

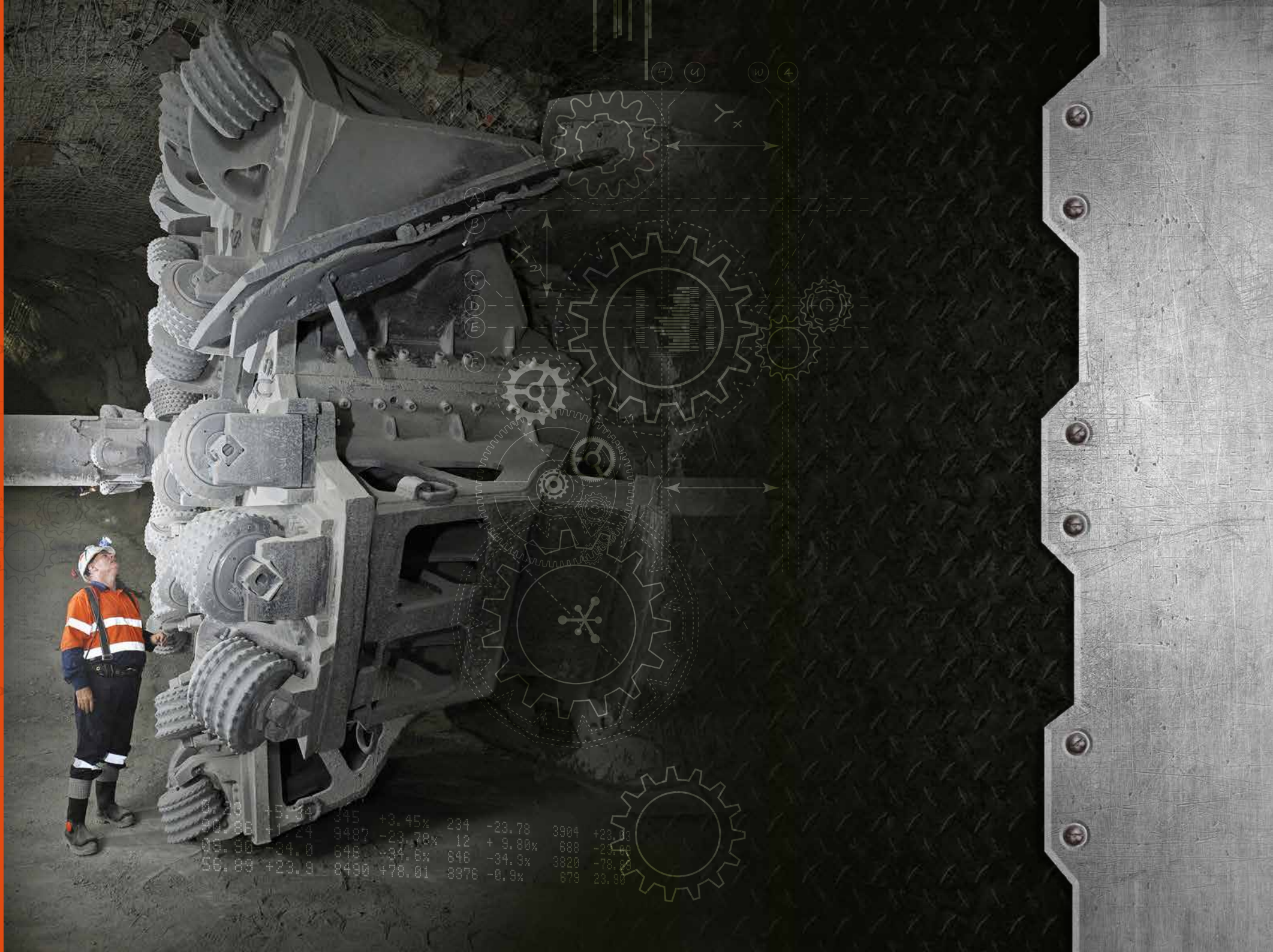
# MAN AND MACHINE



Masters in innovative, cutting-edge drilling solutions

# WHAT WE DO

Leading global experts  
in drilling solutions that  
support our clients' unique  
needs with our specialised  
in-house equipment design,  
manufacturing, training and  
maintenance capabilities





## WHO WE ARE

Master Drilling, established in 1986, is a global technology solutions driven company, focused on delivering a fully mechanised range of services to the mining, civil and energy sectors. As the trusted partner of choice, our business model is characterised by cutting-edge technology, innovative solutions and tailor-made designs, coupled with a flexible support and logistics chain. We partner with our clients during every project touchpoint – from exploration phase to the production and capital stages.

