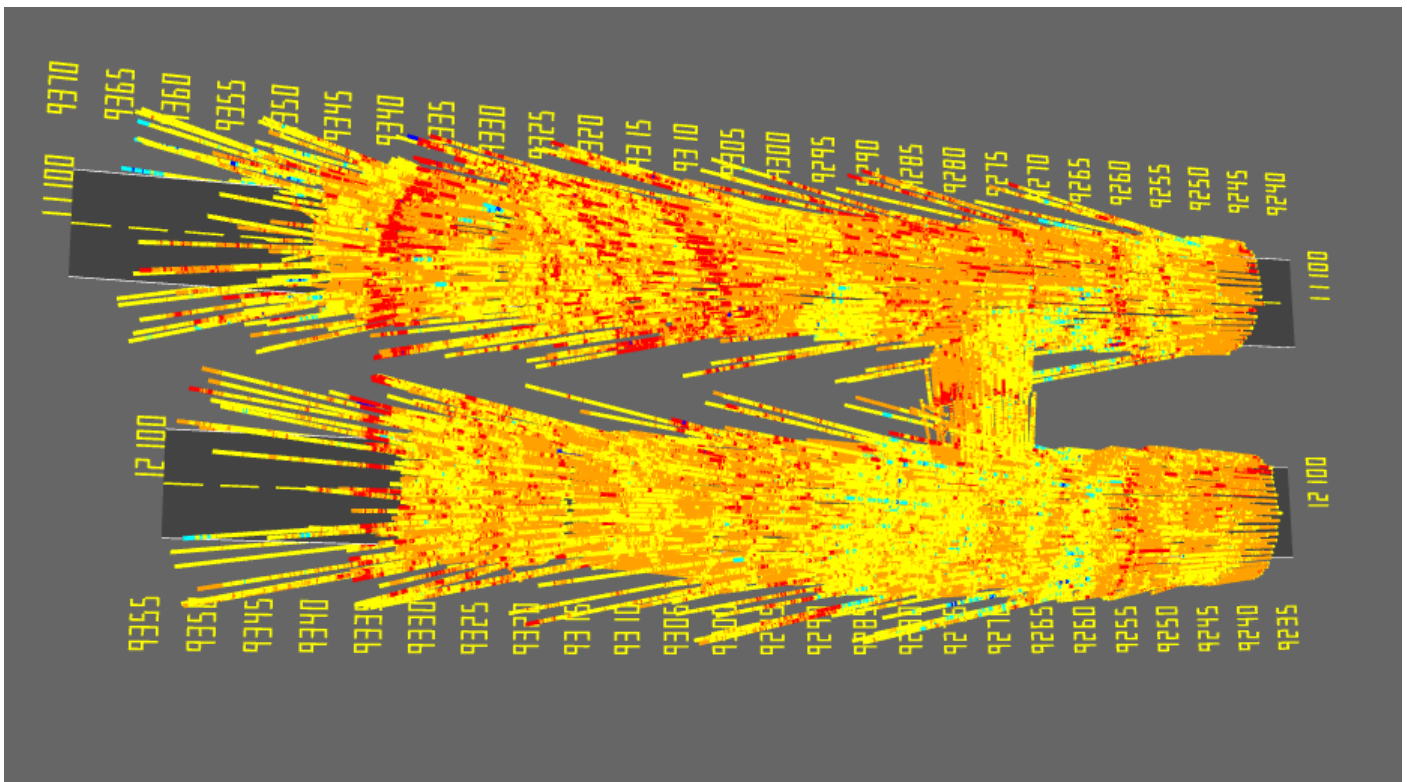


Bever Team Online MWD module

Digital mapping of geology

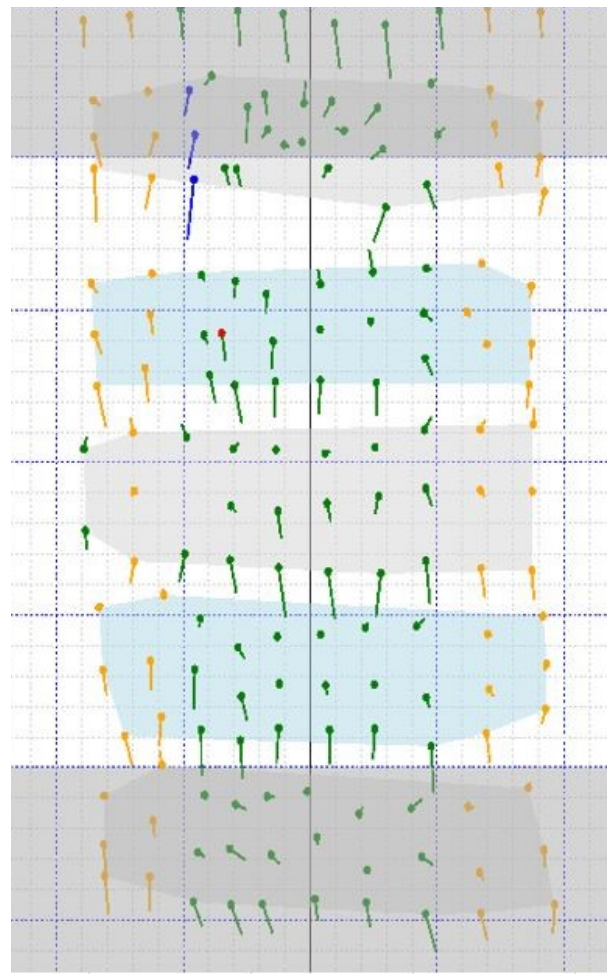
By interpreting drill logs from the drilling jumbo, properties of the rock mass can be presented graphically

- Analysis of ready available drilling data can give important inputs to operation for increased safety and reduced operation cost.
- Graphical 3D presentation of Hardness, Fracturing and Water
- Filtering and advanced analysis of drill logs from any drilling jumbo.
- Near real time analysis, data available for decision support on the spot.
