

# Mining & Construction

A magazine from Epiroc

miningandconstruction.com

## INSIDE

The Innovation Issue  
02-2019

## FOLLOW-UP

**Taking the high road**  
PowerROC rig working at 5600 meters  
**Pages 14-15**

## ON SITE

**Aspiring to innovate**  
Epiroc leaders gather to make headway  
**Pages 32-37**

## MY WORK

**Finding solutions**  
Everyday issues motivate Maureen Bohac  
**Pages 42-43**

[ Our Customers ]

# TUNNEL VISIONARIES

Kajima Corporation employs automation to stay competitive in underground operations.

**Pages 08-13**

# Innovating for a brighter future

**D**EAR CUSTOMERS, the mining and infrastructure industry is in a period of fundamental change. Automation and digitalization are altering how business is being done. Whether we talk about remotely controlling drill rigs from a safe distance, monitoring machine performance, or conveniently ordering spare parts via a mobile phone app, digitalization done right can do wonders for your productivity and safety.

Another ongoing fundamental change, especially for underground mining, is the transition from diesel-powered machines to battery electric equipment. In late 2018, we launched our new generation fossil-free loaders, trucks and drill rigs. As a result, several customers are enjoying the benefits of a healthier and safer work environment,

lower total cost of operation and higher productivity. Epiroc is proud to be at the forefront of the drives toward both automation and battery electric machines as we see how our customers truly benefit.

**INNOVATION IS**, of course, what's behind these sweeping changes. At Epiroc, we view ourselves as a 145+ year-old start-up, meaning a quick-footed modern company with deep roots in industrial Atlas Copco. Innovation is part of our DNA and so is collaboration. We know it's crucial to work together with customers to understand your needs and jointly develop the best solutions.

In this issue of Mining & Construction, you can read more in-depth about innovation. Innovation is the future and together with you we make the future brighter. ✕

## On my radar

### The business climate

The US-China trade war, Brexit, etc. have created market uncertainty. We are keeping a close eye on developments to stay alert and agile.

### Safety

Safety is a top priority and the injury rate is decreasing – but we always look to further improve.

### Climate change

We focus on reducing energy consumption in our production, transportation and equipment.

## Enjoy!

### Per Lindberg

President and CEO,  
Epiroc



Epiroc is a 145+ year old start-up; a dynamic new company, built on long and proven expertise and experience from the mining and construction industry.



## About Epiroc

Epiroc is a leading productivity partner for the mining and infrastructure industries. With cutting-edge technology, Epiroc develops and produces innovative drill rigs, rock excavation and construction equipment, and provides world-class service and consumables. The company was founded in Stockholm, Sweden, and has passionate people supporting and collaborating with customers in more than 150 countries.

# Epiroc Group – get to know us better

Our innovations

Industries we serve

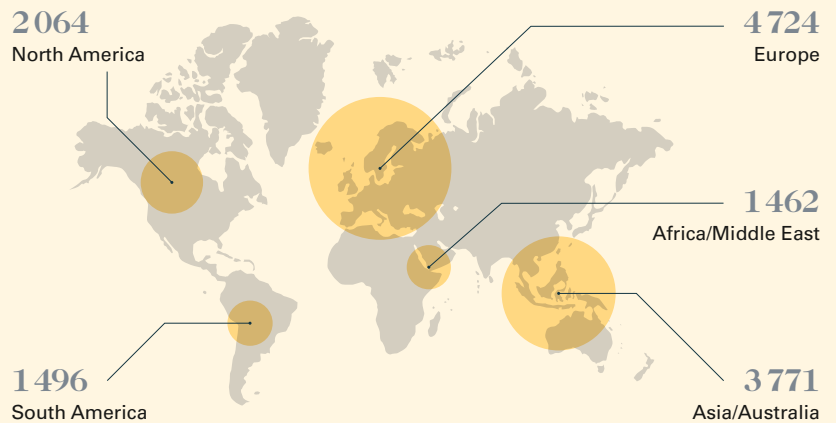
Average number of employees by region

Our solutions aim to solve our customers' key issues – including requirements to reduce operating costs, increase productivity, increase utilization of equipment, reduce environmental impact, and enhance health and safety conditions.



- **Mining and quarrying**  
Underground mining, surface mining, exploration, quarrying, well drilling, oil and gas.
- **Infrastructure**  
Underground civil engineering, surface civil engineering and urban development, deconstruction and recycling.

In total, approximately 14 000 employees in 60 countries (average number of employees 2018).



## The Group in numbers



# 14 000

- About 14 000 employees
- Customers in more than 150 countries
- 145+ years of experience
- Revenue 2018: SEK 38 billion

## Divisions and reporting segments Equipment & Service / Tools & Attachments

### Rock Drilling Tools

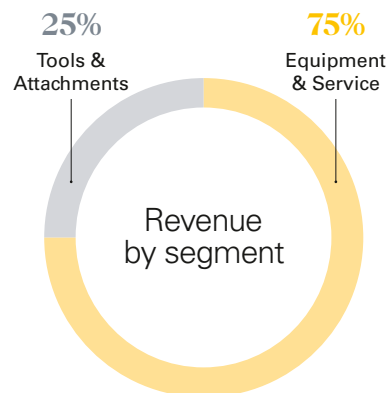
Dedicated to rock drilling tools worldwide

### Hydraulic Attachment Tools

Dedicated to hydraulic attachment tools for carriers

### Rocktec

Dedicated to technology solutions, and drives the automation and interoperability expansions for Epiroc's divisions



### Drilling Solutions

Dedicated to a wide range of rotary drilling equipment

### Mining and Rock Excavation Service

Dedicated to parts and services aimed at maximizing customers' productivity

### Surface and Exploration Drilling

Dedicated to rock and exploration drilling equipment

### Underground Rock Excavation

Dedicated to a wide range of tunneling and mining equipment

# CONTENTS

## No. 02 | 2019



### [Feature]

# INNOVATION

Innovation has been key in the history of mankind, and is vital in today's high-tech climate. Epiroc's field is no exception.

26–41

## 16 | **FACE TO FACE** Better together

Epiroc listened to common challenges from customers and initiated the My Epiroc software solution; built together with the ones who use it. Al Fajar Holding has taken part in the development.

## 22 | **INNER WORKINGS** Tracking in real time

Digitalization is the way forward for increased safety and efficiency, and Mobilaris Mining Intelligence offers a complete solution. It has helped Hudbay Minerals boost operations in Manitoba, Canada.

## 44 | **OUR CHALLENGE** Out of harm's way

Boliden planned to raise the production quota in the Aitik copper mine, and chose the automation route. In a pilot, a semi-autonomous Pit Viper showed a 30 percent increase in productivity compared to a fully manually operated machine.



### ON THE COVER

Kajima Corporation is building a drainage tunnel to prevent flooding in rural Kochi Prefecture in Japan. The Epiroc Boomer E2, an automated face drilling rig equipped with several smart functions, is a key component in the project.

CONEXPO-CON/AGG is held in Las Vegas every three years. The next edition will take place **March 10–14, 2020** at the Las Vegas Convention Center and nearby Festival Grounds. CONEXPO-CON/AGG is North America's largest construction trade show representing asphalt, aggregates, concrete, earthmoving, lifting, mining, utilities and more.

[conexpoconagg.com](http://conexpoconagg.com)



SAID KARLSSON

OUR CUSTOMERS

“The rig is a crucial timesaver”

With the Boomer E2, between 85 and 90 percent of the drill holes at the Kusakagawa New River Tunnel in Japan, built by Kajima Corporation, are drilled autonomously.

08



EMIL NORDIN

32

Selected highlights

- 06 | **EPIROC IN BRIEF**  
Keep tabs on what's happening in the world of Epiroc.
- 14 | **FOLLOW-UP**  
High altitude and freezing nights haven't stopped the PowerROC T25 DC from performing at the Chajnantor Mountain in Chile.
- 20 | **AROUND THE WORLD IN BRIEF**  
Assorted news from the mining industry.
- 32 | **ON SITE**  
The Aspire leadership program ties in nicely with Epiroc's innovation strategy.
- 42 | **MY WORK**  
Quality Manager Maureen Bohac joined the company fresh from college, and loves the mining industry.
- 47 | **SUSTAINABILITY**  
Can a Boomer painted pink make a bigger difference? In Mongolia it can – and does – at Oyu Tolgoi.
- 52 | **FROM THE LAB**  
Powerbit line brings overhaul to tophammer surface drilling.



BATTUSHIN OYUNCHIMEG

47



SEBRON SNYDER

42

**Mining & Construction** is published by Epiroc. The magazine focuses on the company's know-how, products and methods used for mining and construction worldwide.

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## MILESTONE IN SURFACE DRILLING AUTOMATION

Epiroc is constantly pushing the boundaries in the rock excavation industry. As proof of this, the world's first fully autonomous SmartROC D65 surface drill rig, a milestone for surface drilling in open-pit mining and quarrying, is now in production. With a push of a button, it is now possible to complete entire drill patterns autonomously.

Not only will this remove the operator from potentially hazardous benches in a mine or a quarry, it will also let the operator perform other tasks while the rig is drilling. Other benefits are increased productivity and better hole quality. In addition to this, positioning is faster and more accurate.

**THIS ACHIEVEMENT IN** automation would not have been possible if it weren't for the strong partnership between Epiroc and Newmont Goldcorp and their dedicated staff in the Hollinger open-pit mine in Timmins, Canada. Epiroc's

Automated drilling means more holes drilled per shift, in part because automating the drilling process results in continuous operations without breaks and with less wear on drilling tools.



JAMES HODGINS

6th Sense way of working, a new approach that combines digitalization and automation to boost customers' performance, was used to implement and develop the fully autonomous SmartROC D65. In the project, Epiroc and Newmont Goldcorp collaborated on a tailored solution that gathers ongoing insights to optimize process and people performance and unlock the potential of machine automation using interoperability.

**"THE HOLLINGER PROJECT** is a perfect example of collaboration between a mining company and Epiroc that demonstrates what our industry is capable of achieving. The future is very exciting,"

says **Brian Doffing**, President of the Surface and Exploration Drilling division at Epiroc.

Autonomous drilling employs already existing technologies developed by Epiroc, such as Rod Handling System (RHS), Hole Navigation System (HNS) and Auto Positioning.

"In my opinion, this is awesome. After our morning brief, instead of spending 30 minutes going by truck to the drill rig down in the pit, I just go to the office upstairs and start it up. I'll check the drill rig status, load the drill pattern and I'll be up and drilling in a matter of minutes," says **Annie Levasseur**, autonomous drill rig operator at Newmont Goldcorp Porcupine. ✕

## 6th Sense – a game changer for smarter operations

**THERE IS A GROWING** need to utilize digital technologies to enhance safety, productivity and sustainability. To address this, Epiroc has introduced 6th Sense, an approach that helps customers get the most out of their operations, making sure their processes, people and technology are working together

in an optimized way. The solutions range from information management and system integration to automation. With the flexible OEM agnostic interoperability platform, machine data can be integrated into the

customer's current systems or made available through Epiroc's own telematics solutions. Epiroc's automation platform provides from on-board driver assist to fully autonomous teleremote operated vehicles.

**More** [www.epiroc.com/6thsense](http://www.epiroc.com/6thsense)



EPIROC



## Epiroc introduces 3D printing for spare parts

**EPIROC RUSSIA** and Epiroc's Mining and Rock Excavation Service division are introducing a project focusing on the use of 3D printing capabilities – thanks to additive manufacturing – for the manufacture of spare parts on site and on demand. For those who use Epiroc equipment, waiting time for spare parts supply will be noticeably reduced. Consequently, equipment downtime will also decrease.

### FIGURE



## RCS Lite System reaches triple figures

**EPIROC HAS REACHED** the milestone of one hundred drill rigs equipped with RCS Lite, an operating system offering several safety and productivity features. It allows all Epiroc rotary drills to have the same onboard display and system for consistent operator training and service.

*Epiroc has introduced 6th Sense, an approach that helps customers get the most out of their operations through digitalization and automation.*

## If you had a sixth sense, what would it be?



**Nicole Angst**  
Digital Solutions  
Manager,  
Australia

"I'd like to see things differently, so that I can understand problems in a fresh way and make better decisions. This insight could be used to facilitate new and smarter ways of going about things, initiate and encourage change to the way we do things, and develop solutions that have meaning."

### PROJECT NEWS

## Mobilaris Onboard breaks new ground

Mobilaris Mining & Civil Engineering recently launched Mobilaris Onboard, a revolutionizing new product that makes high accuracy positioning in underground mines possible, even without any positioning infrastructure. Mobilaris Onboard runs on a standard tablet and uses a patent pending disruptive technology.

### EASIER FOR OPERATORS

Mobilaris Onboard will allow drivers of underground vehicles/machines to navigate in the mine, avoid traffic congestions, get situational awareness and become safer.