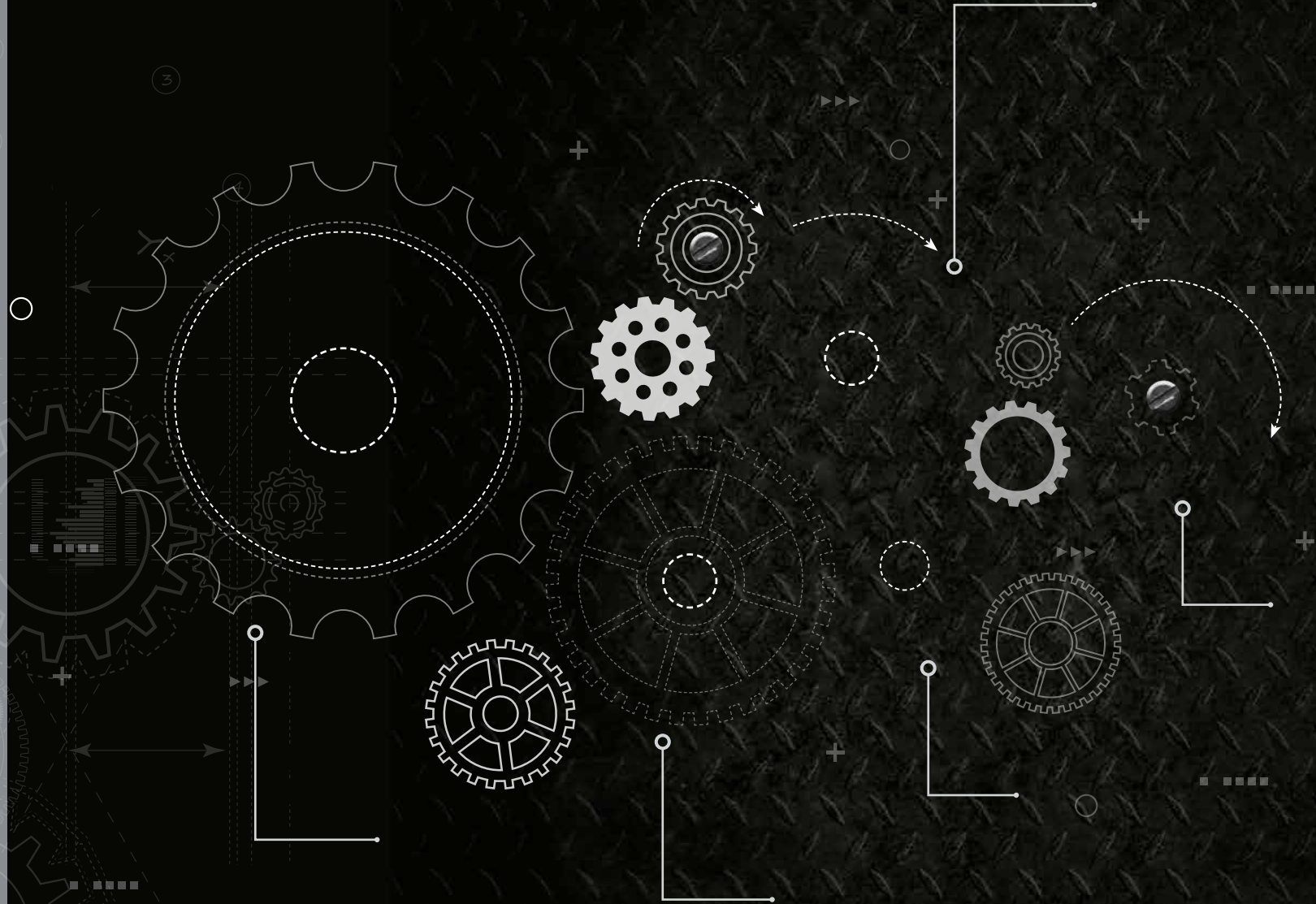
Our leading experts and advisors strive to provide a solution for every operational challenge – be it access, transportation, ventilation or analysis – focusing on the continuous research and development of new techniques and methods.

