
INNOVATING
GROUND
SUPPORT.
MINOVA

SECURING PERFORMANCE. TOGETHER.

Minova is an international producer of high-performance ground support products for the mining, construction and energy industries.

Our products are engineered to provide safety, efficiency and certainty to your operations, wherever you are.

We provide tailored solutions for a variety of applications, whatever it takes.

We can help you increase project performance and overcome application challenges through a wide range of products that are secure in any conditions, wherever you need to go.

SPLIT SET MINING SYSTEMS
UNDERGROUND ROOF SUPPORT PRODUCTS

Since May 2019, Minova has partnered with Split Set Mining Systems (SSMS), to distribute Minova's speciality products such as resin capsules, grouts and ventilation into the Western Australian market.

SSMS, a leading manufacturer of hard rock ground support products offer a competitive range of bolts and steel products, logistics and manpower. Minova contribute its technical expertise, innovation and premium products (including resin, injection chemical, steel, fibre glass and ventilation control products), to this partnership.

Together we offer the Western Australia market local manufactured steel products and warehoused resin and specialty products and services.

NEXT GENERATION BOLTING.

Our innovative bolting technology combines leading edge and high quality, high strength products to make rock bolting safer, faster and more efficient.

The combined advantages of our self-drilling anchor (SDA) bolts and our high performance, injectable, two component bulk resin grouts create a unique offering for mining environments.

Our innovative bolting range has been designed for dynamic, converging and variable rock conditions with options to replace cable bolts. We offer solutions to suit individual mine requirements and to work in with your surface support. Whether it be static or dynamic capacity, we have a range of options for you.

KEY FEATURES

Resin grout advantages

- Immediate load bearing capacity
- Adjustable volumes allow full encapsulation
- Guaranteed mixing quality
- Improved operator handling and safety

Minova SDA advantages

- Rapid installation in varying ground conditions
- Optimised bolt and drill bit diameters
- Static and dynamic options
- Independent dynamic testing at impacts up to 50 kJ

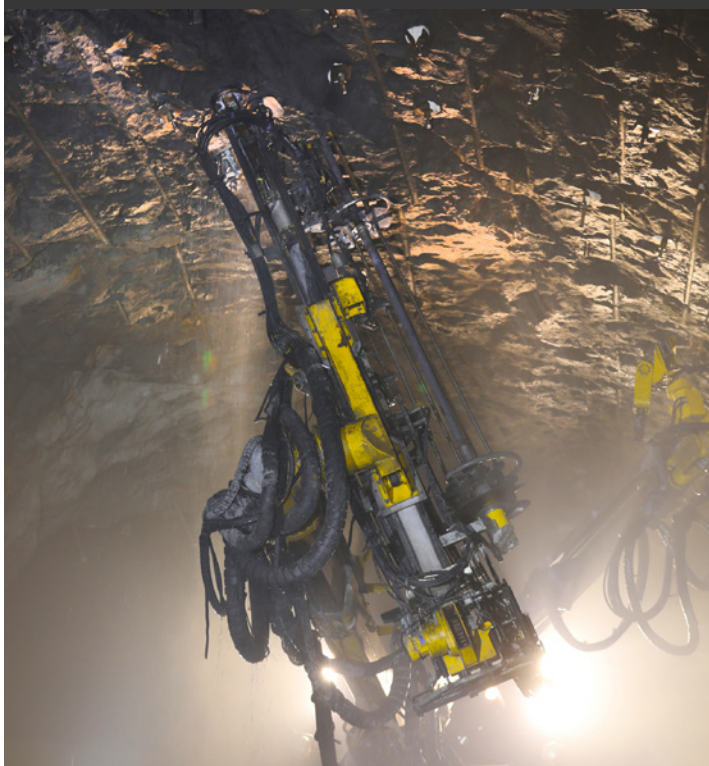
Technology that reduces manual material handling and improves overall installation efficiency

safer, faster & more efficient

new technologies

- Increase bolting speeds
- Increase worker safety
- Minimise operational delays
- Simplified supplier interface
- Reduced project costs

AVERAGE INSTALLATION TIME: 2 minutes 30 seconds PER BOLT.



SOLID BOLTS

SECURA® BOLTS are specifically designed solid reinforcing bar for use in strata reinforcement with resin capsules. The Secura® Bolt includes a unique paddle system to improve resin mixing and film shredding, with 27mm diameter deforms which provide higher bond strengths in larger diameter boreholes. Secura® paddles are formed using a unique shearing process which results in a more consistent resin mixing along the column length. The solid bar is threaded at one end with a high strength R thread profile which includes a modified rope thread for improved installations.

