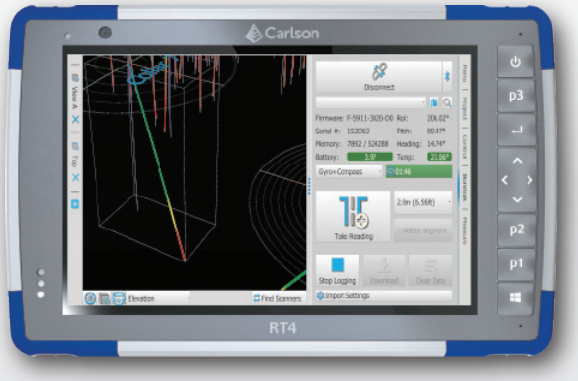
Boretrak®2

Carlson
BREAK NEW GROUND

Deploy and Measure at Any Inclination with Full 360° Capability



The Boretrak2 borehole deviation measurement system is a simple-to-use, gyro-based system for measuring the deviation of boreholes at any drill hole operation such as underground mines, on the surface, in quarries, open-pit operations, and civil works.

As a successor to the widely used Cabled and Rodded Boretrak systems, the fundamental capabilities of the Boretrak2 are backed by over 35 years of in-the-field history. The features of both units have been combined into a single all-purpose unit capable of measuring boreholes in any inclination: down, up or horizontal.

Together with Carlson Boretrak software, the Boretrak2 provides a simple to use system for checking the accuracy of drilled holes and their deviation from design.

Improve Safety

- Accurately measure borehole deviation and effectively use the data to plan projects safely and in compliance with auditing requirements
- Record and visualize 3D data on drilling activity from ground level or underground site
- Comply with quarrying legislation
- Avoid the potential risks and costs associated with blasting from deviated or un-surveyed boreholes

Increase Work Efficiency

- Optimizes blasting and engineering works by easily creating detailed maps of drilling activity in the field
- Portable, lightweight, and hand-deployable, the system doesn't require rod deployment and can be deployed with a single operator
- Powerful and intuitive, the operational software, Carlson Boretrak, requires minimal training and is simple-to-use
- Validate and confirm data with confidence and accuracy

Works Reliably in Extreme Environments

- Designed for the rugged mining and quarrying environments: harsh weather, muddy holes, extreme temperatures, and ruggedized treatment
- Have confidence that the system will last for years, giving accurate and reliable data in the toughest conditions
- Capable of operating in areas of magnetic interference and in flooded holes

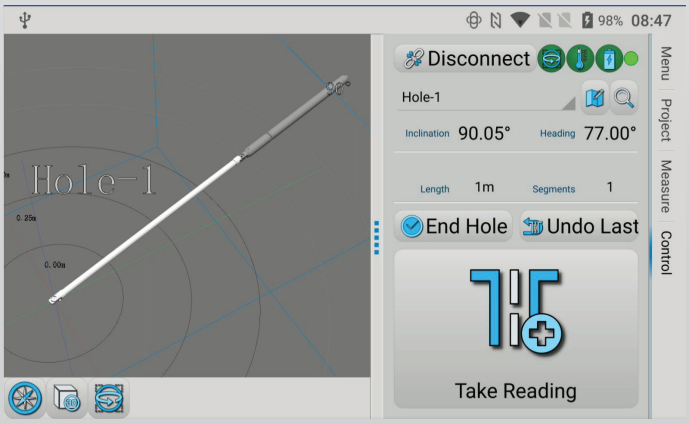
Gyro-Based Solution

The Boretrak2 utilizes a miniature inertial measurement unit (IMU) which contains a triaxial accelerometer, magnetometer, and gyro. Prior to deployment, the probe is calibrated against a known orientation on a supplied jig. This establishes a starting reference azimuth for the gyro. The gyro provides the Boretrak2 with an accurate, live heading which is tracked as the probe is deployed along the borehole.

