

ShovelSense Measuring Grade At Bucket Resolution: The New Tool In The Mine Geologist Toolbox

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ABSTRACT

ShovelSense[®] is an in-bucket grade measurement system being commercialised by MineSense Technologies Limited. It combines X-ray fluorescence (XRF) sensors, installed in the brow of the bucket, with real-time on-board processing and a cloud-based data analytics platform. It is fully integrated with the fleet management system on the shovel, enabling truck loads to be automatically diverted from their planned destination if the grade measured in the bucket produces a material classification that is different from the mine plan.

The ability to measure the grade of each bucket reduces the selective mining unit (SMU) from the size of a mining block (e.g. 1500 m³) to a single bucket (e.g. 45 m³ or less). The smaller SMU size offers the ideal opportunity to separate ore from waste, exploiting the in-situ heterogeneity of the orebody for maximum benefit. In comparison, attempts at bulk ore sorting further down the mining chain are hampered by mixing of ore and waste during mine extraction and processing.

The flow-on benefits from bulk ore sorting with ShovelSense at the mine face are large—improving processing plant efficiency (less water and energy), limiting tailings, reducing the accumulation of acid generating sulphides in waste dumps and extending the life of mine.

Beyond real-time ore-waste differentiation, measuring grades at bucket resolution allows for improvement of the future mine plan, through enhanced reconciliation of what was previously extracted. For example, small scale structures not recognised with blasthole samples can be delineated on the mined bench and projected to the next bench to improve the dig plan. The same information can also be used to verify estimated blast movement and further optimise blast design.

This contribution will provide an overview of the ShovelSense system with examples of how it is adding value at commercial operations today.