

# ROCK BOLTING SOLUTIONS.

# SECURING PERFORMANCE. TOGETHER.

We are 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 can provide you with tailored solution offerings for a variety of applications whatever it takes.

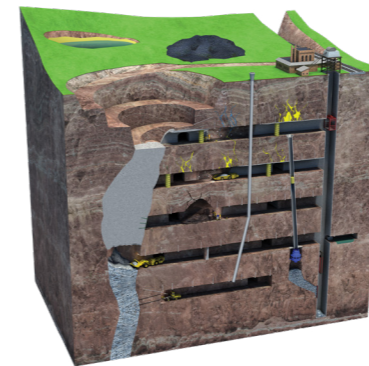
We can help you increase project performance and overcome application challenges through a flexible product portfolio with a wide range of differing characteristics, wherever you go.

## OUR INDUSTRIES.

We serve the mining, construction and energy sectors.

### COAL MINING

We are a leader in providing safe environments in extremely fractured and fluid ground conditions. We understand that safety and efficiency are the key requirements of coal production.



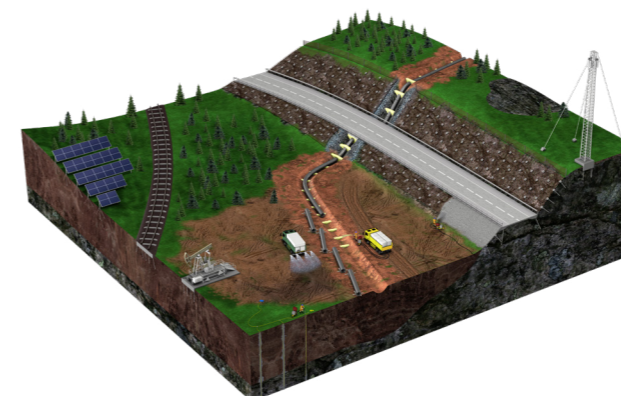
### HARD ROCK MINING

We support underground hard rock mines across the primary commodities. Our products are designed to provide safety, improve efficiency and include automated solutions.



### CONSTRUCTION

Stemming from our mining expertise, we have produced a wide range of products that are used in the construction industry. Our solutions are utilised in both above and below ground assets to secure, repair, restore and rehabilitate.



### ENERGY

We support many types of geostabilisation and structural repair projects in the energy sector. Our products and services include solutions in the oil & gas and renewable energy sectors.

# ROCK BOLTING.

## INNOVATING PERFORMANCE

We offer a comprehensive range of reinforcement and support solutions that control and stabilise rock in excavated or unstable areas.

### SUPPORT WHERE YOU NEED IT

We provide you with solutions for both active and passive methods of rock support wherever you are.

Our products range from various steel and Glass Fibre Reinforced Polymer (GFRP) bolts to steel arches, meshes and shotcretes.

Our offering can help you with:

- Filling of cavities / voids and backfilling
- Ground consolidation
- Mine gas sealing and ventilation control
- Joint sealing
- Water sealing
- Micropiling
- Non-potable water pipe repair
- Slope stabilisation
- Concrete repair.



