

Do underground excavations mined by non-explosive techniques require less support than when mined by blasting. A challenge to rock engineers to review support design practice.

Rod Pickering, Dave Arnold & Jim Porter



ROCK EATER
SMART MINING



ROCK EATER
SMART MINING

Rod Pickering CV

1960 – 1965 Apprentice in Marine Engineering

1965 – 1969 BSc Honours, Mechanical Engineering

1969 – 1972 Union Corporation, GCC

1972 – 1974 Marketing

1974 – 1977 Roberts Construction, Pelindaba, Acting Contract Manager,

1977 – 1996 COMRO, Director of Stoping Technology

1996 – 2016 Rod Pickering & Associates. Advisor on equipment development to Sandvik, specially Narrow Reef and Narrow Vein mechanised mining. Programme Manager for PlatTech. Initiator of Wits CMMS. President SAIMM.

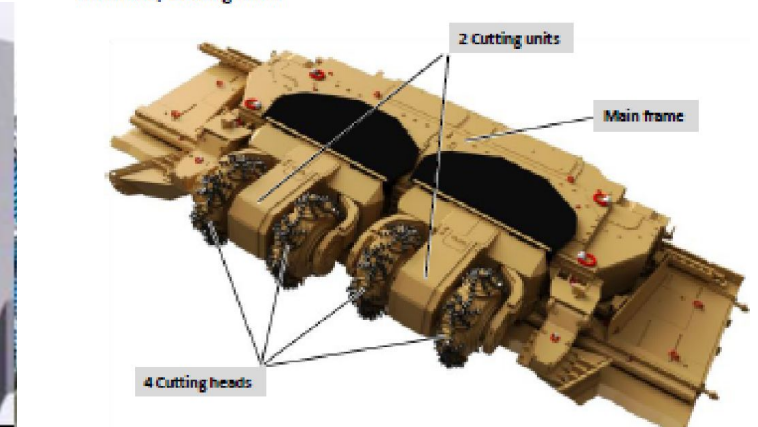
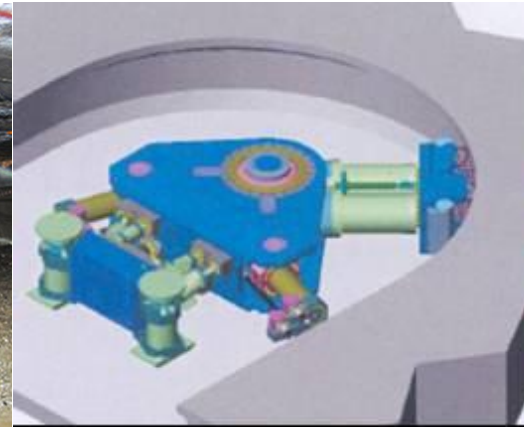
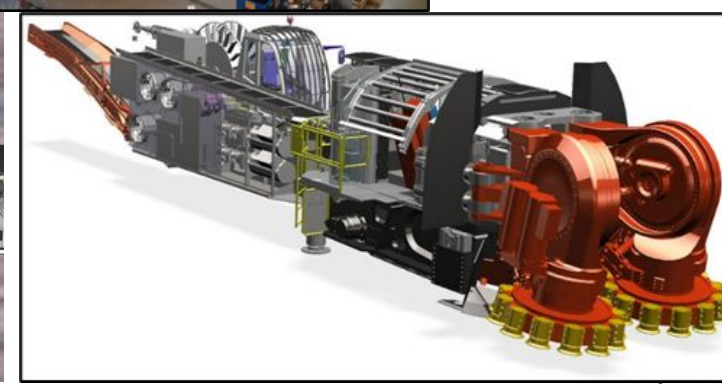
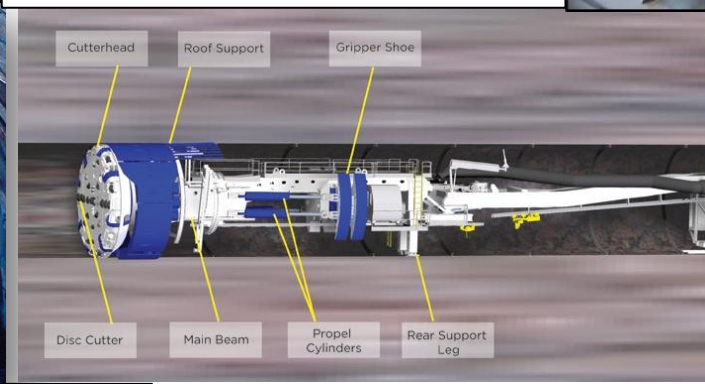
2016 – 2025 Commercial application of CFI

Nearly 50 years learning about mining and how to change it through the application of technology.

