Boliden Kevitsa

A connected digital mine

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Photo: Boliden Kevitsa

NEW BOLIDEN

Boliden is a Swedish multinational company with a focus on sustainable development. The company's core competence is within the fields of exploration, mining, smelting, and metals recycling. Boliden operates six mining units and five smelters in Sweden, Finland, Norway, and Ireland.

Boliden Kevitsa is a multi-metal open pit mine operating in Sodankylä, Northern Finland. The mine's main products are nickel and copper concentrates. Concentrates also include cobalt, platinum, palladium and gold. These concentrates are supplied to Boliden's own smelting plants in Harjavalta and Ronnskar. In 2020, around 9,186 kilotonnes of ore were processed, generating an operating profit of SEK 320 million.

Boliden's vision is to be the most climate friendly and respected metal supplier in the world. Therefore, the mine is working systematically to minimize environmental impact, increase energy efficiency, and preserve biodiversity, while improving productivity and safety by investing in automation, electrification and remote control.

Transforming mining operations

Throughout history, miners have looked to improve safety and gain a mechanical advantage by using heavy machinery to automate tasks such as drilling, blasting, loading, hauling and crushing.

Today, many mining companies are pursuing a full automation strategy, where all manually operated machines will eventually be replaced with their autonomous counterparts.

Remote operations will further empower automation, enabling key personnel to monitor automated processes, optimize asset performance and utilization and operate machinery at a distance.

Autonomous vehicle technology, internet of things (IoT) sensors and analytics, machine learning (ML) and artificial intelligence (AI) all hold tremendous promise, taking mining automation to the next level.

These innovations will accelerate almost every aspect of mining operation, from pit to port. They have the potential to dramatically improve safety, efficiency and productivity — optimizing operational processes and costs.

> “ Unfortunately, we have a large-scale, low-grade deposit. That means we have to put extra focus on the efficiency. Automatization and electrification are important. And for that, of course, we need to have reliable networks that we can use in the harsh climate here.”
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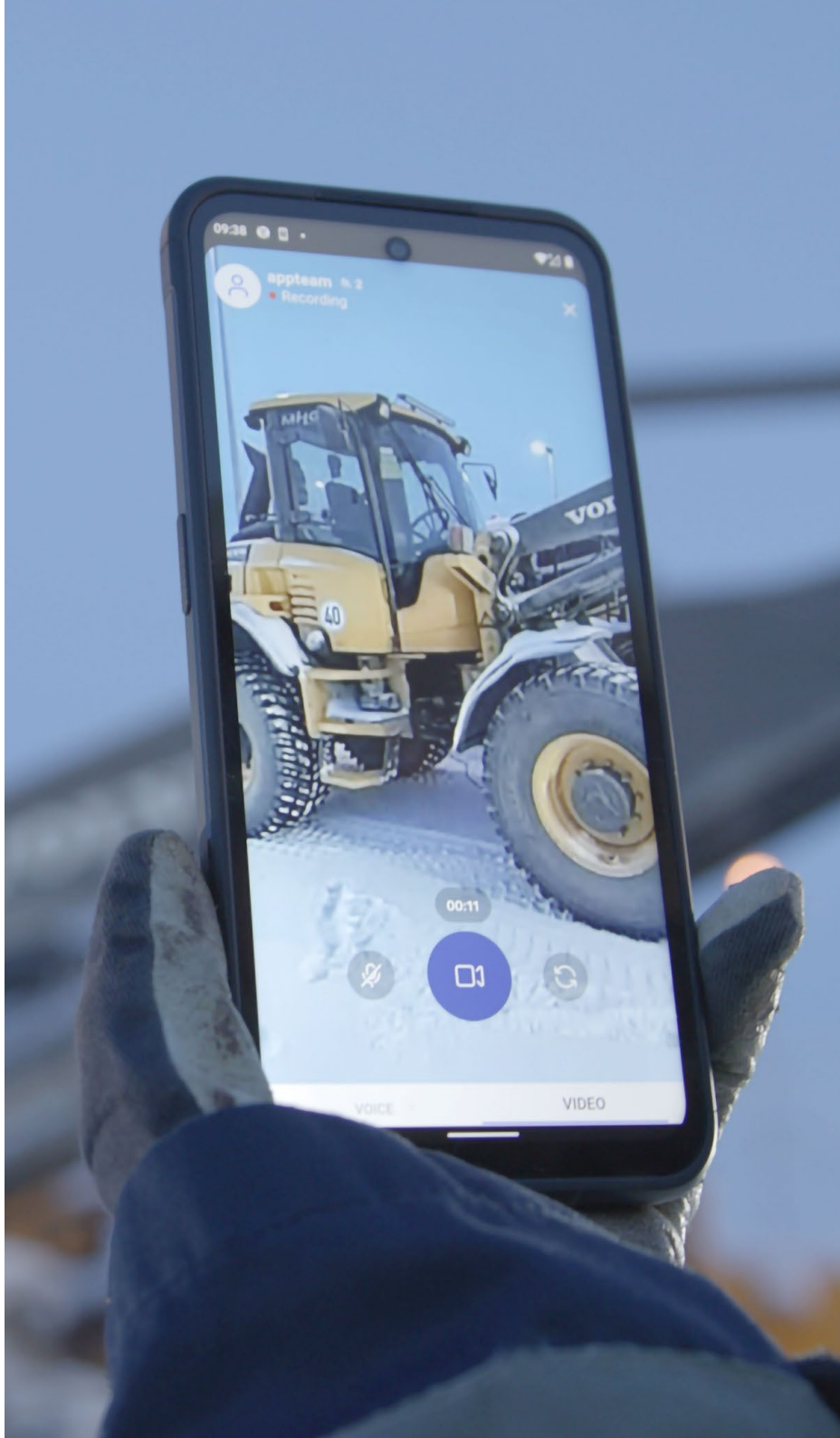
> Henrik Grind, General Manager, Boliden Kevitsa



“ Wireless connectivity is the main enabler for automation down in the pit.