# THE COMPLETE SOLUTION.

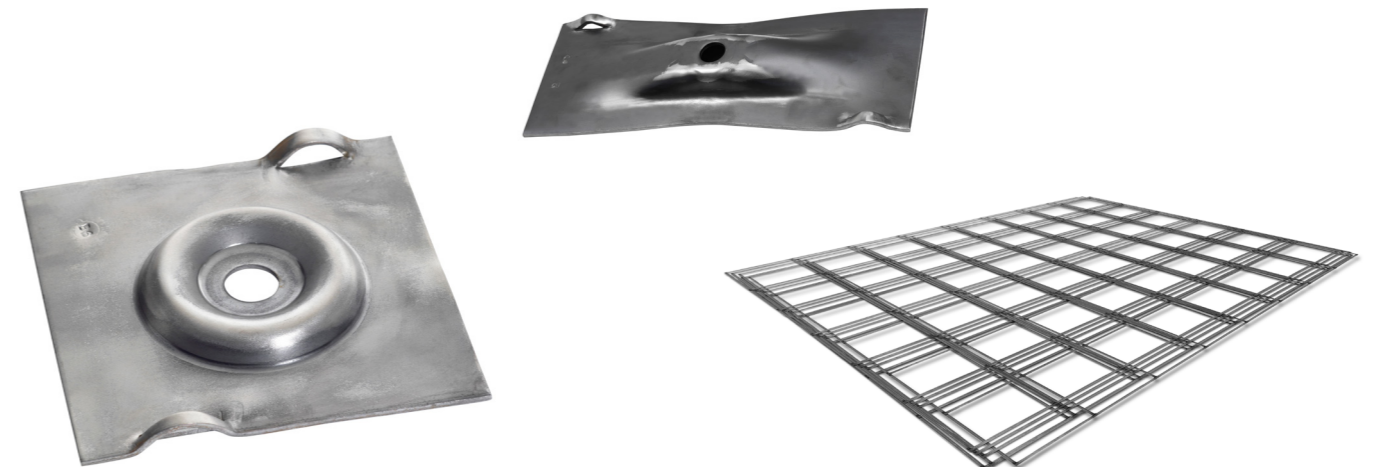
Bolts alone may not be enough.

Many applications require additional components to ensure the desired results.

We provide steel and GFRP accessories that work in combination with our products for you to achieve the best outcomes. From drill bits, couplings, meshes to plates and nuts and trusses. Our portfolio works to provide you with the right solutions wherever you are.

We also offer specific lines of shotcrete materials, spray plasters, sealants and liners for the mining and construction industries and deliver systems and applications knowledge as part of our integral offering, including:

- Bolting and drilling equipment
- Consultation and application services
- Abrasion and impact resistant shotcretes
- Fibre reinforced or fibre free grouting accessories
- Capsule installation systems
- Pumping and injection products and solutions
- Pre-mixed cements and coatings
- Spray applied waterproofing membranes
- Thin structural liners



# ROCK BOLTING PRODUCTS.

We have developed a series of complete solutions addressing today's bolting challenges. Our research and development teams can create tailor-made solutions for your needs.

PRODUCT	DESCRIPTION
GFRP: Glass Fibre Reinforced Polymer Bolts	Manufactured using the latest technologies offering high mechanical strength and long-term characteristics for anchoring, our GFRP products offer the lowest carbon footprint of any bolting product in the market with 66% lower CO <sub>2</sub> emissions. High strength, lighter weight products improve logistics, ergonomics, safety, and productivity rates.
SDA: Self-Drilling Anchor Bolts	SDA bolts provide reinforcement for the most unstable ground conditions like sand, gravel, silt, clay or fractured rock. The hollow bar attached to a sacrificial drill bit is used as a drill string and flushed with water, air or cement grout and it is fitted with a left- or right-hand, R- or T-thread. SDAs can be extended with couplers and connected to conventional rock drilling equipment. When used with grouts, including Carbothix or Celroc P, anchoring can be achieved in the most challenging rock conditions.
Cable Bolts	For passive or active long tendon applications with smooth bulbed or indented strands to enhance anchorage. Primary or secondary support, long or short-term applications where high-capacity supports with high shear strength and flexibility are required. A pumped grout is used to encapsulate the cable during installation.
Resin Capsule Cable Bolts	For long tendon applications, passive or active installations with smooth bulbed or indented strands to enhance anchorage. Primary or secondary support, long or short-term applications where high-capacity supports with high shear strength and flexibility are required. Designed to mix the two component Lokset resin cartridge. The cable is spun into position during installation thoroughly mixing the resin.
Friction Bolts (Expandable)	Used for immediate support in mechanised mining and tunnelling activities. Inserted undersized, expands under high-pressure water. Once fully expanded the bolt is drained of water, allowing for improved control of the bolt loading and corrosion protection.
Friction Bolts (Split)	The split bolt is made of a high strength steel and uses a spring-based design with an interference fit, creating immediate load transfer between the bolt and the rock mass once the bolt is fully inserted.