ADVANTAGES

- Unique paddle system to improve resin mixing providing higher bond strength in large diameter boreholes
- Proven historical performance and extensive quality-controlled manufacture
- Permanent primary support
- Consistent pin nut torque drive system
- High strength 'Nova' thread (R thread) profile including a modified rope thread with large root and small crest areas
- High load transfer

PRODUCT SPECIFICATIONS

Bolt by colour ID	Bar Tensile Force (kN)	Bar Shear Force (kN)	Bar Torsional Strength (MPa)	Nut/Thread Tensile Force (kN)
Minova Secura	**351**	**263**	**1,755** [1]	**352** [2]
Red Bolt	303	214	1,534 [1]	302 [2]
Blue Bolt	324	233	1,534 [1]	308 [3]
Yellow Bolt	212	166	975 [1]	201 [3]

1 MODE OF FAILURE: Torsional rupture of bar
2 MODE OF FAILURE: Tensile rupture of bar
3 MODE OF FAILURE: Thread stripped
A complete copy of report is available on request

All the testing and results reported, were undertaken (independently) by a NATA accredited testing service, Melbourne Testing Services Pty. Ltd. (MTS) In collaboration with the Deakin University.

While the report does not provide any specific conclusion, this flyer identifies the Minova R27 Secura Bolt and offers a performance comparison, based on our own interpretation of the tested data.

LOKSET ADVANCE

LOKSET ADVANCE RESIN CAPSULES

consist of a reinforced, thixotropic polyester resin mastic in one compartment and an organic peroxide catalyst separated by a physical barrier in the other. The rotation of the bolt during installation ruptures the capsule, shreds the skin and mixes the two components causing a chemical reaction and transforming the resin mastic into a solid anchor.

APPLICATIONS AND USES

The Lokset resin capsule is used primarily as an anchoring medium for rockbolts and long tendons. They provide roof and sidewall support in mines and tunnels. Can be used with both hydraulic and pneumatic roof bolters.

PERFORMANCE ADVANTAGES

- Extended shelf life of 12 months at 25°c reducing storage, waste and disposal
- High compressive strength allows strong, rapid and consistent anchorage
- Unaffected by vibration
- No expansion stresses and can be used in weak strata

PRODUCTIVITY ADVANTAGES

- Rapid and easy to install with no specialty injection equipment
- High load transfers achieved almost immediately
- Lower viscosity and improved rheology allows easier push through of resin
- Can be supplied in spin and hold or spin to stall configuration.

ANCHORING GROUTS

We have a comprehensive selection of anchoring grouts for all your general and specific bolting applications. They include cable bolt grouting, general strata grouting and consolidation applications. Our tried and tested anchoring grouts have been specially designed for mining projects where rapid strength gain is essential.

KEY FEATURES

- Rapid strength gain
- High strength and low porosity for long term life
- All grout formulations include a non-shrink expansion compensation system
- Suitable for all forms of manual and mechanised cable bolting
- Excellent pumpability
- Resistance to high saline and acidic ground water
- Supplied pre-blended and pre-packaged requiring only the addition of water

CONBEX® HES is a thixotropic grout ideal for cable bolt grouting in underground and surface mine applications where rapid strength gain is a prerequisite.

ALSO AVAILABLE:
Conbex® HT (Hithix) - long pot life for use with automated cable bolting rigs.

STRATABINDER™ HS is a high strength grout for bottom up cable bolt grouting.

ALSO AVAILABLE:
Stratabinder HS Slow Set - low viscosity grout that remains workable for several hours.

over **18+ years**
of experience

in stabilising rockfill and creating artificial rib and sill pillars for the safe extraction of high value stopes

“To date, five pillars have been consolidated allowing us to mine 116,000 ounces of gold earlier than planned and access an additional 23,000 ounces.”

Newcrest, PTNHM Indonesia

Our customers include:

- **Round Oak Minerals**
- **Newcrest Mining**
- **Castlemaine Goldfields**
- **Newmont**
- **Goldfields**
- **Evolution Mining**
- **South 32**
- **Glencore**

OPTIMISED ORE RECOVERY.

Many hard rock mines have ore rich reserves, contained in unmined area’s, commonly referred to as sterilised ore. With the placement of backfill adjacent to these resources, our solutions can maximise the extraction of previously sterilised ore resources, with unique and well proven products and methodologies.