**Kumeshan Naidu**  
Regional Automation  
Centre Manager,  
South Africa

"If I had a sixth sense, I'd like to have the ability to read minds. Imagine knowing what your customer wants before they do... With the right data, we could all be superheroes. This is what Epiroc's digital suite of products is moving closer to every day."



**Anna Eklind**  
Program Manager  
Connectivity,  
Sweden

"I would replace advanced telematics technology and just tell our customers what they need to know about their Epiroc products' health and performance. I could also inform our service force what they need to know in order to be prepared to help our customers."

**More** [www.epiroc.com/mobilaris-onboard](http://www.epiroc.com/mobilaris-onboard)

# Booming in Japan



[On Location]  
Japan

**AUTOMATED BOOMER RIGS SAVE TIME AND MONEY  
FOR KAJIMA IN CRUCIAL TUNNELING PROJECT**





Disaster preparation is a major issue in Japan, where earthquakes, erupting volcanoes, typhoons and landslides can cause considerable problems. Construction giant **Kajima Corporation** is digging a drainage tunnel in rural Kochi Prefecture to prevent flooding during the typhoon season.





Japan has more tunnels per square kilometer than any other country in the world. To prevent flooding, Kajima Corporation is building a draining tunnel in the town of Hidakamura.

**DUE TO ITS POSITION** in the western Pacific Ocean, Japan is beset by 30 or more powerful typhoons, packing strong winds and heavy rain, between June and October every year. Floods and landslides caused by the massive rainfall are very common and a constant headache for communities around the country.

Shikoku, the smallest of the four larger islands, receives more than its fair share of these typhoons. In a town called Hidakamura, the Kajima Corporation, one of the oldest and largest construction companies in Japan, is busily building a drainage tunnel called the Kusakagawa New River Tunnel at the request of the national government.

A key component in the project is the Epiroc Boomer E2, an automated face drilling rig. When Mining & Construction Magazine visits the site, surrounded by massively forested hillsides, it enters the tunnel at the start of the day shift. The tunnel is well lit and various support vehicles are parked along the walls, ready to move when different stages of the process are completed. As the rig reaches the end of the tunnel, the operator initiates preprogrammed drilling of holes for explosives. The two booms smoothly and quickly move to reposition for the next hole. Once the drilling cycle is completed, explosives are inserted manually, the blast is set off, and the muck is rapidly transported out of the tunnel by loaders. Once the wall is scaled with the help of a large breaker, the walls and ceiling are covered in shotcrete. It is then time for



**Masakazu Matsuda**  
Project Manager,  
Kajima

the whole process to be repeated. The speed and efficiency are impressive.

“We are adamant about meeting our schedule for the residents in the area, who face the peril of more floods and landslides with every typhoon season without proper drainage of the rain water,” says Masakazu Matsuda, Kajima’s Project Manager for the Kusakagawa New River Tunnel.

**THE BOOMER E2** is equipped with the Epiroc Rig Control System, allowing the operator to easily monitor and control all rig functions and maintain a better focus on drilling, as well as Advanced Boom Control (ABC) Total.

Morning ceremony, *chorei* in Japanese, is common at most larger companies. It typically finishes with a gymnastics session.



The latter is a smart function that allows for complete automation of the drilling process, even through employee breaks and shift changes.

“The rig is a crucial timesaver for us. Thanks to its automated features and its ease of use, we save a lot of time on both operator training and the actual drilling. Between 85 and 90 percent of the drill holes are drilled autonomously,” says Masakazu Matsuda. With Epiroc’s long history in the field of autonomy, Kajima’s automation rate is much higher than that of similar companies in comparable countries. “This achievement is built upon our vast experience with Epiroc automation, starting with the Boomer XE4C,” says Matsuda.

**K**ajima is an accomplished tunnel builder – with its mountainous landscape, Japan has more tunnels per square kilometer than any other country in the world – but there are always problems along the way.

“The rock here is quite varied, and even though we do geological surveys before we start, we often find that they don’t always correspond with reality. That’s why we truly appreciate how the Boomer E2 can sense the rock hardness and fractures while drilling and give us data about the rock some five meters in,” says Masakazu Matsuda.

Deputy Project Manager Hiroshi Fujii adds: “The quality of the equipment coupled with the computerized control of the drilling really cuts down our costs for service and consumables, not to mention less downtime. We estimate that we save around 50 percent on repair costs and up to 80 percent on consumables. Not having to manually mark the positions of the drill holes is another small but time-consuming operation we don’t need now.”

**AT KAJIMA HEADQUARTERS** in central Tokyo, automation technology research and development is taking place at an accelerated pace, often together with partners in fields such as robotics and



Thanks to the Epiroc Rig Control System and ABCTotal, the operator can easily monitor and control all rig functions.

## Kajima Corporation

- One of Japan’s oldest (founded in 1840) and largest construction companies, employing about 7800 people.
- Subsidiaries and affiliated companies in Asia, Oceania, Europe and North America.
- One of the companies that built the Seikan Tunnel, the world’s longest undersea tunnel.

artificial intelligence. There are already specially programmed industrial robots in use in high-rise building projects for tasks such as welding, riveting, painting, and even transporting material and assembling components. But, while buildings are fairly predictable projects, tunnels are a different beast.

“In tunnels, nature itself is our adversary, and the variety and changeability of conditions make it more difficult to fully automate,” explains Hiroshi Fujii.

**THE CONSTRUCTION INDUSTRY** in Japan is facing a number of challenges, now and in the future. Takahiro Aoyagi, General Manager of Tunneling, says, “In Japan, we have a serious demographic problem with an aging population and low birth rates. Those are factors that affect all industries, but especially those who employ manual labor.”



Hiroshi Fujii  
Deputy Project Manager, Kajima



Takahiro Aoyagi  
General Manager of Tunneling, Kajima



# “We will be able to make our tunnel drilling faster, safer and increasingly efficient through automation”

**Takahiro Aoyagi**  
Tunneling Manager, Kajima Corporation

**J**APAN IS WELL-KNOWN for its high median age and its large number of centenarians. This, coupled with fewer young people having children, has prompted the Japanese government to relax rules for foreign labor at Japanese companies. But Kajima’s view is that this is not enough; automation must also be adopted where feasible.

A smaller labor population is one persistent problem. Another is that manual labor is increasingly being viewed as “dirty, dangerous and hard” by younger Japanese. Automation is considered key to improving the image of construction work, making the workplace more attractive. The automated systems on the Epiroc Boomer E2 are very valuable in this respect, according to Kajima. The automation features of the rig also create economic benefits. Site Manager Takashi Mega mentions how the automated rig will save the company a lot on



**Takashi Mega**  
Site Manager,  
Kajima

employee-related costs: “The conventional rigs require experienced professionals that we have to recruit from throughout the whole country and provide housing for onsite. But with the Boomer E2, we will be able to attract people from the surrounding area with less experience.”

**KAJIMA HAS ALWAYS** been at the forefront of technological development in its industry, and the company sees automation as one of the large, strategically crucial challenges that will affect the future of Kajima Corporation and the Japanese construction industry as a whole.

Takahiro Aoyagi says, “With the assistance of advanced systems from Epiroc, we are confident that we will be able to make our tunnel drilling faster, safer and increasingly efficient through automation both now and in the future.” ✕

## Epiroc and Kajima Corporation

Kajima has been using Epiroc machinery since the 1980s, utilizing several generations of the Boomer series, mainly in tunnel projects. Despite Japan’s rental culture, Kajima has purchased its Epiroc rigs. The two companies are continually cooperating in the development of tailor-made solutions to fit Kajima’s varying needs.



### Kusakagawa New River Tunnel

- A drainage tunnel to prevent flooding and landslides when typhoons bring heavy rain
- Scheduled to be completed by March 2021, it will be 5 130 meters long
- Connects the Kusaka and Nyodo rivers on the island of Shikoku
- Joins two other drainage tunnels already in place



Experienced Kajima Construction superintendents ready to supervise the work at the Kusakagawa New River Tunnel project.

## FIVE KEYS TO SUCCESS

<p><b>1</b> Automated features</p> <p><i>The automated features of the Epiroc Boomer E2 enable faster and more accurate drilling operation.</i></p>	<p><b>2</b> Easy to use</p> <p><i>The Boomer E2 is easy to use, meaning it is less complicated and time-consuming to train operators.</i></p>	<p><b>3</b> Great savings</p> <p><i>The excellent product quality and the computerized automation produce great savings in terms of service and consumables.</i></p>	<p><b>4</b> Accumulation of data</p> <p><i>The data accumulated in the system over time leads to increasingly precise and trustworthy operations.</i></p>	<p><b>5</b> Hole optimization</p> <p><i>Epiroc's Total Station Navigation system, coupled with ABC Total, optimizes the number of holes, saving both time and money.</i></p>
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[On Location]  
Chile

The road to the Tokyo Atacama Observatory, to be built at the Chajnantor Mountain in northern Chile, must be wide and smooth enough to carry a flawless mirror seven meters in diameter.



### PowerROC T25 DC

- Main benefits:
  - Great power and penetration rates
  - Straightforward hydraulic direct control
  - Outstanding maneuverability, even in rough terrain
  - Minimized electrical parts for increased reliability
- Drilling method: Tophammer
- Rock drill: RD14S
- Hole diameter: 51 mm – 89 mm
- Maximum hole depth: 18.3 meters

# Top of the world

»»→ Earthmoving specialists Movitec are testing a PowerROC T25 DC in the most challenging conditions imaginable – building a road to the world’s highest observatory.

**W**hen Mining & Construction visits, work is about 70 percent complete on the road that must be wide and smooth enough to carry a flawless mirror seven meters in diameter to the summit of northern Chile’s Chajnantor Mountain, more than 5 600 meters above sea level. The Tokyo Atacama Observatory, funded by the University of Tokyo, will one day offer unparalleled views of the universe, which could help to determine its age.

**ACCORDING TO** contract manager **Claudio Alvarado**, the principle challenges for the roadbuilding team are the lack of oxygen and extreme weather conditions encountered at such high altitudes.

Altitude sickness can cause headaches, vomiting and, in extreme cases, potentially fatal pulmonary edemas. But even a brief fainting spell can be fatal on the mountain. Each worker must carry their own oxygen supply and undergo medical checks several times a day from the onsite nurse. The high altitude also brings extreme weather – at night, temperatures are so cold that heaters must be used to stop fluids from freezing while last winter, heavy snowfalls closed the project for six weeks.

**IN JANUARY**, Movitec took possession of an Epiroc PowerROC T25 DC to help them deal with the mountain’s difficult geography.

## *What role does the PowerROC T25 DC play at the project?*

“We encounter lots of large rocks that we need to remove. However, we cannot use explosives because we are located within an astronomical area and blasting would affect the operation of the 66 telescopes of the Atacama Large Millimeter Array (ALMA), which are less than ten kilometers away. So, we use plasma blasting technology. The PowerROC drills a 51-millimeter hole up to two meters into the rock and then water is injected into the hole. When a pulsed electric charge is applied, the rock is shattered into tiny pieces.”



**Claudio Alvarado**  
Contract Manager,  
Movitec

## *What’s been your experience with the PowerROC?*

“The machine has been operating on the mountain for about two months. It has worked very well, better than we expected, so we are very happy with the functionality that the equipment has displayed in the project. At night, temperatures can fall to fifteen to twenty degrees Celsius below freezing, which can cause the hydraulic fluids and fuels to freeze and make starting the equipment in the morning very difficult. However, with the PowerROC, we have had absolutely no problems with fluids freezing or starting up in the morning. Nor has it lost pressure when working at altitude.”

## *Is there anything you would like to improve?*

“Perhaps the arm could be longer or more flexible, which would help on the complicated terrain found on the mountain.” ✕

**More** [www.epiroc.com/powerroc-t25-dc](http://www.epiroc.com/powerroc-t25-dc)



# CLICK TO TRACK PERFORMANCE

## MY EPIROC IMPROVES COMMUNICATION AND PRODUCTIVITY

»»» Working in remote areas, Al Fajar had a strong need to follow up on the workshop to save time and increase production. Thanks to My Epiroc, a new solution from Epiroc, they do just that. And the company played a part in the development of the platform.

**SAŠA JOVIĆ**  
General Manager  
at Technical Drill-  
ing & Blast-  
ing (TDB), one of five  
affiliate companies  
to Al Fajar.



[On Location]  
UAE





**A**l Fajar Holding is a well-known drilling and blasting company with more than 600 employees and offices located in Oman and the UAE. With employees from different backgrounds, working in remote areas, they had concerns about fleet management. Software that enhances communication and increases productivity was seen as an answer to the problem.

At the same time, Epiroc was conducting a study, gathering customer requirements in order to develop a new service called *My Epiroc*, a solution intended to help customers increase their fleet efficiency that can be used anywhere – on the road, in an office or in a drill rig. Gathering all data at one place, it assists technicians and operators in managing their daily flows, reporting breakdowns, scheduling, and ordering spare parts. Epiroc developed *My Epiroc* in tandem with some key customers, and invited Al-Fajar to be a part of the pilot. Mining & Construction met up with Al Fajar’s **Saša Jović** and Epiroc’s **Sergey Ivanov** to find out more about the collaboration.