PRODUCT	DESCRIPTION
Resin Bolts	Used with Minova Lokset capsules, the bolts are inserted into the borehole after the capsule is set in place. The rotation of the bolts mixes the resin. On setting of the resin (minutes) the full load bearing capacity of the bolt can be used.
Tension Rebar Bolts (TRB)	Offers precise tension and significant cost savings. The TRB System has tensile strength characteristics from 140MPa to 318MPa (20 300PSI to 46 200PSI), where needed for better beam building. This exceptional support, installed in a 25mm (1") hole, allows for dramatic savings in resin and is available with a variety of tensions nuts. (Right- or Left-Hand Spin).
Mix Bolts	A combination of expansion shell bolt as temporary rock support and subsequent injection for permanent rock support through integrated injection hole and bleed air holes. The bolt remains fully secured during grouting.
Post Grouted Bolts	Using the expansion shell principle, the bolt is held in position while injection grouts fill the bolt-hole annulus, creating a fully encapsulated bolt for securing areas where higher rock pressures exist. A grout injection set, consisting of seal and piping, are used for injection of the grouts.
Expansion Shell Bolts	Simple and easy to install for immediate support to a work area, the expansion shell creates a point to anchor into the hole by turning the bolt in the hole. The shell tightens to the rock creating tension at the foot of the borehole, transferring the load from the bolt head and plate to the rock via the shell.
Wedge / Shaft Bolts	Used primarily in mining applications to connect the reinforcement support to the shaft-lining and to fit pipeline or cable holders and other fixtures in the shaft. The wedge is inserted into the borehole and the bolts are hammered into position. The bolt can also be grouted to provide additional long-term security.
Continuous Thread Bolts (CTB)	CTB are similar to Tension Rebar Bolts, but with the added benefit of being threaded the entire length of the bar, thus allowing for more versatility. If ground conditions or roof control plans change down the road the ability to tighten the bolt provides added flexibility.

# GOING DEEPER.

As mines and tunnels continue to go deeper, excavated areas are exposed to increasingly difficult ground conditions and rock pressures. Due to challenging strata and greater depths, even highly competent rock may become overstressed.

## CONVERGENCE AND DYNAMIC YIELD APPLICATIONS

We work closely with the leading mining and tunnelling companies to address the challenges of deeper excavations by offering a range of convergence and dynamic bolting technologies.

## OVERCOMING BROKEN OR WEAK GROUND

Our Self Drilling Anchor (SDA) bolting technology is designed to improve installation times and to address hole collapses when used in fractured ground.

It is a flexible system that features a load-bearing hollow bar/bolt that is encapsulated by a grout body.

The bar/bolt is used as the drill rod, transferring the energy during drilling.

Flushing may be achieved with air, water or simultaneously improving productivity by using the single pass drilling and grouting method.

The SDA bolts are manufactured from high quality seamless or welded tubes that have either left or right-handed thread types, ('R'=Rope thread or 'T'=Trapezoidal thread).

Our products are suitable for either manual handling or use on-board fully automated bolting rigs.

The bolts utilise sacrificial drill bits and are easily lengthened by adding extension couplings.

These extensions allow for installation of bars where space is limited or where design flexibility is needed.

Uniform placement of the bolt within the borehole is achieved using optional centralisers.



## AUTOMATION IMPROVING SAFETY AND PRODUCTIVITY

As the mining environment moves more and more towards automation, we are the leading innovator in total solutions for automated rock bolting. Our rock bolting solutions reduce manual handling requirements and improve installation efficiency.

