



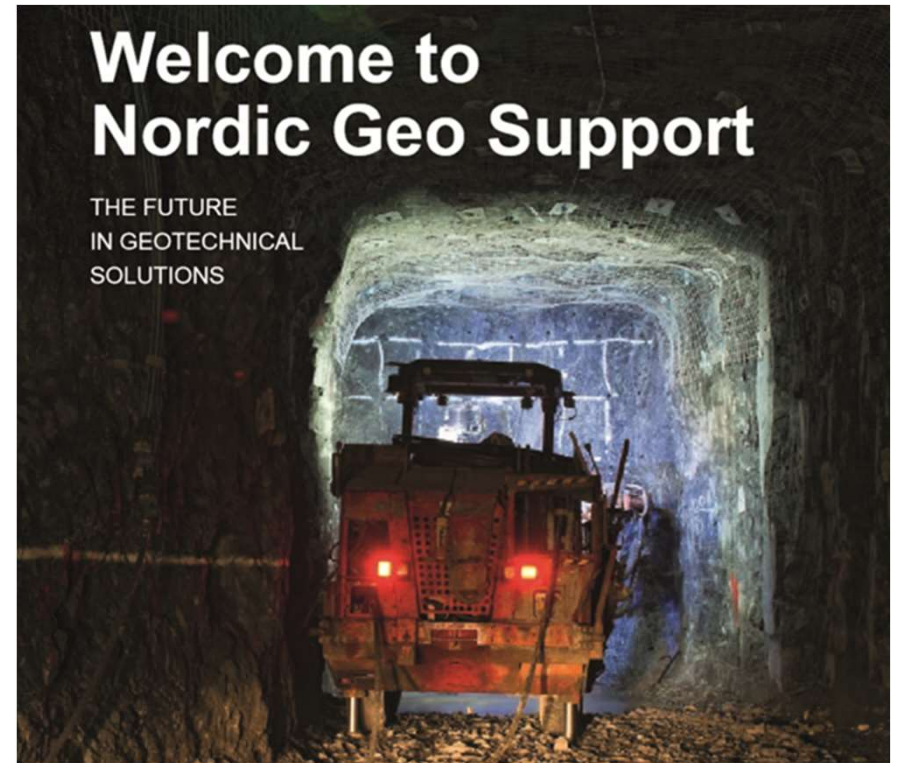
# Nordic Geo Support

Products for a Sustainable World

# NordicGEO – Sustainable Technologies



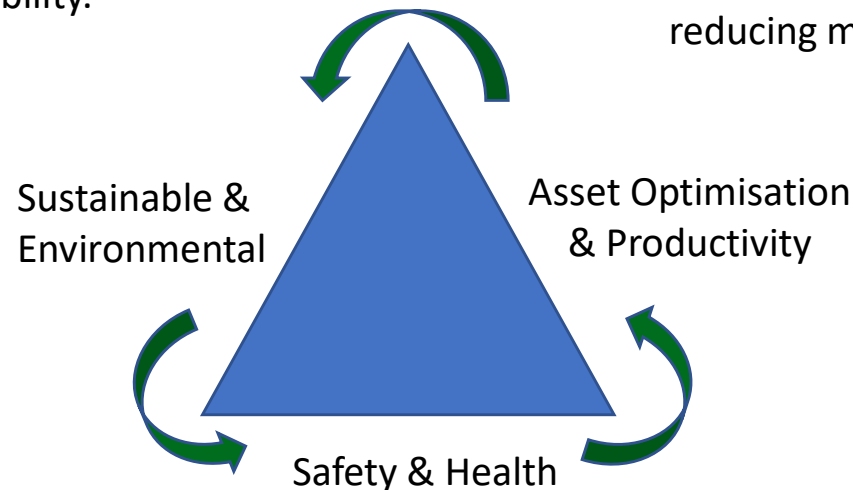
- **Nordic Geo Support** is a specialist offering high-performance solutions.
- Our technology advancement in resin based solutions place our customers at the leading edge of sustainable bolting, sealing, consolidation and stabilisation of rock and soils as well as building and infrastructure repairs.
- Our drainage solutions for construction, mining and tunnelling reduce the needs for high levels of applied sprayed products.
- High efficiency and reusable ventilation ducts and service hangers are reducing energy and future project investment costs.
- **The following selection gives an overview of several leading edge technologies addressing safety, productivity and more importantly environmental factors. Sustainable solutions from Nordic Geo Support.**