- Online system, wireless transfer from jumbo to cloud — reports generated automatically available in your web browser.



Hardness 3D view, red color represents softer rock or weakness zones.

Antall bolter		
Lengde (m)	Antall	Farge
-0.5 - 0.5	1	Red
2.5 - 3.5	38	Orange
3.5 - 4.5	60	Green
5.5 - 6.5	1	Blue

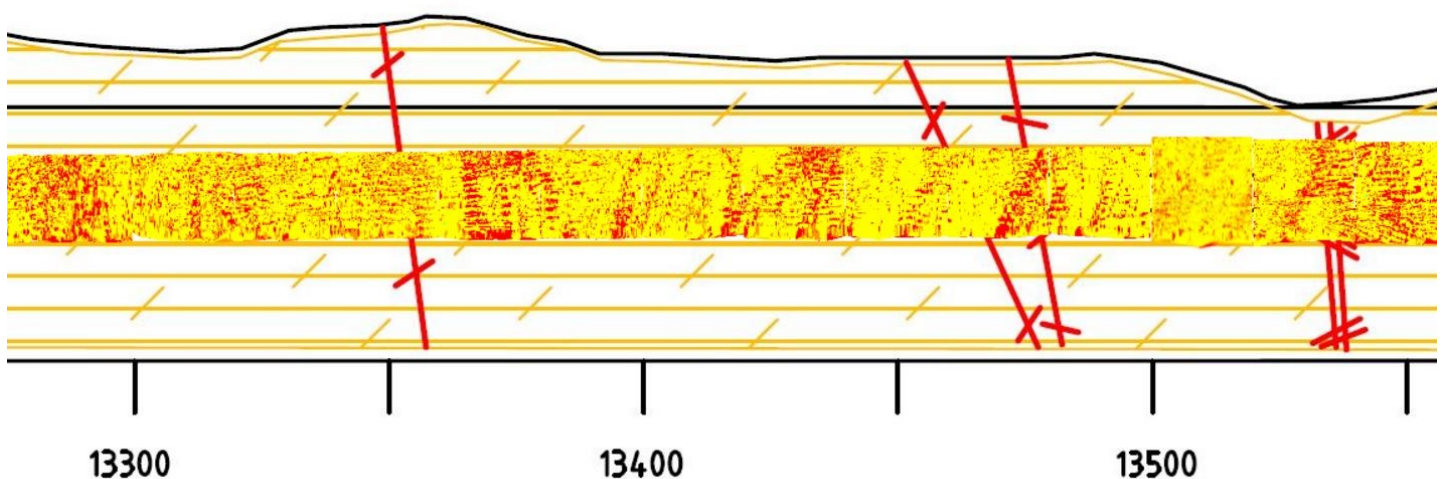


Get help with your project's documentation from Bever Team Online - Support.

Color coded bolts provide probable length and direction. The file can also be exported to .KOF for use with other software.

