

Rodded Boretrak® and Cabled Boretrak®



Improve safety

Measure accurately the borehole data you need, and use the information to plan projects safely with a compliance audit trail.



Cut costs

Optimise blasting and engineering works by creating detailed maps of drilling activity, reducing the need for large teams or qualified surveyors.



Deliver results in tough environments

Rugged, portable design together with the ability to operate in areas of magnetic interference make Boretrak a system for challenging projects.



Key benefits of using the Boretrak system

The Boretrak borehole deviation measurement system improves safety and enhances productivity by giving you a cost-effective, reliable and portable way to measure borehole deviation in a wide range of applications, including quarry and cast blasting, exploration and foundation drilling, dam pinning, construction, piling and engineering works.

The Boretrak system is designed to cope with the challenging conditions encountered in such projects, and gives you on-site results quickly, enabling you to:

Work safely

- Deployed from ground level (or from underground sites), the Boretrak system keeps workers safe while giving you 3D data on drilling activity.
- Boretrak works with the Renishaw Quarryman® Pro laser scanning system to help ensure compliance with quarrying legislation, protecting local residents, employees and property.
- Measuring borehole deviation avoids the risks associated with incorrect borehole data: fly-rock caused by poorly designed blasts, or intersection with underground utilities in engineering works.

Work efficiently

- There's no need for an expert surveyor on site because the system is simple to use, with very little training needed.
- The Boretrak system frees up personnel. A 20 m hole can be surveyed in a matter of minutes, and entire drilling sites can be measured and modelled in hours.

Get accurate data, on site, and make better decisions

- A handheld computer display unit (CDU) interfaces with dedicated PC software so you can audit drilled holes and produce reports in minutes. Results can then be issued to drillers on site if needed. Your on-site drilling operation becomes data-led, responsive and better integrated.
- Map entire sites. Boretrak data can easily be geo-referenced and related to your local co-ordinate system. This means you can compare today's results with historical data and view data from a range of systems – notably Quarryman Pro – in one place. There's no guesswork and no data gaps.

Work reliably in extreme environments

- A high degree of dust- and water-proofing is engineered into both the Rodded Boretrak and Cabled Boretrak systems. Resistance to wet weather, water-logged ground, submersion, temperature extremes, sand and dust mean that Boretrak performs in tough conditions, reliably and accurately.
- Portable, lightweight and easy to transport across sites and between locations, the easy-to-deploy Boretrak system is designed to be used by a single operator. Cabled Boretrak comes in a single Peli-case, with a total weight of less than 5 kg. The Rodded Boretrak probe and rods can also be hand-carried by personnel.



The quick-to-deploy Boretrak is designed for use by a single operator.

Boretrak applications



The Boretrak system enables faster yet safer rock face blasting.



Renishaw's Cabled Boretrak system is supplied in a Peli-case that can be hand carried by a single operative.

Drilling and blasting in quarries (Cabled Boretrak or Rodded Boretrak)

Boretrak has been widely used in quarries for over 20 years. The system ensures compliance with legislation on worker safety and environmental impact and, increasingly, as part of ambitious blast-optimisation programmes, which have delivered impressive returns on investment for both small and large-scale quarrying companies.

In such cases, the Boretrak system is used alongside Renishaw's Quarryman Pro to provide detailed data at all stages of blast planning, providing quarry managers with a much greater degree of control over final results than has previously been possible.

The Quarryman Pro system is used to scan, map and model the rock face to be blasted, generating a 3D model of the rock face, which is then used to calculate the burden and design the borehole positions.

After drilling, Boretrak measures the 'as built' position of the borehole, which can vary significantly from the planned angle, depth and relative position of the planned drill holes, depending on drilling capabilities and geological conditions. The datasets from Quarryman Pro and Boretrak allow quarry managers to accurately calculate the burden at each position across the face. With an accurate model of the burden, the blast design can be optimised, offering much greater control over the blast and the size of fragmented rock. Using Boretrak and Quarryman Pro system together to optimise blasting helps you:

- Improve safety:
 - Reduce fly-rock incidents and prevent injury to workers or damage to property
- Minimise environmental impact:
 - Lower fuel costs and the number of vehicle journeys across site, and cut processing time by reducing the need for secondary breakage
 - Minimise air blast, noise and vibrations to ensure compliance with legislation

- Improve operational and cost efficiency:
 - Reduce revenue loss from fines
 - Reduce wear on tyres and on heavy mobile equipment by achieving better floor control
 - Reduce the costs of crushing and transport by reducing the number of oversize rocks
 - Cut the cost of explosives by knowing how much to load

How can Rodded Boretrak improve results in engineering and geotechnical works?