# Reducing Project Impacts

**Sustainability & Environmental:** Solutions that drastically reduce CO<sub>2</sub> emissions in manufacture and transport and energy usage as well as offering longer life cycles and reusability.

**Asset Optimisation & Productivity:** Solutions that are faster, more efficient, easier to use and reusable, optimising advance rates and ore recovery as well as reducing maintenance costs.



**Safety & Health:** Solutions that remove humans and equipment from unsecured ground, faster ground securing, ensuring stability and consolidation, reduce manual operations and weight in manual handling.

# Business Snapshot



## Mining

Increasing focus by miners on Rapid Development

Increasing focus by miners on cost control

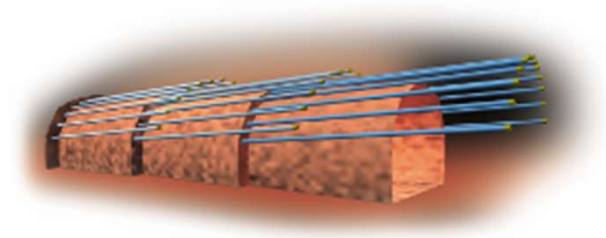
Continued focus by miners on safety

Production mining – continued need for support infrastructure expansion.



Need to get services to the face as fast as possible

Less environmental impact – smaller footprints.



# Business Snapshot

## Tunnelling and Construction

Automation and less manual handling



Reduction of project footprint



Safety

Protection of strategic assets – ground water and drinking water

Improvements in productivity  
Finish projects early



New, upgrade and remediation of infrastructure assets

# Business Snapshot

## Building Construction



Aged construction requiring water stopping and basement repairs



Remediation works  
Warehouses and  
Carparks repairs



New construction with  
improved seals



Buildings requiring  
integrated  
foundations and  
underpinning works

# Engineered Systems

**Nordic GEO Support** offers an extensive range of engineered solution to meeting the demands of miners and construction customers.

Our team works closely with out end customers and specialists to develop the best solution to meet the project's demands.

Cement systems include:

- Injection technologies
- Bulk mixing and pumping systems
- Integrated systems for automation in:
  - Bolting
  - Foundations
  - Slope Stability
  - Other...



