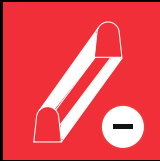
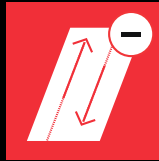


Understanding the Impact of Blast-Hole Deviation

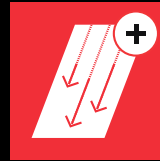
POOR BLASTING OUTCOMES



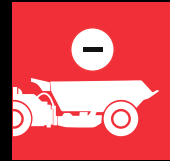
Reduced Recovery



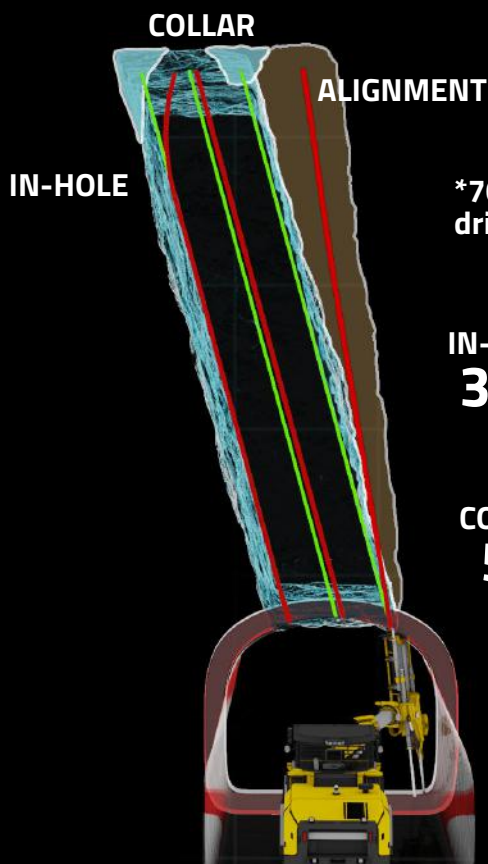
Unplanned Dilution



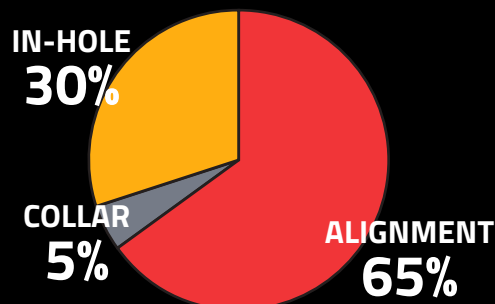
Re-Drills



Slower Stope Cycle



***70% of errors occur BEFORE drilling commences**



What are the Causes?

