

CASE STUDY

TAGGING/LOGGING WITH AN AUTOMATED, HOLE-DETECTION SYSTEM THROUGH DIFFERENTIAL GPS

PROJECT SUMMARY

INCREASED EFFICIENCY IN TAGGING/LOGGING

Customers across the mining industry experience common problems when tagging/logging detonators:

- Incorrect delay assignment due to:
 - Incorrectly marked blast holes
 - Incorrect tagging of a hole or delay
 - The lack of a blast plan
- Blast delays:
 - Difficulty locating the correct blast hole
 - Delays due to time taken to find a problematic hole when fault finding and troubleshooting on the bench
- Blast outcomes:
 - Incorrect timing will impact blast results in fragmentation, loading efficiency, and overall productivity

The use of Differential Global Position System (DGPS) Technology is changing the world of blasting. DetNet has developed the first ever sub-meter (3.28 ft) Tagging and Hole Identification system using DGPS technology.



Easily setting up the DGPS base.



Confirming the accuracy of the hole position.

PROJECT GOALS

INTRODUCE DGPS TO MINE SITE

Phase 1:

- Configure the DGPS equipment for the custom coordinate system at the mine
- Identify and test satellite coverage at multiple positions at the mine
- Confirm DGPS Tagger's accuracy in locating hole positions

Phase 2:

- Conduct multiple blasts using DGPS as the tagging/logging system
- Expose all blasting crews to the DGPS system
- Collate feedback from the blast crews

CASE STUDY



Extremely flexible tag path.

TECHNOLOGY APPLIED

DGPS TAGGER

Standard GPS provides the position of an object on the Earth using signals generated by satellites in the GPS constellation orbiting the planet. GPS comprises a standalone receiver, in which the location is directly calculated; however, the result is prone to inherent orbit and clock errors, and accuracy can be further reduced due to signal bounce known as multi-path errors. As a result, GPS yields a nominal accuracy of 10 – 15 meters (33 – 50 ft). While this is useful for various applications, standard GPS is NOT suitable for accurate blast hole positioning.

DGPS is an advancement in GPS technology resulting in greater location accuracy compared to standard GPS.

This improvement is gained through the use of a reference receiver (the CE4 Commander in this instance), which is placed at a surveyed location and broadcasts correction data to the DGPS Tagger to mitigate inherent errors and signal degradation. This results in improved accuracy, which means that the DigiShot Plus 4G DGPS system provides sub-one-meter (3.28 ft) accuracy, making it suitable for accurate blast hole positioning.

VALUE ADDED

INCREASE ON-BENCH EFFICIENCY

To implement the DGPS system on-site, the mine's custom co-ordinate system had to be incorporated through a conversion process supported by the system. This conversion was successful and a sub-one-meter (3.28 ft) accuracy was achieved with the DGPS Tagger. This indicates that the complete system (DGPS and ViewShot 3D) is capable of supporting standard and custom coordinate system projections. The sub-one-meter (3.28 ft) accuracy that was achieved ensures the correct hole position is identified and tagged with the right information, eliminating the possibility of human error.

The ease-of-use of the system, along with a straightforward set-up process, encouraged the customer to use the system. The DGPS Tagger automatically identifies the hole position as the user walks towards the hole so that very little (or no) interaction is required, which was particularly helpful to the customer.

The analysis of the previous tagging data at the same site shows that 51% of the blasts have a tag error/retag due to the user incorrectly identifying the correct hole position. With the DGPS Tagger, a 0% error/retag rate was obtained in the trials due to the accurate and automated hole-detection ability of the system. The elimination of tag/log errors that the system provides will assist the customer with improved on-bench efficiency and associated downstream cost benefits. The prevention of incorrect timing will also mitigate against the safety concerns of a poor blast result due to tag/log errors.

The system also supplies the user with an actual representation of the hole layout which assists with the reconciliation process. This semi-autonomous system of tagging/logging offers tremendous value to the customer, as a noticeable increase in on-bench efficiency was noted.