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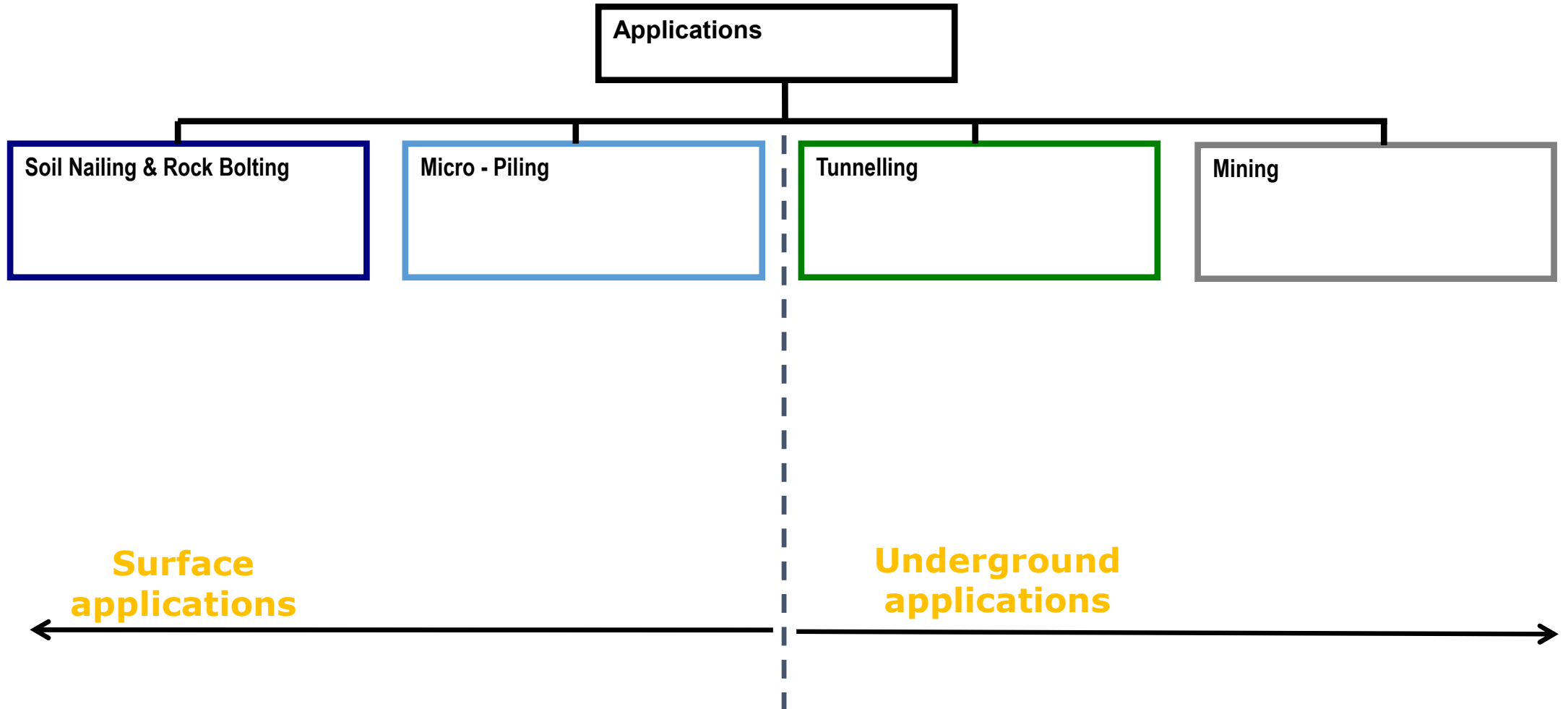
- ✓ **System Scoping – Holding Tanks, Mixing and Pumping unit Demands**
- ✓ **Design – Holding Tanks, Mixing and Pumping unit technologies**
- ✓ **Automation and Controls**
- ✓ **Process and sequencing of products**
- ✓ **Turn-key solution**
- ✓ **Specialised components**



