

INDUSTRIAL SOLUTION

**THE 3 KEY TRENDS DRIVING  
UNDERGROUND VENTILATION  
IN 2022 & BEYOND.**





## **FLEXIBILITY. TECHNOLOGY. AGILITY.**

**From the moment mankind began the pursuit of mining the earth for valuable commodities, there has been one unchanged constant - the need for the safe, reliable and efficient supply of air to those underground.**

Since the beginning of civilisation, man has toiled to extract stone, ceramics and later precious minerals to subsist, to improve his way of life and in time, to prosper.

Following the onset of the industrial age, this pursuit has expanded on a vast scale and the need to supply air sustainably and in volume to underground operations has grown.

Today, however, while the pace at which mining is undertaken throughout the world has increased, the imperatives are changing. While the core responsibility for global miners is to provide sustainable operations, the need to constantly adapt and generate new efficiencies is ever present.

On top of the need for quality air supply, the industrial narrative is expanding with miners now charged with the mandate of achieving increased safety, profitability and environmental outcomes.

As the pace and scale at which mining continues into the future, there are three key enablers which are guiding this new era of mining.

They are **flexibility, technology** and **agility**.

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**VISION. INNOVATION. RESULTS.**



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**A NEW  
APPROACH  
TO OPTIMISING  
AIR FLOW  
UNDERGROUND.**

**T**he ability to adapt to change is vital in any industry and being able to tailor processes to meet operating conditions is key. In underground mining, the ability to target air supply in line with production requirements is one of the main challenges for operators. To meet this challenge, the concept of Ventilation On Demand (VOD) has been prevalent in recent years with systems designed to deliver air flow to workings based on scheduling and people movements.

However, the contemporary approach to delivering on-demand air supply in recent times has been to regulate airflow through complex and expensive infrastructure. The solution has been the application of Variable Speed Drives (VSD), Variable Frequency Drives (VFD) or Variable Voltage Variable Frequency Drives (VVCFD) - which control power to the ventilation system enabling air flow to be ramped up or down based on demand.

It is a given that high air velocities require high pressure gradients and maintaining this pressure across a mine network comes at a high cost. In the post 2007 Global Financial Crisis (GFC) era and subsequent mining downturn of 2013, the use of VSD's was seen as the logical way to tailor the supply of air flow based on demand, with the primary benefit being a reduction in power consumption costs.

For an underground mine, has been estimated that ventilation systems can contribute to as much as 50% of power consumption needs.

While there has been heightened focus on driving down costs to enable economically sustainable operations, VSD's still present somewhat of a conundrum.

By nature, VSD's are a costly solution in themselves, with infrastructure and supporting control software ranging in the tens to hundreds of thousands of dollars. As expensive as they

are, they are equally fragile, requiring dedicated, air-conditioned rooms and custom cabling for operation. While the benefits of Ventilation On Demand via the use of VSD's seem apparent, their use now almost seems illogical in the harshest of underground environments.

If only there was another way.

Enter Australian business MINETEK, with a new approach to optimising air flow underground called Performance On Demand (POD).

MINETEK have developed an innovative approach to optimising air circuits enabling a shift away from requiring costly VSD's. This is certainly a watershed moment in underground ventilation.

Able to be manually or autonomously controlled, the mechanical driven solution delivers the required flexibility for operators by tuning the dynamics of the air flow over the system's innovative impellers.

By mechanically controlling the flow of air over the impellers - not the supply of power to the fan - power consumption is optimised and can be maintained at a significantly lower level.

MINETEK has been able to deliver up to a 50% reduction in power consumption costs, all while enabling operators maintain flexibility in line with production and scheduling requirements.

From a broader perspective, POD considers the new imperatives faced by miners - by actually driving down operational costs and in turn yielding improvements in environmental outcomes.

This new approach to delivering true flexibility is improving profitability and the long-term viability of underground operations around the world.

**01.**  
**FLEXIBILITY.**



**T**hey say necessity is the mother of all invention and underground mining has a rich history of reflecting this expression. Driven by necessity, the mining sector has been constantly innovating to deliver safe, reliable and efficient operations underground.

Technology in mining has evolved with mankind. From the ancient use of tools to extract precious metals, to the use of black powder explosives to break apart large rocks in the late middle ages, mining has been a proving ground for new technologies for millennia.

Given the severity of underground conditions, the appetite for the development of enabling technology has maintained pace if not exceeded that of life above ground.

Driven by the need to ensure safety, improve operational efficiencies and more recently a focus on reducing environmental impacts, mining has been an eager, albeit cautious adopter of new technologies.

Over the past two decades in particular, the shape of technology in mining has moved towards new themes. Automation, optimisation, digitisation and even electrification are the new focus for underground miners, as organisations explore new and integrated ways to meet their safety, profitability and environmental objectives.

Underground ventilation is a tremendous lever in achieving progress against all three objectives and the application of new technologies can have a significant impact. Now, the key drivers in underground ventilation are very much about the interoperability of disparate systems within the operating layer and automating processes to maximise performance.

For years the requirement for ventilation has fundamentally been to meet a minimum volume and pressure requirement; however the evolved

mine now recognises the need to optimise assets and processes - like every other aspect of production - to extract maximum efficiency, drive down operating costs and increase profitability.

MINETEK has at its core a focus on innovation and is relishing the opportunity to challenge the status quo in the design, implementation and operation of underground ventilation.

Outside of MINETEK's radical approach to the design of fan systems, focus is squarely on integrating with mine systems to enable autonomous operation.

Performance On Demand is an excellent example of applied technology and MINETEK are moving beyond the focus on reducing power consumption to explore truly responsive operation.

While Radio Frequency Identification (RFID) technology has been around since the mid-1940s, its application in the industrial world is now connecting opportunities to improve processes in mining.