Deployment Accessories

The incorporation of a gyro means that the Boretrak2 is not reliant on a magnetic compass or on physical rod alignment to establish the changing direction and orientation of the borehole. The gyro frees up the Boretrak2 to be deployed using a variety of methods. Downhole, the probe can be lowered on a simple wire line. Horizontal and uphole the Boretrak2 can be supplied with a semi-rigid push rod system, spooled out from a cable reel. Alternatively, traditional Boretrak rods can be used and an adaptor allows customised deployment devices to be fabricated for applications unique to your site.

Boretrak2 probe with steel cable supplied for downhole deployments



Carlson Boretrak deployment on an Android Screen

Carlson's Boretrak2 supports both surface and subsurface borehole deviation measurement

Boretrak2 system with 50-meter cable and RT4 Windows Tablet

Carlson Boretrak

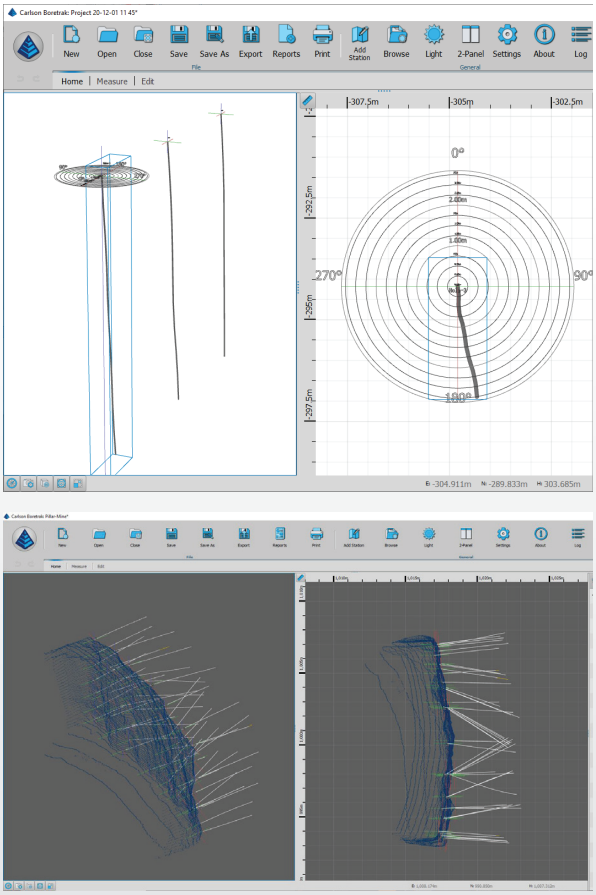
A mobile device – an Android phone or Windows tablet – is used to run Carlson Boretrak which controls the Boretrak2 operation.
Use Carlson Boretrak to setup the project, import hole coordinates, setup design holes and import third party data to form a background to the collected Boretrak2 data. A Bluetooth connection between the probe and mobile device allows setup and calibration prior to the deployment and also synchs the clocks on the probe and the mobile device.

Deployment Methodology

Once in the hole, the probe runs independently — constantly recording data from the IMU onto its internal memory. Each sensor record in the probe is accompanied by a time stamp.
The probe is deployed along the hole at fixed intervals. At each stop, a reading is taken in Carlson Boretrak software. When the end of the hole is reached, the probe is retrieved and, when the Bluetooth link is re-established, all data is downloaded from the probe into Carlson Boretrak.
Carlson Boretrak reads the time stamps recorded on the mobile device and extracts the records in the Boretrak2 probe data which match these time stamps.
With reference to a starting hole collar coordinate and a calibrated gyro value, these raw observations are converted into X, Y, Z coordinates. A model of the hole is created, and a comparison made to a design hole or another survey of the same hole.