From Simple to complex technology designs

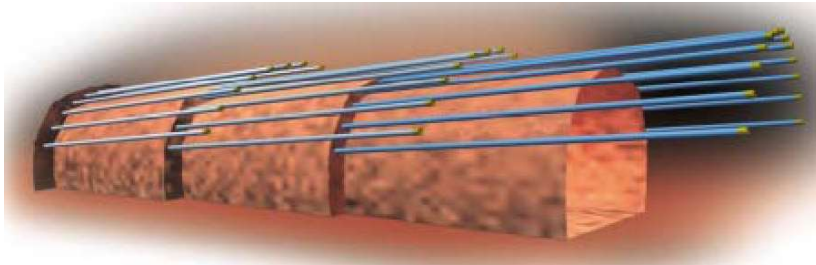


# NordicGEO – application areas



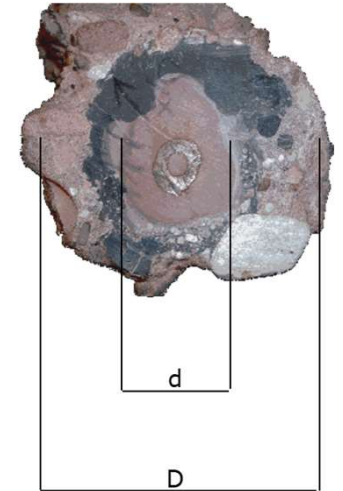
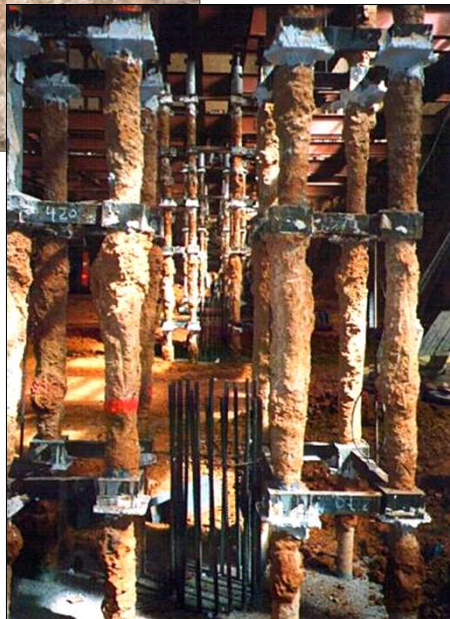
# Cement and Grout Delivery Systems

## Underground Spaces

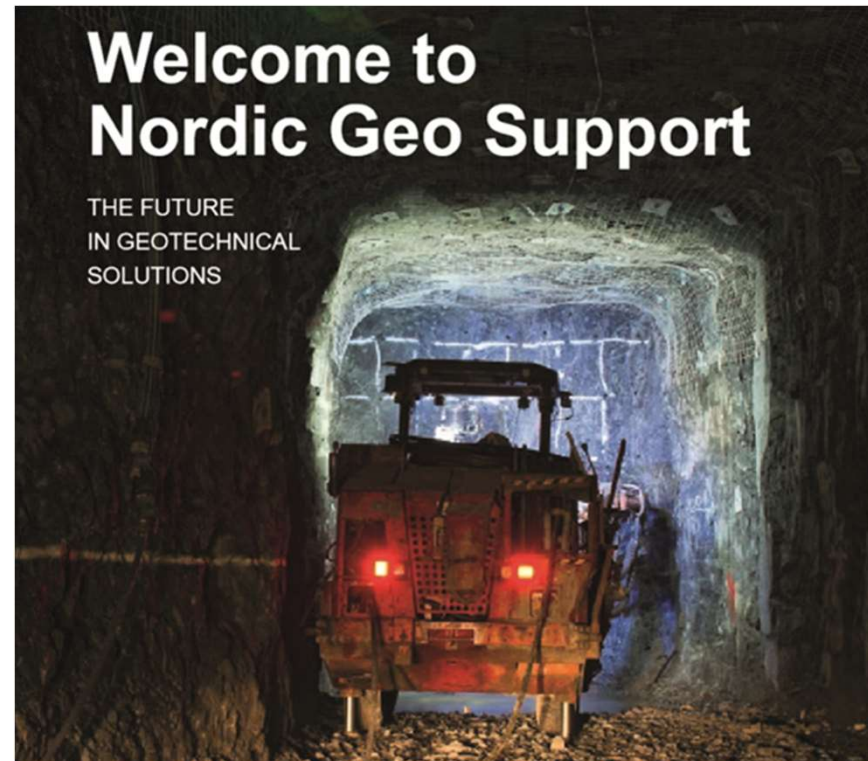


# Cement and Grout Delivery Systems

**Experienced in Automation in construction  
and underpinning**



## Other Technologies from Nordic Geo Support



# Water Management

Nordic Geo Support offers a range of products to control water in tunnels, mines and construction sites:

- **TunnelDrain** – the innovative alternative to or used with strip drains.
- Drainage pipes and **mechanical seals** for tunnels and construction
- For **dewatering**, Solid Pump's range offers a robust and economic solution. The Winzemaster pump offers a simpler alternative.
- A range of waterstopping injection resins. Including leading edge **ground water and drinking water approved products**.