*How did Al Fajar come on board for the development of My Epiroc?*

**SERGEY IVANOV:** We have a close relationship with the Al Fajar group, and believed we could jointly come up with solutions for tracking breakdowns. We approached them, and found them interested.

**SASA JOVIĆ:** Yes, being able to develop the application with Epiroc and some other customers of theirs was a very exciting prospect. We felt that *My Epiroc* could help us deal with machine breakdowns and malfunctions. By tracking them, we can improve the analysis of our operators and machines.



**SERGEY IVANOV**  
Business Line  
Manager Mining  
and Rock Excavation  
Service at  
Epiroc Middle  
East FZE.



**“During the pilot, workshop managers, operators and other concerned positions started to use My Epiroc to detect any obstacles”**

Saša Jović, General Manager at Technical Drilling & Blasting Co. LLC

*What were the main challenges during the pilot, and how did you tackle them?*

**SJ:** There is always the challenge of communicating operators’ needs to the developers. In our case, Epiroc is already knowledgeable about our machinery. Our role was to add the human angle, and so we helped to develop features that address tracking and reporting human behavior, and help to reduce paper work.

**SI:** One of the challenges has been the international pattern of Al Fajar; how to engage people from different cultures and languages to use an application that was initially created for English language. To come to terms with this, we are making the interface more user friendly and less dependent on English skills.

**SJ:** During the pilot, workshop managers, operators and other concerned positions started to use My Epiroc to detect any obstacles, and the platform was developed continuously.

*For Al Fajar, what are the major benefits of My Epiroc?*

**SJ:** The data helps us increase productivity because this is not just about reporting breakdowns but also about preventive maintenance. Using the application, real time data is at your fingertips, and gathering it in one place makes everyday

work run a lot smoother. Safety will definitely be enhanced as the machines are better maintained and will also boost productivity. Also, proper analysis of breakdowns reveals what kind of spare parts are required, so that money won’t be wasted on unneeded parts.

**SI:** The application will enable operators in remote areas to report problems immediately, and get the support they need as soon as possible.

**In Focus:** Al Fajar

**Originally known** as Hajar Explosives Trading Co. LLC, Al Fajar Al Alamia Co. SAOG is an Omani company with worldwide connections. It was set up in collaboration with ICI Nobel’s Explosives Company, at that time the largest commercial explosives company in the world.

Al Fajar manufactures industrial explosives and its customers are mainly drilling and blasting companies, civil engineering contractors, and quarry operators.

It is a holding group that has five affiliate companies; three in Oman – Musdak, Al-Andalos and TechRock – and two in the UAE; Technical Drilling and Blasting (TDB) and Geodynamics Middle East.

- **Founded in Oman in 1979**
- **Operates in Oman and the UAE**
- **600+ employees**
- **Revenue (2018): OMR 21.67 million**

**More** [www.alfajar.co.om](http://www.alfajar.co.om)

*Is there a human resources aspect here as well?*

**SI:** Yes, My Epiroc will definitely improve communication and reduce frustration because data is collected directly from the machines. As a result, workshop managers will get transparent information. For instance, if managers know that a delay has been caused by mechanical failure, there won't be an issue with the operators.

**SJ:** The employees are at different levels of education and training; some are less skilled, and others are only at the beginning of their career. So, to bring them to the same level, you have to know what leads to mistakes. Until recently, information has been transferred via Whatsapp chat groups. They're not a bad communication tool, but you cannot guarantee that messages are read by everyone. In contrast, My Epiroc is designed to set an alarm that both operators and managers have to commit to.



**Saša Jović**  
General Manager,  
Technical Drilling  
& Blasting



**Sergey Ivanov**  
Business Line  
Manager Mining  
and Rock Excavation  
Service, Epiroc

*Is My Epiroc limited to fleet management and mining activities, or can it be extended to other fields?*

**SI:** It can be adjusted for other industries. Also, My Epiroc has the ability to connect people across different countries, as long as there is GSM signal. And even when there is no signal, it stores data and sends it afterwards, when reconnected.

*What lessons have been learned through this joint work, and where are you heading next?*

**SI:** I would say that we've learned that open discussions among partners and mutual commitment are crucial ingredients for sustainable collaboration. As is transparency and the desire to develop and move forward. We have received valuable feedback from Al Fajar that we are currently working on. As mentioned, they need an interface that uses more icons and less wording in order to better suit non-English speakers and also be an easier interface for less experienced employees. Our team in Sweden that develops My Epiroc has already started working on the design and logic for implementing this requirement for Al Fajar and other customers with similar needs. This responsiveness to customer needs, and what adds value, is what makes the team creating My Epiroc so successful. It's an agile approach that adds both speed and accuracy to the entire creation process with minimal waste. There are also other requirements, such as modifying the application to be able to track rock drill tools, and we are striving to respond to all of Al Fajar's requests.

**SJ:** If you want to stay competitive, you have to think outside the box and know that a partnership is a "give and take" relationship. Partners should trust each other and have open communication. ✕



## KEYS TO A SUCCESSFUL PARTNERSHIP

Through innovation, companies can sustain their pioneering position. Yet, it takes continuous feedback to take the product to the next phase.

### Innovation

✓ New challenges emerge all the time and My Epiroc is developed to optimize workflow and keep track of productivity. It typically addresses drawbacks encountered by the client.

### Open feedback

✓ Epiroc worked closely with Al Fajar and other customers to develop the solution that deals with the latter's fundamental challenges. Continuous feedback has led to a more user-friendly interface.

### Commitment

✓ Mutual commitment and constant discussions among partners are crucial. Epiroc was committed to developing the product in accordance with the customer's needs.

### Sustainability

✓ My Epiroc offers a unique opportunity to have all data in one place, identifying machine malfunctions and human error. With subsequent planning of adequate maintenance and sufficient training, this creates sustainability for the entire project.

# AROUND THE WORLD IN BRIEF



SHUTTERSTOCK

Used hard drives can be a source for rare earth elements (REE). US researchers are testing a new, cost-effective method of extraction.

## Rare earth elements extracted from scrapped magnets

► **RESEARCHERS AT THE U.S. Department of Energy** and the **Oak Ridge National Laboratory** are testing out a new energy-efficient and cost-effective method of extracting rare earth elements (REE) from scrapped magnets of used hard drives and other sources, *mining.com* reports. The goal is to scale up the process for commercial production.

**TO EXTRACT THE REE**, scientists dissolve the magnets in nitric acid, feeding the solution through a module supporting polymer

membranes. The membranes contain porous hollow fibers with an extractant that only lets rare earth elements like neodymium, praseodymium and dysprosium pass through. The rare-earth-rich solution collected on the other side is further processed to yield rare earth oxides at purities exceeding 99.5 percent.

The research program will also explore separating in-demand elements from lithium-ion batteries, such as lithium and cobalt.

## Slow start for sustainability adoption, but things are speeding up

► **THE MINING AND** metals industry remains behind the curve in the adoption of environmental, social and governance (ESG) considerations, but that might soon change, according to *mining.com*. In a report by Fitch Solutions, analysts have witnessed increased engagement in regards to social and environmental sustainability across the industry in recent years, and expect this to continue in the near future.



SHUTTERSTOCK



**Stephen Evans**

Head of Molecular & Nanoscale Physics Group, University of Leeds

## How did you strike gold?

**At the University of Leeds, you have created a new form of gold.**

“Well, we synthesized a gold nanosheet in an aqueous solution with chloroauric acid, an inorganic substance that contains gold. The substance was then reduced to its metallic form in the presence of a confinement agent so that the gold formed as a sheet just two atoms thick. All atoms are surface atoms, so the material is regarded as 2D.”

**What areas of usage do you foresee?**

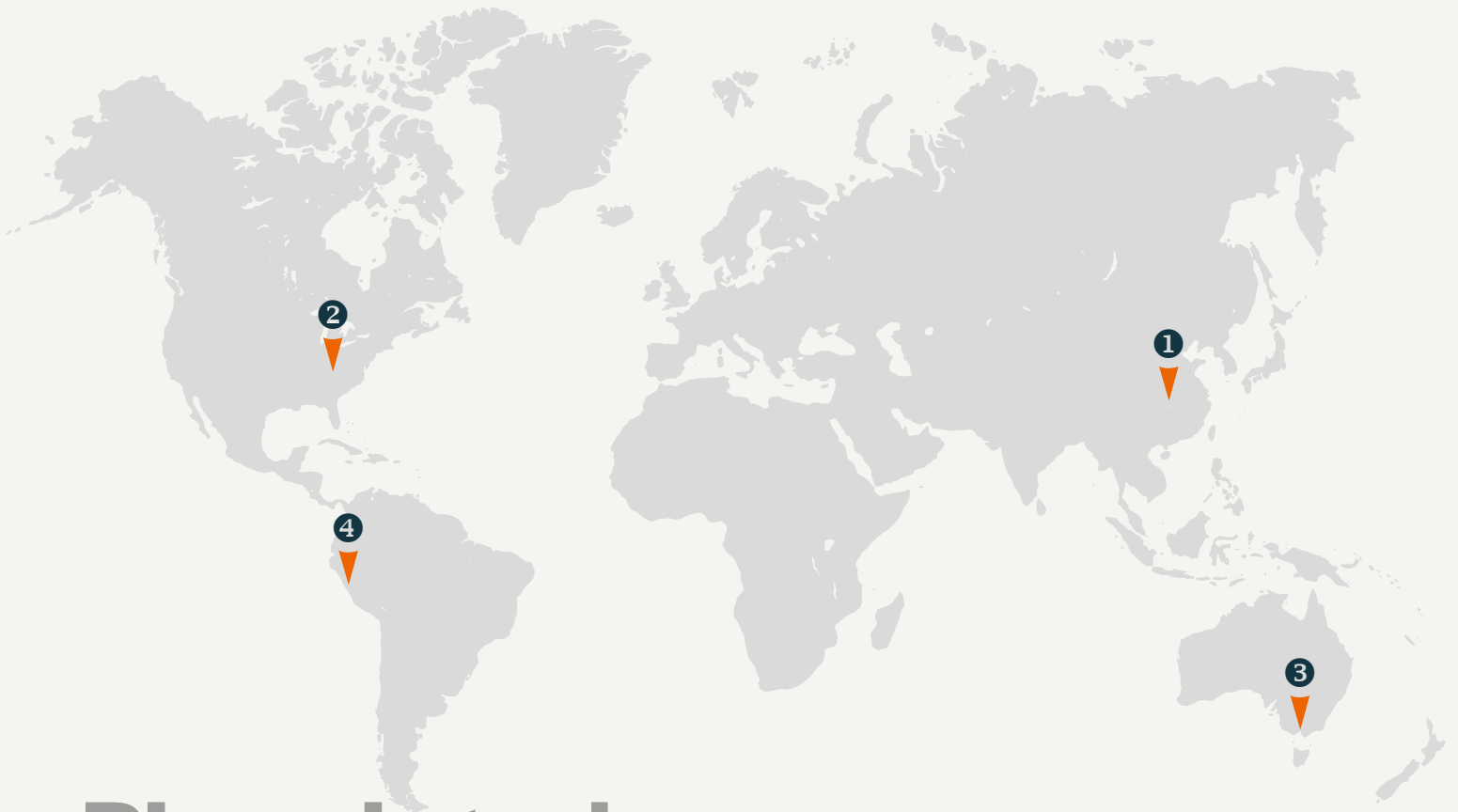
“The original idea was to make gold of controlled thickness, on the 10 nanometer scale, which would have been well suited for optical purposes. Since the gold became thinner, just 0.47 nanometers, it’s optically less interesting but there are new properties that we didn’t foresee. Due to all atoms being in contact with a solution or with air, the gold has enhanced catalytic properties that can be utilized. Also, there are possibilities in the field of healthcare and diagnostics, as well as display-type devices.”

**When could those possibilities be transformed into products?**

“We are still at an early stage, but we are certainly exploring the possibilities. We will be talking to manufacturers in relevant areas and will try to form partnerships. I am fairly confident that this will translate.”

**More** [www.bit.do/thinnestgold](http://www.bit.do/thinnestgold)

Want to keep track of what's happening in the mining and construction industry? Visit [miningandconstruction.com](http://miningandconstruction.com) for links to industry news and other interesting reading.



# Pinpointed

## 1 Intelligent safety helmets in China Hubei Province, China

➤ Intelligent safety helmets are being used on high-speed railway construction sites in the Hubei province in central China, China Daily reports. The new hard hat helmets are equipped with a high-definition camera, a communication antenna and a control chip. Developed by **Wuhan Electrification Bureau Group**, the helmets can shoot video, record the construction work, and sound safety alarms. The technology can be used to pass on vital construction site information, making it accessible via an app.

