Site Profile

Heidaigou coal mine is located in Zhunger, inner Mongolia, China, and belongs to the Shenhua Energy group. At the time of writing, it is the largest single coal mine in China. In 2005, a dragline was bought from BUCYRUS company to optimize their mining methodology. Since the extent of cast directly impacts dragline productivity, the customer has been keen to optimise cast blasting to improve the operating efficiency and productivity of this expensive excavation item.

The Situation

Heidaigou coal mine has been working closely with Orica Mining Services since the introduction of the dragline in 2005. Exel™ non-electric delay detonators were initially introduced to optimize cast blasting results.

The i-kon™ electronic blasting system had successfully been adopted in Australia and several other countries because of its well known benefits in cast blasting and environmental control through higher accuracy and consistency.

Based on this success, Heidaigou coal mine decided to conduct trials with i-kon™ detonators in 4 cast blasts. The objective was to improve the cast rate by 15% compared to the 2009 average benchmark Exel™ cast of 32%.

Technical Solutions

In the first side by side blast, the drill pattern and loading was kept the same as that of the current Heidaigou practice. Orica's Technical Services team designed the timing using SHOTPlus-i™ Pro software. Post-blast survey showed that the cast rate of the Exel™ area was 33% compared to 38% in the i-kon™ area.

All the production holes were primed with i-kon™ detonators for the second blast. Standard Heidaigou blast parameters were maintained. The cast rate of 2nd shot was 37%.

The pattern, loading and timing parameters for the 3rd shot were adjusted by Orica Technical Services based on the results of the previous blast. The blast was extensively modeled using Orica’s Distinct motion Code (DMC) model. The advanced modeling suggested a superior outcome could be achieved by modifying timing and loading the first six rows with Fortan™ Coal 12. This blast resulted in an average cast rate of 40.2%.

The same pattern, loading and time parameters as the third blast were followed for the 4th blast. A resulting 42% cast rate was delivered with the 4th shot.

The Result

According to the contract agreed by both parties, the 3rd and 4th blast were regarded as the benchmark blasts for assessing Orica’s performance. The average
cast rate for i-kon™ and Fortan™ Coal 12 with Orica's Operational and Technical Support was 31% greater than the mine had previously been achieving.

The result showed how cast blasting can be significantly improved which in turn delivers substantial increases in dragline efficiency.

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