KEY FEATURES

- Over 18 years’ experience
- Proven application success rate
- Increasing profits, by supporting the extraction of valuable resources
- Optimising control of mineral dilution
- Cost effective usage of R.O.M waste rock material
- Providing structural elements of a known strength for mine life extension
- Improved management of HSE risk

OUR SOLUTION:

Since 2001, Minova has invested technology and resources into developing the correct methodology and optimal product design to consolidate (previously unconsolidated) material to form artificial rockfill pillars.

FB200 was developed as a low viscosity, flowable, high yield cement grout with complete void penetration, easy pumpability and dimensional stability.

Our technical team conduct site analysis and work closely with our customers to determine the optimal consolidation thickness and test the rockfill permeability prior to commencement of the operation.

Our specialist operations team then mobilise the equipment and complete the product application, continually monitoring QA/QC.

Published conference papers and case studies for our applications are available upon request.

CASE STUDY:

Client:
Round Oak Jaguar Pty Ltd
(Round Oak Minerals)

Location:
Jaguar Operation,
Western Australia

Mine:
Bentley Mine

Contractor:
Minova

Duration:
June - August 2018

Products Offered:
FB200, Tekseal

Industry Sector:
Underground
Metalliferous Mine

OPTIMISED ORE RECOVERY

Minova have helped customers maximise ore reserves and improve extraction outcomes in unmined areas for more than 18 years, delivering substantial financial benefits safely and efficiently.

Round Oak approached Minova to assist with a solution that could maximise the ore recovery of stopes at their Bentley Underground Mine. One of the principal mining methods historically used at the Bentley Mine is the Avoca method which requires all development in a given area to be completed before stoping commences in a bottom-up sequence (both the conventional and modified variants are used at Bentley, which rely on end-on and central access respectively). Stope voids are sequentially backfilled with loose R.O.M waste rockfill.

The 3900 AOS level is positioned below a previously extracted Avoca zone with unconsolidated rockfill situated in the 3920 AON Stopes immediately above. Stopes in the 3900 were originally earmarked to have rib and sill pillars to maintain control of the existing backfill, however due to several factors including a shift in mining economics over time, options to achieve full extraction were reviewed.

Scope

To optimise extraction of this level, a 150m long section of consolidated rockfill was required in the 3920 AON to provide a stable exposure to mine underneath, so as to reduce the risk of dilution during extraction.

CASE STUDY:

Our Solution

Minova supplied technical advice, product, specialised equipment and operations capability to support Round Oak during the consolidation program.

FB200 grout was selected for its unique rapid gel times, quick strength, low viscosity and high water content, allowing for controlled placement through carefully designed borehole patterns to gain maximum penetration of the unconsolidated rockfill.

Tekseal, another high yield grout, was used to create grout curtains to control the placement of the FB200 within the rockfill.

The Result

With the help of Minova's 18 years of product ingenuity and experience in maximising ore recovery, Round Oak were able to adapt their mining method to a primary/secondary sequence, utilising the stabilised rockfill sill in conjunction with CAF backfilled primary stopes, which enabled the extraction of the previously planned rib and sill pillars.

Minova provided 360 tonnes of FB200 to Round Oak and were able to consolidate the rockfill in the 3920 AON ore drive during a three (3) week campaign. To date, all the primary stopes have been extracted with minimal dilution observed, with extraction of the secondary stopes still to occur. Minova are currently undertaking further work at Jaguar to unlock and extract value within the mine.

Achievements:

- Primary stopes have been extracted to full height, including the originally designed ore sill pillars. This represents an average **20% increase in ore tonnes** on the initial design for these stopes.
- Dilution within the consolidated rockfill sill has averaged **less than 3%**.

Quality Control:

- Grout samples were taken during application to ensure the correct ratio of product would achieve the correct strength.
- Samples were tested by Minova and a third party to ensure compliance.

VENTILATION CONTROL DEVICES.

For more than 20 years, Minova has manufactured a range of cementitious and steel fabricated systems that are used in the design and construction of underground mine ventilation structures and bulkheads.

In 1999 we diversified into contract design and installation of Ventilation Control Devices (VCD's). Since then we have considerably expanded the range of products, devices and services available to the underground coal and metal mining industries globally.

We offer vast experience and capability in engineering, design, product manufacture, fabrication and contract installation of VCD's. We have successfully developed and implemented many specific devices for individual customer requirements.