## 2 Strong low-emissions trend for non-road machinery Kentucky, USA

➤ The rate at which new powertrain technologies will be adopted on off-highway machinery was the focus of a presentation at the **Diesel Progress Summit** in Louisville, Kentucky, USA on September 30th. There is no current legislation in any market for low carbon fuels in the non-road sector, but the rapid switch of focus in light and heavy commercial vehicles towards zero tailpipe emissions solutions is also putting pressure on non-road machinery OEMs. This will drive them to invest in new concepts, architectures and technologies.

## 3 Diversity and inclusion in focus at mining expo Melbourne, Australia

➤ Championing diversity and inclusion in the mining industry means challenging stereotypes, being uncomfortable, and rejecting tick-a-box solutions. Promises made must be kept, programs started must be given time to develop, and people employed must be supported. These were topics discussed in a webinar tied to the **International Mining and Resources Conference and Expo** in Melbourne in October. The panel consisted of mining industry experts **Alex Atkins**, **Kate Hobbs** and **Nick Flanagan**, [mqworld.com](http://mqworld.com) reports.

## 4 Early dam failure warnings from space Cerro de Pasco region, Peru

➤ **HR Wallingford**, a UK-based engineering and environmental hydraulics firm, will be working alongside the **UK Space Agency** to monitor the construction of a dam in Peru. The system uses Earth Observation (EO) techniques – including the analysis of spectral responses and iron traces from satellite images as well as data

from navigation systems – combined with real-time in-situ devices to give a clear picture of the state of play. System software called **DAMSAT** will analyze the data, monitoring for early dam failures. The collaboration aims to extend the monitoring to other dams in the area, and eventually worldwide.



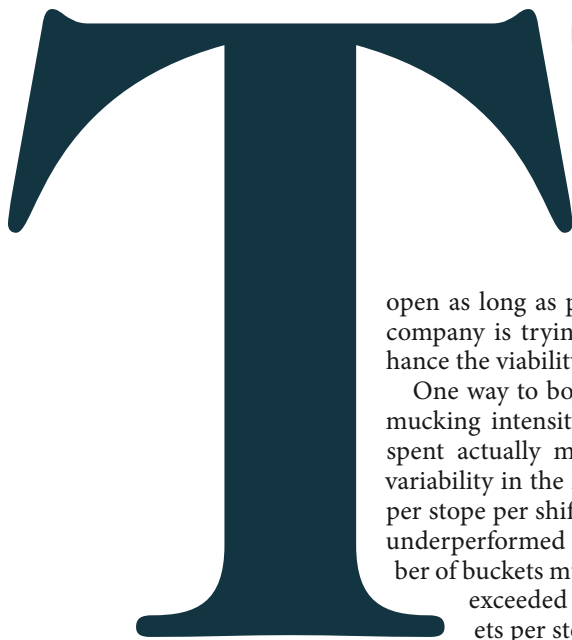
SHUTTERSTOCK



[On Location]  
Canada

# RIGHT HERE RIGHT NOW

»»»— Mobilaris Mining Intelligence makes mining more efficient by tracking equipment in real time. At the 777 mine in northern Canada, the new technology is boosting Hudbay's mucking rate.



**THE 777 ZINC-COPPER** mine in Flin Flon, Manitoba is on the wane. After 15 years in production, the underground operation is expected to close in 2022 unless Hudbay Minerals discovers more ore. In order to keep the doors open as long as possible, the Toronto-based company is trying to find efficiencies to enhance the viability of the operation.

One way to boost efficiency is to increase mucking intensity, or the number of hours spent actually moving ore, while reducing variability in the number of buckets mucked per stope per shift. During 2018, some shifts underperformed from a perspective of number of buckets mucked to target while others exceeded for an average of 56 buckets per stope.

To address this challenge, Hudbay launched a three-month pilot project in partnership with Epiroc in December 2018 to determine whether Mobilaris Mining Intelligence (MMI), a digital technology designed to track people and assets in real time, could make a difference. And it did.

**USING MMI TO** track equipment from 25 access points at the test level increased the mucking rate by seven percent because equipment such as Epiroc's Scooptram ST14 underground loader could be located instantly at the start of a shift and priorities adjusted during the shift to better match the company's targets.

"Sometimes operators are pulled out of the stopes to do other tasks," said production coordinator **Nathan Stuart** from the surface. "Now, we can track the actual hours allocated to production and if it's more important for an operator to be back at the stope, we can instruct them to do that."



Just by using a web browser, any personnel with the appropriate access rights can use the very intuitive real-time 3D visualization of the mine.



**Nathan Stuart**  
Production  
Coordinator,  
Hudbay Minerals

Stuart, who grew up in Flin Flon, directs the crews from his simple 2-monitor workstation at the center of a one-story mine office perched on the volcanics of the Flin Flon-Snow Lake greenstone belt. One monitor shows a map of the mine levels and access points, while the other displays information about each piece of equipment as it passes an access point, most importantly location.

“The pilot was an opportunity to try some technology we knew was out there and to gain some efficiencies,” said mine manager Bob MacDonald on a phone-in from Sudbury to the 777 mine site. “We now have more consistency in the plans for our crews.”

In a broader sense, MMI is helping Hudbay apply Short Interval Control (SIC), a means of



## LEARN MORE // MMI

# The complete digital solution

**THE OPERATOR AT** the Mining Operation Center (MOC) monitors the entire operation from ground level, using real time data to support underground personnel and prioritize operations.

### Monitors production data

The MOC operator receives production data in real time, giving them an overview of the entire operation.



### Interacts with manager

Stays in touch with the shift manager in order to gain approval for greater decisions.

**Tracks equipment**  
Keeps track of underground equipment during the shift.



### Gives new orders

Based on new information, can give new work orders directly to operators and/or the underground shift supervisor.



Production Supervisor **Mike Jones** and Epiroc Account Manager **Kevin Nivon** review the Scooptram ST14 safety log outside the 777 mine.



**Mike Jankowski**  
Manager of  
Technology  
Development,  
Hudbay Minerals

keeping a process – in this case mucking – on target by reducing variation. Typically in underground mining, managers must wait until the end of a shift to assess the difference between their target production and the actual tons of ore mucked. Any losses during the shift cannot be recovered.

The beauty of MMI is that it can signal if mucking intensity is underperforming during the shift so adjustments can be made right away. For example, if one stope is ahead of target and another is behind, Stuart can reassign the mucking fleet to keep both stopes on target.

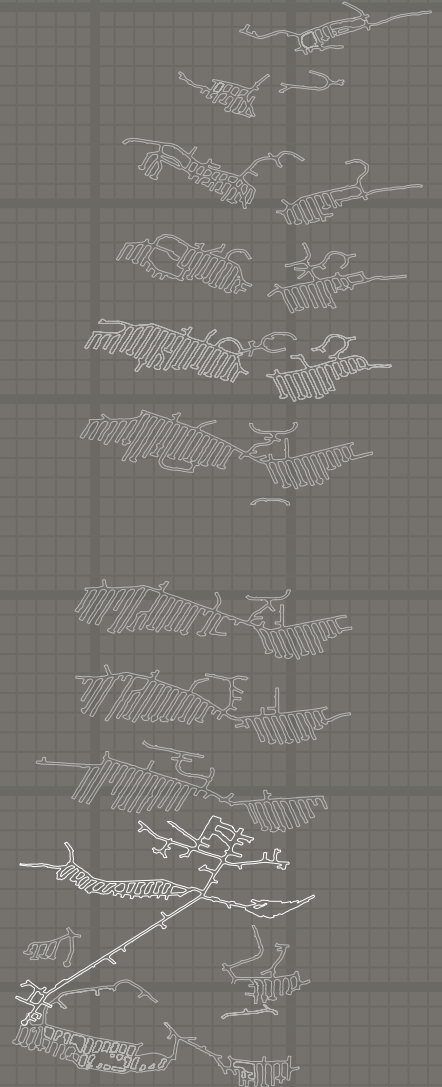
The data generated in the process is like gold to Hudbay’s Manager of Technology Development **Mike Jankowski**. “I’ve been able to see the value that Mobilaris Mining Intelligence brings from an information management perspective,” the Toronto-based electronics engineer said. “We now have the information we need to know whether a problem is worth addressing or not.”

**THE DATA ALSO HELPS** Stuart accurately predict how many buckets will be mucked under various scenarios. In the best-case scenario – a dayshift with an early bird component and an available fuel truck – operators can muck 11 buckets per hour.

“There was a bit of a learning curve for us, but we like what we got out of MMI, and there are plans to roll out the deployment to other areas of the mine,” said Stuart. Hudbay is also planning to install Mobilaris at Lalor, its gold-zinc mine about 210 kilometers to the east. ✕

## The complete mine layout

The main image (to the right) is just one layer of the mine. The complete 3D visualization consists of many layers put together.

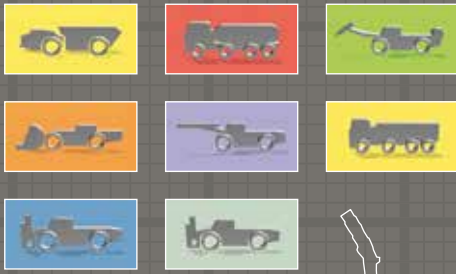


## Hudbay Minerals

Founded in 1927, Hudbay Minerals is one of Canada’s oldest mining companies. The epicenter of operations is Flin Flon, northern Manitoba, where a base metals discovery in 1915 developed into a massive zinc-copper mining, milling and smelting complex. The Toronto-based company continues to operate two mines, two concentrators and one zinc plant in the area. In 2011, Hudbay branched out to southern Peru with the purchase of the Constancia copper deposit.

**More** [www.hudbayminerals.com](http://www.hudbayminerals.com)



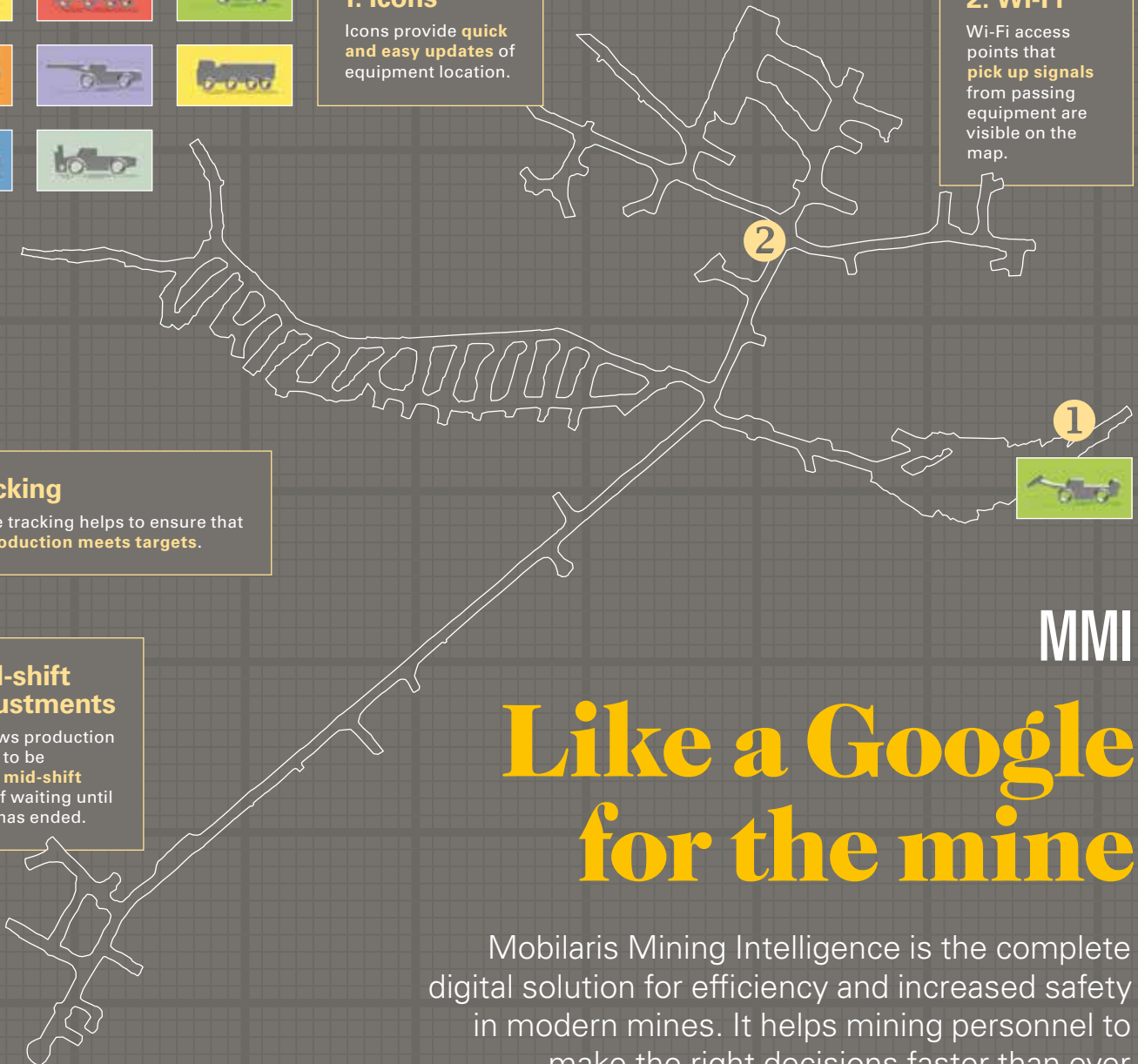


**1. Icons**  
Icons provide **quick and easy updates** of equipment location.

**2. Wi-Fi**  
Wi-Fi access points that **pick up signals** from passing equipment are visible on the map.

**3. Tracking**  
Real-time tracking helps to ensure that actual **production meets targets**.

**4. Mid-shift adjustments**  
MMI allows production priorities to be **adjusted mid-shift** instead of waiting until the shift has ended.