Benefits of NOT Blasting

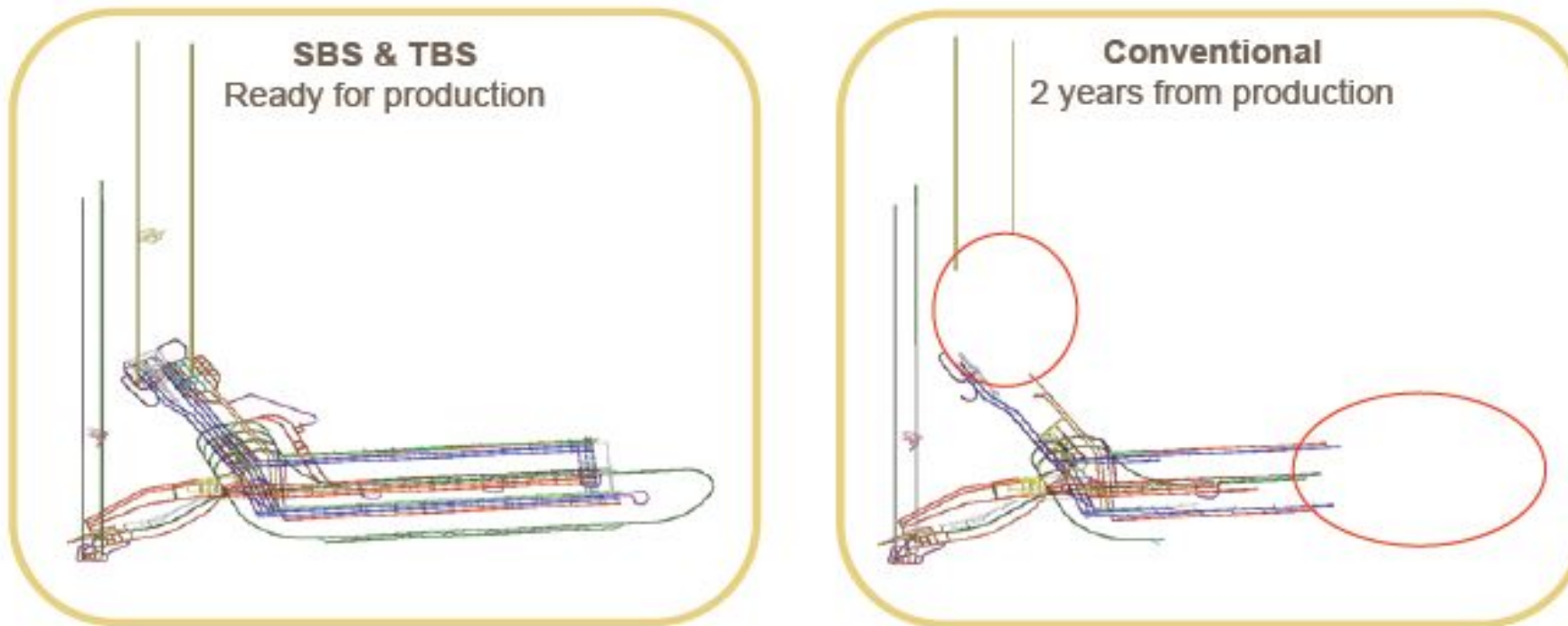
- Effective mechanization.
 - Higher productivity.
- Speed
 - Overall mine development, opening up ground, adequate development for stoping requirements.
 - Capital efficiency
- Accuracy of excavation
 - Selective mining and control of dilution. “All the gold, only the gold, all the time.”
- Quality of surrounding rock
 - Safety.