KEY FEATURES

- Enhanced air quality in underground mines
- Improved re-entry times after blasting due to advanced air control
- Improved cost efficiency with mine ventilation systems
- Trusted designs and engineering certification
- Complete service by one supplier for design, construction and installation of ventilation structures
- Safe to handle VCD's with convenient and rated lifting points, allowing easy and safe handling during installation
- Customised products to suit any roadway dimension and mine layout
- Protective coatings for harsh environments

over **20 years**
of experience

in the design and construction of underground mine ventilation structures and bulkheads

product versatility
supply & installation

- Direct product supply
- Product supply and service
- Full service and installation

LARGEST RANGE OF LIVE TESTED, EXPLOSION RATED VENTILATION CONTOL DEVICES, TESTED AT WORLD RENOWNED FACILITIES.

5 psi rated overcast

BLASTFLOW® LOUVRE REGULATORS

Blastflow louvre regulators provide enhanced control of airflow in primary ventilation circuits which are subject to air overpressures from stope firings.

Blastflow maximises the time available to underground operators by allowing them to work in a controlled ventilation environment right up to the time of the blast. Once adjusted, airflow is regulated immediately before and after the blast. Blastflow can be converted to allow remote control of the modules through the use of electric actuators and the mines SCADA system.

ADVANTAGES

"Set and forget solution" - simple hand wheel adjustment that establishes airflow settings before and after stope firings

Reduced safety risk exposure as operators are not required to remove hardwood drop boards and other ventilation controls before firings

Minimise manual handling by simply lifting modules into place using an ITC and locking pins for fixing inside steel regulator frames

Modules can be interchanged at other regulator sites, allowing for increased design flexibility

No requirement to disassemble before blasting

Blastflow modules can be fitted with man-doors, and the frame centre struts can be removed on double and triple 7 blade module regulators to enable light vehicle access

Workers aren't exposed to return air dust and removing timber boards

VENTILATION BLINDS

Minova's QBC blind is an easy to install ventilation device that allows for stopping of airflow to or from the area of a mine that may require access at a later stage.

Designed for a wide range of operating pressures to suite any opening size up to 5.6 metres in width. QBC Blinds have been developed for a wide range of applications in underground metal mines, coal mines and rail tunnels.

ADVANTAGES

Easily installed using existing mine services

Can be opened and closed with one person in a few seconds to allow vehicle and truck access

Can be tailored to suit specific size and ventilation requirements

Durable and high tensile cloth eliminates wear and impact damage

Flexible support ribs eliminate damage due to excessive ventilation pressure

Easily relocated for use where required

Approved cloth material for use in coal mines

Silent Seal®

Silent Seal® is a multi-purpose expanding sealant approved for underground mine use.

This polyisocyanurate two component foam is a quick and efficient sealant used to insulate, fill and seal gaps and voids. Chemically inert with an extremely low flame spread index of less than 25[1].

1 based on independent ASTME-162-87 test results.

ADVANTAGES

- Supplied as a ready to use pack, simply open the valves to begin
- Can be sprayed onto any surface in any direction
- Fully expands and tack free within seconds, cures in 1 hour
- Expansion ratio (approximately) 8 to 1
- Excellent coverage
- Cured sealant is chemically inert, non-toxic and non-reactive in approved applications
- Requires no power source to apply
- Empty containers are fully disposable
- Theoretical yield 0.42 m^3 per pack

TECHNICAL SERVICES

Qualified Minova representatives are available to assist in any necessary underground evaluation programs. Industry standard training and assessment procedures exist for all Minova products including Coal Bolts. All Minova service representatives are accredited workplace trainer/assessors and are experienced in the use of all Minova products.

QUALITY CONTROL

The superior quality of all Minova products is assured through a four-part quality control program:

1. Raw Material Testing
2. In-process quality control testing
3. Finished product acceptance testing
4. Quality system management to ISO9001

Testing levels and specifications for each of the above programs have been established statistically, based on actual historical data to ensure the customer receives a uniform quality product which will perform dependably under field conditions.

For further information see the relevant Technical Data or Safety Data sheet, copies of which are available on our website.

NEW SOUTH WALES
Kurri Kurri
Smithfield
Nowra

QUEENSLAND
Mackay

SOUTH AUSTRALIA
Adelaide

WESTERN AUSTRALIA
Perth

Customer Service:
1800 Minova / 1800 646 682 (free call within Australia)
1300 Minova / 1300 646 682 (local call Australia)

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