Drilled holes are employed in a wide variety of engineering and geotechnical works. In all cases, the requirement is a hole drilled to a specified depth, inclination and heading. The experience of the driller, the quality of the equipment, the angle drilled and the local geology can all contribute to the borehole deviating from its intended path. By using Boretrak, those responsible for engineering and geo-technical drilling projects can:

- Produce an audit trail of drilling operations, giving confidence in the inclination, heading and depth of the borehole
- Build a complete picture of underground structures. Referencing the survey to the local co-ordinate system allows Boretrak data to be viewed in conjunction with other surveyed sub-surface structures. Boretrak can avert potentially disastrous situations where drilling operations intersect with tunnels, shafts and underground utilities.
- Avoid down time due to damaged, waterlogged or clogged-up equipment. Boretrak is designed to cope with the challenging conditions encountered on engineering projects, construction sites and geotechnical applications.
- React quickly. The quick deployment and recovery of the probe allows data to be viewed on a PC screen in minutes so feedback from the results can be analysed and acted upon without delay.

Using the Rodded Boretrak system to increase safety and efficiencies in underground mining operations

Underground mining projects often require holes drilled in planned patterns prior to explosive loading and blasting. Borehole deviation in underground mining poses real dangers: the confined mine environment means that even a slight deviation can result in unpredictable blast results. This can be costly, pose a risk to workers, and potentially cause delays.

Using Renishaw's Rodded Boretrak to gain accurate data on the depth and angle of drilled holes, delivers a range of benefits:

- Planning blasting using precise geo-referenced data enables you to better predict and control results. Boreholes don't always match the drilling plan, and if deviation has occurred – due to operator error, geological structure or mechanical fault – proceeding to blast can be dangerous and costly. With Boretrak you can base your blast design on the true deviation of the holes rather than the intended, theoretical hole design.

- Reduce the risk of unsafe or inefficient blasts. With Boretrak, any problems in the drilling can be flagged up quickly.
- Use one system for a wide range of projects. The Rodded Boretrak system allows uphole and downhole borehole measurement with a single tool.
- Work accurately, without the interference associated with compass-based systems. The Rodded Boretrak system does not use a magnetic compass and so will not be affected by the heavy machinery, generators, ferrous metals, steel reinforcements or cabling found in an underground environment.
- Get a complete picture of underground structures. Boretrak data can be geo-referenced and fitted into a mine's local co-ordinate system. This means the data can be viewed in mine planning packages alongside other surveyed data.
- Deploy personnel more effectively. A 20 m hole can be surveyed in a couple of minutes. The speed of the survey frees up underground personnel for other work.



View and analyse borehole data results on your PC within minutes and make faster decisions.



Optimised blasting means you can plan to produce finer rock particulate for easy removal.



Above: Cabled Boretrak's lack of rigid extension tubes enhances portability and ease of deployment. **Right:** Rodded Boretrak does not require an in-built compass and so can be used in areas where magnetic fields would otherwise cause problems.

Cabled Boretrak and Rodded Boretrak

Cabled Boretrak

Cabled Boretrak is designed to let you work quickly, and move across large sites, covering vast areas without the need to transport bulky surveying equipment. It is compact, lightweight, rugged and highly portable. It is designed to be deployed downhole on its integrated, toughened cable, to depths of up to 65 metres.

The Cabled Boretrak probe contains a dual axis tilt sensor and digital compass, to calculate borehole deviation from the collar position at fixed intervals.

The Cabled Boretrak system is supplied with a weighted extension piece, which customers can fill with lead shot or sand to ballast the system in deep or flooded holes.

Rodded Boretrak

Rodded Boretrak gives unique capabilities to measure borehole deviation in situations where other systems will not work: in underground mines, areas of ferrous materials and uphole as well as downhole. Its unique method of deployment ensures accuracy where other systems underperform and it offers significant advantages over cabled systems for many applications.



Rodded Boretrak's rods guide and locate the probe.



The benefit of a Cabled Boretrak is speed and portability.

Other probes used to measure borehole deviation, including our Cabled Boretrak, rely on compasses to help measure borehole angle heading

While these systems work well in non-ferrous environments, the Rodded Boretrak system uses specially designed rods to guide and locate the probe in place of a compass. This means it can be used in many situations to give a much more accurate measurement, including uphole, in areas of ferrous material, in areas with cabling or metal works, or other areas where magnetic interference is experienced.

Rodded Boretrak, tried and tested in a wide range of applications, is unique.

- It can measure borehole deviation without losing accuracy due to magnetic interference, meaning you can work in a wide range of areas.
- Rodded Boretrak can go uphole as well as down hole, unlike cabled probes. It can be deployed up to 45° from vertical.
- The Rodded Boretrak inclinometers are accurate to 0.1°.
- Rodded Boretrak is ideal if you need to deploy to great depths. With cabled probes you are limited to the fixed cable length that is initially purchased; with Rodded Boretrak, simply add additional stacks of rods if you want to deploy down deeper holes.

About Renishaw

Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing, vacuum casting, and injection moulding technologies for design, prototyping, and production applications
- Advanced material technologies with a variety of applications in multiple fields
- Dental CAD/CAM scanning and milling systems and supply of dental structures
- Encoder systems for high accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications



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