Mechanization Developed



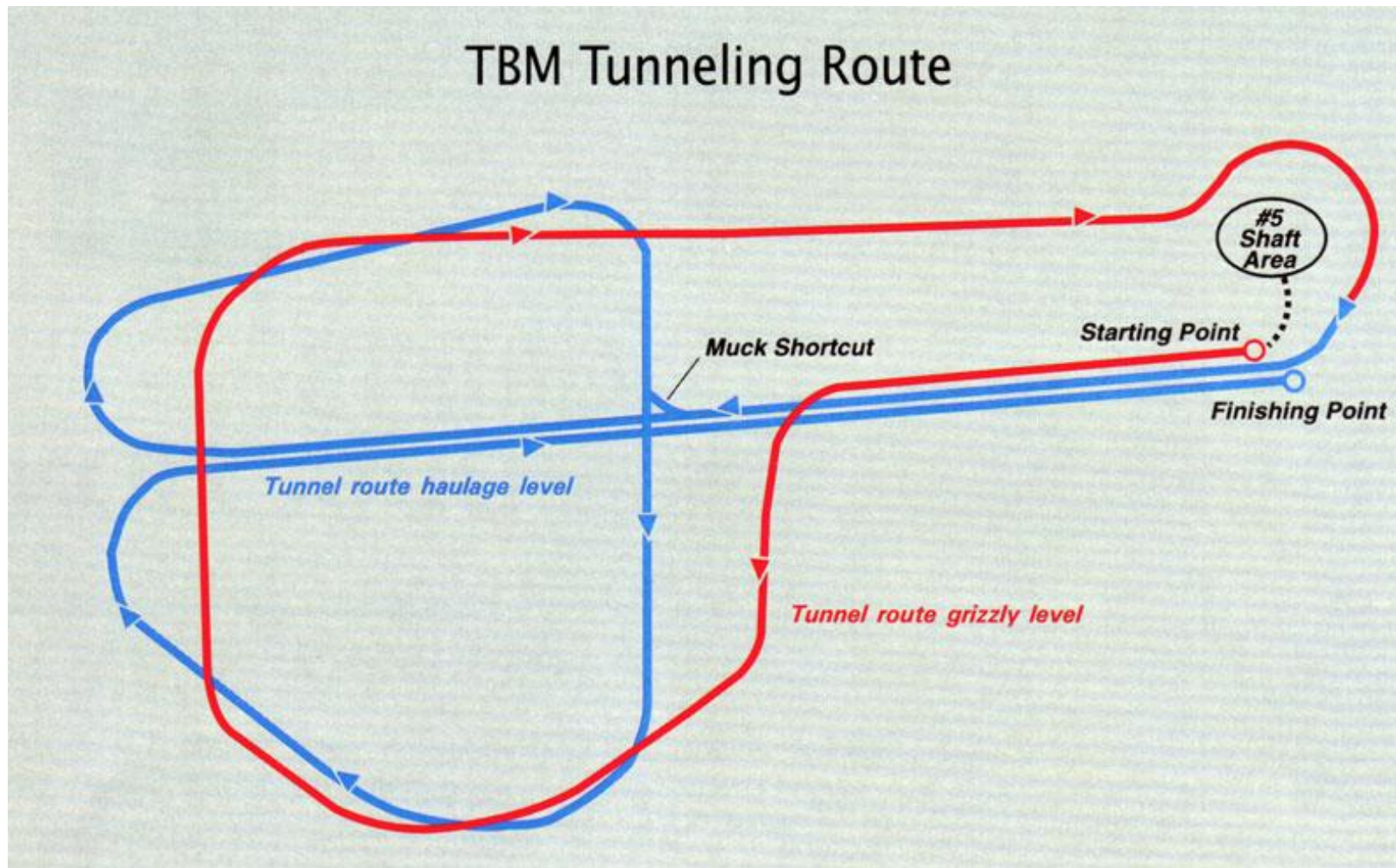
Rio Tinto - Speed

- Detailed re-scheduling of block cave using TBM and Shaft Boring.
- Opportunity to reduce construction period by 40% from 4,5 to 2,5 years.