Master Drilling is listed on the Johannesburg Stock Exchange (JSE).



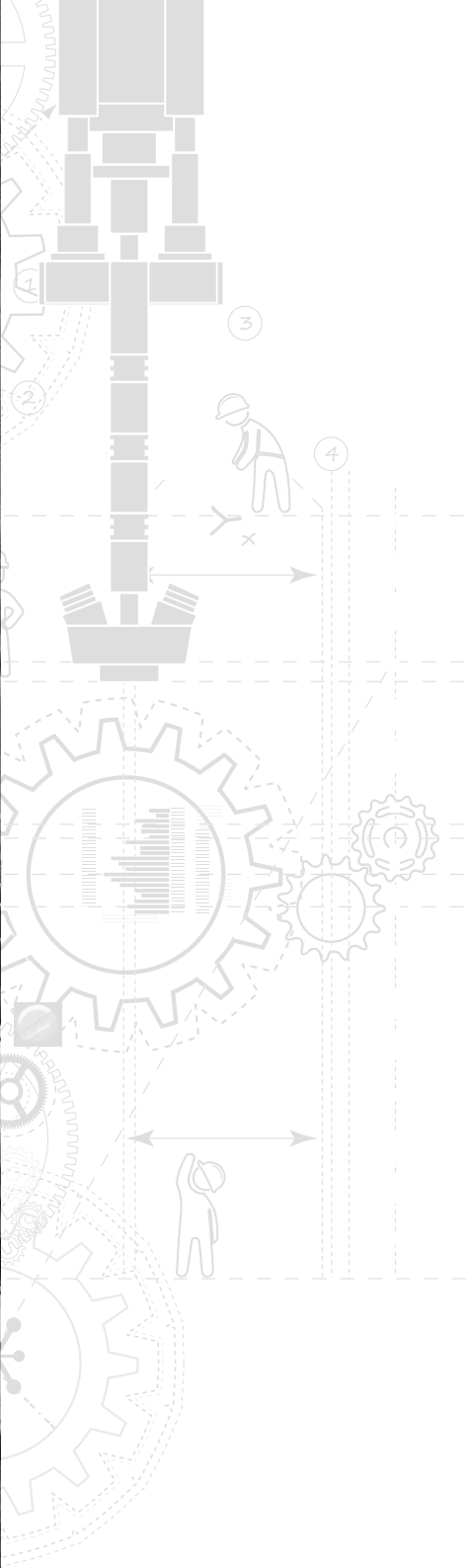
# HOW WE DO IT

WE CHALLENGE  
THE STATUS QUO  
TO PROVIDE OUR  
CLIENTS WITH  
SPECIALISED,  
ADAPTIVE AND  
INTEGRATED  
DRILLING  
SOLUTIONS





## WHY ARE WE DIFFERENT



## WHERE YOU FIND US

Master Drilling is a global business with geographic diversification being part of our strategy as it broadens our growth potential and reduces our overall risk.

We tailor solutions to meet the specific conditions and challenges faced by our clients.

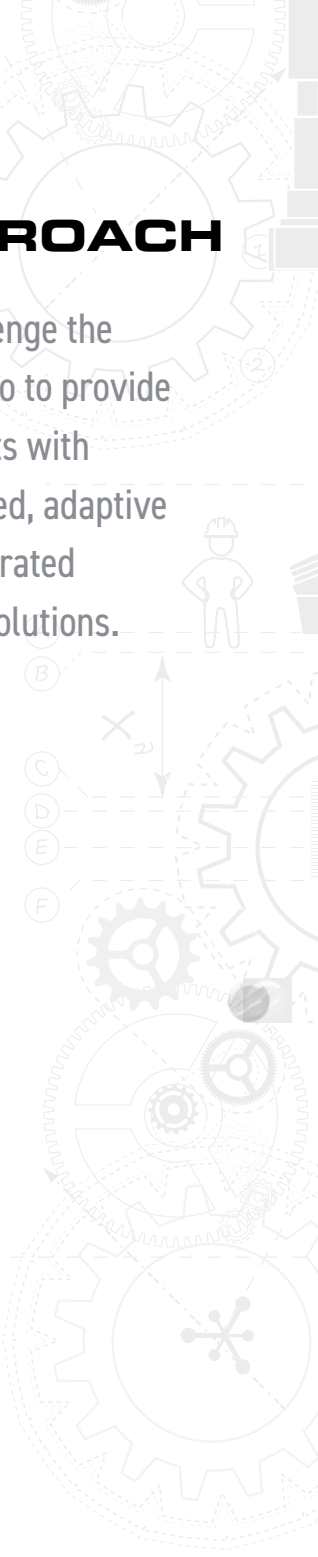


## OUR GLOBAL FOOTPRINT



# OUR APPROACH

We challenge the status quo to provide our clients with specialised, adaptive and integrated drilling solutions.