**MMI**

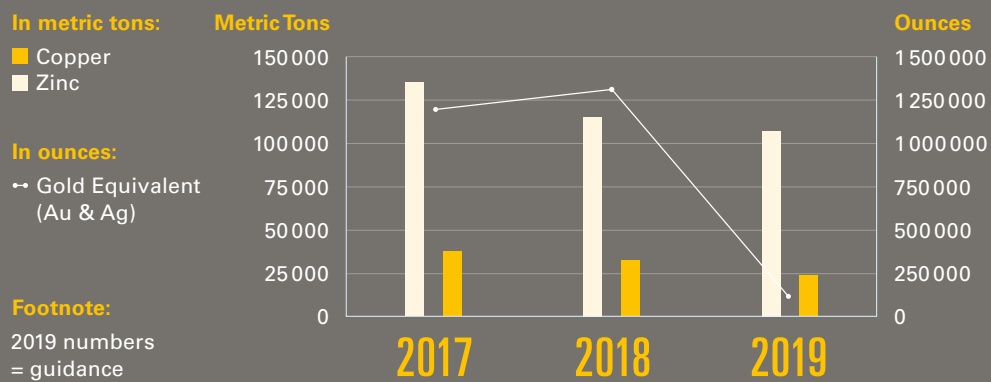
# Like a Google for the mine

Mobilaris Mining Intelligence is the complete digital solution for efficiency and increased safety in modern mines. It helps mining personnel to make the right decisions faster than ever.

## 777 mine

- In the town of Flin Flon, northern Manitoba, Husbay owns the 777 underground mine, an ore concentrator, and zinc production facilities
- Opened in 2004, the mine produces 31 000 metric tons of copper and 59 000 metric tons of zinc per year, plus gold and silver credits
- At a current mining rate of 4 400 metric tons per day, the mine is expected to close by 2022

## Production for Husbay operations in Manitoba



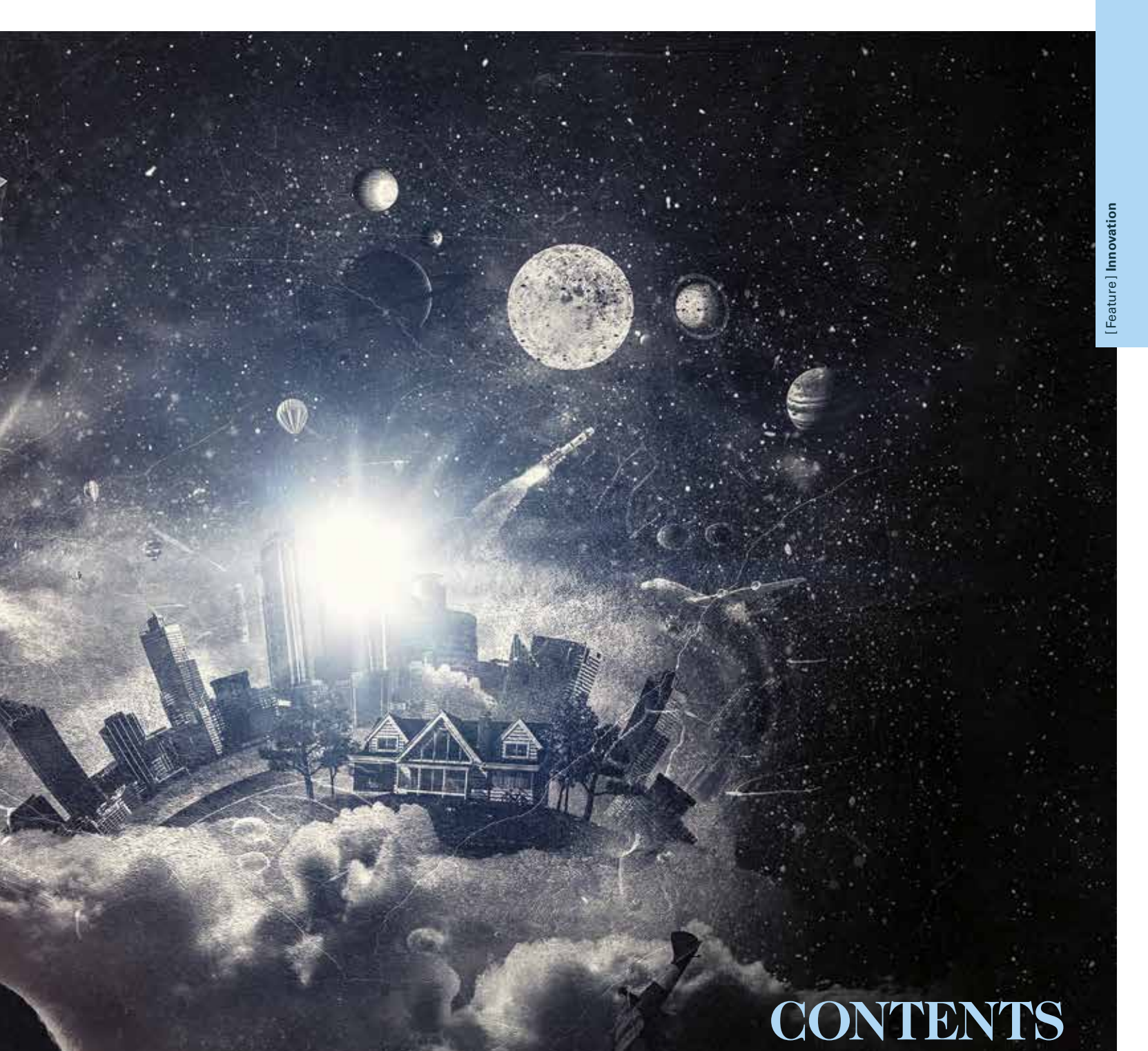


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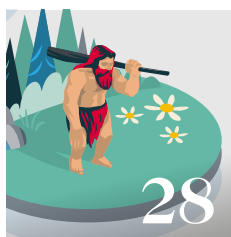
# INNOVATION

Human progress has always been tightly linked to innovation. New ideas, concepts, tools, philosophies, conveniences and services have made life easier and better through the ages.

But innovation will not happen all by itself. Some conditions make it thrive: most notably, collaboration and communication.



# CONTENTS



## ORIENTATION

### The innovation configuration

Innovation requires not only a flexible collective mindset, but also an environment that lets it grow.



## ON SITE

### Fostering a company culture

A company like Epiroc can never rest on its laurels. The way forward is through innovation.

## 38

## PERSPECTIVE

### The Pixar model of creativity

The animation wizards at Pixar have flooded the movie market with a steady stream of creatively brilliant films over the years. What makes them tick? A combination of culture and architecture.

## 40

## SURVEY

### "Innovations have existential values"

Innovation is essential, not only in the mining and construction industries, but everywhere. We talked innovation with representatives from other areas of expertise. What benefits are there?

## 41

## SEVENTHINGS

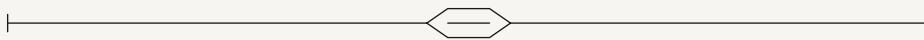
### The innovative eras

Innovation has not happened at a steady pace through human history. Some ages and milieus have been far more productive than others. Here are some highlights, from the Stone Age to the Singularity.



# The adaptive mindset

## Innovation – the application of imagination and reasoning to give birth to new concepts – is what sets us apart from other animals. However, some habitats are better at fostering innovation than others.



**M**ost innovations solve specific, clearly defined problems. It is only the odd isolated invention that fulfills needs we did not even know we had.

Innovation is mostly hard work; the quip about innovation being 1 percent inspiration and 99 percent perspiration is very close to the truth. There are no Gyro Gearloose or “Doc” Brown style inventors in real life. Thus, the so-called disruptions – the great innovation leaps forward (or sometimes sideways) – are rare.

Take, for example, a stick. It is a brilliant way of increasing reach, leverage and momentum; deceptively simple in the way that the very best ideas are. The very notion of using one as a tool, however, probably required a large leap of imagination. But one day, under favorable conditions in our distant past, some genius hominid cracked the code.

Once the general concept of using a stick was in place, though, the innovation could easily be modified and shaped to fulfill a number of needs: club, lever, support, fishing pole, oar, spear and a thousand other uses. Most innovations are of this incremental kind: slight improvements on existing technologies. Few are as disruptive as the stick.

**David Robertson**, professor and teacher of innovation at Massachusetts Institute of Technology (MIT), is skeptical about putting too much focus on disruptive innovations.

“Chasing the dream can lead you away from your core business and make you ignore the basics. Also, this kind of innovation work is often expensive.”

What companies should mainly focus on, he says, is to learn the needs of their customers in depth.

“Innovation should be like dating. You have to spend time with your customers and understand what really matters to them. Find out what they care about, and about their hopes and fears. You want to become a bigger part of their life – designing products and services that will become important to your customers,” says David Robertson.

In particular, he stresses the importance of going outside one’s own company to witness and learn about the customers’ everyday struggles and frustrations.

“The reason for this is that what people, customers, say and show is often very different from what they actually think, feel and do. You have to be with them to observe.”

David Robertson is also “not a fan” of leader-driven innovation.

“Innovative thinking should permeate companies at all levels, in all functions. A chief innovation officer, for example, can easily be a bottleneck suppressing ideas and ultimately preventing innovation.”

**B**uilding the right company culture for innovation is essential. But the real work starts at an even earlier stage. **Nina Powell**, London-based partner at innovation strategy consultants What If Innovation, has spent two decades helping companies in various industries improve their innovative capabilities.

“There are some fundamentals common to all industries. First and foremost



**David Robertson**  
Professor and teacher of innovation, Massachusetts Institute of Technology (MIT)



**Nina Powell**  
Consultant and partner, What If Innovation

is the need for a clear sense of the mission – what value does and should the company create for its customers? What gap is there between where we are, and where we want to be? How do we bridge that? Also, you have to be very clear about what you actually mean by innovation – is it innovative products, or an innovative mindset?

We’ve found that to be really successful, you need both,” says Nina Powell.

Innovation demands the right ecosystem, nimble mindsets and a culture that can grow and nurture ideas. In Nina Powell’s experience, traditional types of leaders might not be the best choice for working with innovation.

“Leaders have often gotten to where they are because they’re very good at navigating their jobs, making decisions deduced from previous experiences rather than seeking new solutions. I’ve seen many examples of managers killing entire projects after a single failure. Innovation demands another mindset, which can be quite challenging to get into: how can I adapt to change, and what can I learn from mistakes? You have to be persistent, and rather brave.”





# “Innovation should be like dating. You have to spend time with your customers and understand what really matters to them”

**David Robertson**

Professor and teacher of innovation,  
Massachusetts Institute of Technology (MIT)



Switzerland is perpetually ranked high on lists of the most innovative countries, and has an old and profitable history of innovation.

“Switzerland is not a typical case. We have a successful economy, and rank high in innovation, which makes most people assume that we subsidize companies. That’s not really true. What we aim to do is to ensure the right framework,” says **Lutz-Peter Berg**, Head of Science & Innovation at the Embassy of Switzerland in the UK.

The government support for innovation is entirely peripheral, by for example providing high levels of education, renowned research universities and a skilled workforce.

“The government takes a back seat, and innovation is usually driven from the bottom up. But we help in some ways, for example by providing coaching programs for startup companies to help them build viable business models,” says Lutz-Peter Berg.

An important objective for the Swiss government is to facilitate the mingling of business and academia on productive ground. To that end, Switzerland builds innovation networks around thematic areas. At the moment, themes include materials, photonics and foods.

Lutz-Peter Berg compares the Swiss strategy to those of other countries, for example the UK:

“British companies get government grants to innovate. One of the draw-

backs of that is the tendency to pick winners while other research suffers. Switzerland doesn’t pick winners, and we don’t have a national industrial strategy. It’s the duty of companies to stay innovative. Switzerland is expensive to run businesses in, and it’s in the best interest of Swiss companies to be at the cutting edge so they can stay ahead of international competitors. The products have to be pretty much the best in the world.”