Respective Development after 2,5 years

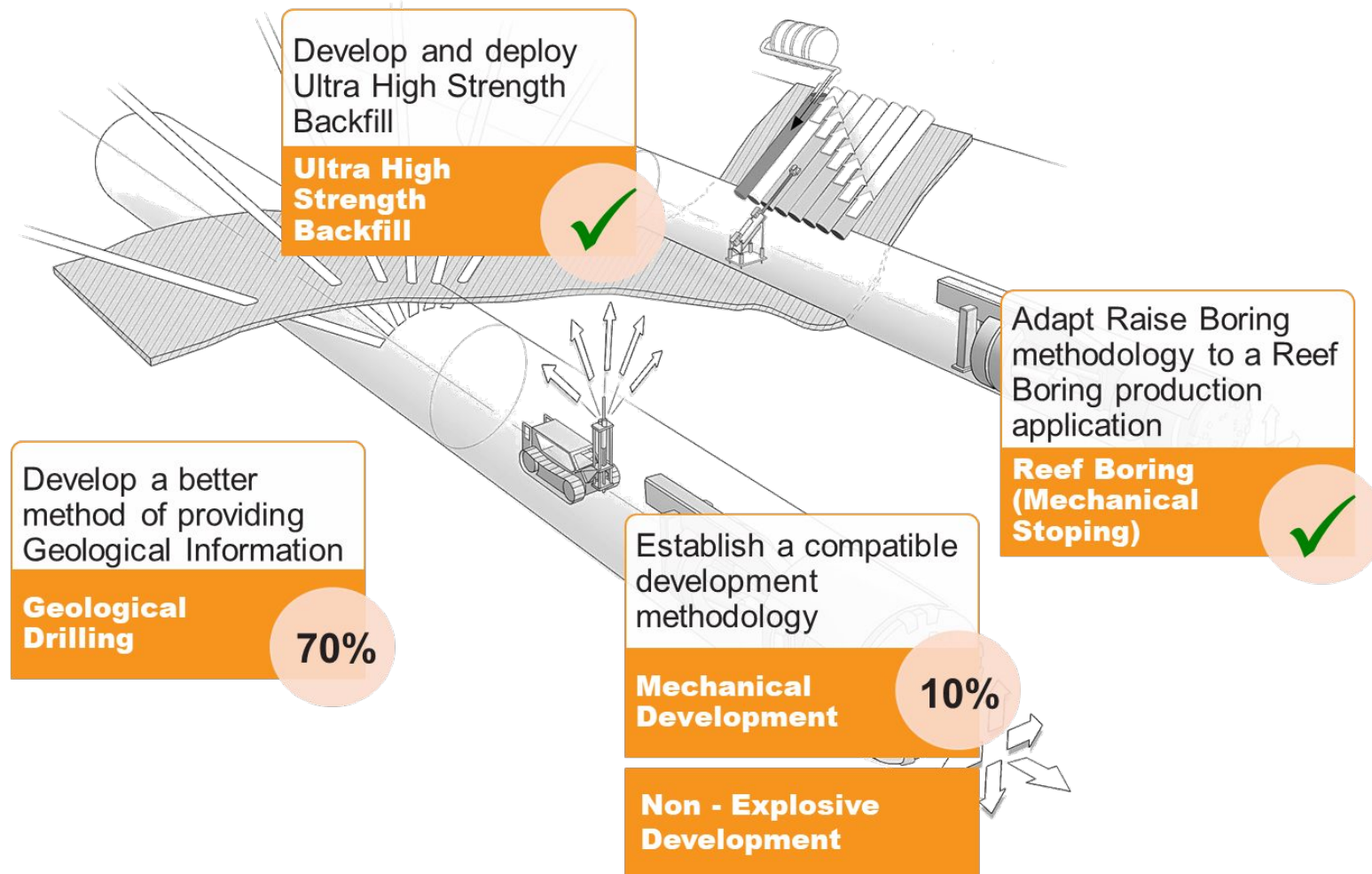
Magma Copper - Speed 23 – 30 m/day



Limestone in Canada - Accuracy of Profile



Selective Mining AGA 'all the gold, only the gold, all the time'