The background features a dark, textured surface with a technical illustration on the left. The illustration includes several interlocking gears of various sizes, some with internal patterns. A central vertical shaft or rig structure is shown, with a worker in a hard hat and safety vest positioned next to it. A large gear in the center contains a bar chart. To the left of this gear is a vertical axis labeled with letters A through F. To the right, another vertical axis is labeled with numbers 1 through 4. Arrows and dashed lines indicate relationships and flow between these elements. On the far right, a vertical metal plate with several screws is visible, suggesting a mechanical or industrial context.

## OUR ZERO HARM PHILOSOPHY

Our aim is not only to comply with stipulated health and safety codes, but also to continually exceed the targets we have set for ourselves as a global business and a responsible corporate citizen.

This means a focus on:

- Identifying and reviewing safety, health, environmental and quality risks and hazards through performance measurement, ensuring effective corrective action and training
- Ongoing health and safety initiatives for employees and surrounding communities
- The efficient use of resources and a focus on reducing our carbon footprint

Master Drilling Group Ltd is ISO 9001, ISO 14001, BS OHSAS 18001 certified

## OUR SERVICES

We have a comprehensive portfolio of niched services, adapting to and meeting our clients' requirements.



# ROCK BORING


## ROCK BORING





### RAISE BORING

We have over 30 years' experience in this field, and our raise boring fleet is the largest in the world. With over 100 rigs that operate quickly and efficiently in hard rock, we are able to drill up to a depth of 1.5km.

### APPLICATION

**Mining sector**  
 Drill shafts for ventilation, transferring ore, rock storing silos & hoisting to the surface.

**Civil sector**  
 Tunnels route waste water underground for disposal and access rail system shafts.

**Energy sector**  
 Hydro Electric or Pump Storage plants for pressure shafts & access nuclear storage facilities.

### BENEFITS


- No explosives required - a lower cost alternative in certain applications and scale compared to conventional methods
- A fast and efficient way of excavating rock
- Stronger - stable circular excavation is completed with no damage to the sides of the hole or shaft





### HORIZONTAL RAISE BORING

We have pioneered HRB technology and applications worldwide. HRB is similar to traditional raise boring where a contact tunnel is bored horizontally.

### APPLICATION

**Mining sector**  
 Used where a horizontal excavation is required and a chamber is available at both ends.

**Civil sector**  
 Excavating tunnels through mountains to connect parallel metro and rail tunnels.

**Energy sector**  
 For nuclear storage tunnels or short tail races in hydro-electric plants.

### BENEFITS

- Has lower support requirements due to stable circular excavation
- Improved production advance rates as a result of continuous excavating cycle
- Compact equipment design contributes to greater mobility. More cost effective and reliable when compared to a TBM system



### BOX HOLE BORING

This mode of drilling is conducted underground from the bottom upward to create access. Master Drilling currently has the largest fleet of box hole drilling machines in the world.

### APPLICATION

Holes are drilled from the bottom up to the intersection of the ore body. This is then used as a transfer pass for dropping material from the reef/ore horizon downwards where it can be collected and transported; or as a ventilation shaft to the mining location.

### BENEFITS

- Drilled upwards, no typical holing point is required
- Personnel are not required to enter the excavation; enhancing safety
- Safer, faster and a lower cost alternative to Alimak excavation
- Drill rods feature a unique non-rotating stabiliser design

# ROCK BORING

## ROCK BORING



### SLOT BORING

Slot boring holes tend to be smaller in diameter than box hole and raise boring, as the rigs can start drilling without any civil preparation at the base of the machine. If a slot is drilled and completed, the machine will move to the next slot position without delay. Slots are typically between 0.6m and 2.4m in diameter and 35m in length.

### APPLICATION

Slots are used as free-breaking faces for holes that are drilled and blasted to produce ore or reef in underground mining. Holes can be vertical, inclined or drilled up or down from a tunnel or specific position.