Ground Water Approved  
Drinking Water Approved

# Drainage Systems

## Water Ingress Management



Basements, cellar, car parks, tunnels and other subterranean applications

### Background

- Many areas require fast installation of adequate drainage to reduce water ingress
- Comprehensive system better alternate to other drain technology
- Systems that are compatible with sprayed concretes and TSL's (Thin sprayed waterproof liners).
- For use as temporary or permanent structures



### Facts

#### Origin: Denmark

Users:	Underground mines, tunnels and construction spaces
References:	Scandinavian tunnels and mines New markets India and Singapore
Focus	Environment and sustainability
Impact	Large: productivity gains, reduce project costs, reduce materials usage

### Value Propositions

- Fast and easy installation
- Modules are easily managed and to cut on site as required
- Compatible with sprayed cements and TSLs; optimal bonding
- Flexible, robust structure
- Reduce consumption of spray applied materials (cements)
- No shrinkage or cracking of concretes (seen with strip drains)
- Multi-channel to optimise water transfer to drains
- Easy to maintain

# Water Sealing Solutions

## Water Ingress Management

✓ Drinking Water Approved



### Background

- Many areas require securing of ground and sealing of water ingress
- In high pressure or high-volume areas, wash out easily occurs. Fast setting and secure products are required
- Consideration to life cycles and environment are key today
- Systems approach is required for applicators to optimize the result
- Many older cellars are impacted from ingress and cannot be accessed externally. From and internal drill and injection, it is possible to secure underground spaces.



### Facts

### Origin: Europe

Users:	Underground mines, tunnels and construction spaces
References:	Global with focus on European tunnels and mines, Singapore, Africa
Focus	Environment and sustainability
Impact	Large: productivity gains, reduce project costs, reduce materials usage

### Value Propositions

- Available in Epoxy, Acrylate, Polyurethan and Silicate based solutions
- Ground water certified
- Leading Edge Drinking Water certified
- Total system including pumps, packers, lances and accessories
- Fast and easy installation/application
- Flexible (elastic), robust structures, foam or non foaming
- Mechanical sealing and draining systems also available.

# Ground Support

Nordic Geo Support offers a range of products to control water in tunnels and mines:

- A range of consolidation and stabilisation injection resins. Including leading edge **ground water and drinking water approved products**.
- Glass Fibre bolting **improving LCA targets** for projects whilst improving productivity and health and safety aspects.
- Self drilling bolting systems and grouts for **automation, safety and productivity** gains.





# Resin Based Systems

## Ground Consolidation and Stabilisation

✓ Drinking Water Approved



### Background

- Many areas require securing of ground, whether consolidation, stabilization or sealing.
- Comprehensive system better alternate to other drain technology
- Systems that are compatible with sprayed concretes and TSL's (Thin sprayed waterproof liners).
- For use as temporary or permanent structures



### Facts

### Origin: Europe

Users:	Underground mines, tunnels and construction spaces
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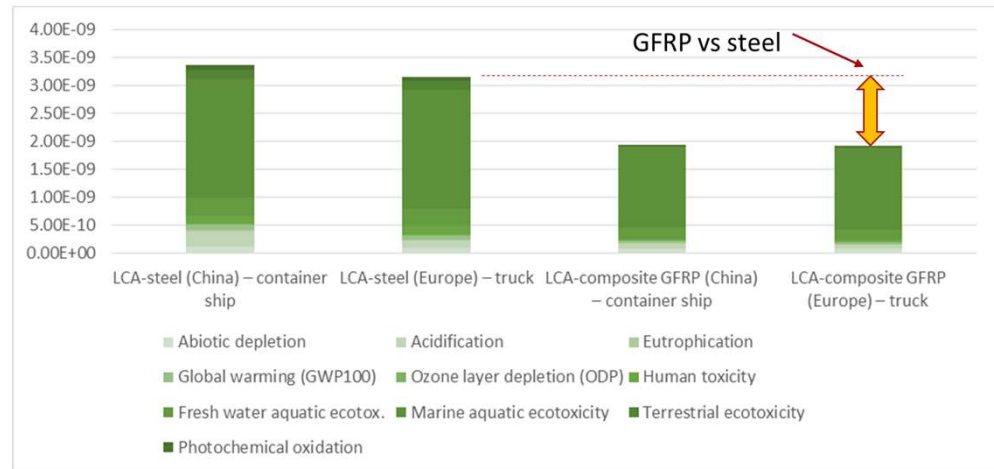
# GFRP Bolt Systems