TBM Tunnel Free State After 20 years

Stability & Safety

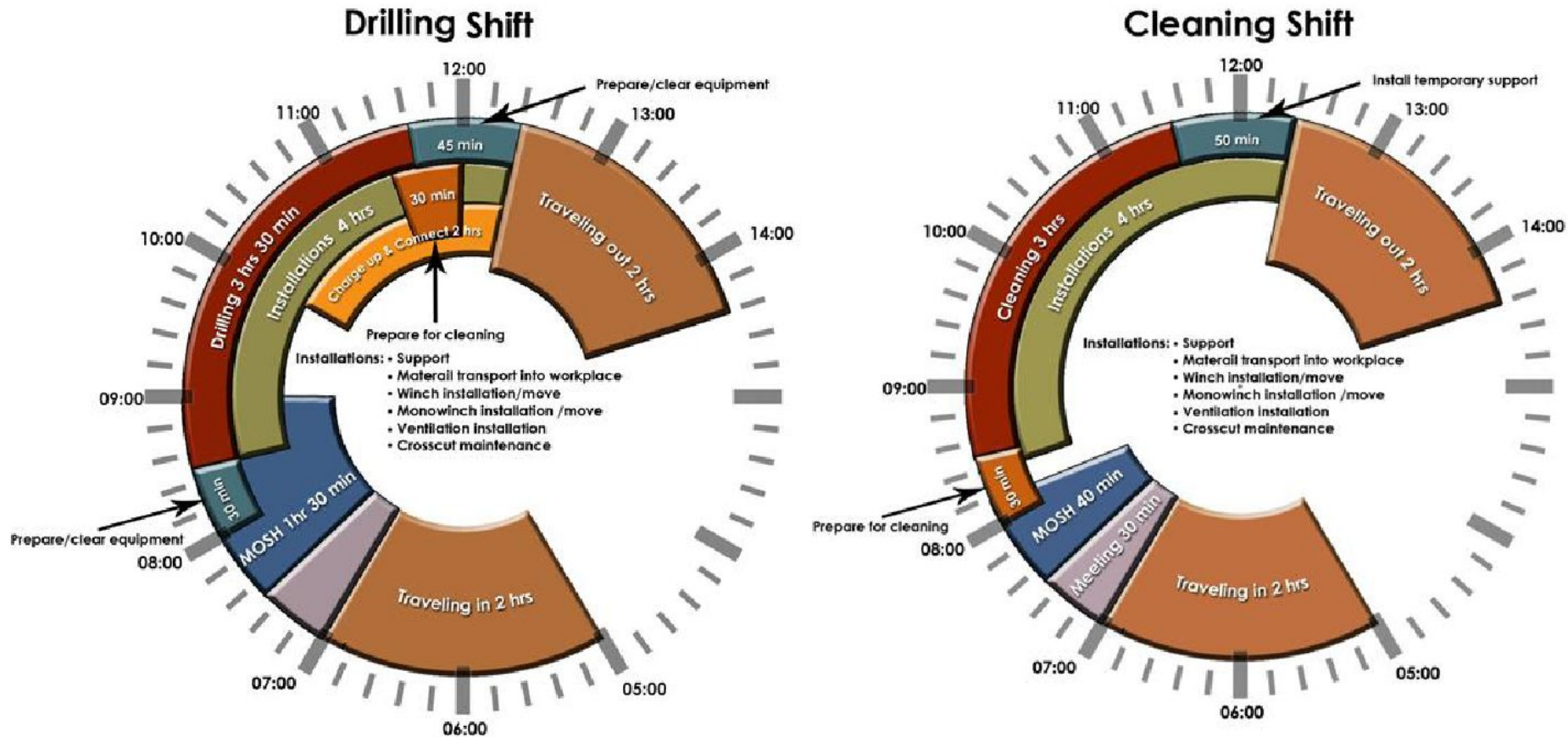


Legislation

In the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and Regulations.

