Case Study
Maximising Productivity and Coal Recovery in Dipping Coal Seams
Wahana Coal Mine, Indonesia

Site Profile
Wahana site is located in the Tanah Bumbu regency South Kalimantan, approximately 200 km South East from the capital city Banjarmasin. The project is owned by Wahana Baratama Mining, serviced by PT Leighton Contractors Indonesia with PT Orica Mining Services providing explosives related services.

Leighton operates two-229mm Drilltech D 55 units and eight-140mm Tamrock Pantera units, with trucks and excavators to remove overburden and interburden. Small excavators are being used to expose the coal seams.

The Situation
The coal seams geological condition at Wahana varies in slopes and thicknesses which result in conventional blasting being difficult to operate efficiently.

Safety and production requirements were the other considerations. Dipping benches requires drilling on slopes or significant dozer time is required to create drill benches. Due to the limitations of available areas to drill and blast, blasting multiple small areas in the pit is done which results in the whole operation shut down for blasting.

Application of Through Seam at Wahana
Two series of Through Seam demonstration blasts were undertaken during the month of August and November-December 2009. The first series of demonstration blasts had a combined total volume in excess of 480k bcm. Seam thicknesses were between 0.2-0.5 m and had 6-11m of interburden between the coal seams. The second series of blasts blasted over 790k bcm with seam thicknesses between 0.12-0.9 m, included blasting an area in the disturbed zone and a sump blast in the bottom of the box cut.

After the completion of drilling, coal horizons were accurately located using various techniques to improve the geology model and to ensure the correct placement of the explosives charge to break the rock whilst not damaging the coal seam for each blast area. This information is an input into the Orica SHOTPPlus®-i Pro design package from where the loading for each individual blasthole is developed. The loading varies due to the changes in the location of the coal seam in each and in the vicinity of each blasthole. Furthermore, the use of i-kon™ electronic detonators is essential in being able to manipulate the timing to achieve the firing sequence between decks.

Through Seam Blast Solution
Orica and Leighton Contractors Indonesia have been going through a program of investigating opportunities of transferring methodologies that have been successful in other parts of the world in improving mining efficiency. In this case, Through Seam blasting for steeply dipping coal seams was identified as one such methodology.

Through Seam blasting is a unique combination of process management expertise and industry leading products. It draws upon the depth of field experience of Orica’s Technical Services personnel, excellence in delivery process management systems and Orica’s suite of unique products including SHOTPPlus®-i Pro blast design software and i-kon™ digital energy system.
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Fig Loading design using SHOTPlus®-i Pro

Fig 3: Intact coal seam – Shot 4 Seam 5, August 2009

Benefits
All Through Seam Blasts to date successfully fired at Wahana. The main benefits from this blasting method are:

- Shot size for dipping seam blasts good compared with what it was before the project – 25 k bcm. Target blast size would be around 200-250 k bcm
- Drilling deep holes on flat benches resulted in stepped increase of drilling productivity as well the ability to use a single large diameter drill with 229mm holes instead of 5 small drills with 140mm holes
- Accuracy of delineating the location of the coal, greatly improves the protection afforded to the coal. By undertaking through seam blasting, coal protection is an extremely high priority and such is integrated into the loading process
- Reduced blasting window from having to blast multiple area everyday to blasting every 2 or 3 days. This reduction in blast events would translate to a decrease of the number of equipment moves and shutdowns due to blasting
- Accuracy of i-kon™ electronic initiation system allows significant improvement in control of blast induced vibration
- Fragmentation above and below coal was in line with the mine plan and allowed the mine to better plan its sequence.

Customer Quotes
Wahana Baratama Mining has found real benefits at our mining project, through the introduction of Orica’s through seam blasting system. Our overall productivity/performance in both coal and overburden mining has increased, quicker coal exposure, more than 50% increase in the vertical advance of our mining blocks in the overall operation. Orica’s gamma logging of drill holes also gives us the opportunity to update our current pit model with more accuracy, which assists our mine planning sequences and schedules.

Water management has also benefited from the introduction of through seam blasting by developing sumps to meet our pumping requirements, which makes it much easier, quicker and developing the sumps much deeper, without the concerns of any coal loss. The Wahana project is still in its early stages of development, but we are looking forward to the future and the further benefits, which through seam blasting will contribute to our project.

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