### BENEFITS

- A quicker and cheaper method of creating free braking faces
- Does not require blasting or explosives
- Promotes equipment mobility: It is moved by means of a remote crawler frame or a wheel loader. As such, the drilling of larger slots is possible, yet remaining mobile and efficient



### REEF BORING

Reef boring is related to narrow vein ore bodies, where equipment is moved underground and positioned in such a way that holes can be drilled on the reef horizon. Small single pass holes are drilled and, if required, enlarged by reaming which can then be backfilled if required.

### APPLICATION

Utilised at great depths where reef extraction is challenging, and a large complement of personnel and large equipment cannot be accommodated. It is also suited for the extraction of mineral rich pillars.

### BENEFITS

- Reef is drilled out in a continuous, non-explosive process
- Fewer machine operators are required
- Dry reef transportation reduces reef loss and dilution
- Eliminates water loss, enhancing process efficiency



### MOBILE TUNNEL BORING

The Mobile Tunnel Boring technology is specifically designed for horizontal and inclined hard rock applications; eliminating the need to drill and blast. The high-level automation allows us to excavate tunnels with a smooth circular cross-section, safely and cost effectively.

### APPLICATION

Mining sector



Access tunnels to ore bodies in decline-type ramp or horizontal haulage format.

Civil sector



Used for metro utility waste water pipes, communication etc, & railway infrastructure.

Energy sector



Hydro-electric or pump storage projects for the use of tailrace tunnels.

### BENEFITS

- Allows for simultaneous cutting, loading, meshing and bolting
- Allows for mobility and steering in all directions during excavation
- Capable of transportation in vertical shafts (fits into standard cage dimensions and low areas with 2m height restriction)

# SLIM DRILLING

## ROCK BORING



### BLIND SHAFT BORING SYSTEM

**BSBS is a mechanised alternative for conventional drill and blast shaft sinking. The system can facilitate access, and establish ventilation shafts of up to 9.5m in diameter and up to 1 500m deep in hard-rock applications where no bottom hole access exists.**



**Shaft boring is used for construction of access or ventilation shafts for the mining industry.**



**In urban infrastructure used for access and ventilation shafts to metro tunnels & parking.**



**In the energy sector it is used for surge, ventilation, access and pressure shafts.**

### BENEFITS

- No explosives required
- Ensures for a continuous production process
- Fewer personnel required to work in shaft during construction
- A safer, faster, more flexible method of accessing underground ore bodies
- Advances up to 6m per day, whilst simultaneously supporting the shaft; improving mine production and logistics
- Allows for simultaneous mine level break-away development

## SLIM DRILLING



### CORE DRILLING

**This method provides clients with high quality geological samples, allowing for accurate modelling and resource estimation. Core samples also provide invaluable information regarding the geotechnical properties of underlying geology, critical for mine design in terms of safety and optimisation.**

### APPLICATION

Mainly used in both surface and underground drilling for defining and delineating ore bodies. Used to drill cover holes for determining groundwater in underground mining.

### BENEFITS

- Non-invasive
- Effective in difficult or remote areas



### PERCUSSION DRILLING

**The system is deployed using fleet-truck and crawler-based units and operates through air driven hammers that drive percussive bits with conventional and reverse airflows.**

### APPLICATION

Used for the drilling of:

- De-watering holes on open cast mines
- Blast holes for the injection of explosives
- Water-wells for domestic use
- Utility holes used for cables
- Production-wells for oil and gas
- Also imperative in diamond tailing

### BENEFITS

- Mobile, delivering fast production rates
- Pre-splitting machines allow for true single person operation

# SLIM DRILLING

## SLIM DRILLING



### REVERSE CIRCULATION DRILLING

RC drilling is used to obtain information about underlying geology and is also used to drill down to geological ore body before intersecting it with a core hole. In addition, it is applied as a method of grade control drilling.

### APPLICATION

RC drilling allows for the extraction of geological information in the initial stages of exploration as well as the confirmation of ore body characteristics in open cast mines prior to blasting and loading.

### BENEFITS

- Operator fully protected in cabin
- Allows for automated rod handling and the automated line-up and positioning of the rig
- Operational data can be transferred to server for reporting purposes
- A range of safety feature, including high wall detection and the optimisation of cone splitters
- Cost effective method



### MUD ROTARY DRILLING

We currently have three rotary drive rigs equipped for mud rotary drilling. These operate a variety of water or mud type systems, ranging from centrifugal to triplex pumps. We apply mud rotary drilling principles on all raise boring pilot drilling applications.