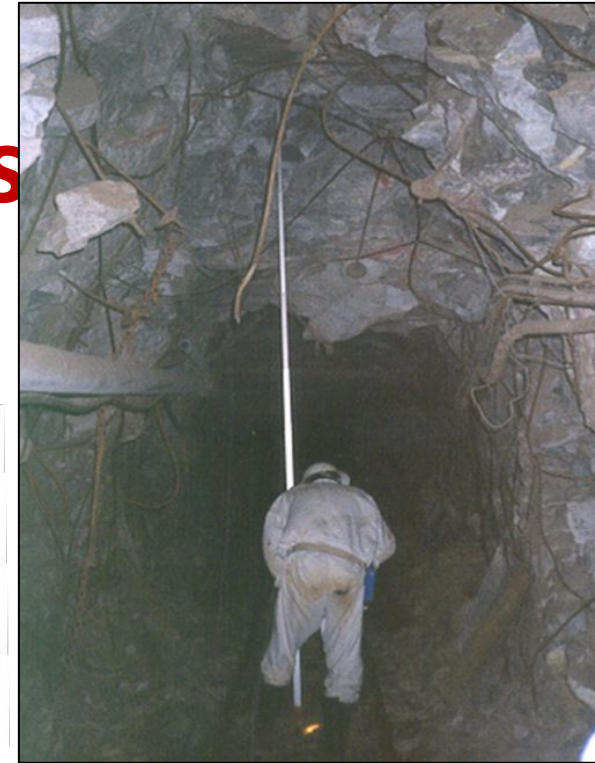
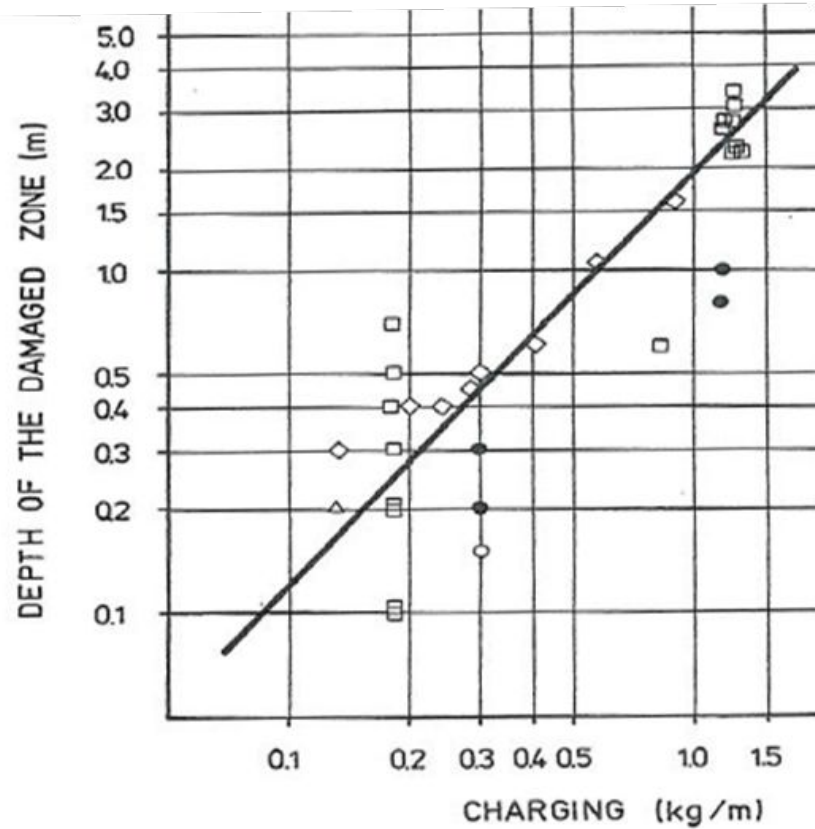
- The word explosive is mentioned 254 times,
- The word blasting is mentioned 168 times,
- Both enjoy their own definitions,
- Individuals cannot hold any position of mining responsibility without being the holder of a Blasting Certificate,
- The whole mining extractive process, infrastructure and system is designed around a cycle determined by the need to clear the mine to allow blasting to take place and the harmful products thereof to be cleared.

Productivity in Blasting Cycle



Total time attributed to **value adding** activities is **6 hours and 30 minutes**—27% asset utilisation

