Site Profile
Dawson is located at the southern end of the Bowen Basin in Central Queensland near the town of Moura, approximately six hours drive North West of the city of Brisbane.

The mine is one of QLD’s longest established coal mines and is currently owned through a joint venture between Anglo American and Mitsui Coal Holdings and is managed by Anglo American.

The Situation
Coal seams at Dawson typically dip from East to West at a range of between 5-40 degrees and an average of 12 degrees. Due to the steep seam dip, through-seam blasting has been implemented in the Terrace pit to enable a simplified mining process. The use of through-seam blasting ensures all blasts are fired to a target RL, providing flat benches for the next drill pattern which reduces drill prep requirements and improves safety for both operators and blast crew personnel. Use of through-seam blasting also typically minimises the number of blast events, reducing blast related downtime and increasing equipment utilisation.

In 2014, concerns were raised regarding the effectiveness of through-seam blasting using non-electric detonators. Reported problems included misfires and substantial coal loss in areas where through-seam blasting activities were being conducted, with coal recovery in some seams reportedly being significantly below target.

A project was initiated by the site drill and blast team to implement a trial of i-kon™ II electronic detonators to assist with achieving consistency and predictability of blast results and the Orica Technical Services team were contacted for guidance regarding the implementation.

Technical Solutions
Since initial trials in 2014, Orica have collaborated with the Dawson drill and blast team to work on improving the through-seam blasting results in the Terrace.

Initially, blast modelling was conducted to assess potential benefits of adjustments to firing sequence and direction. The utilisation of electronic detonators provided flexibility to adjust delays between decks and change angles of initiation to minimise potential for movement of the coal seam.
Adjustments made based on assessments of previous blast results and analysis of individual blast conditions, allowed the initiation sequence to be designed to produce a blast outcome that was least likely to damage the coal seam.

Through the use of i-kon™ II electronic detonators, the blast initiation sequence was adjusted from the typical centre-lift timing that was used with non-electrics, which often resulted in uneven movement and heave throughout the coal seam. The increased flexibility of electronic detonators allowed blasts to be designed in individual layers, with each layer initiated to both move material along the strike of the coal and maximize the confinement of the seam. This enabled each blast to minimise potential for movement or disruption of the coal seam whilst still providing suitable fragmentation of the surrounding material.

The Orica Technical and Dawson Drill and Blast teams worked together to conduct an assessment of the specific geology of each individual blast, particularly joint orientation and coal seam location. The initiation sequence could then be designed and adjusted between layers, to minimise risk of both explosives column dislocation, coal seam movement and damage to the surrounding un-blasted rock mass.

Through the flexibility available from the use of i-kon™ II system, each blast could be assessed and then designed to minimise the risk of misfires and coal loss that had been experienced using the previous blasting practices necessitated by standard non-electric detonators.

**The Result**

Through the introduction of i-kon™ II electronic detonators and the collaboration between the Orica Technical team and the Dawson Drill and Blast team, significant improvements have been made to through-seam blasting practices in the Terrace. Through-seam blasts in the Terrace have demonstrated more consistent blast movement and lower signs of visible coal disruption. With increased focus and improvements in mining practices from Dawson operations and a substantial input from the Dawson technical department, a significant increase in coal seam recovery has occurred, representing a significant increase in value to Dawson operations.

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