E*STAR detonators were introduced with specially prepared timing. Utilizing QED and Blasting Solutions software packages, the optimal configuration was determined. A series of full profile blasts were done with very promising results and predictable vibrations.

THE OUTCOME

After the initial tests, the D&B continued with daily advances of 1.5m (one blast per day). Later in the project, the face was split into top and bottom sections to be blasted separately. The full face had 160 holes, utilized the same number of E*STAR detonators and 148.5kg of Emulex explosives with specific consumption of 1.21kg/m³.

There was continuous presence of Austin technical support on site to provide expertise, needed changes in the charging, or the timing plan, based on the measured vibrations as well as the programming and blasting of E*STAR detonators. Over a period of 5 weeks the project advanced past the 40m distance line and continued up to 28m from the tunnel crossing when the D&B was stopped by the contractor.

In 5 weeks Austin managed to get the customer 12m closer to the tunnel crossing than it was originally intended, saving 40 work days and \$20,000 USD on D&S, compared to the original plan.



AUSTIN POWDER