Blasting Introduces Fractures

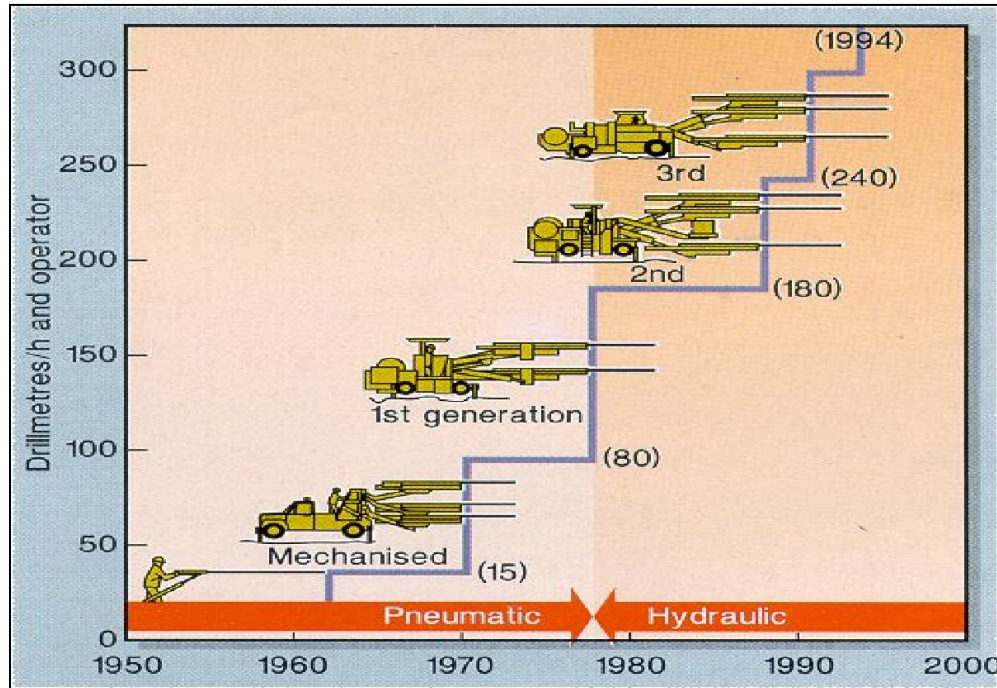


Support Design Process

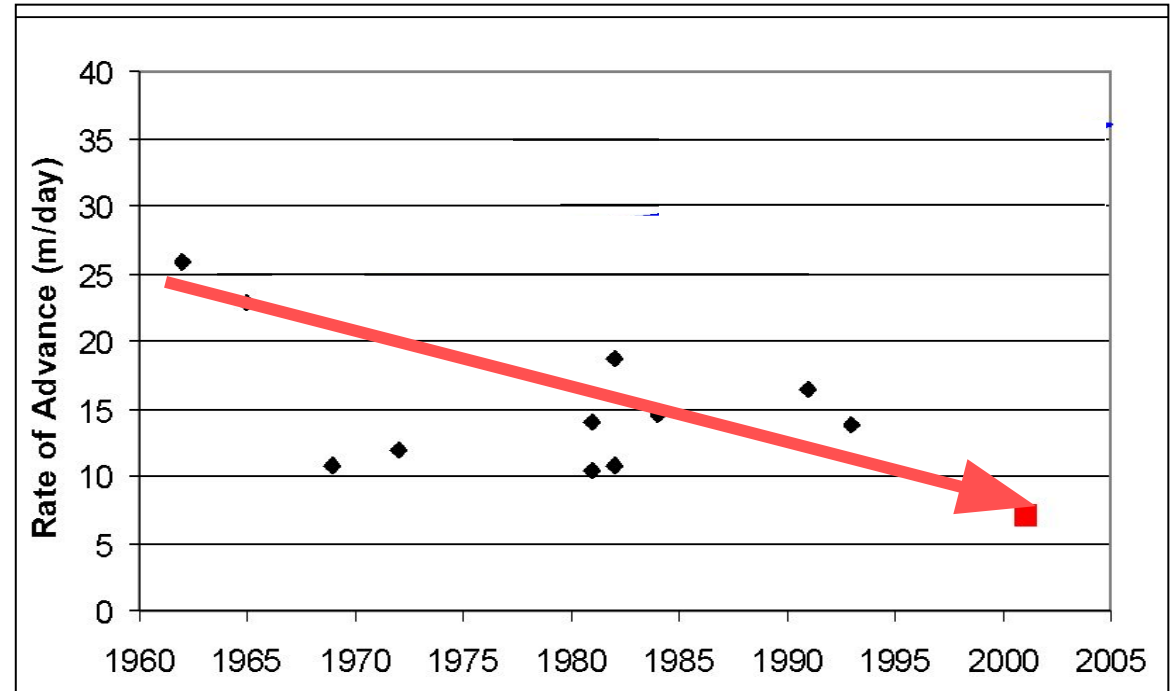
- Observe existing excavations – model your findings.
- Use as a predictive tool for support design in other applications.
- What impact, if any, does the excavation method have?
- In searching the literature we could find no guidelines for support design for blasting compared to non-explosive rock breaking.
- Available to study there are narrow reefs mined non-explosively - Lonmin, Impala & Mototolo.
- Let's observe and model – for safer more productive mining.
- CAUTION

Why Non-explosive in Development?