## Ground Consolidation and Stabilisation



### Background

- Projects are looking for design life optimization, targets are reaching 120 years in design life. Many projects today are seeking faster installation methods to secure ground or control slopes.
- Projects are meeting broken ground conditions not suitable for standard bolting systems.
- LCA targets and reduction of green house gases are being measured as part of performance criteria
- Projects are looking for inert products to optimize safety and reduce corrosion effects.
- Combined with NGS BoltFast grouts for high productivity gains.



### Facts

### Origin: Europe

Users:	Underground mines, tunnels and construction spaces
References:	Global with focus on European tunnels and mines, Singapore, Africa
Focus	Environment and sustainability
Impact	Large: productivity gains, reduce project costs, reduce materials usage

### Value Propositions

#### Improvement for environmental aspects of projects

- Corrosion resistance
- Ease of cutting
- Electrically insulated
- Flexibility for installation in confined spaces
- High tensile strength
- High torsional strength
- High thermal isolation
- Lightweight (up to 75% lighter than steel)

# Self Drilling Bolt Systems

Ground Consolidation and Stabilisation



## Background

- Many projects today are seeking faster installation methods to secure ground or control slopes.
- Projects are meeting broken ground conditions not suitable for standard bolting systems
- More tunnels in built up zones
- Tunnelling requiring security ahead of the excavation
- Combined with NGS BoltFast grouts for high productivity gains



Self Drilling, overburden and foundation drilling solutions available

## Facts

### Origin: Europe

Users:	Underground mines, tunnels and construction spaces
References:	Global with focus on European tunnels and mines, Singapore, Africa
Focus	Environment and sustainability
Impact	Large: productivity gains, reduce project costs, reduce materials usage

## Value Propositions

### Faster installation, ideal in broken ground conditions

- Self-Drilling bolts also known as Self Drilling Anchors or SDAs.
- Versatile and efficient
- Ideal in unstable ground conditions, where the bolt acts as a drill string that remains in the hole after drilling.
- The bolt is post grouted to secure the bolt in position.
- The bar can be extended by using couplings where deeper tendons are required for securing ground, replacing cable technologies, especially in unstable ground conditions

# Ventilation and Services

- Ventilation remains one of the highest costs in any project. **Nordic Geo Support ventilation systems reduces the environmental footprint** related to energy costs, transportation, lifetime use and re-usability for the next project.
- Nordic Geo Support offers **services hangers designed for re-use** during the project or re-use for the next project.