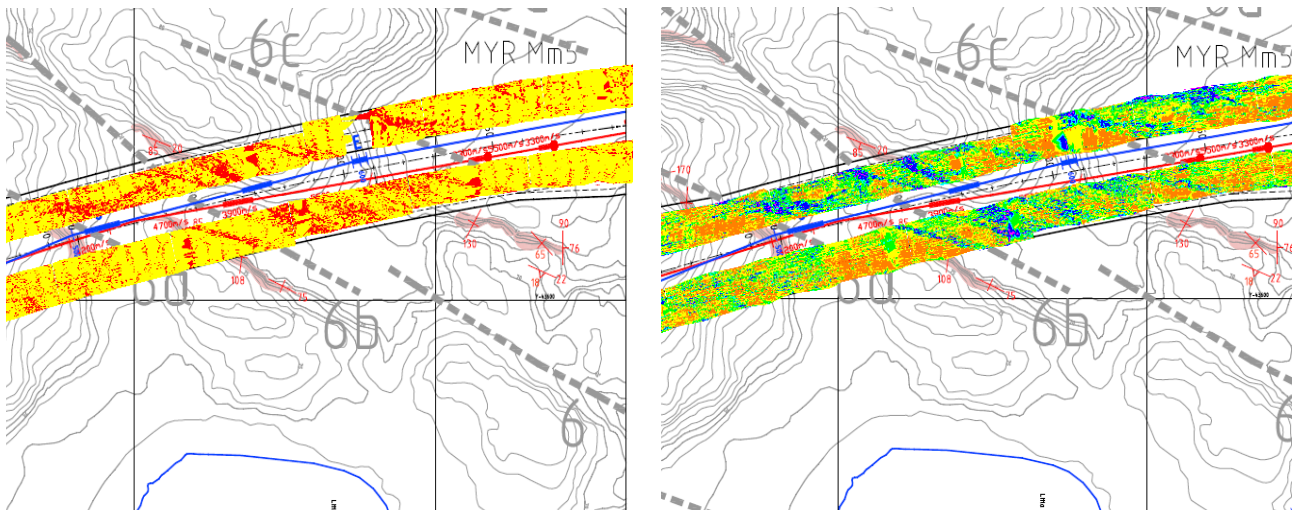
View the tunnel from the side to get an overview of the tunnel coverage, and the fit with any weakness zones detected in preliminary investigations.

Koordinater							
Pel	Lengde (m)	Ansett - Nord	Ansett - Øst	Ansett - Opp	Bunn - Nord	Bunn - Øst	Bunn - Opp
9121,114	3,204	1263077,75	104289,487	-214,714	1263075,96	104286,843	-214,97
9120,294	3,2	1263077,39	104290,307	-216,651	1263075,6	104287,743	-217,332
9120,885	4,19	1263078,84	104290,881	-219,485	1263076,92	104288,192	-222,062
9121,629	4,192	1263080,34	104291,254	-220,815	1263080,29	104289,776	-224,737
9120,359	3,207	1263086,71	104298,529	-215,186	1263089,86	104299,036	-215,48
9120,332	4,202	1263081,4	104293,953	-221,113	1263081,5	104293,708	-225,307
9120,657	3,192	1263086,43	104297,937	-217,629	1263089,25	104299,104	-218,571
9120,716	5,95	1263085,78	104297,317	-219,3	1263090,38	104298,88	-222,737
9120,379	4,202	1263084,41	104296,567	-220,527	1263086,01	104297,32	-224,336
9120,336	4,188	1263084,65	104296,829	-220,07	1263086,53	104297,823	-223,679
9124,212	3,19	1263080,04	104287,388	-215,358	1263077,96	104284,976	-215,53

