



A justifiable expense

Spending the big dollars on a payload monitoring system can pay off quickly. That is the view of BMT WBM's Charles Constancon, Keegan Kelly and Arnold Williams.

Low commodity prices are taking their toll throughout the mining sector. No-one can predict when demand will increase and commodity prices will return to sustainable levels.

In these times, mining companies are struggling to stay profitable, even by cutting costs, selling assets and cancelling or deferring capital expenditure.

Improving efficiency, productivity and asset life are proving to be key factors in the challenge to maintain profitability and a competitive edge.

The benefits of best practice payload monitoring align directly with improving efficiency, productivity and asset life goals that mines have set out as their key drivers.

When it comes to truck and shovel or excavator operations, payload monitoring is

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not just about getting the most material on each truck. It is about loading each and every truck as close as practicable to the target specification for the truck, every time.

It is about dispatching the truck to the stockpile, dump or crusher loaded in the most optimal way in the shortest time possible. This means that each truck has

to be loaded with the most material that it is designed to carry efficiently, while still operating safely and without doing undue damage to the truck or tyres due to overloading.

Overloading trucks not only cause safety issues, mechanical and structural damage to the trucks, it also results in reduced



Improved payload monitoring can boost the productivity of a load and haul fleet.

productivity while the truck is forced to dump the offending payload at the dig face and rejoin the queue to be reloaded.

To maintain a margin of safety against accidental overloading, most operators underload trucks leading to the loss of productive capacity. With accurate payload monitoring and dipper by dipper operator feedback giving full loading control to the operator, the required margin of safety against accidental overloading can be significantly reduced while maximising the truck payload.

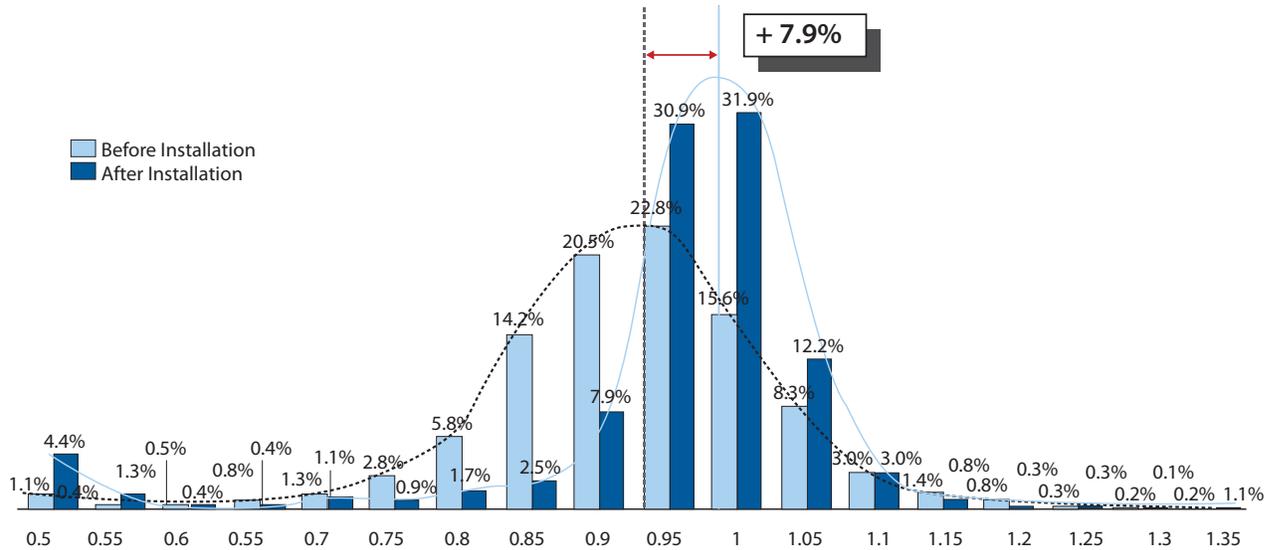
To achieve increased productivity it is essential to accurately measure the payload dipper by dipper load and provide the information to the operator in real time – before they unload the dipper.

Truck scales, which are used commonly to obtain truck payloads can be grossly inaccurate during loading at the shovel. A truck scale measures strut pressures to estimate the payload and yields a typical accuracy of approximately 10% of actual load during loading. ▶



A composite of a view of a rope shovel dipper and a close up showing the placement of the payload monitoring tool.

Production Data Before and After the Installation of an Accurate Payload Monitor



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When it comes to accuracy, the terms trueness and precision are used to describe a measurement. Trueness refers to the closeness of the mean of the measurement results to the actual (true) value and

precision refers to the closeness of agreement within individual results. Therefore, the term “accuracy” refers to both trueness and precision. The illustration shows the significance of precision and trueness in producing an accurate measurement.