Display and Outputs

All data from surveyed holes is immediately displayed, in 3D graphical mode, 2D schematic mode, or in tabular formats.
Back in the office, data can be transferred onto Carlson Boretrak running on your desktop or laptop PC for further analysis.
Survey data from the Boretrak2 can be exported seamlessly to other Carlson packages such as BlastOPS using the DRL format. Other formats such as DXF and CSV can be used to export to third party CAD and blast design packages.
Reports can be generated for each hole, showing all data in plan, front, side or 3D views, together with tabular data outlining each reading during a deployment.



Carlson Boretrak used in Desktop mode on an office PC

Carlson Software and Technology Solutions

The Boretrak2 is one of many Carlson hardware and software products dedicated to providing solutions in the mining and quarrying industries.
The Boretrak2 works seamlessly with the Quarryman® Pro profiler and BlastOPS blast design software.
Carlson Boretrak software - which drives the Boretrak - also works with the Void Scanner+ (VS+) underground stope scanner and the C-ALS® Gyro cavity scanner and so can combine surveys of ring blasts and underground scans. Boretrak data can be integrated with stope scans to compare actual hole surveys and the void created from the blast.
Carlson Mining imports borehole data from Boretrak2 and scan data from C-ALS and VS+ to help monitor the as-built world underground.

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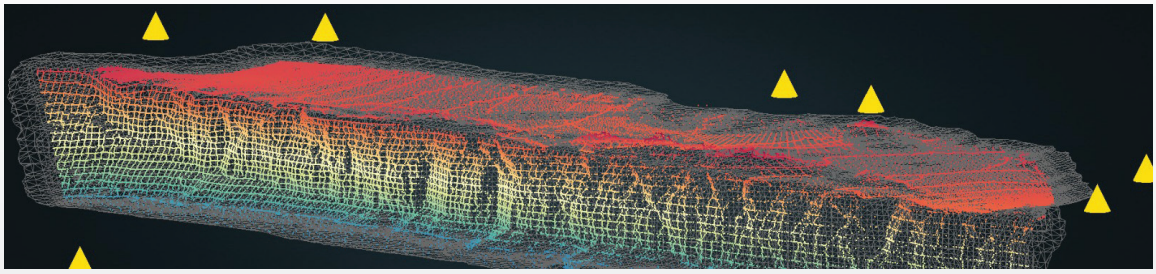
CarlsonOPS for Simple and Comprehensive Blast Design

CarlsonOPS is a separate software module for blast design and compliments workflows supported by the Boretrak2. Work with point clouds to develop meshes, create blast pattern layouts, and ensure proper burden and borhole spacing for more productive blasting and project optimization. Utilize Boretrak2 data to assess borehole deviation from design.

- Plan blast pattern layouts
- Work with burden measurements for hole loading
- Load the holes
- Quality check timing and initiation and more.



Specifications

Construction		
Probe		Stainless steel
Downhole cable		5mm plastic-coated steel cable with metre markers
Push cable		9mm Fibreglass rod with aluminium frame and reel
Physical		
Weight	**Probe (inc batteries)**	3.1 kg
	System in case (inc 50m cable & optional PDA)	13.3 kg
Dimensions	**Probe**	710 mm x 40 mm (L x Dia)
	Case	625 mm x 500 mm x 218 mm (L x W x H)
Sensor		
Build		IMU with 3-axis gyro, accelerometer and magnetometer
Gyro rotation limit		Configurable: up to 1920° per second
Inclination accuracy		+/-0.1°
System deployment accuracy		Final position within 1% of hole depth*
Power		
Probe		3 x 1.5 D cells (LR20)
Environmental		
IP rating		IP68 waterproof (pressure rated to 300 m)
Operating temperature**		-10° C to +60° C
Storage temperature**		-20° C to +70° C

* Proved under Carlson test conditions

** The probe operating & storage temperature may be limited by the choice of battery.

For further information and the best possible application and performance support please contact Carlson at lasermeasurement@carlsonsw.com

020-211-60