MINETEK has developed an innovative new approach to optimising air circuits by integrating RFID technology to trigger its Performance On Demand ventilation system and target air delivery based on vehicle movements.

The approach is a game-changer in enabling operators to effectively reduce airflow to parts of the mine with no scheduled activity, maintaining air bag inflation levels at a minimum and reducing power consumption costs exponentially.

By automating triggered air flow and removing the need for human intervention, both safety and operating performance can be optimised.

Connecting modern ventilation technologies to leverage data and drive predictive processes is the path forward to achieving true operational efficiency.

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EXTRACT  
MAXIMUM  
EFFICIENCY,  
DRIVE DOWN  
OPERATING  
COSTS &  
INCREASE  
PROFITABILITY.”**

# 02.

## TECHNOLOGY.





## UNDERSTAND HOW TO APPLY RESOURCES OVER TIME TO ADAPT & OPTIMISE

**A**gility is defined as being able to move quickly and easily. Being nimble, lithe and spry. In recent years the term agile has been adopted in the project management field, characterising the approach to the dividing tasks into short phases with frequent reassessment of plans and priorities.

Although coined within software development circles, where the pace of change is rapid, this definition of agility is certainly apt for the continuously changing environment in which underground mining occurs.

By definition, a mine is constantly changing.

It is required to undergo systematic change in its shape and size as ore body is extracted from the earth.

While the initial design of an underground mine provides operators with a road map of how their infrastructure will evolve, it is agile project management and the understanding of how to apply resources over time that is required to continually adapt and optimise.

Agility requires a combination technology and flexibility.

At MINETEK, we have recognised the need to be agile and have partnered with leading mines the world over to apply the latest thinking in mine ventilation, which is enabling miners to meet and exceed their objectives.

For example, MINETEK's innovative fan technology is giving operators flexibility through Performance On Demand. POD enables operators to quickly ramp up or down air delivery by directing the flow of air through innovative control vane design.

This approach removes the need for VSD intervention which offers a distinct performance improvement. By removing the need for VSD,

mines can use all available power without risk of fan stalling or creating harmonic imbalance. This flexibility in control and application offers true agility, by lowering power consumption and costs and also allows faster re-entries following blasting activity.

To be agile requires a lean approach.

MINETEK's robust designed single speed fans, with blades virtually impervious to wear, have been proven to reduce power consumptions costs by up to 50%. Also, by stripping away bulk, the compact fan design is enabling miners to achieve agility by enabling them to be safely and efficiently deployed across the network with ease.

Compared to traditional larger fans, MINETEK's compact units have the capability to outperform larger alternatives and then be re-deployed quickly and easily to other locations as the mine workings evolve.

By virtue of their smaller size, MINETEK fans can be easily installed in a range of orientations and tight underground locations. This agility and responsiveness enables operators to adapt to changing conditions, while reducing the potential for manual handling safety impacts.

To be truly agile requires confidence.

MINETEK has built deep domain experience in the design, manufacturing, testing and installation of the most advanced fan systems in the world and are backed by a large team of aeronautical, mechanical and electrical engineers.

From initial decline modeling and consultancy through to post implementation support, our team has the combined capability to help deliver an agile approach to your next underground ventilation project in 2022 and beyond.

# 03.

## AGILITY.



# MINETEK AIR IS DELIVERING ALL THREE ENABLERS. TODAY.



- ✓ **FLEXIBLE CONTROL OVER AIR FLOW**
- ✓ **INNOVATIVE CORE TECHNOLOGY & INTEROPERABILITY**
- ✓ **COMPACT DESIGN FOR AGILE DEPLOYMENT**

**MINETEK is a global industrial solutions provider with decades of experience in helping mining and industry leaders achieve environmentally sustainable air management outcomes, enabling safe, reliable and profitable operations.**

Since 1984, MINETEK has been delivering innovative, modular air management solutions for underground miners.

Our world-class range is proven to deliver increased productivity and reduce operating costs all with the flexibility to control delivery of air when and where it's needed.

Our Performance On Demand (POD) technology allows operators to tailor pressure and power consumption - without the need for VSD control.

With the ability to integrate with all mining Ventilation On Demand (VOD) and mine communication systems, the result is a seamless, responsive solution which optimises performance, reduces power consumption costs and increases overall operational efficiency.

#### **Talk to the MINETEK team about:**

- **Primary Ventilation Systems**
- **Secondary Auxiliary Fans & Ventilation**
- **High Output (HO) Technology**
- **Booster/Intake Fans**
- **Multiple Heading Ventilation**
- **Bulkhead Fans**
- **Long Duct Runs**
- **Tunnel & Development Fans**



# GLOBAL SOLUTIONS. PROVEN EXPERIENCE.

MINETEK has delivered over 2000 projects across more than 60 countries, enabling operational efficiency in the most challenging environments in the world.



## SARACEN THUNDERBOX

- Supply of an Interim Primary Ventilation Solution with the ability to be repurposed into the secondary system
- Customised solution to fit into existing fan chamber, saving money and time in expansion of infrastructure
- Modular design allowed on site personnel to successfully carry out the install with Minetek site support
- Regulation of air has allowed the mine to increase ventilation as production increases require, saving energy consumption at the operation

## MINCOR KAMBALDA OPERATIONS

- Optimisation of LOM (Life Of Mine) fans across Primary and Secondary saving the client approx. \$1.2 million in capital
- Supply of all required ventilation from Development fans to Primary
- Displayed energy efficiencies across the projects at all stages of development
- Production increases through faster re-entry times for the contractor



## SOME OF OUR CLIENTS INCLUDE

RioTinto



**VISION. INNOVATION. RESULTS.**