With a solid groundwork in place, they pretty much might be. ✕



**Lutz-Peter Berg**  
Head of Science & Innovation,  
Embassy of  
Switzerland in  
the UK

## HOW TO GAUGE?

### Measuring innovation success

**MEASURING THE SUCCESS** of innovation can be rather complicated. Nina Powell at What If Innovation (see main text) suggests adapting the measurements to stage-appropriate sets along the journey; measure points may include everything from speed-to-market to employee engagement.

In a podcast, Guttorm Aase, an associate partner at McKinsey & Company,

suggested two metrics that measure long-term economic innovation success in equitable ways. The first is the ratio of R&D spending to new-product sales; the second is the ratio of gross margin to new-product sales. These numbers should typically be measured over a period of three to five years, depending on the innovation cycle of the particular industry.





**BRAVE AND  
RESPONSIBLE  
PEOPLE  
COLLABORATING  
FREELY...**

**IT'S  
INNOVATION**

»→ We consider innovation a part of our DNA. But, how does Epiroc go about achieving it? Mining & Construction Magazine met with leaders from different parts of the world to find the answer.





## “It is important to anticipate change, monitor change and be able to adapt to change quickly”

**George Miltenyi**  
EMD Workforce Development

In a conference room at Haga Slott outside of Enköping, Sweden, **George Miltenyi** stands in the middle of the room as he gets ready to summarize this morning’s lectures on change management. Seated in front of him are forty-odd Epiroc employees from countries like Australia, Brazil, the Congo, the USA and Finland.

When George Miltenyi speaks, he focuses with great enthusiasm on cheese.

“OK, so, where’s the cheese? Oh, it’s over there!” he says, pointing towards a corner of the room.

“Then you have to get there. You have to follow the cheese!”

George Miltenyi comes from the company EMD Workforce Development. In this beautiful setting, about an hour’s drive northwest of Stockholm, he and a number of other lecturers held a week-long leadership program for specially selected participants from Epiroc in early May. The focus was innovation.



[ On Location ]  
Enköping

The participants, eager leadership program applicants, were divided into six project teams, where they worked on an assignment that reflects challenges Epiroc is currently facing. The project teams then continued working on their assignment in the months that followed this innovation week. In September, the teams spent another week together presenting their results.

**THE WALLS OF** the conference room are full of paintings and posters that give hints about the topics of the lectures. “*Love your enemy*” is found on one. “*Give up your dream scenario*” on another. Scattered among the posters, you can also find quotes related to cheese. “The cheese analogy comes from a 1998 business motivation book by Dr Spencer Johnson called *Who Moved My Cheese?*,” explains George Miltenyi when we sit down together during the lunch break. The book compares us to mice, saying that we acclimate to change and find ways to find the cheese even when it is not in the same place from one day to the next.



Innovation is a big part of Epiroc's DNA, emphasizes **Helena Hedblom**, Senior Executive Vice President Mining and Infrastructure, pictured at the Epiroc headquarters in Stockholm, Sweden.



**Nadim Penser**  
Vice President  
Human Resources,  
Epiroc, Sweden

“Change happens everywhere, so it is important to anticipate change, monitor change and be able to adapt to change quickly so that you can start to enjoy it when change happens. If you do this, you will have a competitive advantage,” says George Miltenyi.

**EPIROC HELD THIS** Aspire program twice before, and **Nadim Penser**, Vice President Human Resources, underscores just how important leadership training is for the company.

“Epiroc is a high-tech company where innovation plays a key role. I would say the Aspire program reflects the company's view of innovation. It's like Epiroc in miniature form.

He clarifies:

“Innovation is based on collaboration, i.e. teamwork. It is very rare for someone to sit alone in a room and invent something fantastic. So, how do we get this innovative spirit to permeate our entire organization? Well, it starts as early as the recruitment process, where we conduct behavior interviews. We look at how people collaborated with others previously. We look for independent individuals who have made an impression at their previous jobs. At Epiroc, we offer freedom with responsibility and want our employees to show courage, challenge current ways of thinking, and suggest improvements. At the same time, we need a collaborative spirit. We form teams that are a

mixture of people with different backgrounds, personalities, nationalities – and ensure we have a good gender distribution – and challenge them to come up with creative suggestions in projects with clearly defined goals. It is a way of strengthening our culture, which is based on innovation coupled with diversity and collaboration.”

Nadim Penser pauses, and then connects the dots until they reach Aspire.

“In other words, it is the same thing as we do here via Aspire. We want our leadership program applicants to come from different parts of the world and from as many different parts of our organization as possible. It is then that you, just like in daily life here at Epiroc, not only manage but also challenge and come up with new business-friendly approaches and solutions.”

**EPIROC SEES ITSELF** as a 145+ year-old startup, in other words a modern company with a rich history in Atlas Copco. Despite its size, it must be possible for decisions to be made quickly.

“We must never rest on our laurels,” says **Helena Hedblom**, Senior Executive Vice President Mining and Infrastructure, when we meet at the Epiroc headquarters in Sickla on the outskirts of Stockholm.

“Innovation is one of our core values and is part of our DNA. It is our innovative capacity and the role that innovation has always played in our



**George Miltenyi**  
EMD Workforce  
Development



**Helena Hedblom**  
Senior Executive  
Vice President  
Mining and  
Infrastructure,  
Epiroc, Sweden

## Q&A

**Mahmood Hassan**  
Engineering Project Manager, Automation,  
Drilling Solutions, Garland, USA



*The process automation team at Epiroc in Garland, Texas, is responsible for the Autonomous blast hole drill rig and its control room. This includes testing new software and new features for the drill, creating and updating installations of autonomous components, testing new technologies and sensors for possible future use, and continuous improvements of existing features.*

- Q** How much of your work is dedicated to innovation?
- A** “It used to be over 50 percent, where we were focused on a truly new product being developed for the market. But since the Autonomous Pit Viper is a released product, the time for innovations is down to 30 percent. The other 70 percent is spent supporting – and improving – existing products. With that said it is hard to draw a line since we have to come up with innovative solutions for problems,

- even when we are supporting the existing or newly released products. This requires being agile and adaptable to changing requirements from stakeholders.”
- Q** You work using something called AGILE methodology. What is this?
- A** “It is a much better process for project management, focusing on an iterative approach to develop the product incrementally. You don't plan for a large project that is supposed to be completed in three years where, in the end, say, only 40 per-

cent of the product is still useful. Instead, you work on a product that the customer would benefit from right away, deliver the MVP (Minimal Viable Product), and then you constantly improve on it, delivering value with each iteration. This requires not just a process change, but a whole new mindset, and it enables the team to work in a more efficient manner, creating maximum value and quality for the customers. You can integrate customer feedback more frequently and rapidly to tackle and solve their problem statement.”

- Q** How have customers responded to Epiroc using AGILE?
- A** “Customer response has been really positive. They see the benefits of this approach. They get to see the development sooner and are able to give their feedback so that the end product does not come as something totally new and unfamiliar. In addition, the delivered MVP meets their expectations since they have been in the loop during development.”

**More** [www.epirocgroup.com/vision-and-beliefs](http://www.epirocgroup.com/vision-and-beliefs)





↑  
To be hands on with the leadership program, the participants make paintings that include words and phrases they learned from the lectures.

→  
Guest speaker **Tony Stewart** is summarizing the morning's lecture on change management and gets a lot of smiles when he repeats the importance of following the cheese, which means being open and positive to changes.



**Heinrich Duvenage**  
General Manager,  
Epiroc, South Africa



**Mouritz Harvard**  
Business Line  
Manager  
Market Sales,  
Epiroc, Indonesia

culture that makes us who we are today. We are creative and entrepreneurial and always want to get even better in everything we do. Our entire business centers around understanding customer needs and developing products and solutions that respond to them. To achieve this goal, we must be innovative,” says Helena Hedblom.

As a complement to Epiroc’s inherent innovative capacity, Hedblom points to the company’s acquisitions, i.e. how they buy parts of smaller companies.

“I believe that a combination of partnership, co-ownership and self-development is the fastest and most effective way to create innovation. The advantage of owning a part of smaller companies is that speed is maintained while we gain access to the technical solution that these companies have developed.”

**OUT AT HAGA SLOTT**, afternoon is giving way to evening. This means that it is once again time for

participants to sit outside of the lecture room and reflect on the day.

**Heinrich Duvenage**, General Manager South Africa, feels like he has gotten to know himself better.

“To be innovative, you need innovative people. But, to be effectively innovative, you also need people who can analyze and people who can execute the ideas in a good way,” he says. “I found out that I have a lot of things I need to work on. Like the way I communicate with people. I am very results-driven and I want the job to be done, but sometimes I think that people might not fully understand what I ask them to do.”

**Mouritz Harvard**, Business Line Manager Market Sales Indonesia, has similar thoughts on the subject.

“I can be a little bit pushy and sometimes say that I want something done in one week. The employees getting this order sometimes ask ‘Why one week? I need two weeks.’ After being here,



### Faghmi Cader

Owner Elf Drilling, Kimberley, South Africa

## How does BenchREMOTE improve operations?

### Why did Elf Drilling purchase Epiroc's BenchREMOTE remote operating station?

"It's ideal for removing the operator from the danger area, taking them away from the noise and dust and the extreme weather. The winters in this area of South Africa are extremely cold and the summers extremely hot. So the drill operator can now comfortably sit with a BenchREMOTE a hundred meters away, drilling in hazardous areas near the high wall, thereby contributing to elevated safety levels."

### The tagline of Elf Drilling is "New age of drilling automation". What was your latest innovative move?

"We can now measure and compare the costing, including the life of our components, machine wear, rock drilling tools and the like. This will also allow us to track machine movements and service interventions through the fleet, for example if drill rig number 10 was in production a certain number of times with X number of rotations for servicing. This will better enable us to monitor and control our performance and production results."

### Would you say that you, more than a customer, are a collaborator to Epiroc?

"Yes, a bit like that. We are constantly speaking to the manufacturers or with the people in Sweden to improve on certain aspects. We are constantly pushing to improve the system as far as automation is concerned. It's important for us to advise Epiroc on how their products perform in the geology – on the rocks and the sand and the clay and the manganese and the zinc – in our area." ✕

More [www.elfdrilling.co.za](http://www.elfdrilling.co.za)

I've learned that instead of being pushy I can ask, 'If we give you more resources, could you get it done in one week?'"

**Christel Füllenbach**, Business Line Manager Service Germany, says it's "great to meet and get to know leaders from other cultures and parts of the world, and to learn from each other and reflect on why you do something in a certain way because everything can always be improved."

"Innovation is part of our normal workday, but if you think about what it means and how we can really be innovative, then it's quite complex," she says. "For me, the Aspire training is an innovation in itself. It gives people the freedom to think about topics that are not necessarily related to daily work, and also to build a relationship with other passionate people in an open atmosphere. Another great thing is that I can spread this feeling and culture to my local organization. It's quite remarkable how innovative people can be in the right environment." ✕



**Christel Füllenbach**  
Business Line  
Manager Service,  
Epiroc, Germany

# PERSPECTIVE PIXAR ANIMATION STUDIOS

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There are always things to be learned from other organizations and other industries. This is how another player has approached the theme of this issue.

☑ Christian Tarras Ericsson  
📷 Shutterstock





# The animated playground

**PIXAR, THE ANIMATION STUDIO** behind popular and acclaimed movies like *Toy Story*, *Finding Nemo*, *The Incredibles* and *Up*, is arguably one of the most successful of all creative ventures in modern times.

The Pixar model encourages creativity in the workplace in a number of ways. First and foremost is the emphasis on open communication. Meetings are held in “safe zones” where participants leave their titles at the door and are encouraged to give honest feedback, thoughts and ideas. Feedback is always constructive, given without hesitation or apology, and never directed at the person responsible – only at the work. The focus

of the discussions should always be on the project, not the participants.

Fear of failure is actively discouraged by sharing work in progress early and often. This not only enhances the end results, but also gives early indications as to whether the team is on course or needs to adjust the direction of the work.

**PIXAR HAS ALSO** recognized that creativity thrives in groups. Decisions usually draw on the collective knowledge of people from a wide variety of expertise at all levels in the studio. This not only makes everybody a stakeholder, it also enables decisions based on both the big picture and little details.

Also in that spirit, Pixar encourages managers to strive to recruit the very best talents. Not only do talented and ambitious persons do better work, they keep managers on their toes, forcing them to measure up while simultaneously giving them more time for tasks other than micromanaging. The manager’s role is primarily to optimize the culture for creativity in the team and safeguard the dynamics of their team. This allows for all of the good things mentioned previously to happen.

Last but not least: play matters at Pixar. Parties, retreats and sandboxed personal hobby projects give creativity room to grow. ✕

The **Toy Story** series has so far generated four feature films, all of them starring the character Woody (who is voiced by Tom Hanks).

