DigiShot® Plus Spooled Wire Reduces Loading Problems in Deep Angled Holes

Project Summary

REDUCE TANGLING OR KINKING OF THE WIRE DEPLOYED IN 30° HOLES

While the standard DigiShot® Plus wire coils work well in vertical holes, angled holes provided new challenges.

Many blasters have different ways to deploy the wire into the blast holes. The 30° angled holes with an Emulsion/ANFO blend coating the footwall side of the hole makes it difficult to deploy the primer assembly smoothly. A better way to deliver the primer assembly into the blast hole was needed.

Background

DYNAMIC WATER AND PRODUCT SLUMPAGE ALONG WITH LONG SLEEP TIME CAUSED WIRE BREAKAGE ISSUES

Blasters have tried different methods to deploy the primer assembly into the blast hole. Some let the bulk blend push the booster down the hole. Some put in a bottom load and stop the delivery of bulk product while they deploy the primer. Some have placed both top and bottom primers in the hole before any bulk product has been loaded. The wires are then tied off to a lath on the surface. The bulk product is then delivered into the hole.

All of these methods can create problems. If the primer assembly hangs up, the blaster will jerk the wire up to try to free the primer and let it continue down the hole. When there is slack in the wire, it may get tangled up or at least get a kink in it. Wet holes tend to cause a bit of slumping over time. If the primer assembly is being pulled down, kinks or tangles in the wire can prevent it from sliding through the stemming zone, or even through the explosives column itself. Primers that are hung prior to loading the bulk product may get damaged wire from the bulk product slamming into it.

Any method that prevents a smooth delivery caused problems, especially in holes with long sleep times and

dynamic water. After the hole has been loaded, the wires are tied to a lath placed in the drill cutting pile. After stemming, the lath is moved closer to the hole so there is slack in the wire. The blaster has to go back periodically to check that there is still slack, as sometimes the wire gets pulled down the hole if slumping has occurred. If slack in the wire is not provided, wire breakage may occur.

Project Goals

ELIMINATE WIRE BREAKAGE DUE TO DEPLOYMENT PROBLEMS

As mentioned, different wire types were tried, but the helix effect was still there. Wires that had the ability to stretch a bit before breaking showed no significant advantage. Various deployment methods were tried, which showed that some methods were definitely better than others, but still not good enough.

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Technology Applied

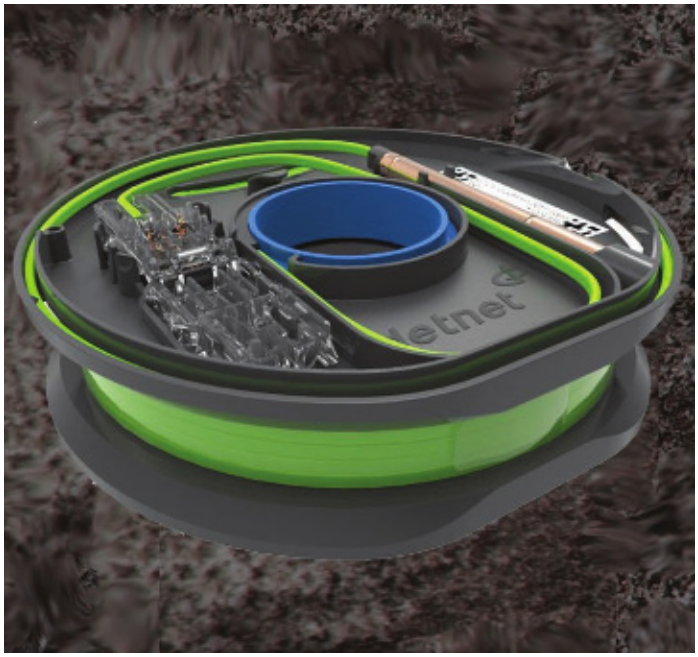
COILED WIRE WAS REPLACED WITH SPOOLED WIRE

In order to get rid of the helix effect, spooled wire was tried. The primer assembly could be lowered into the blast hole smoothly without any tangling or kinking.

It was determined that the best deployment method was to start loading the bulk product, and after a predetermined bottom load was loaded, the primer was placed into the hole. The bulk delivery was not stopped, allowing the bulk product to carry the primer down the hole. After another predetermined time, the top primer was placed in the hole. Again, the bulk product delivery was not stopped. After loading the hole, the wire was tied to a lath placed in the drill cuttings pile. After the hole was stemmed, the wire was untied and the spool was placed over the lath.

The large hole in the center of the spool had two advantages over other products. It allowed the blaster to use the stake that is placed at every hole as the axel to hold while the spool was spinning. The large diameter of the hole in the spool also allowed it to be placed over the lath. If the wire was being pulled down the hole due to slumping, the wire could self-deploy because the wire was not tied off to the lath.

Four test shots were conducted to test the new spooled wire. The first shot contained 662 detonators. Time from start to finish was 8 days. There were no failed detonators, or no detonators that showed leakage. The second shot contained 1,433 detonators. Time from start to finish was 13 days. Part of this shot was extremely wet. One detonator was lost while loading, and was replaced. There were no failed detonators and no leakage issues on this shot. As a comparison, a competitive product was used on the next cut. They lost 13 detonators in the first half and 9 detonators on the second half. The third shot had 967 detonators. Time from start to finish was 7 days. Other than 2 wires that were cut while the hole was stemmed, there were no failures, and no leakage. The fourth shot contained 539 detonators. Time from start to finish was 5 days. There were 2 failed detonators on this shot. It is suspected that they were damaged during stemming.



Value Added

3,601 DIGISHOT PLUS DETONATORS SHOT IN 4 CAST BLASTS WITH ONLY 2 FAILURES.

With the large spool design, and the self-deploying ability, the blaster does not have to keep going back over the shot every day to check for slack in the downline. That saves a tremendous amount of time. Two detonators tested as failed prior to shooting. Four detonators wires were damaged by the stemming machine. One wire was broken while being loaded when the clip on the end caught on the downline. Two failures out of 3,601 detonators is superior performance and demonstrates the capability of the spooled DigiShot Plus wire. Not having unshot holes in a blast improves shot performance and safety.