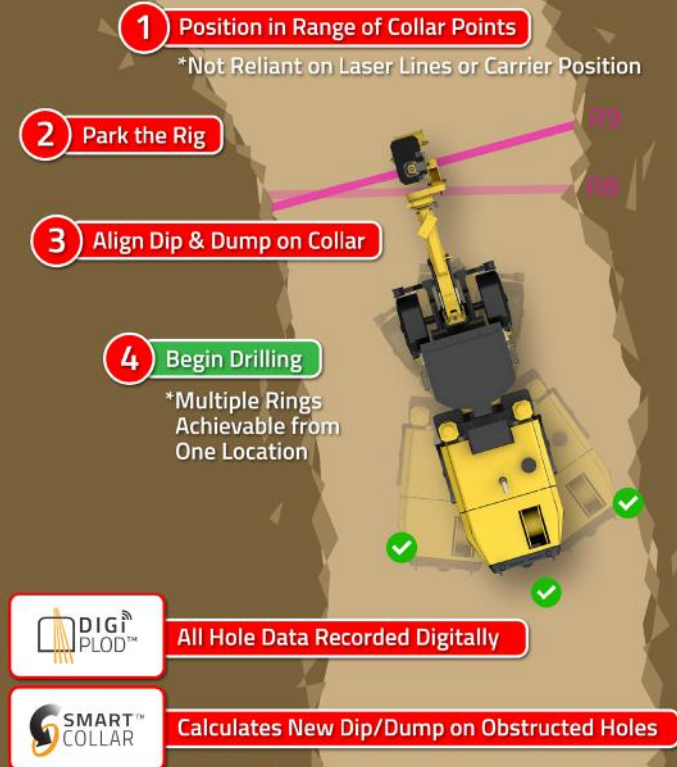
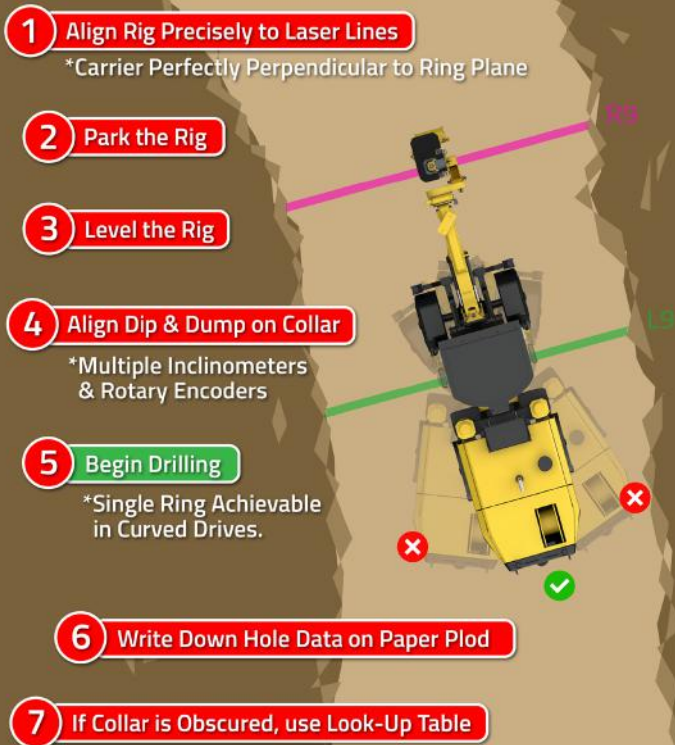
- Geology
- Drilling Error
- Blasting Error

What is Causing Drilling Error?

- Onboard (Rig) Sensors
- Survey Mark-Up Errors
- Rig Positioning Error
- Operator Error

Let's Examine the Process...

*Results from a Minnovare 1,000 hole study, across 10 underground mines.



Existing Rig Setup Process

Alignment Accuracy is Reliant on Numerous Tolerances

- How well the laser lines are marked?
- How well the rig is aligned to the laser lines?
- How well the rig is leveled?
- Multiple inclinometer calibration.
- Multiple rotary encoder calibration.
- Wear and slack in the rig affects accuracy.

Excess Time Spent Setting Up

- Achieving accurate set up takes time due to multiple tolerances = less time spent drilling.

Multiple Sensor System

- Sensors can break.
- Calibration drifts.
- Many wires that can be damaged by rock fall.

Limited Accountability

- Drillers incentivised on production meters rather than quality meters - best practice is not always followed.
- No record keeping of initial alignment.
- No accountability for how well the rig is set up.
- Drill plans and plods are all paper based.
- No option to re-calculate a new dip and dump when collars need to be offset.

Production Optimiser™ Process

Alignment Accuracy is Reliant on a Single Tolerance

- Between the Production Optimiser sensor, and the rod.
- System references true north.
 - No reliance on laser line mark-up.
 - No reliance on rig leveling.

Minimal Time spent Setting Up

- Simplified setup = more time spent drilling and a faster stope cycle time.

Reliable Technology/System

- Wireless communication - less likely to get damaged.
- System is self calibrating.

Greater Accountability

- Guarantees consistency between drillers – the system will not allow an “out of tolerance setup” to be saved.
- Records all setup and drilling data against the driller/rig.
- Digitised drill plans and plods – simplifying data transfer to and from mine systems (**Digi-Plan / Digi-Plod**).