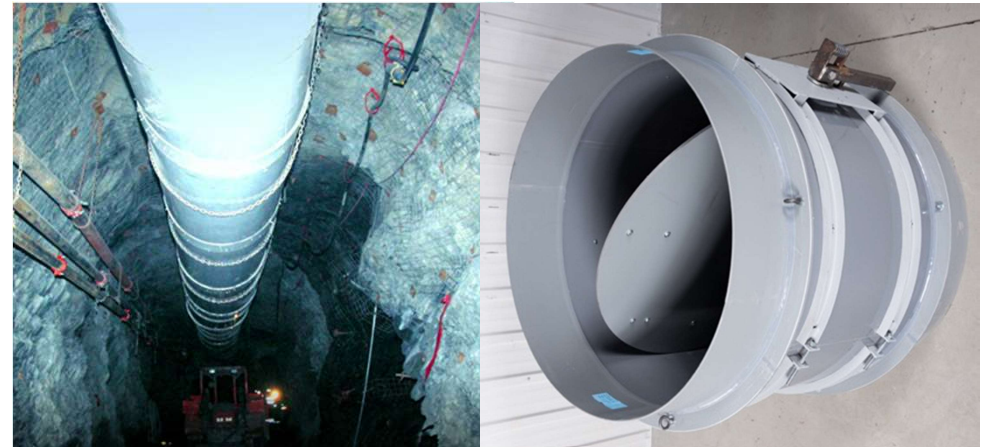
# Ventilation Systems

Improve air flow, reduce energy consumption



## Background

- A major cost to mines and tunnel projects is energy consumption by ventilation systems
- In remote site challenges to ship fixed permanent or temporary systems is costly
- Temporary ventilation systems reduce drastically energy efficiency and more robust than temporary systems (approximately a full system change out is every 2 to 3 years depending on environment)
- Need for faster extraction of poor-quality air or blast fumes.



## Facts

### Origin: Canada

Users:	Underground mines, tunnels and construction spaces
References:	Canadian and LATAM mines
Focus	Environment and sustainability
Impact	Substantial: Energy Efficiency, massive long term reduced operational costs; sustainability.

## Value Propositions

- Large savings CO<sub>2</sub> savings in transportation and energy use
- Reduction of power consumption used by vent systems by up to 50%
- Easily transportable on surface and underground 1 truck = 24 trucks in fixed ventilation systems
- Quick and easy to install
- Reusable
- Accurate and precision manufacture to the size required
- Easily adaptable for push and push/pull vent systems
- Robust and flexible
- Connects directly to vent fans, ensuring high performance and air quality
- The duct resists negative pressures; no recirculation issues

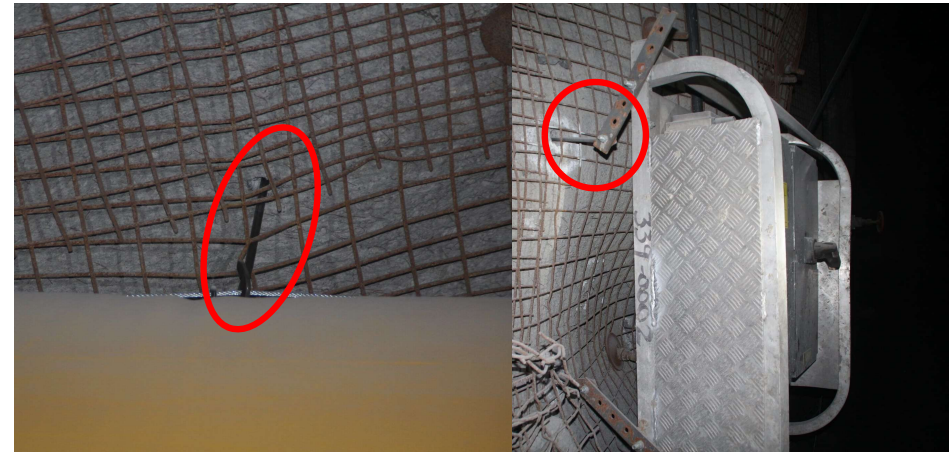
# Re-usable Service Hangers

Reduce costs, improve productivity



## Background

- Traditionally service hangers are grouted into position as a single use item, waiting time to load the hook reduced installation times
- Depending on the environment service hangers can easily corrode reducing their weight bearing performance
- New technologies offer fast to install methods, optimized protection to corrosion from aggressive ground conditions
- Blast hook also available, reducing steel impact on downstream operations (crushers, mills and conveyers).



## Facts

## Origin: Sweden

Users:

Underground mines, tunnels and other construction areas.

References:

Scandinavian mines and construction sites.

Focus

Environment and sustainability

Impact

Good: Speed to install and load bolt, reusable, reduction in operational cost, reduction of waste.

## Value Propositions

- Re-usable
- Quick to install for immediate services support
- Expansion shell is plastic so no corrosion
- Can be delivered in galvanised form for highly aggressive conditions
- Design can be changed to customer needs

### **Blast Hooks Cleaner ore recovery, reduced downstream maintenance**

- The all plastic design means that crushers and conveyers have less exposure to wear and tear
- further reducing operating costs.
- Reduction of ore contamination from steel