We are the technical leader for in-hole bolting solutions combining expertise in steel and GFRP bolting with cementitious grouts and resins.

Our One Step Bolting System™ combines the benefits of SDA bolts with our high-performance injectable resins.

The immediate bonding of the resin makes it possible to load the bolts without leaving the borehole making the bolting process safer, significantly quicker and more efficient.



# IMPROVED DESIGN LIFE.

The demand for extended bolt life requires improved rock bolting technologies. One of the main limiting factors to bolt life is corrosion acting on steel elements.

## COATING PROTECTION FOR ROCK BOLTS

We provide multiple coating solutions for a wide range of bolts that increase bolt lifespan while maintaining its performance.

Single and twin coated protection systems are available that can be combined with our grouting solutions to optimise the lifespan and performance of our bolts.

## FLEXIBLE DESIGNS

Our Enduro System provides tough chip resistant protection to steel products.

The finish offers excellent UV, alkaline and acidic corrosion protection, enhancing the useful life of steel.

Tyta Bolts are made with larger threads that extend the useful life of the bolt, and allow the bolt to be re-tightened as needed.

Our Continuous Threadbar bolts allow for ease of use and flexibility when designing bolting systems.

The bolts are fully threaded allowing for versatile installation and length design.

## IMPROVED RESIN MIXING

We developed cost-effective, high-performance bolting systems like the Eclipse and Secura Bolts that enhance resin mixing.



# SUPPORTING MINING WHERE YOU ARE.

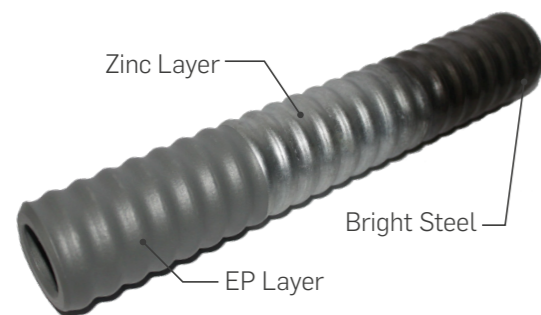
## TWINCOAT™ PROCESS

Our TwinCoat process is available for our SDA anchors.

The coating process is comprised of a hot dip galvanisation in accordance to EN ISO 1461 and Epoxy coating in accordance with ISO 2178.

The TwinCoat process is tested for suitability in accordance with corrosion category C5-M and Im3 (durability range according to ISO 12944-2).

Testing performed by OFI (Austria).



Deep mine developments can often be exposed to vibrations caused by blasting and seismic movements.

Many bolts used in such areas have a thin formed thread and are easily damaged or require re-tightening.

In cooperation with mining customers, we developed a new bolt, known as the Tyta bolt, featuring a bolt assembly with a robust extended length coarse thread.

This innovative thread design is blast resistant and improves meshing process, allowing for increased safety and productivity. With improved pitch, our customers found it easier to clean and saved time on re-tightening of the bolts.



# GFRP PRODUCTS.

## A SUSTAINABLE CHOICE

Glass Fibre Reinforced Polymer (GFRP) technology positively impacts the environment and your workforce. GFRP products reduce manufacturing and transportation CO<sub>2</sub> emissions.

GFRP have lower per-unit weights compared to similar steel products leading to more units per load, lowering transport costs.

The positive impact of lighter GFRP products extends to your workforce improving your productivity and safety.

We offer a variety of GFRP products for use in various applications including continuous thread bars, self-drilling bolts, hollow bars, reinforcement bars and meshes.