For example, today we have tele-remote drilling, but we are planning to move towards autonomous drilling. In hauling, we can ensure quality control, such as programming the system to follow what type of material is loaded and trigger an alert when the driver is going to the wrong place to dump it. In addition, the maintenance team can monitor vehicle information and receive alerts to prevent potential failures and other issues.

For us, Wi-Fi is not an option. With private wireless we only need four access points to cover the 14km^2 pit area, whereas with Wi-Fi we would need at least ten times as many. ”

Antti Eskelinen, Finance Manager, Boliden Kevitsa

Private wireless: Best fit for mining automation

The digital transformation of mines requires mission-critical wireless connectivity. Over the last decade, point solutions, such as Wi-Fi, have been deployed. But they also have limited capabilities, as the figure shows.

4.9G/LTE and 5G mobile technologies are available through private wireless networks. These meet the requirements and set the standard for even the most ambitious digital mining applications including autonomous haulage.

Nokia industrial wireless solutions can support all mission and business critical applications on a single network. Typical applications include push to talk and push to video, high definition video, low latency edge computing for remote, automated and autonomous operations and support for low power sensor networks, telemetry and IoT applications and analytics.

Wi-Fi	Private Wireless (4.9G/LTE and 5G)
Capacity: ~30-100 active connections per access point (AP).	**Capacity:** up to 800 connections on a single (4.9G) access point; tens of thousands on a macro antenna.
Coverage: access point radius of ~50-100 meters; truck-mounted APs to cover the whole pit.	**Coverage:** radius from 100 meter up to 30km; 5-10 times less antennas needed.
QoS: best effort; lack of prioritization.	**QoS:** dependable QoS management with prioritization.
Performance: high peak rates; unstable performance/capacity.	**Performance:** predictable data rates; 3-5 x9's reliability (6 X 9's with 5G R17).
Mobility: loss of connection up to 15 secs on handover between APs.	**Mobility:** 350 km/h (4G) to 500 km/h (5G)
Latency: fluctuating between 1 ms and 2 secs; reliability decreases with number of connections.	**Latency:** 8-20 ms with 4G down to a few ms with 5G; remains stable with increasing number of connections.
Security: high risk for hacker attacks and intrusion.	**Security:** security by design
Services: co-existence with private radio, no IoT support; no handover to public network.	**Services:** one network for PTT/PTV, broadband, video streaming, IoT; same technology as public 4G and 5G.
OpEx: low-cost perception but up to 15 hrs/week reconfigurations needed.	**OpEx:** 4 times less configuration, management and maintenance cost; up to 5X less TCO.

A purpose-designed network by Nokia and Edzcom

Connecting all assets and people in a single private wireless network is the foundation of a solid digitalization and automation strategy. A purpose-built, mining-tailored private network solution that is designed, built, and operated at the mine premises.

Partnerships are key for innovation and constantly advancing technology, quality and business performance in any sector –but in mining, it's mission-critical. Particularly at extreme temperatures of -26°C/-15°F like in Northern Finland.

Edzcom has been the long-term partner designing, building and operating the private 4.9G/LTE wireless connectivity in Boliden Kevitsa, using Nokia industrial-grade private wireless technology to implement and deploy a 100% local and geo-redundant core network.

They brought in a single point of contact to designing, building and operating a tailored network, deploying best practices and technologies to help Boliden Kevitsa achieve their digitalization goals:

Phase 1 provided private wireless coverage to the whole 14m2 outdoor mining area, connecting facilities, vehicles and drilling equipment. The initial network deployment also provided basic coverage for the indoor facilities.

Phase 2 extended coverage to all the buildings and facilities at the Boliden Kevitsa mining site – with indoor and outdoor fully integrated. No matter where one is at the site, there is seamless connectivity. Every employee in the area is fully connected.

The network will be able to support future critical communications needs and use cases enabling Boliden Kevitsa to keep benefitting from wireless connectivity for a broad range of mission-critical and safety-critical applications.

“ Boliden needed a complete environment for outdoor and indoor areas that gives them full control without any blind spots. It’s a platform for future proofing their digital technologies.”

Jaakko Kuukka, Commercial Country Manager, Edzcom

“ Private wireless networks provide the capacity, coverage and reliable, low-latency communications to enable digital connected mines like Boliden Kevitsa.”

Jaime Laguna, Global Head of Mining, Nokia

“ [This project] has significantly helped us in our goals to become a better mine.”

Henrik Grind, General Manager, Boliden Kevitsa

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At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

About Edzcom

Edzcom, a Cellnex company, is a pioneer and European market leader in Edge Connectivity, solely dedicated to designing, building and operating private 4G and 5G networks. On a mission to empower enterprises with connectivity solutions and enable their ambitious digitalization goals.

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