

“ We’ve seen a *significant* increase in the productivity, efficiency and ultimately, profitability of our mines since employing Minnovare’s Production Optimiser™

It’s a prime example of a technology that quickly adds value in multiple areas - producing a better business outcome. ”

Jeff Brown, Principal - Innovation & Technology
Northern Star Resources (NSR)

WHAT’S THE BEST MINING TECHNOLOGY INVESTMENT YOU’LL MAKE THIS YEAR?

It’s one of the most overlooked areas of mining process optimisation - **blast-hole accuracy**. Inaccurate drilling leads to sub-optimal blasts, which in turn has a significant downstream impact on the productivity *AND* profitability of your operation. Minnovare’s **Production Optimiser** technology is an advanced hardware/software system that can be applied to ALL rig makes and models - enabling sites to quickly improve their drilling and reap the rewards.

Here’s how...

1. INCREASE YOUR AVERAGE RECOVERY:

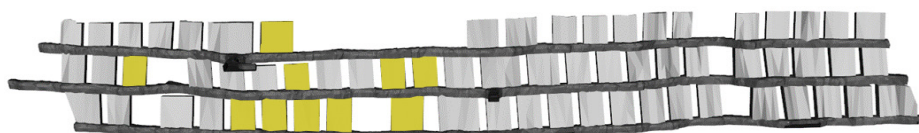
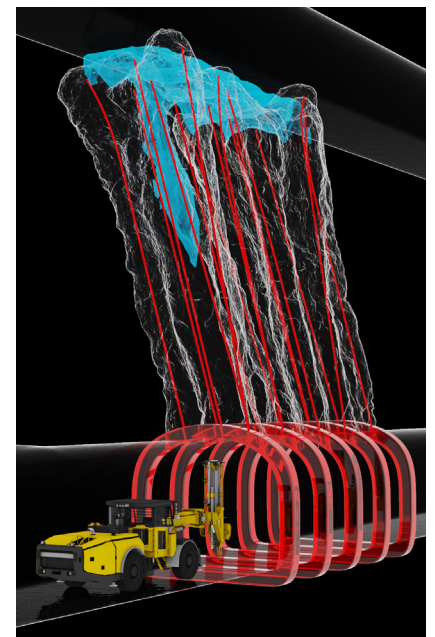
Drilling accuracy directly impacts mineral recovery in a number of key ways. Firstly, by reducing **bridging / hang-ups**. All sites are trying to maximise the amount of high-grade ore extracted from each stope. Sub-optimal blasts, as a result of hole-deviation, leads to the increased likelihood of valuable ore being left unrecovered.

Secondly, inaccurate drilling leads to increased re-drills and re-work. By reducing re-work and overall setup, the Production Optimiser **reduces stope cycle time**, i.e. more tonnes, faster.

Third, highly accurate drilling enables tighter drilling patterns - bringing **previously uneconomic narrow-vein stopes back online**.

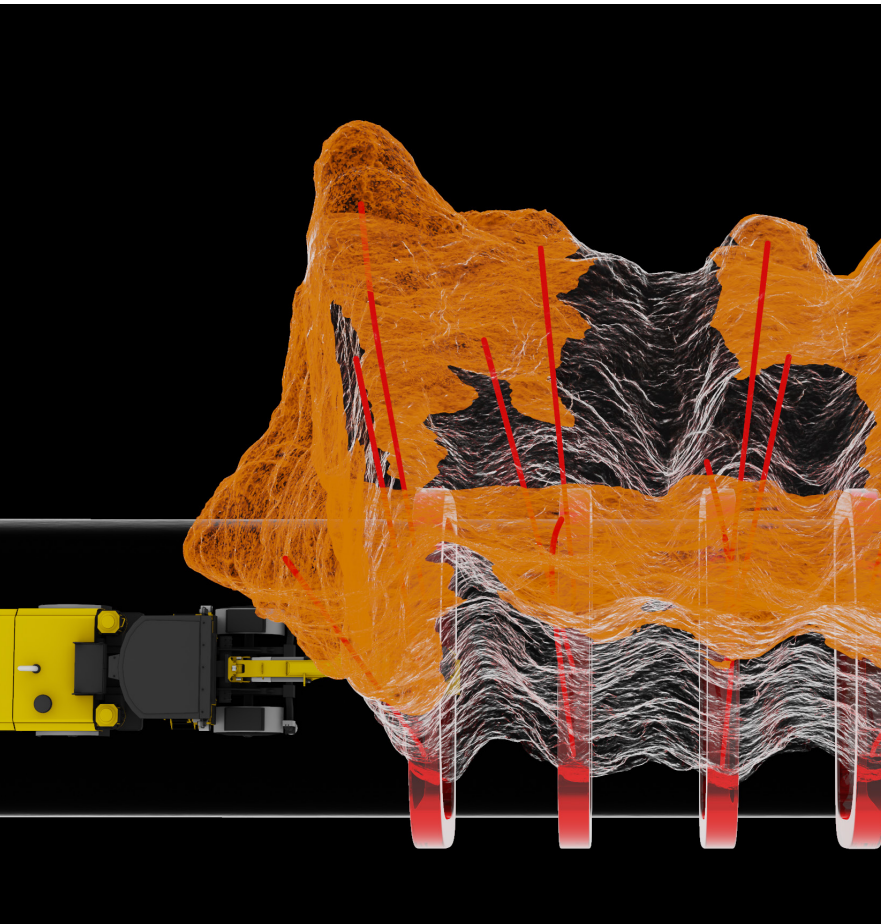
“IN 1 YEAR WE
REDUCED OUR
BRIDGED TNS
RATIO BY 54%*”