## In focus Pixar Animation Studios

The **Pixar Animation Studios** building was conceptualized by the late great Steve Jobs as a workplace for collaboration and innovation. Situated near San Francisco, the building has remained largely unchanged since its inauguration in 2000.

The office is designed to promote encounters and unplanned collabora-

tions among colleagues, for example by locating the staff mailroom, cafés, foosball table and gym facilities, cinema and every single toilet to a central atrium area.

All employees are given their own office rooms to decorate however they want. There are also extensive activity grounds and gardens.

**More** [www.bit.do/pixarfacts](http://www.bit.do/pixarfacts)

# SURVEY WHY AND HOW?

Want more input on this theme?  
Three people from different fields  
give their views to help paint a  
broader picture.

☑ Christian Tarras Ericsson & Gustaf Höök

01

What do you consider the main benefits of innovation?

02

What exactly is involved if you want to work innovatively?



**Susanne van der Velden**

Program Manager,  
Smart Industry,  
Netherlands



**Golaleh Ebrahimpur**

CEO Chalmers  
Industriteknik,  
Sweden



**Riikka Aaltonen**

Senior Adviser, Mineral  
Policy, Ministry of Economic  
Affairs and Employment  
of Finland

01 **"INNOVATION IS A** way of creating value for the customers and for society. For companies, it is ultimately about gaining and retaining competitive power. A strong and innovative industry provides growth and jobs."

02 **"SMART INDUSTRY** has been around since 2014, and we are now on our second agenda. It's a collaboration between the Ministry of Economic Affairs, industry, research institutes, the Chamber of Commerce and other parties. The aim is to make the industry more competitive through better use of information and communication technology. To lay the foundation for strengthened innovation in the Netherlands, we bring people from different tech companies and other organizations together and put them together in open innovation field labs. That way, they get to explore whether they have common questions and issues and can find common ground."

01 **"IN GENERAL TERMS,** it's the ability to enhance something and/or find new ways forward. It could be from a commercial perspective, in that an innovation could lead to new perspectives, improved efficiency, new market shares, better quality and so on. Then there's also the 'common good' perspective; if innovations result in, say, fewer accidents, improved mental health or positive environmental impacts."

02 **"FIRST OFF,** new ideas and new ways of thinking have to be embraced and nurtured. However, it's equally important to prioritize and to look at things from a longer perspective. What will the effect be? Innovation is something that comes after research is done, when there's a foundation but when it's not yet clear what should be done with the knowledge. Ideally, there's a concrete purpose so that it's easier to determine what the focus should be and what resources should be allocated."

01 **"INNOVATION IS A** way of making things run smoother and better. I've worked in mines myself, and I feel that there's a long tradition of innovation everywhere in the Nordic countries – when we see something that doesn't work, we immediately try to think of ways to improve it. So we're probably better at incremental innovations than disruptive ones."

02 **"IT'S IMPERATIVE TO** think innovatively at all levels of society and within companies, and to have a culture that is receptive to innovative ideas. At the state level, we work through an organization called Business Finland. Among other things, we give financial support to R&D and provide for education and re-education. We also establish platforms where actors from research institutes, universities and widely differing industries can meet, combine and exchange ideas."

More [www.bit.do/innovationfacts](http://www.bit.do/innovationfacts)



## The great leaps forward

Development has not been a steady plod through history. Instead, development staggers and stumbles, sometimes falling – and sometimes leaping forward.

07

### The Singularity

The Singularity (coined by John von Neumann) is the point of time in the near future when AI systems will start to self-improve, causing an intelligence explosion. At that point, all bets are off in trying to accurately predict future developments.



01

### The Stone Age

Some of the most important innovations in history happened long before anyone could write down the stories of how they came to be: basic tools, fire, boats, weaving, pottery, agriculture, wheels ... And, of course, written language itself.



06

### The Invention Boom

The late 19th and early 20th century saw a bonanza of technological innovations. Inventors like Tesla, Bell, Marconi and Edison became household names, and concepts like the vacuum tube and the Haber-Bosch process changed society forever.



02

### The Axial Age

A number of new and revolutionary philosophies cropped up globally during a period centered around the 6th century BCE. At one point in history, Confucius, Buddha, Pythagoras and the last of the Hebrew prophets were all walking the earth at the same time.



05

### The Age of Enlightenment

In bright contrast to the Renaissance, the Enlightenment was all about looking forward. Reason, progress and tolerance were the new black. Sciences like geology, anatomy and zoology strode forward, and the invention of the steam engine was a capstone.



03

### The Roman Age

The Roman Empire was all for making life more comfortable for its citizens. Plumbing, air conditioning, aqueducts, arched structures, surgical tools, roads and a calendar system that actually made sense were all developed during this prolific era.

04

### The Renaissance

The Renaissance looked to the distant past for wisdom, rediscovering long forgotten knowledge. This led to a formidable explosion in creativity; organized banking, technical drawings, newspapers, and floating docks were all invented during this era.



Next issue  
[Feature]

The issue of diversity is gaining importance as a means of staying relevant and competitive. Read more in the next issue's Feature.

# MY WORK: QUALITY MANAGER

Epiroc's greatest asset is our employees. We take pride in offering them an outlet for their creativity in order to provide the best possible value to our customers.

☑ Sanna Persson  
☑ Sebron Snyder

## “You never know what’s around the corner”

»→ Maureen Bohac grew up in the mining industry and has had many roles there. As a Quality Manager at Epiroc Drilling Solutions, she faces challenges and constant problem-solving, the very things she loves most about her work.

“Growing up in a family of miners, we moved around quite a lot. My dad worked for a mining contractor specializing in tunneling, and by the time I finished high school I had lived in 18 different states, Canada and Puerto Rico. Fresh out of college, I started out as a manufacturing engineer at Atlas Copco for the sub-assembly area. I then moved to a new product development team as a manufacturing engineer.

**MINING CAN BE** very polarizing to people who don’t know it from within. While I grew up in a family where mining put food on the table, a lot of people don’t understand all the hard work that goes into it – and all the modern day luxuries it produces. I wanted to understand our customers better, and help others understand all the possibilities that come from mining. In that quest, marketing became a natural next step for me. I was a product engineer and was then promoted to product manager for the large blasthole drills. This is where I truly gained my appreciation for our



**MAUREEN BOHAC**

**Job:** Quality Manager, Epiroc USA (based in Garland, Texas)

**Joined the company:** 2005

**Best part of the job:**

“Working with all the different levels, cultures and people in my organization. There are so many personalities, but we are all in this together”

machines and customers. I was able to travel the world, visiting a variety of customer sites and gaining their feedback on our machines, their applications, and the customer’s expectations. Outside work, I have a beautiful family that keeps me very busy, but I also try to focus on who I am – beyond being a wife and mother. I am a history buff, love swimming, love reading and am a self-taught amateur wine sommelier. I am newly into crossfit and it has been a huge learning curve for me, but I love the physical challenges, successes and even the failures it brings. I enjoy pushing myself, both in my personal life and at work.

Every single workday is different for me. I can have meetings scheduled all day and then a major quality issue comes up and I have to let everything else go. It’s exciting and one of the things I love most about my job – the fact that you never know what’s around the corner. It’s constant problem-solving, helping your customers or the people around you. Facing new problems can be frustrating and it’s never simple, but finding solutions is what motivates me to go further.” ×



**Maureen Bohac**  
never really knows  
what the next day  
will bring – and she  
loves it. Problem-  
solving motivates  
her to go the extra  
mile at work.



# Aitik automated bit by bit

» To increase productivity and safety in the Aitik copper mine, Boliden went the automation route. The fleet of Pit Viper rigs will be remotely controlled by operators.

1

## THE CHALLENGE

**S**WEDISH MINING AND smelting company Boliden plans to raise the production quota in the northern Swedish open pit copper mine Aitik to 45 million metric tons for 2020. To meet the quota, the company needed to strengthen its fleet of Pit Viper blast hole drill rigs from the five in operation today. The obvious solution would be to invest in one or more additional rigs, but Boliden was interested in seeing whether increased automation and remote operation could fill the ticket.

One reason to convert to remote operation is the potential time gain. With depth of up to 450 meters and a width of several kilometers, the Aitik pit is



**Fredrik Lindström**  
Product Manager,  
Automation

huge, requiring 15–20 minutes of driving time for operators to travel to and from the surface level. A lot of time is non-productive.

“Another factor taken into consideration is the often harsh arctic winter climate, with snowstorms and biting cold that reduce visibility, driving safety and workplace conditions. We were curious to see whether automated Pit Viper rigs would handle themselves well,” says **Fredrik Lindström**, Product Manager Automation at Epiroc.

2

## THE SOLUTION

**T**HE FIRST STEP was to perform a pilot test with one of the Pit Viper blast hole drill rigs, converting and upgrading the machine for remote operation. A meeting room in the mine office building was converted into a temporary control room. The WLAN in the pit was updated and fortified to increase coverage and reception. And the operators, naturally, were trained in handling machinery by remote control. Primary results, measured in meters per operating hour, were positive. So was the feedback from the operators.

“There’s more to converting to automated operations than you’d think. To enjoy the full advantages of automation, you have to systematically change and improve work routines, adapting them to the new processes. The lion’s share of the work involves getting people to change their habits to reach the common goal. Boliden has done a tre-

mendous job in laying the groundwork for the necessary process changes,” says Fredrik Lindström.

**THE NEXT STEP** involved converting the other four drill rigs for remote operation, while upgrading the first Pit Viper to handle single-row autonomous operation. Autonomy in this case entails the operator initiating the process, leaving the Pit Viper to drill a whole row of blast holes on its own and move autonomously between each drill hole. The operator then moves and prepares the machine for the next row of holes.

“Some of the advantages of increased automation are that we can boost the usage rate and be more cost effective. There is also less wear and tear on the drill bits, and less maintenance overall. We get more consistency in drill hole depth and placement, which produces better blast results,” says Fredrik Lindström.



3

## THE RESULT

**C**OMPARING THE semi-autonomous single row Pit Viper with a fully manually operated machine, under optimal conditions, Boliden has measured an increase in utilization from 45–50 percent to 80 percent along with a 30 percent increase in productivity.

“They are very pleased with the results, which is why they’re converting the rest of the Pit Viper fleet to remote operation as a first step towards further automation,” says Fredrik Lindström.

The operators seem to have handled the transition extremely well, in part thanks to the controls being organized in a configuration similar to the cabin of a Pit Viper.

“There were initially some worries about learning to use the technology beforehand, but that settled quickly. They appreciate working together in a control room in the office building. It’s a better work environment, easier to exchange experiences, and there’s more socializing,” says Fredrik Lindström, continuing:

“Handling the winter climate was also a cinch, despite heavy snowfalls and extremely low temperatures for days on end. Even the Obstacle Detection System coped splendidly during snowfall. The automated systems withstand arctic conditions very well.”



# Sustainability creates long-term value

»→ Sustainability and corporate responsibility, with targets tied to the UN Sustainable Development Goals, are integrated in Epiroc's operations.

**E**piroc has selected eight relevant UN Sustainable Development Goals, connecting them to the company's own goals (see sidebar below).

"These are the goals where we feel we can make the most difference. Sustainability is extremely important. It allows us to contribute to society, while at the

same time lowering risks, and it opens up new business opportunities. The world is becoming increasingly complex, and our Sustainability Policy and the Epiroc Code of Conduct allow us to navigate the complicated landscape," says **Camilla Goldbeck-Löwe**, VP Corporate Responsibility at Epiroc.

The sustainability work at Epiroc focuses on four prioritized areas: ethical

standards, safety and well-being, people and leadership, and responsible and efficient use of resources. The foundation for working responsibly, both within Epiroc and in relation to suppliers and customers, is the Code of Conduct.

"It contains policies on areas such as environmental impact, human rights, responsible sourcing, and corruption. All of our managers and suppli-

## IN FOCUS UN SUSTAINABLE DEVELOPMENT GOALS

The eight UN goals, as selected by Epiroc, capture four areas that Epiroc sees as prioritized to achieve longterm success.



"We need greater diversity in our workforce."



"We keep track of water use in shortage areas, and run Water for All projects to improve access to clean water and sanitation."



"We are developing new, improved products and finding new ways to reduce energy consumption in operations."



"We measure the safety and well-being of our employees, and check that our suppliers comply with our Code of Conduct."



"We innovate to make our products ever more energy efficient."



"We make sure to handle chemicals and other waste products responsibly, recycling where possible."



"Our products should affect the terrestrial ecosystem as little as possible. Smarter products reduce rock waste."



"There is zero tolerance for corruption at Epiroc, and all employees and business partners must comply."



The pink Boomer at Oyu Tolgoi has been greatly appreciated, seen as a symbol of the company's will to build an inclusive work community of both women and men.