Not all payload monitoring systems have the required level of trueness and precision to be effective as an onboard real-time payload monitor.

Shovel or excavator-based accurate payload monitoring provides real-time feedback of truck load to the operator

allowing for target or smart loading practices to be implemented changing the operator from a passive to an active element of the production cycle.

Aside from accuracy and timely reporting of critical loading data to the operator, there is also the issue of payload monitoring system maintenance.

Whether an operation is large or small, there will always be many more trucks than there are shovels or excavators.

From a maintenance and calibration standpoint, it makes more sense to focus on the maintenance of a single shovel or excavator payload monitoring system than a fleet of lower accuracy truck systems.

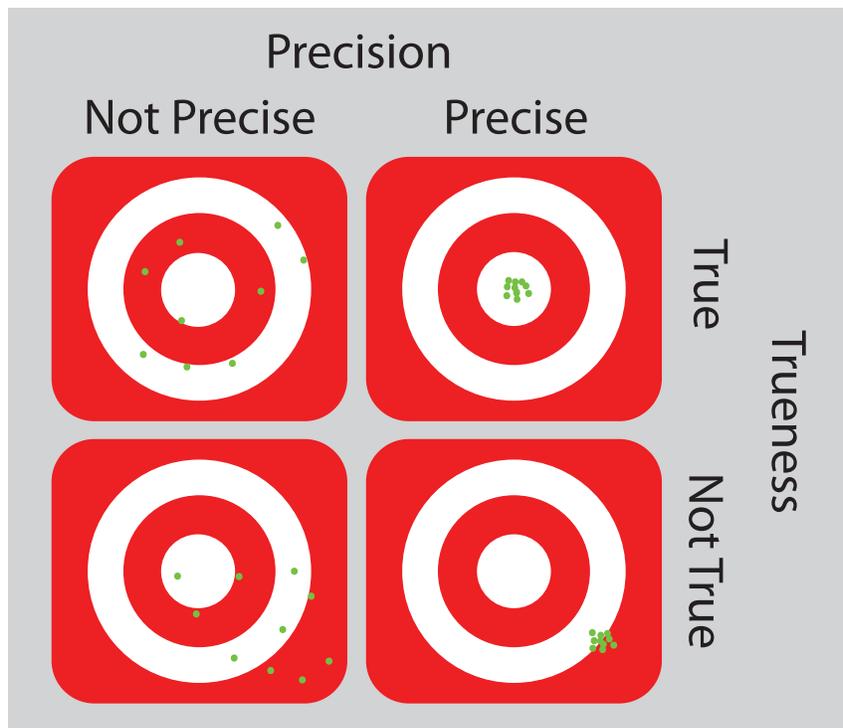
BMT WBM has gathered data on mines working in multiple countries, with varying materials and with differing equipment.

This data shows that with accurate payload monitoring, average increases in the actual material moved of between 7% and 12% – and greater improvements of up to 20% in the case of less skilled operators – can be achieved.

To realise the maximum benefit, it is vital to provide accurate dipper by dipper load measurements to the operator in real-time before they unload the dipper such that the operator is always aware of the current truck load and the remaining capacity to be loaded.

The production data graphs shows the actual production data from a mine, which illustrates the immediate benefit of real-time and accurate payload feedback to the operator.

To produce this plot, BMT WBM compared mine records of production data for the same group of operators working with the same truck and shovel fleet operating under nearly identical digging and haulage conditions immediately before and after



the fitting an accurate payload monitoring system to the shovel. The data shows that with the aid of an accurate onboard payload monitor, the operators could increase the rate of production by approximately 8%.

The production increase stems from the increase in the average load closer to the target load as well as the ability to control the load variation tightly around the target load.

While there are several payload monitoring systems available from original equipment manufacturers and other third parties, few would be considered sufficiently accurate and feature-rich to serve the purpose of real-time payload monitoring.

The PULSETerraMetrix (PTM) is the only shovel based payload monitoring system that deploys an accurate inertially corrected load cell technology capable of high fidelity measurement in all operating environments, achieving both precision and trueness.

The loadcell and inertial sensors are installed as close as practicable on the dipper. This means that the PTM system directly measures the load in the dipper.

It does not try to deduce or estimate the payload by using approximate static measurements based on structural or electrical parameter measurements remote from the payload location in the dipper. PTM accuracy and fidelity has been proven



It makes sense to look at the payload of the loading tool first.

through multiple field tests using calibrated ground scales.

System accuracy of less than 5% error, 95% of the time has been consistently achieved in all operating conditions. In current market conditions, productivity and efficiency improvement of a mining asset is an essential

ingredient of a competitive and sustainable commercial strategy. To get the best return on investment, when choosing payload monitoring systems for truck and shovel or excavator operations, proven accuracy and fidelity through field trials using calibrated ground scales is a must.

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