### APPLICATION AREAS

- Permanent structural reinforcement (bars/mesh)
- Non-conductive or radio-sensitive application
- Rock bolting (permanent and temporary)
- Soil nailing, rock face stabilisation and ground anchoring

### ADVANTAGES OF GFRP

- Size flexibility
- Excellent durability
- Lighter than steel
- Corrosion resistance
- Ease of cutting
- Electrically insulated
- Flexibility for installation in confined spaces
- High tensile strength
- High torsional strength
- High thermal isolation
- Low sound transmission



# SUPPORTING CONSTRUCTION WHERE YOU ARE.

Expansion of historical railway tunnels can be a great challenge.

The electrification of old railway tracks in the United Kingdom uncovered unstable and hazardous ground conditions. The supporting roof consisted of sand, clay and glacial till.

Our solution was to provide GFRP and injection resin support to secure the dowels, bonding loose material and filling cavities. Our GFRP dowels provided much needed flexibility allowing them to be easily cut to the required length.

Our sole-sourced provision of products and services provided our customer with the required dowels, injection grouting for cavity filling and consolidation.

Our site team also supplied our customers with pumps, packers and small drilling equipment to ensure the work was carried out safely and efficiently.

# GROUTING PRODUCTS.

We manufacture a wide range of grout solutions for rock bolting applications. From generic grouts to highly engineered rapid setting and strengthening grouts, our grouting products allow for a tailored offering wherever you are.

Our industry-leading capsule products, Lokset and Capcem, offer full encapsulation for ease of handling.

Our products are bulk packaged, scalable and can be used with manual or fully automated systems.

Carbothix, our flagship silicate resin, increases safety, significantly improves efficiency and decreases material waste.

Our bulk cements can be used for strata injection and consolidation applications in mining, construction and energy projects.

Our grouts work across a wide range of applications and placement methods including long distance pumping, thixotropic grouting and injection for water stopping.

These products may be applied manually or via automated methods, including rapid advance bolting.

Special application grouts have been developed in cooperation with our customers.

## LOKSET

Lokset is our innovative resin-based grouting capsule. This product is renowned for its reliability, high bonding strength and ease of use.

The capsules are available in various sizes, with varying setting times and viscosity to give you the right level of flexibility.

## CAPCEM

Capcem is a cementitious capsule designed for easy handling in bolting applications.

It eliminates the need for mixing and pumping equipment, minimising grout wastage.

Capcem's non-shrink features ensure effective contact between the bolt/bar and grout, contributing to a successful load transfer and increasing site safety.

Being a chloride free product, it helps to avoid corrosion and thanks to its thixotropic nature, loss of grout is prevented even from overhead holes, reducing operational cost.

## CARBOTHIX

We manufacture a wide range of grout solutions for rock bolting applications.

Carbothix is a two-component silicate resin that instantly thickens and cures when pumping is stopped.

Compared to traditional cement-based grouts, which need 24-48 hours to harden, bars/bolts can be loaded in minutes with Carbothix. Unlike polyurethane grouts, Carbothix works in the presence of water, allowing for flexible utilisation.

Our formulations of Carbothix allow for use in various ambient temperatures and moisture conditions found underground, giving you the flexibility that you need.



# SUPPORTING ENERGY WHERE YOU ARE.

Located in California, the Oroville Dam is the tallest eastern dam in the United States.

After years of drought conditions, this embankment dam suffered considerable damage due to significant rains causing massive flooding during the spring of 2017. The rains led to severe erosion of the dam's primary and emergency spillways, as well as many of the surrounding access service roads.

We provided support to our customers with a number of products and services to prevent further erosion and reinstate the structural integrity of the dam spillway. The innovative technology of our products allowed our customers to receive a tailored package solving their needs.

Celroc P grout was pumped into heavy water burdened drill holes to create anchorage points for dowels connecting the new spillway to base rock and the remaining sections of the old spillway. Its high resistance to washout and fast curing allowed for faster anchorage pull tests speeding up the project completion time.

Our technical field support was on site providing our customers with application training for TekCrete Fast® shotcrete material. The product was used along with soil nails the structural coating under access service roads, helping to stabilise the ground and prevent any further soil erosion along the steep slopes.



