

► GROUND CONTROL INSTRUMENTATION FOR THE MINING INDUSTRY





## HOW DO YOU ENSURE SAFE MINE ROADWAY SUPPORT? JUST ASK GOLDER.

Ground control monitoring instrumentation fulfils two key requirements for safe underground mining. Firstly, it provides personnel with information on the stability of the roof and sides. Secondly, it can provide the detailed data on rock and support loads and deformations required to optimise support design.

### ABOUT GOLDER ASSOCIATES

With more than 180 offices across 6 continents, Golder Associates is well placed to satisfy your mining ground control instrumentation needs.

We have extensive experience in the design, manufacture, installation and monitoring of ground control instrumentation for underground mines worldwide.

Many of our instruments and systems have intrinsic safety certification for application in potentially explosive atmospheres such as those encountered in coal mines.

Our ground control instrumentation is used around the world in a wide range of mining applications including longwall and pillar extraction.

**DUAL HEIGHT ROCKBOLTING TELLTALE:** Our visual telltales give immediate information on movement within and above the rockbolted height.



### SAFETY MONITORING

Our safety monitoring product range extends from simple, very low cost, visual telltales to mine wide remote reading telltale systems.

### DESIGN MONITORING

Our mine design monitoring products include the ETM range of sonic extensometers and our strain gauged rockbolt and readout system. These can provide essential data for verification and validation of geotechnical numerical models.

### OUR SERVICES

- **Stress measurement**  
We have extensive experience of underground rock stress measurement in soft and hard rock using the industry standard CSIRO hollow inclusion cell.
- **Instrumentation advice and specification**  
We understand the underground mining industry and can help you determine the best solutions for your monitoring problems.
- **Bespoke design**  
We are always pleased to consider our customers' special instrumentation requirements.
- **Installation and training**  
We can install your instrumentation and train your personnel to install use and read the instruments and interpret the data.
- **Rock bolt integrity testing**  
We offer a number of solutions for identifying in-situ failure of rockbolt and long tendon reinforcement systems.

To see our full range of instrumentation products and services, visit our website: [www.golder.com/instrumentation](http://www.golder.com/instrumentation)

**STRAIN GAUGED ROCKBOLT AND SM02 STRAIN METER:** Our SM02 strain meter records data from multiple strain gauged bolts for down-load to PC and analysis using our EXBOLT software suite.

**I.S. FOUR HEIGHT REMOTE READING EXTENSOMETER:** Compatible with our remote reading telltale system or read locally by portable readout.

### OUR PRODUCTS

- **Visual telltales** – dual and triple height models use concentric indicators for differential reading – also rotary options available.
- **Autowarning telltales (IS)** – fitted with flashing LEDs to warn of roof failure in pillar recovery operations.
- **Remote reading telltales and extensometers** – multiple units installed along a roadway can be daisy chained and read with a portable readout or connected to our surface monitoring system.
- **RRTT software suite** – provides GIS display of remote telltale readings in mine control room and offices - generates individually programmable email and SMS warnings on absolute roof movement or rate of change.
- **Acoustic energy meter** – for locating loose rock and shotcrete and poorly grouted tunnels linings.
- **ETM02 flexible probe sonic extensometer** – high accuracy measurements of up to 20 anchors in 7m long boreholes.
- **Sonic anchor sets** – low cost and compatible with our ETM extensometer range and obsolete systems from other manufacturers.
- **Strain gauged rockbolts** – typically 9 pairs of gauges are used along a bolt to resolve axial load and bending.
- **SM02 strain recording meter** – records data from multiple strain gauged bolts.
- **Borehole video camera** – LED illuminated for use in small diameter boreholes.
- **MIDAS** – MSHA approved data logging system with data wireless data download.



MAKE YOUR BUSINESS DECISIONS ON A SOLID FOUNDATION.  
CHOOSE A COMPANY WITH THE TECHNICAL EXPERIENCE AND COMMITMENT  
TO SERVICE EXCELLENCE AND SUSTAINABILITY THAT YOU NEED TO BE SUCCESSFUL.

## JUST ASK GOLDER

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To see our full range of instrumentation, visit our website: [www.golder.com/instrumentation](http://www.golder.com/instrumentation)

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**ENGINEERING EARTH'S DEVELOPMENT, PRESERVING EARTH'S INTEGRITY.**



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