## GENDER DIVERSITY ON THE RISE IN MONGOLIA



[On Location]  
Mongolia

»→ The mining industry is a male-dominated sector, not least in Mongolia. Nevertheless, continuous improvement is being made for women in mining, with mining company Oyu Tolgoi LLC leading the way.



**Camilla Goldbeck-Löwe**  
VP Corporate Responsibility, Epiroc

ers must sign a commitment to follow the Code. Breaches of the Code of Conduct can be reported anonymously in our Speak Up tool, showing that we have the full cycle

covered,” says Camilla Goldbeck-Löwe. The safety focus area involves a vision of zero work-related injuries and a clear goal of decreasing sick leave. Regular safety activities are continuously held to raise awareness.

“As for people and leadership, one of the target goals this year has been gender equality. We do that through mentorships and by increasing diversity awareness in the organization. To be an attractive employer, we also must have the right type of leaders, which is why we invest a lot in leadership development and the Epiroc University. And when it comes to responsible use of resources – it’s not just better for the world, it’s also sound business,” says Camilla Goldbeck-Löwe. ✕

**AT THE END OF 2018**, Oyu Tolgoi LLC, which operates one of the world’s largest known copper mines in Mongolia, decided to rebrand one of their Boomer face drilling rigs and paint it pink as a gesture to show the value of women in mining.

“About two years ago, women were not legally allowed to work underground in Mongolia. The pink Boomer was symbolically important,” says **Lkhamaa Yondon**, Specialist External Partnerships at Oyu Tolgoi and board member at nongovernmental organization Women in Mining Resource Mongolia (WMRM).

**THE AIM OF WMRM** is to create better gender balance within the mining industry while professionally developing female employees working at Oyu Tolgoi mine site. The organization helps sharpen its members’ soft skills and has a successful mentorship program. It organizes discussion-based speaker series and reaches out to students in mine-related fields and high school students.

“I brought my second child to work when he was about five months old,” says Lkhamaa Yondon. “Back then, there was no place for me to nurse him so



**Lkhamaa Yondon**  
Specialist External Partnerships, Oyu Tolgoi, and board member at nongovernmental organization Women in Mining Resource Mongolia (WMRM)

I had to go outside. Today, we have a nursing room in the office for all working mothers. We have paid maternity leave for six months, and mothers who have children up to one year old can work shorter hours. We are also seeing an increase in the number of women in leadership positions.”

**SINCE THE EPIROC BOOMER S2** was handed over, many Oyu Tolgoi workers, both women and men, have been wearing pink shirts to show their support for women in mining.

“We want to build an inclusive community of women and men dedicated to supporting women’s pursuit of excellence. We know that we have support from many men, including our CEO and other senior leaders, and we believe in including more men in our activities,” says Lkhamaa Yondon. ✕

More [www.wimmongolia.org](http://www.wimmongolia.org)

# BLAST FROM THE PAST YEAR 1989

Innovative products and a wide array of customers: Epiroc is a new company with a long and rich history, dating all the way back to 1873. In each issue of Mining & Construction, we take a glimpse in the rearview mirror.

✍ Gustaf Höök  
📷 Emil Fagander





The Ericsson Globe is the largest hemispherical building in the world. White on the outside and red on the inside, the arena offers great flexibility and has hosted a wide range of events.

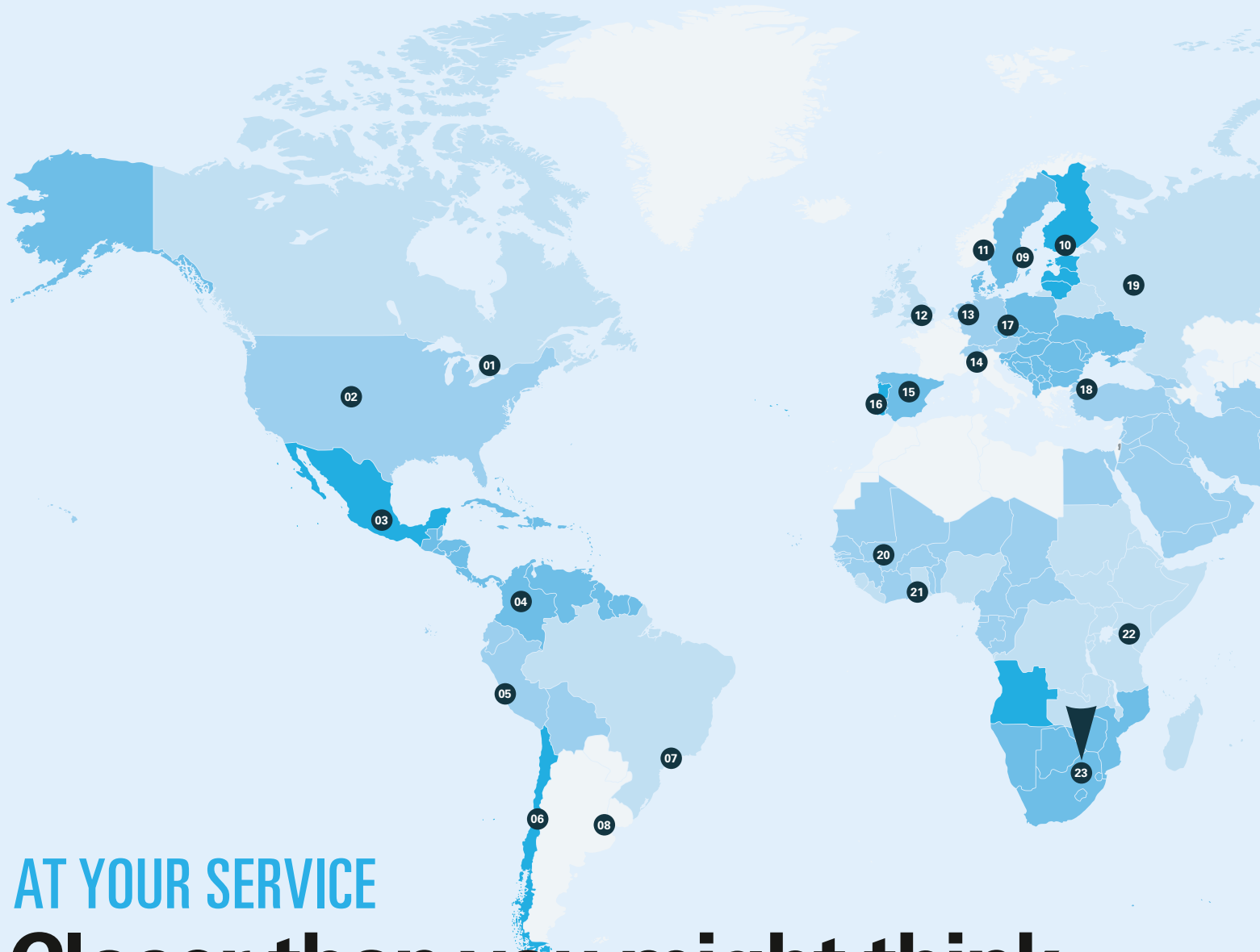
## Portfolio: Ericsson Globe

**THIRTY YEARS AGO**, the Stockholm skyline underwent a dramatic change. In less than three years, construction of a giant silvery ball was completed on the south side of the Swedish capital. Known as the Globe Arena, it was a huge, perfect sphere measuring 85 meters in height and 110 meters in diameter. The task of excavating 42 000 cubic meters of granite to make way for the foundations and a three-story underground parking garage was performed with the help of an Atlas Copco ROC

512HC lightweight crawler rig. Easy to manoeuvre but packing a big punch, it fit the bill perfectly.

While primarily used for ice hockey, the Globe Arena, known as the Ericsson Globe since 2009, has not only been used for other sports but has also hosted several musical performances. Irish guitarist Gary Moore played the first ever concert in the newly built arena. Since then, acts like Pink Floyd, Guns N' Roses, U2, Britney Spears and Beyoncé have all performed here.

**More** [www.bit.do/ericssonglobefacts](http://www.bit.do/ericssonglobefacts)



# AT YOUR SERVICE

## Closer than you might think

**OUR CUSTOMERS ARE** located all over the world and so are we. There is always an Epiroc office to turn to, making us truly local. At the same time, we are a global enterprise with worldwide resources. We have Customer

Centers in 33 regions. In each one, there are one or more Service Centers.

All this supports our goal: Count on us to listen, collaborate and deliver the right solutions for you.

01 Canada Toronto	07 Brazil São Paulo	13 Europe 1 Essen	18 Turkey & Middle East Istanbul
02 USA Denver	08 Argentina Buenos Aires	14 Southern Europe & Northern Africa Milan	19 Russia Moscow
03 Mexico Mexico City	09 Sweden Stockholm	15 Spain Madrid	20 Mali & Burkina Faso Bamako
04 CVCA Bogota	10 Finland Helsinki	16 Portugal Lisbon	21 Ghana Obuasi
05 Andean Lima	11 Norway Oslo	17 Central Europe Prague	22 Eastern Africa Nairobi
06 Chile Santiago	12 UK & Ireland Hemel Hempstead		



[In focus]  
**Johannesburg, South Africa**

## Hello there! What's happening in Johannesburg?



**Jan Roesch**  
 Vice President  
 Ground Support,  
 Rock Drilling Tools

**IN APRIL 2019**, Epiroc completed the acquisition of New Concept Mining, a successful South African manufacturer of rock reinforcement products for underground mining.

New Concept Mining, with its headquarters in Johannesburg and facilities in Peru, Zambia and Canada, has targeted the US and Australian markets in recent years, and now intends to expand even further. **Jan Roesch**, Vice President Ground Support in Rock Drilling Tools division at New Concept Mining in Johannesburg, elaborates. "In South Africa, where it all started, we can't increase our market shares much more. Being a part of Epiroc will allow us to expand in a way that would otherwise have been very difficult, and we can tap into markets where we are unknown today."

**What will New Concept Mining bring to Epiroc?**  
 "We will provide Epiroc with a wider product range in ground support, with a focus on new solutions and a customer-orientated approach. Our innovative solutions and developed strategies will also add value to the company."

**What strengths will be most valuable?**  
 "Our main strength is that we work closely with our customers with the goal of overcoming their challenges. We always look into a specific problem, trying to find or develop a product that suits the specific underground conditions of the customer. This approach has been very successful for us in the past and will add an extra dimension to Epiroc going forward." ✕

- |  |  |
|--|--|
| <p>23 Southern Africa<br/>Johannesburg</p> | <p>28 Southeast Asia (South)<br/>Jakarta</p> |
| <p>24 India<br/>Pune</p>                   | <p>29 Southeast Asia (North)<br/>Bangkok</p> |
| <p>25 Central Asia<br/>Nur-Sultan</p>      | <p>30 South Korea<br/>Seoul</p>              |
| <p>26 Mongolia<br/>Ulaanbaatar</p>         | <p>31 Japan<br/>Yokohama</p>                 |
| <p>27 Gr. China<br/>Nanjing</p>            | <p>32 Australia<br/>Perth</p>                |

Find Epiroc in your country: [www.epiroc.com](http://www.epiroc.com)

The Powerbit drill bits offer a higher penetration rate, longer service life and more drill meters per day.

# Powerbit

## –packed with power

»»— A little while back, the Powerbit line of drill bits was launched for tophammer surface drilling. Now the turn has come for the underground drill bits to get a similar overhaul.

**Thomas Österholm** explains what has been improved.

**W**hat are the thoughts behind the Powerbit product line?  
 “We’ve standardized and done a major overhaul of the drill bit line-up. We wanted to take all of our expertise and design the best possible drill bits from the ground up. The goal was to improve the quality and service life of the drill bits, and the test results tell us we’ve been successful.”

*Can you give us an example of how you’ve reasoned when designing?*

“To maximize the service life, we redesigned the gauge buttons. The wear volume of the gauge buttons is a limiting factor for the service life of the whole drill bit. The more cemented carbide you can put there the better, but there’s not much space to work with on a drill bit. Apart from gauge buttons, we have to fit front buttons, flushing holes and grooves in the bit body.



**Thomas Österholm**  
 Mechanical Designer,  
 Epiroc Drilling Tools

We also had to find the right button sizes to get the optimal balance between the front and gauge buttons.”

*What are the major improvements in Powerbit?*

“To start with, trapezoidal Trubbnos buttons increase both the penetration rate and the service life. The new flushing configuration removes cuttings more quickly and significantly reduces the risk of jamming, while the thread and undercut geometry has been optimized using Finite Element Analysis to reduce body fatigue. The bit head shape has also been optimized to minimize the stress levels, and a new heat treatment produces harder and more wear-resistant steel. We’ve even gone over the production process itself to ensure the quality of every single drill bit.” ✕

### Improvements in Powerbit

- New button shape and surface treatment
- Optimized bit head shape
- Optimized flushing configuration
- Optimized thread and undercut geometry
- Optimized cutting grooves
- Harder, more wear-resistant steel

More [www.epiroc.com/rdt-powerbit-underground](http://www.epiroc.com/rdt-powerbit-underground)