



## **Richard Sullivan**

### **Specialist Drill & Blast Engineer**

BE (Mining) (Hons)

Certificate IV in Explosives and Blasting (Quarry and Open Cut Mining)

Certificate of Blasting Operations in the Mineral Industry

Western Australian Shotfirer Licence ESF015317

#### **Expertise**

I have over 25 years of Drill and Blast Engineering experience gained across 80+ sites throughout Australia, New Zealand and Indonesia, involving a wide variety of technical challenges;

- Large scale open pits, including Grasberg in Papua and Boddington in Western Australia, to successfully develop very steep, deep, stable pit walls;
- Coal mines in the Hunter Valley, New South Wales, requiring extraction of multi-seam deposits adjacent to major highways, bridges and High Voltage transmission towers;
- Quarries needing to find blasting solutions for demanding vibration, airblast and public engagement challenges;
- Construction sites looking to use explosives and other products to break rock in open public areas, at sensitive locations, adjacent to key infrastructure and even down driveways between houses.

#### **Electronic Detonators**

I have been intimately involved with electronic detonator systems since their introduction in trials commencing in the mid 1990's. I designed the timing for the very first Australian blast of a fully commercially released system, and helped fire that shot, which occurred on 20<sup>th</sup> December 2000, at Mt Cotton Quarry in Queensland.

My key interest from that point was to work on creating new blasting methods and improved timing sequences employing electronic detonators, including pioneering techniques such as 'System' timing for frequency control in quarries and construction projects, 'Brick' timing for vibration reduction and improved wall control outcomes from large production shots in open pit mines, and 'Chase' timing to enable the combining of multiple large/ complex/ combination shots into one simultaneously firing blast.

#### **Innovation**

I have a passion for developing, trialling and proving new and innovative Drill and Blast products and services offerings including;

- Increasing the drill bit diameter above conventional Down-the-Hole (DTH) sizes to reduce unit costs of Drill and Blast, whilst maintaining or improving fragmentation, diggability and muckpile presentation.
- In-house development of Measure Whilst Drilling (MWD) solutions, to link drilling outputs to blasting inputs, target energy where it's needed most, improve near-time reporting, and enable sharing of critical data with customers such as Load and Haul, Processing, Geology and Geotechnical teams.





- Designing packaged pre-split products that are pre-assembled in a bespoke site specific one-box-one-hole format. This allows greatly increased hole loading rates, reduced Total Cost of Ownership (TCO), and improved wall outcomes (precise charge per hole, consistent in-hole placement, elimination of joins and knots, and wastage!).
- Optimisation of bulk explosives formulations to improve in-hole energy, resistance to dynamic desensitisation, and manage the output of blast fumes such as NO<sub>x</sub> and CO.
- Critical evaluation of new supplier offerings such as high energy bulk explosives products, non-traditional stemming systems, decking products etc.

### Continuous Improvement

My work on refining and applying techniques for wall control has assisted global mining houses to safely and reliably steepen pit walls in some of the most demanding and complex ore bodies. I have delivered sizable productivity improvements, reduced the Drill and blast unit costs, provided significant downstream benefits to Load and Haul, wall scaling and ground support operations, and Processing, but most importantly of all: unlocking the ability to redesign pit shells for sizable Net Present Value (NPV) improvements.

I have assisted sites to undertake structured continuous improvement programs, using multi-disciplinary teams to actively improve site outputs. Key elements include;

- Project Scope creation and stakeholder engagement
- Identification of Key Performance Indicators (KPI) and criterion for success
- On site measurement systems including bulk explosives testing, reactive ground characterisation, in-hole probes for Velocity of Detonation (VOD), pressure and temperature measurement, high speed video cameras, vibration and airblast monitoring, muckpile fragmentation, Blast Movement Monitors (BMM), telemetry and GPS data for diggability analysis, and detailed Large Data Set studies of Mine to Mill impacts.
- Disciplined data collection, robust measurement and meaningful statistical analysis
- Research and Development (R&D) claims, designing the project to ensure it employs the Scientific Method, is undertaking a genuine trial, and is generating new knowledge.

### Supplier Engagement

I believe the key is to bring together Head and Regional offices and on-site departments, to set up a taskforce of Commercial, Technical and Operational specialists to work together as a cross-functional team. My goal is a robust Defence-Against-the-Dark-Arts strategy that enables critical assessment of Suppliers' Value Propositions in all shapes and forms; mapping Subject Matter Experts (SME) to Commercial pitches and evaluations, Technical engineering case studies and Operational needs and practicalities. The desired outcome is a final decision that will ultimately be Corporate approved, Regional led and site-owned.



A recent explosives supply procurement process I was involved in as the Technical SME resulted in very significant, demonstrable and sustainable benefits for the site and globally for the company. Key deliverable of that project were;

- Developing a tender Scope after collaboration with all identified prospective Suppliers, following pre-tender site engagement meetings,
- On-site bulk explosives field trialling during the Negotiation Phase to validate that products performed as claimed, were suitable for site conditions, and cost effective compared to their peers. In addition we also scrutinized service levels, ensuring Supplier personnel, training levels, operating procedures, equipment presentation and maintenance, and safety systems met site requirements,
- Transformation of the tender negotiations to unbundle Supplier proposals, focusing on bulk explosives products as commodities rather than service offerings; requesting detailed formulation transparency, the setting of a standardised product energy rating system to allow cross-Supplier comparison, and insisting on fully disclosed product down-hole costs. This ultimately enabled us to directly calculate true cost of buying explosives energy for each product, on a \$/MJ basis.
- Increased owner-operated participation resulting in the site owning and operating their own bulk explosives trucks and ultimately possessing their on-site emulsion plant.

### **Career Experience**

Boddington Gold Mine, 2009 – 2018, Newmont Australia

Freeport Cooper Mine, 2005 – 2009, Orica Mining Indonesia

Quarries and Construction, (and various regional mines) QLD/ NT/ NSW/ VIC/ TAS/ SA, 2000 – 2005, Orica Quarry Services

Middlemount Coal Mine, 1999 – 2000, Thiess Contractors

Ernest Henry Copper Mine, 1996 – 1999, Thiess Contractors

Cummnock South & Mt. Owen Coal mines, 1994 – 1996. Downer Mining Australia

Waihi Gold Mine, 1992 – 1994, Downer Mining New Zealand