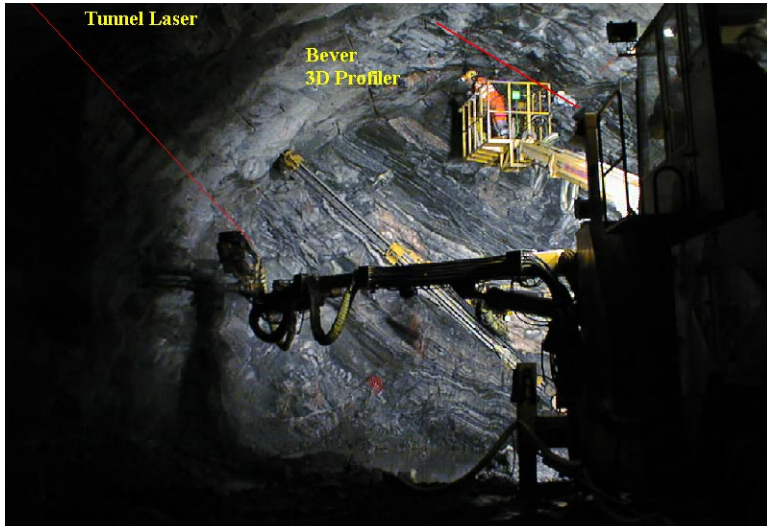


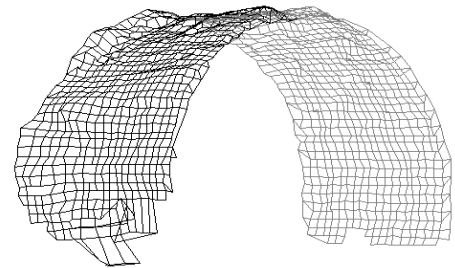
# Bever 3D Profiler

## Guidance and quality control of tunnel profiles

- recorded profile can be displayed on PC and documented on paper
- underbreak may be drilled/blasted during next round
- profile can be drilled with less margin with less risk for costly underbreak removal



Bever 3D Profiler scanning of a blast round with 25 cm grid size



*Tunnel jumbo and Bever system in operation*

There is a general objective at tunneling to drill and blast a profile with optimal profile at the lowest cost. That is : low overbreak and low risk for underbreak (which is costly to remove at a later stage in the project). The Bever 3D Profiler is in most cases mounted on the jumbo rig and can be operated by the drill rig operator.

### Bever 3D Profiler features

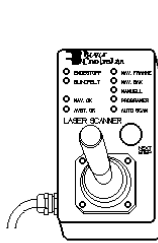
- check tunnel profile as a normal operation during round drilling/blasting
- scanned 3-dimensional profiles is measured and points on profile is displayed to operator
- operator is adviced about underbreaks
- overbreak is calculated and presented to operator



*Operator checks overbreak from cabin*

- reduced need for surveying work, later profiling
- scanning may be done while drilling next round
- operator on rig can operate the profiler without expert assistance

A laser distance measuring unit is mounted on a fixture and is operated by two programmable axis. The profiler is normally placed on the console in front of the operator cabin on the tunnelling jumbo.



*Remote control of profiler from the cabin or other convenient location.*



measured points is shown, and the data is displayed online for the operator. He can immediately evaluate the results, additionally calculated overbreak/underbreak is displayed.

All measured data are saved on the memory card. The data is available with fully defined coordinates in text files that may be processed by standard PC-programs. Bever Control delivers an application for evaluation of results on graphic display and printouts.

### **Setup : Navigation before scanning or single point measurement**

The jumbo is placed for normal drilling. The tunnel laser is used for alignment of the profiler. Two points on the tunnel laser is recorded by pointing with the profiler. The peg number identifying the tunnel coordinates is entered by the operator for an aiming target placed in the laser line. The scanned area can be defined as sections of 1-6 metres and the grid size can also be set. Typical distance on grid size is 25 cm.

## **Mode of operation**

### **Single point recording using joystick pointer**

The operator will position by remote control of the profiler. The joystick is mounted in a portable unit with cable connection to the rig. A red pointing laser shows the actual point to record and a pushbutton gives single point recording. On the display in the cabin the operator can observe actual deviation from reference profile.

### **3-dimensional scanning of a defined tunnel section**

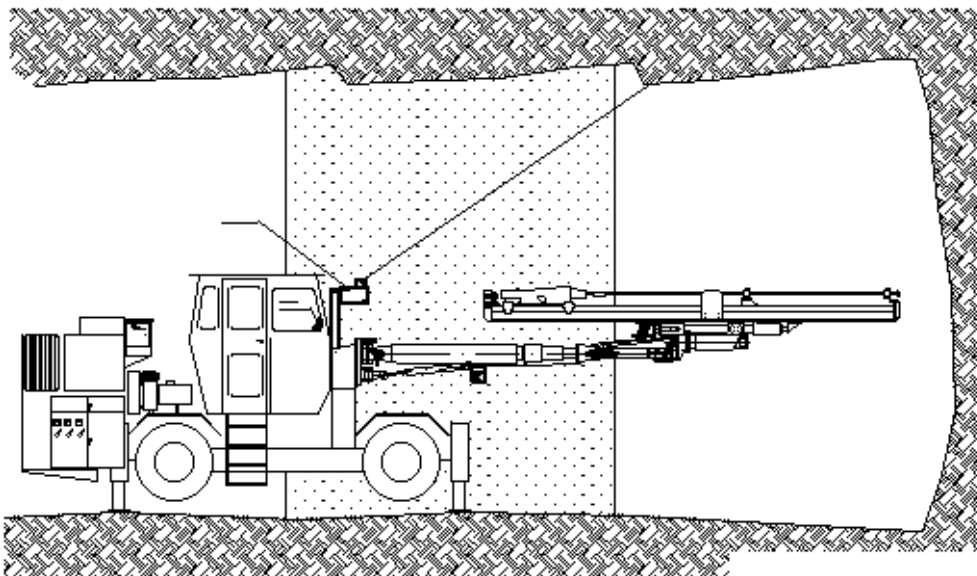
The operator can select a tunnel section for scanning. A typical example will be to check one blast of 5 metres and a grid of measuring points spaced at 25 cm. On the display the cloud of