### APPLICATION

Used for the drilling of utility, paste, de-watering and other infrastructure holes.  
Used for borehole development in the oil and gas industry.

### BENEFITS

- Holes can be drilled in geology with water ingress, and can be used as the most accurate form of directional drilling at depth
- Effective for difficult ground conditions



### AIR ROTARY DRILLING

Ideal for use in poorly consolidated geologies to establish pilot holes for raise bore machines, drilling large diameter blast holes and drilling for samples from poorly consolidated mine dumps and tailings.

### APPLICATION

Used to apply large diameter blast holes in the surface or opencast mining industry and is similar to the blast hole application of percussion drilling.  
Used for aircore drilling in poorly consolidated geologies such as old tailings.

### BENEFITS

- Low cost solution with increased rate of penetration, extended bit life and high production
- Low personnel complement
- Establishes a large diameter and relatively short blast holes from a large flat bench
- Provides cost effective way of drilling tailing and other unconsolidated formations.

# SUPPORT SERVICES

## SUPPORT SERVICES



### DIRECTIONAL DRILLING

Master Drilling has a wide spectrum of skills and experience globally in directional drilling. Our complete systems can be utilised to create vertical and angular holes.



**Mining sector** Where accurate shafts are required: hoisting shafts in mining and the drilling of batch plant holes in order to deliver material to underground operations.



**Energy sector** In the energy industry it is commonly used in hydro-electrical projects to ensure straight excavations.

### BENEFITS

- Ensure that a straight hole is drilled
- Results in less pipe wear during installations



### STAGE SHAFT SUPPORT

Similar to Master Drilling's remote operated support system, this system promotes access and allows for the installation of anchors, mesh, cable bolts, shuttering and equipping.

### APPLICATION

The stage system is used in shafts, promoting access to, and ventilation in mines.

### BENEFITS

- Can be utilised in existing shafts
- Allows for personnel accessibility



### REMOTE-OPERATED SHAFT SUPPORT

Master Drilling has several remotely operated support shaft systems. These systems are tasked with applying a variety of shaft support materials, to ensure the geological stability of the shaft. The geological conditions of the shaft and the method of the drilling would determine which system and which material is applied to the challenge.

### APPLICATION

- Supporting shafts drilled in highly fractured geology.
- Where oxidisation of the strata is to be kept to a minimum.
- Where shaft/hole longevity is to be guaranteed.

### BENEFITS

- Remote operated, no people in the shaft during operations
- Where required, can be applied before the shaft walls are exposed to the outside atmosphere, limiting oxidization
- High flow rates are possible that ensures thick application, fast (Machine dependant)
- Increased geological stability when application is completed

# SUPPORT SERVICES

## SUPPORT SERVICES



### PILING

**Master Drilling is able to provide circular or secant pile walls cost effectively, efficiently and with fewer labour requirements. This offering has shaft, pre-sink and piling applications.**

### APPLICATION

Mining sector

In mining, and in the context of the application used for Master Drilling, the method replaces a shaft pre-sink.

Civil sector

In general civil construction the use of piling equipment for the purpose of foundations is very common.

### BENEFITS

- Fast
- Low- cost
- Requires less labour
- Provides high-quality structure



### GEO INTELLIGENCE

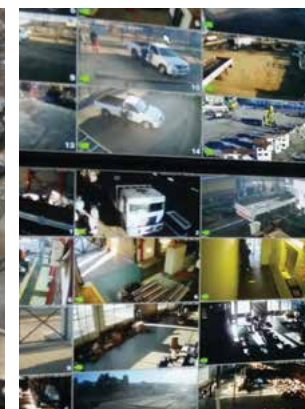
**We provide geo intelligence services by means of strategic partnerships and alliances.**

### SERVICES

- Geological exploration planning and management
- Geological, geotechnical and geohydrological logging
- Geological sampling and lab analysis
- Geological resource modelling report compilations and database management
- Environmental monitoring and management

### SERVICES

- Mine added, belt analyser and grade control services
- Geohydrological services
- Grouting and ground stabilisation services
- Turnkey grade control solutions
- Environmental monitoring and management





**THANK YOU**

**For more information  
please go to:**

