Getac

Windows 10

Rugged Mobile Computing Solutions

Getac recommends Windows 10 Pro for business

VIST Group

Getac F110-Ex Fully Rugged Tablets Prevent Cave-Ins and Protect Miners in Underground Mines Across Russia

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Challenge

Traditionally, the safety and stability of underground mining tunnels are inspected with the naked eye or probed with imprecise acoustic sensors. The lack of precision may lead to delays in identifying hazards and taking precautionary measures, which may ultimately have disastrous consequences. The growing Russian mining sector needs a newer, better solution.

Solution

Getac teamed up with Russian mining solutions provider VIST Group and South African radar solutions developer Reutech Mining to put together a Sub Surface Profiler (SSP) that detects areas of risk with pinpoint accuracy, protecting the safety of miners without interfering with their work.

Benefits

Getac's F110-Ex is ATEX and IECEx Zone 2/22 certified and runs on the Windows 10 operating system, making it compatible with Reutech's radar software. Its powerful Intel processor allows for real-time on-site analysis. The ultralight weight of 1.49 kg makes the total package 78% lighter than competing products.

Challenge

As the largest nation in the world with a landmass of over 17 million square kilometers, Russia has the largest mineral reserves, and is the second top exporter of rare earth minerals. By some estimates, the value of Russia's untapped resources is a staggering 75 trillion U.S. dollars. Due to this, mining is the second biggest industry in Russia after oil and gas. It contributes around 10% of Russia's GDP and 5-10% of its exports. Russia is the largest producer of diamonds and palladium, and the second largest producer of aluminum, platinum, and nickel.

By all accounts, the domestic production of mining equipment in Russia has not caught up with its mining industry. Soviet-era machinery is still a common sight in many significant mines. Unlike the oil and gas industry, mining equipment is not under sanctions in Russia. Demand is growing for foreign-sourced, high-tech mining solutions. The share of imported equipment is as high as 95% in some categories. Considering that Russia imports about 3 billion U.S. dollars'worth of mining equipment every year, there is considerable potential in this market.

One area of intense interest is the application of predictive analytics in workplace safety. Mining accidents claim the lives of thousands of miners each year. A common type of mining accident is the collapse of underground tunnels due to anomalies in the rock formation. Fractures may appear as cracks on the walls or ceiling of the tunnel, but in worst-case scenarios, the fissure may be hidden beneath the surface, and remain undetected until it is too late.

Traditionally, visual confirmation— that is, the naked eye— is used to spot visible fractures, and ground penetrating radar (GPR) is utilized to seek out invisible cracks. Conventional GPR is pulse-based. It uses high power electromagnetic pulses to penetrate up to 200 meters of solid rock to look for anomalies. However, the results are not always accurate. Failure to detect dangerous cracks may lead

to catastrophic cave-ins, while incorrect risk identification incurs the double cost of production being interrupted and preventive measures being wasted. A more accurate solution is sorely needed to ensure safety without negatively impacting productivity.

Solution

Russian mining solutions provider VIST Group combined Getac F110-Ex, the 11.6" fully rugged tablet certified for use in ATEX and IECEx Zone 2/22, with sensors designed by South African radar solutions developer Reutech Mining. The result is a Sub Surface Profiler (SSP) capable of detecting dangerous fractures in tunnel walls or ceilings with pinpoint accuracy.

The sensor itself looks like a roller on the end of a long stick. The operator inspects the safety and stability of an underground mining tunnel by rolling the sensor over the walls and ceiling. The sensor emits radar waves that can penetrate up to 10 meters of rock. The data is transmitted via Wi-Fi to the Getac F110-Ex, which the operator carries in a backpack. Powered by the Windows 10 operating system and Intel® Core™ i7 processor, the F110-Ex runs predictive analytics software that quickly turns the data into a colorful 2D image of red, yellow, and blue hues. The warm red and yellow colors denote safe areas of solid monolithic rock, while the cold blueish colors show hollow areas within the rock formation. If these invisible fractures are determined to be dangerous, a work detail can be immediately dispatched to cordon off this section of the tunnel and reinforce weak walls or ceilings with support structures to prevent cave-ins.

The Getac F110-Ex is uniquely suited for this scenario due to its ATEX and IECEx Zone 2/22 certification, enabling the device to operate where there is risk of potentially explosive dusts or gases. Because cables may restrict the operator's movement, and due to the ATEX and IECEx certifications, data is transmitted from the sensor to the tablet via the F110-Ex's powerful Wi-Fi. The Windows 10 operating system and Intel® Core™ i7 processor allow the F110-Ex to analyze the data instantaneously. The information is clearly shown on the brilliant 11.6"display.

The F110-Ex is fully rugged and certified to MIL-STD-810G, IP65, and MIL-STD-461G standards, so it can withstand accidental bumps and drops. It can operate in temperature as high as 60°C and up to 95% relative humidity (non-condensing), which is important in underground mines that can get incredibly hot and humid. It runs on state-of-the-art dual lithium batteries that have no trouble powering the tablet for a full work shift. The F110-Ex weighs only 1.49 kg; coupled with the sensor, which weighs around 4.5 kg, the total SSP package is about 6 kg, making it very easy and convenient for the operator to carry around in underground tunnels.

Benefits

The SSP that combines radar technology with Getac's fully rugged tablet complements conventional methods of conducting safety inspection in mining tunnels. Possibly dangerous fractures detected by the naked eye or GPR can be carefully scanned and analyzed.

The fact that Getac F110-Ex is safe to use in the volatile and dusty environment of underground mining, yet still possesses the computing power to immediately turn radar data into a 2D image of the rock formation,

is nothing short of revolutionary. Tablets that were previously tried simply lacked the processing power for real time analytics. Instead, the data inside the tablet had to be physically carried back to the office and uploaded to more powerful computers for analysis. This extended the lapse between inspection and follow up action by many hours, even days. Such a delay could be disastrous if the fracture was actually very dangerous. The F110-Ex delivers the analysis on-site in real-time. This allows for dynamic decision making: operators can quickly determine if preventive measures should be taken to secure the tunnel, or if the area is in fact safe to work in. Workplace safety is ensured while minimizing disruption to production.

The F110-Ex's ultralight weight of 1.49 kg is another major advantage. Excavation sites are huge plots of land, and tunnels extend for kilometers underground. Equipment that is convenient to carry around is ideal. Competing solutions on the market weigh up to 27 kg. In comparison, the tablet and radar package designed by VIST Group weighs around 6 kg, which is 78% lighter. VIST Group has already introduced the SSP solution to mines throughout Russia. Getac F110-Ex is set to become part of a new, high-tech mining solution adopted by the vibrant Russian mining industry.

About VIST Group

Founded in 1988, VIST Group is an international company in the field of development and implementation of information technologies for the mining and metallurgical industries. VIST provides fleet management systems for open pit and underground mining, robotic and tele-operated mining equipment, industrial safety systems, solutions for predictive analytics, etc. It has implemented more than 70 projects in leading mining companies around the world. In 2018, VIST became part of the Finland-based AI and IIoT solutions developer ZYFRA Group.