## Operators display

The reference profile is displayed on the screen with actual measured points plotted on the screen. The driller can thus immediately conclude whether the points are inside or outside the reference profiles, and also the distance is given. Calculated overbreak/underbreak is displayed as well as maximum distances from reference profile. The scanned data are stored on memory card ready for later processing on a desktop PC.



*Screen on the rig shows overbrake direct to the operator.*

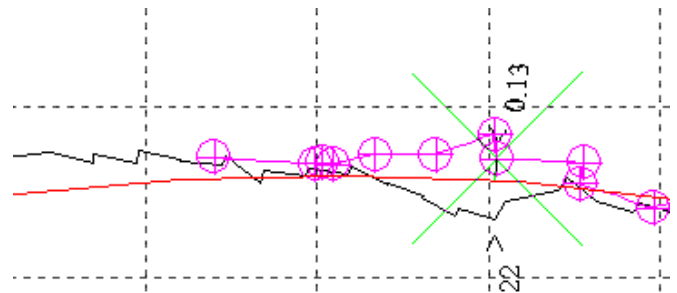


## Desktop PC processing

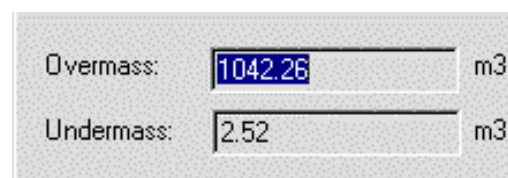
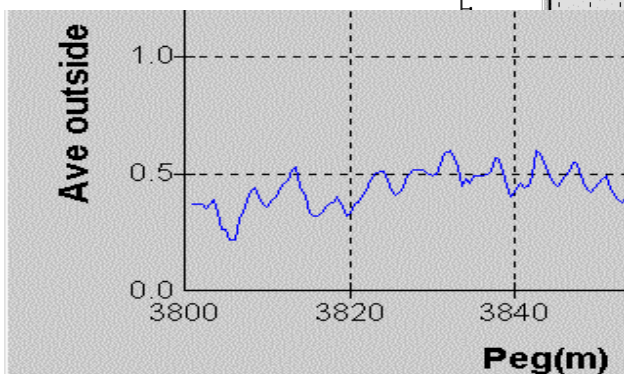
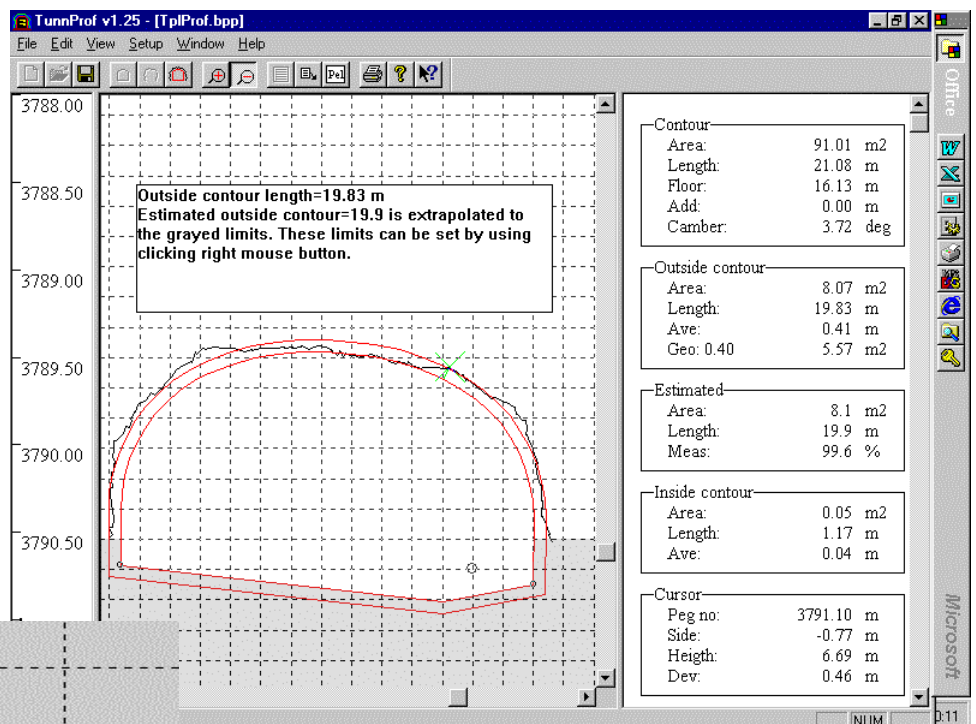
Scanned data are transferred to office computers by means of a memory card. On the PC the profile and actual logged data may be graphically displayed and a selected section documented on paper.

## Accuracy

Accuracy of a measurement on a smooth surface perpendicular to the scanning direction will be 2-3 cm at preset scanning speed. Due to variation of rock surface over the actual footprint and angle of attack, the accuracy will vary. It is required that the navigation is accurate and that the rig does not move during the measuring period.



*Import and export of coordinates from survey tools is easy*



*Overbreak statistics is calculated*

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