

SURFACE

Dyno Nobel on the future of explosives

Safer blasting with more autonomous features lies ahead

Beth McLoughlin



Dyno Nobel is looking to the future | Credits: Dyno Nobel

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Explosives and blasting company Dyno Nobel has been going for 180 years, but it now has its sights set on the future of the sector.

Braden Lusk, chief technology and marketing officer at the company, spoke to *Mining Magazine* about the innovations that are making the blasting sector safer, driving efficiencies and reaching greater levels of autonomy.

He said a lot of ideas for new developments come from customers themselves.

"Most importantly, it is about what they want to achieve with their blasting," he said "We have a lot of technical experts who have been doing this a long time, and they can partner with customers to optimise their operations and find out what it is they need."

DigiShot Plus XR and DigiShot Plus XRS provide a 30% increase in programmable time delay.



Dyno Nobel launched the DigiShot XR series at MINExpo in September 2024 | Credits: Dyno Nobel

"In high dynamic shock environments, sometimes detonator failure is possible," Lusk said. "In this design, we thoughtfully designed the interior components of the detonator with stress relief, the precise component placement and material selection to make them very resistant to shock.

"Our testing has shown that they are very effective."

In tackling the industry-wide issue of misfires, the DigiShot XR series is an example of how Dyno Nobel is working towards making blasting safer.

Lusk said that this fits with the company's purpose of "making blasting and the excavation of rock safer and easier to do."

"I've been in the industry for going on 30 years now, and I've seen things evolve, but I think [safety as a] priority has been there for at least the last 15 or 20 years. There really has been a focus on safety. I would say the industry is very serious about it."

He said there is always room for improvement on safety – and Dyno Nobel has a 'zero harm' target of zero recordable occupational illness, injuries, fatalities, preventable transportation incidents, environmental releases, and process events.

project.

It highlights the way the company can work with miners through the entire flowsheet,

"The copper mine told us they had some specific hard ore they were mining and were concerned about the bottleneck of throughput in their mill operation," Lusk said.

Dyno Nobel did a baseline assessment to understand how operations were functioning before suggesting improvements.

"We had to understand our customer's needs, and that requires communication and partnership," he said. The entire process took four years, but he said that it was a joint effort between Dyno Nobel and the copper mining company.

"Through analysis, we were able to determine that the size fraction that was most important in fragmentation was half inch minus," Lusk said. "We were able to adjust the blasting parameters and improve the half inch minus fraction by 5%-10% in the shot material."

The result was a 15% improvement in mill throughput.

"This was a real delivery of excellence for the mine, and it shows you what can be achieved if you work together."

Sensor technology and data derived from automated systems on mills have boosted the potential for improvements of this kind, Lusk added.

Other improvements made that helped the customer optimise operations included better truck and shovel times, bucket fill factors and crusher and mill power consumption.

Lusk said optimisation is crucial for miners as they weather various price cycles.

"We want to be a part of [our customers'] mining processes and help to deliver the outcomes they are looking for," he said.

"We need to understand what our customers do with that rock material once we blast it, because that helps us understand what it needs to look like after the blast."

The power of automation

Blasting is one critical part of the operation, but linking it to the rest of the process is becoming easier thanks to data and automation, Lusk said.

between different parts of the process.

For instance, information from haul trucks, drills and dispatch systems can be used to optimise the blasting process itself.

Dyno Nobel's DIFFERENTIAL ENERGY can be used to change the energy profile on a blast hole, through the company's emulsion technology and delivery and control systems, to change the density of explosives and different layers of the holes to match rock hardness.

"The next step is a product we call Delta E-Squared, which uses measure while drilling (MWD) information.

"We run it through an algorithm to determine the hardness and conditions in the borehole.

"We can take that algorithm and load a hole-loading profile to our MPU or our bulk truck, and it will be able to load the hole automatically to that profile," Lusk explained.



DIFFERENTIAL ENERGY is Dyno Nobel's method method for controlling the explosive energy profile in a borehole | Credits: Dyno Nobel

It allows Dyno Nobel to tailor energy to where it is needed, he said, loading each hole according to information received from the drill that is measuring as it drills.

"That is one example of how we draw on equipment data," he said.

The company's digital platform Nobel Fire allows customers to manage the input and output of data, and will play a key role in technological advancements in the future, Lusk said.

The future roadmap

As inventors of the safety fuse, Dyno Nobel has always prioritised safety, Lusk said, and that is no different as automation creates new possibilities.

Autonomous blasting is on the menu for us

"We are looking at how we can reduce people's exposure to the bench and to areas where there is equipment moving around," he said.

The industry can learn a lot from Western Australia, he said, the "origin space" for automated haulage.

"Most equipment manufacturers have systems now that do that," he said. "We are also seeing autonomous drilling, or remote operation at a minimum."

Dyno Nobel is now working on autonomous loading and technologies that can help remove people from potentially dangerous areas of the mine.

The company is also hoping to grow geographically. It has a strong presence in Australia, Asia Pacific and the Americas, but wants to grow existing operations in Latin America, Europe and Africa.

"With our technology and outcome-based solutions, we are well-placed to help customers," Lusk said. "We are going to be the key partner to work with from a blasting perspective."

Improvements to the company's emulsion technology and initiation systems are also on the agenda, along with the development of wireless detonators.

"Autonomous blasting is on the menu for us," Lusk said. "It will take time, but we have the components and technology to start putting that together, in partnership with different customers and equipment manufacturers to make it a reality."

Safety will be key to the success of that innovation and a central part of the product development, he added. "If we can do things safely, it also returns productivity benefits," Lusk said.