Efficiency of drilling +500%



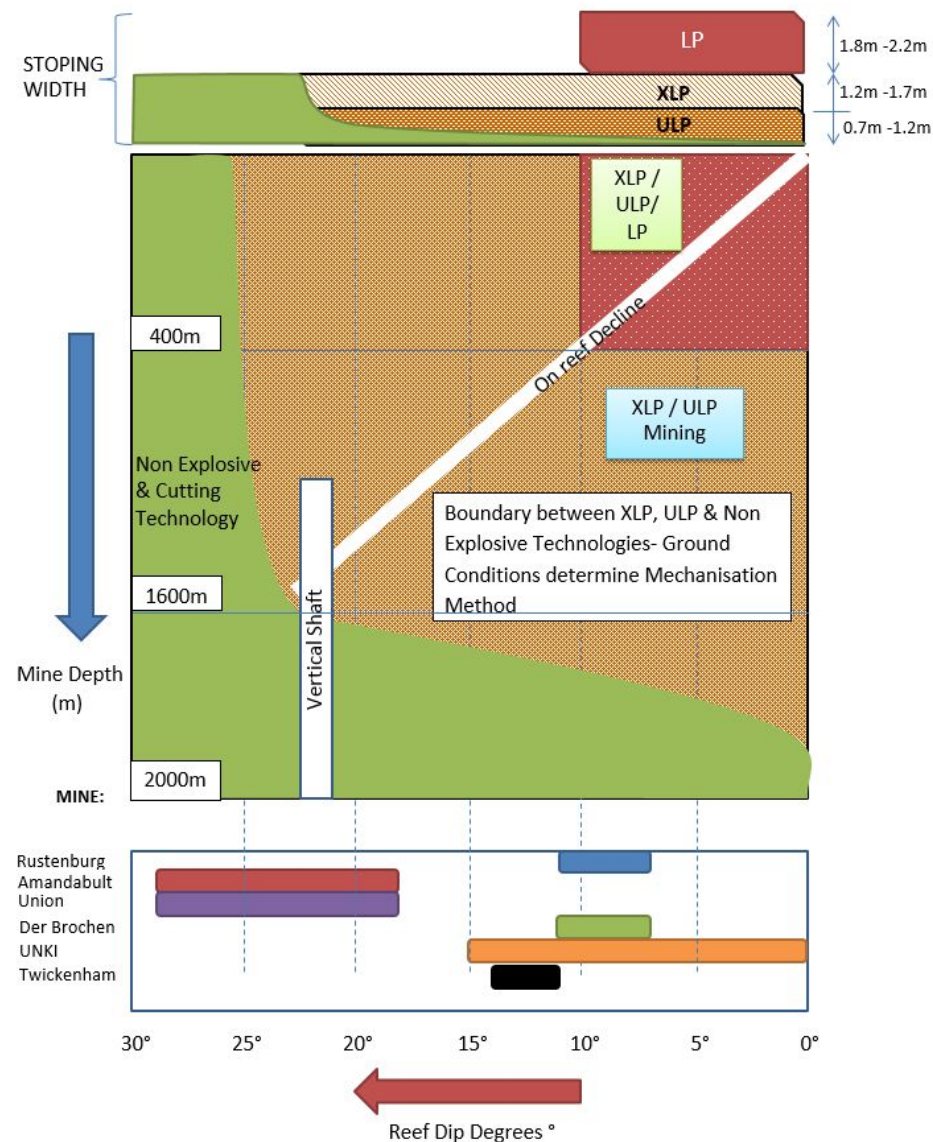
Effectiveness (development rate) 30%



Usual explanation for decreasing tunnelling productivity is level of support requirement and legislative limitations on access.

Why Non-explosive in R&P Mining?

- Anglo Platinum considered that ground conditions determined mechanisation method.
- Non-explosive mining improves ground conditions.
- Less fracturing in hanging and pillars should lead to safer mining and probably higher extraction ratios.

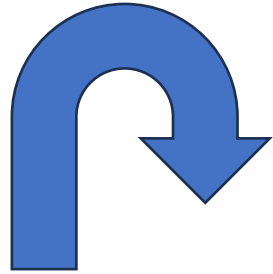


Why is Rock Eater Interested?



We have a method of rock breaking that does not induce fractures in the parent rock

Thank You



QUESTIONS