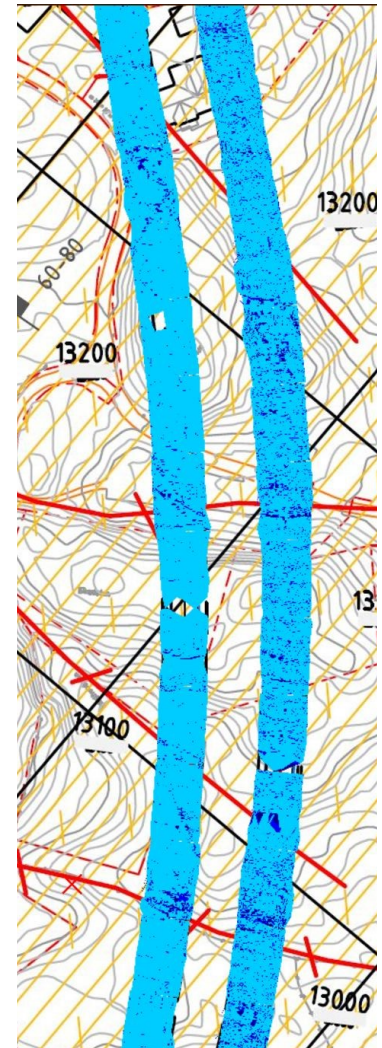
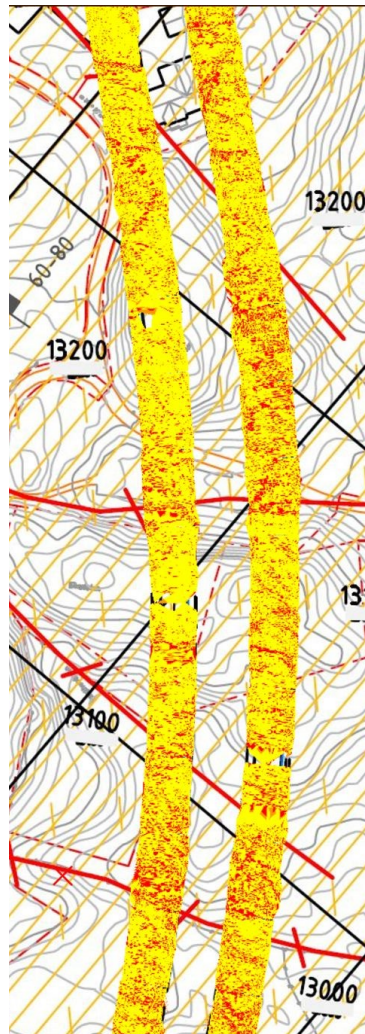
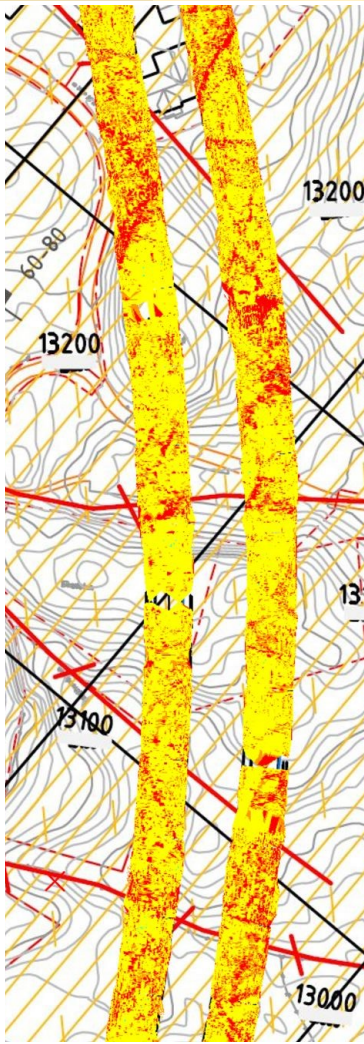


Features:

- Web-based, accessible from any web browser
- Cloud database updated every few minutes
- Everyone works in the same version, and has access to the same «real time» information
- 3D-display and export into easy-to-send in standard formats such as .pdf or .dwg
- Automatically generated reports, when you just want a quick update
- Generate your own reports
- Open system facilitates in-depth analyses of data
- Easy documentation during and after construction phase with Bever Team Online modules
 - MWD maps of unfolded tunnel and in 3D
 - 3D maps and coordinates of bolt drilling
 - Shotcrete scanning with rig-mounted Bever 3D Profiler
 - Overburden calculations compared to design geometry



Side-by-side comparison of the same tunnels.
Interpreted Fracturing on the left, Interpreted Hardness on the right.



Methodology

- The rock mass hardness is estimated based on a normalized and filtered penetration rate. The normalization process includes correction of varying average penetration rate, varying feeder- and hammer pressure at the start of the drilling, and filtering irrelevant data.
- The rock mass fracturing is estimated based on a variance calculation of the normalized penetration rate and rotation pressure. A gliding root mean square value catches sudden changes in drillability within the rock mass.
- The water model is based on a normalized water flow. The normalizing corrects varying average water flow, incoming pressure and pressure drop in drill rods. Rapid changes in the amount of water is detected by calculating a root mean square value of the normalized water flow.

Bever Control Story

Norwegian contractors introduced the concept of computer controlled drilling as early as 1979 when the first AMV computer controlled jumbo was set in operation. Bever Control is the pioneer company for this technology world wide. We have delivered our system to more than 200 drill rigs and have set the standard for the performance of computer controlled drill rig systems.