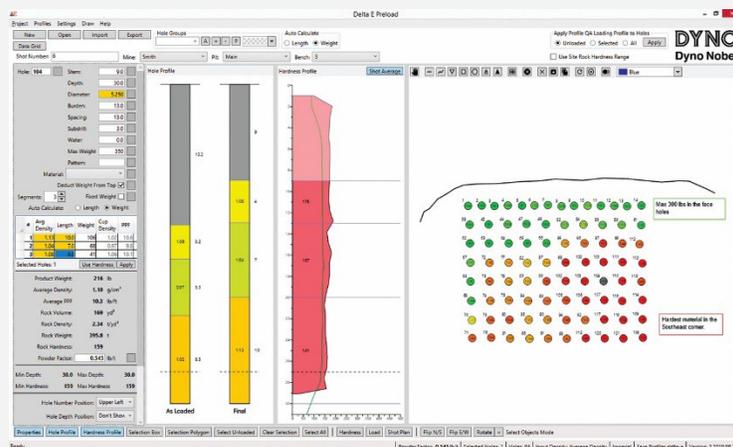


New Solutions Address Trending Challenges

July 2022

New hardware and software can help a mine hit production numbers amid staffing shortages, declining grade and strict sustainability goals

By Jesse Morton, Technical Writer



Using the PRELOAD and DYNOLIGX software platforms, ΔE^2 processes rock property data to allow targeted placement of energy in the blast hole. (Image: Dyno Nobel)

Software Improves Blast Outcomes

Dyno Nobel said several hard rock mining customers have seen improvements in fragmentation, muck profiles and dig rates, and lower overall drill-and-blast costs after implementing the ΔE^2 system.

“Evolving technologies across the mining industry are allowing for greater levels of geologic data collection and processing than ever before,” said Russ Lamont, general manager, DynoConsult. “ ΔE^2 can successfully convert this information into the successful achievement of operational goals.”

Using the company's PRELOAD and DYNOLOGIX software platforms, ΔE^2 processes data from drills or other sources that characterize rock properties to allow targeted placement of energy in the blast hole, said Jeff Averett, senior manager, bulk products and delivery systems, Dyno Nobel.

"Measure-while-drilling data captured from each blasthole provides a high degree of resolution for creating a geology-based blasting model using Dyno Nobel's proprietary algorithms," he said. "This detailed understanding of how rock mass variations will respond across a planned blast pattern is then coupled with our TITAN Bulk Emulsion and end-of-hose gassing technology to allow a customized explosive loading in each blasthole."

Variable density loading ensures the "explosive product is placed where it is most needed in the pattern and reduced in areas where it isn't," Lamont said.

The list of benefits offered is topped by "optimized explosive usage" and "improved fragmentation, overbreak and wall damage, and floor grade," he said.

The system integrates into any Differential Energy bulk emulsion truck. "It improves operator efficiency by simplifying the loading process," Averett said. The information captured can be used as part of the shot reporting process.

"Any mine manager interested in using the valuable information that modern smart drills are generating to improve their operation and reduce costs should be interested in this technology," he said.

Engineers will relish the control it offers over the loading process "through easy-to-use software that sends loading instructions directly to the loading equipment," Lamont said.

"Loading profiles allow a specific loading scenario to be created and used many times to speed up design," he said. "Reports can be printed for users and truck operators to have hard copies of the loading plan in the field."

Additional reports allow the user to see how the holes will be loaded, what the actual hole loads will look like in the shot with each density, and statistics on that information.

"Shot plans are available that give powder factors, rock volume shot, rock hardness as an overall average for the shot, and color-coded visualizations," Averett said. "Actual loading data can be collected from the DYNOLOGIX system and compared to plan, and then compared to actual blast outcomes."



ΔE^2 integrates into any Differential Energy bulk emulsion truck and improves operator efficiency by simplifying the loading process. (Photo: Dyno Nobel)

The history of the system dates back to the 1990s “when our bulk loading technology advanced enough to allow ways to load different product types in the same borehole,” Lamont said.

“When our Differential Energy product was developed in the 2000s, we were able to match that to new ways that the industry could quantify the borehole’s geologic properties,” he said. “In 2017, we created the ΔE^2 system to allow users to match explosives’ energy to rock properties.”

Adoption typically requires some preexisting geological data, clearly defined goals, and then some change management.

“While the system is easy to use, it is different from what many currently use,” Averett said. “The best results are obtained when best practices are followed on the bench,” he said. “This includes good measurement of conditions on the bench.”

Now field proven, ΔE^2 advances the company mission of ensuring customer success, Lamont said.

“By leveraging our latest product technologies coupled with our technical expertise, Dyno Nobel can convert new sources and levels of data being collected across mining operations to improve not just blasting outcomes but overall operational goals for these mines,” he said. “Our research and development teams are constantly working to integrate new capabilities in product, process, and digitization, allowing customers to move towards greater automation and efficiency.”

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