“AT ONE SITE
WE ACHIEVED
AN ADDITIONAL
42,000 STOPE TNS,
~8,300oz / A\$18M”



Cross section from NSR’s Millennium Mine showing 10 additional stopes made economical thanks to improved drilling accuracy (by employing a narrower ‘Zipper’ drilling pattern).

*NSR were able to reduce their bridging / stope tonne ratio by over 50%.



HOW MUCH IS BLAST-HOLE DEVIATION *ALREADY COSTING* YOUR MINING OPERATION?

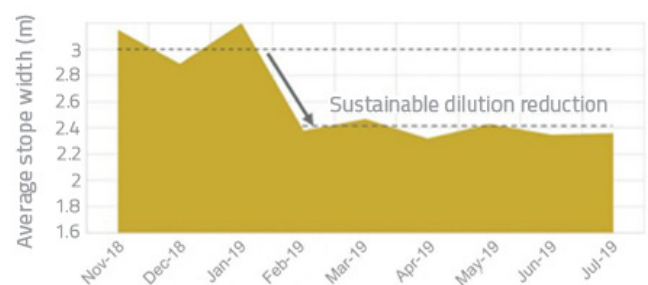
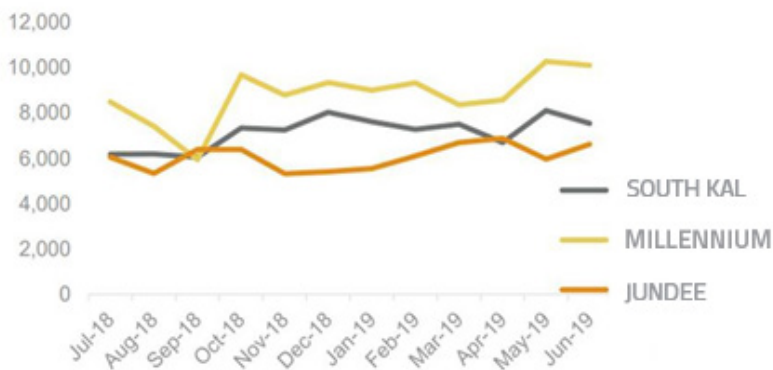
2. REDUCE YOUR AVERAGE DILUTION:

Blast over-break as a result of hole deviation delivers additional waste into the haulage and processing stages - **increasing all in sustaining cost** and directly (negatively) impacting return per stope. Improved drilling accuracy minimises over-break and unplanned dilution as a by-product.

Reliably improved drilling accuracy also **enables more ambitious drilling patterns** (such as moving from a 'Dice-5' to a 'Zipper' on the most narrow-vein stopes) - reducing planned dilution even further.

3. INCREASE YOUR DRILLING PRODUCTIVITY:

By simplifying the process each driller has to follow in order to accurately drill each hole, **the Production Optimiser makes an immediate impact on drilling speed**. For most rigs, the amount of time spent actually drilling therefore increases - contributing to an increase in average meters drilled. As demonstrated in the below graph, NSR increased their average drilled meters by over 30% after implementing the Production Optimiser at Millennium.



**33% INCREASE
IN AVG DRILLED
METERS**

**'ZIPPER'
PATTERN
REDUCED AVG
STOPE WIDTH
BY 0.5M**

**COST OF
DILUTION
REMOVED FROM
HAULAGE &
PROCESSING**

LET US BUILD A BUSINESS CASE BASED ON YOUR OPERATION & DATA

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