



Avatel will redefine work at the face and is a significant step toward **eliminating risks to personnel, while unlocking substantial value for our customers.**



John Cooper,
Vice President,
Explosives, Services and Automation



Above, the side perspective of Avatel at Epiroc's factory in Stockholm, Sweden. (Photo: Orica)

2021. "We are working on improving the underground design tools. In addition to standard tunnel designs, we are developing capacity for functionality in up-hole and ring designs," Strauss said. "We are also ensuring that BLASTMAP is fully integrated with the latest generation of AXXIS."

BME reported the AXXIS blasting system has also served customers well amid the lockdowns. Its ease of use pays dividends at operations under restrictions that limit the number of personnel on site, the company said.

"It can be operated by only one blaster on the block, so there is less proximity between people on the pattern itself," Tinus Brits, global product manager, AXXIS, BME, said.

"For the blast design, no contact is needed between the blasters in the field and the engineers doing the timing design in the office," he said. "The logging and testing can also be uploaded into a cloud database for further analysis by experts elsewhere."

The lockdowns have helped usher in the end of analog blast timing, Brits said. Government restrictions increasingly are nudging miners to adopt digital solutions, like AXXIS.

"The COVID-19 pandemic has encouraged greater use of software to design the blast patterns, which provides the timing automatically for download into the logger," he said. "Australia's mining sector, for instance, is already quite strict about this, requiring all designs to be done through software."

The trend coincides with AXXIS being used to repeatedly best records for largest number of detonators used in a single

blast. "In the latest record, 3,780 detonators were initiated in a blast at a mine near Hotazel in South Africa's Northern Cape province," Brits said. "These large blasts offer considerable value because they reduce the number of blasts a mine must conduct, which in turn means less disruption from mine stoppages during blasting."

Such blasts help prove AXXIS is reliable and accurate. "Among the features of AXXIS that ensure this reliability is the easy fault-finding of missing or damaged detonators, and the identification of leakage in the system," Brits said.

"The loggers can accommodate complex blast designs with multiple detonators in the same blast hole, as required in through-seam blasting," he said. "BME's robust AXXIS down-hole cable resists damage during charging and stemming operations and is regarded in the market as the strongest wire available; this also helps ensure reliable blasts."

The current AXXIS system available can initiate 10,000 detonators in one blast. The next generation, with BME's Titanium initiation system, is in trials through Q1 2021, Brits said. "The design principles remain safety, innovation, quality and functionality."

Separately, BME released the Blasting Guide, an Android app that replaces traditional paper booklets carried and referenced by users, enabling users to quickly calculate and check blast designs in the field. It has a blast design calculator, quick calculators, prediction calculators, surface blast design rules of thumb, environmental guidelines, a table of common rock properties, and an expert contact directory.

The design calculator automatically generates results from formulas that would otherwise have to be done manually.

It offers expedited decision-making, simplified planning, mobility and ease of use in the field, BME said.

"The Blasting Guide app is a powerful means of verifying blast design outputs and making important blast planning decisions," said D. Scott Scovira, global manager, blasting service, BME. "It could be used, for example, to investigate potential blast patterns for a greenfield site where numerous scenarios may be quickly generated, and calculations checked."

The release is consistent with the company's history of developing Industry 4.0 solutions that cut paper usage, streamline processes, optimize value chains, and add value, Christiaan Liebenberg, product manager, software, BME said.

"BME strives to enable integration and seamless reporting throughout the blasting and explosives value chain," he said. "Our software and technology development are an enabler of this integration with the ultimate objective of optimizing value for our customers."

Semiautonomous UG Delivery System

Orica announced Avatel, a first-of-its-kind explosives delivery system for underground that allows an operator to execute the development cycle entirely from the safety of an enclosed cab of an Epiroc M2.

Avatel is a twin-boom, semiautonomous and fully mechanized development charging solution. It combines the latest in technology from both Orica and Epiroc to deliver a self-contained unit designed specifically for lateral development applications.

It uses Orica's WebGen Encoding System for wireless initiation. The LoadPlus intelligence platform drives the charging, inventory and tracking functions. SHOT-Plus, for blast design, supports automated loading functions. Epiroc's M2 features the latest iteration of Rig Control System (RCS), and a dual diesel-electric plug-in power solution.

The automation and efficiencies offered by those solutions result in a process that requires significantly fewer personnel than do predecessor solutions and processes, Orica said.

"Prior to tramping to the face, explosives inventory is loaded onto the unit," John Cooper, vice president, explosives,

services and automation, Orica said. The HandiLoader emulsion process body is filled with Subtek Control Ammonium Nitrate Emulsion (ANE) and disassembled WebGen primers are loaded into the on-board WebGen magazine.

“Once Avatel is in position at the face, the operator clears process water and debris via in-cabin controls for the onboard pumping, compressed air and clearing hardware,” Cooper said. An in-hole signal test is conducted by the LOADPlus smart control system to confirm the firing signal from the WebGen remote firing equipment.

Charge plans and other important data can be communicated between RCS and LOADPlus, Orica reported.

For example, “at any point prior to the beginning of the charging cycle, as-drilled data or a drill design file can be transferred to RCS to enable precise hole navigation,” Cooper said. A predesigned charge plan is loaded into the LOADPlus smart control system, specifying the energy characteristics and timing of each hole.

“If drilling or charging plans are unavailable, or if blastholes have been drilled in addition to design, the operator has the option to navigate the face manually, add

holes and assign the respective loading characteristics and timing,” Cooper said.

“When preparing to charge, the operator navigates the booms, guided by RCS and cameras positioned on each boom, to a blasthole,” he said. The LOADPlus control system starts the charging, and the charging cycle progresses semiautomatically, with charge weight and timing automatically assigned according to the charge plan, or manually by the operator.

“Following up, WebGen magazine automatically dispenses, assembles and encodes WebGen primers immediately prior to deployment into a blasthole before the remainder of the blasthole is loaded with Subtek Control bulk ANE,” Cooper said. “Once the face is completely charged, a secure and unique code is assigned to the blast, and Avatel is trammed away from the face.

The heading is set to be blasted by WebGen’s remote firing system.

The solution offers significant efficiency gains and optimized blast outcomes. It represents a step change in safety by removing people from the face, Cooper said.

“A single operator can prepare and charge a development heading without ever leaving the safety of an enclosed,

air-conditioned, ballistic-protected cabin,” he said.

“A mechanized development charging solution has long been desired by the mining industry, but until the introduction of WebGen, the ability to deliver this has been constrained in part by the manual connections required between the various components of traditional initiating systems,” he said.

“To continue managing the risks to personnel, operators have been forced to use various control measures, ranging from the installation of additional ground support in the face to extended re-entry delays,” Cooper said. “These controls are costly, time consuming, and at times ineffective, while having a negative impact on downstream activities.”

Avatel will redefine work at the face and is a “significant step in the journey toward eliminating risks to personnel, while unlocking substantial value and opportunities for our customers,” he said.

Future iterations of the solution can be extended to other Epiroc carriers, including battery driveline-based machines, Orica reported. Extensive trials will take place throughout 2021.

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