Mining Magazine

Assuring improved performance

Modular Mining explains how its Performance Assurance team helped a copper mine in Zambia manage payload in real time

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Surface Mining > Fleet

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For nearly all mining companies, maximising profits is a top priority. One way that mines can achieve their profitability goal is through effective payload management. By gaining real-time visibility into equipment payload data, mines can avoid under- or over-loading trucks, have an accurate accounting of the material being moved at any given time and optimise the utilisation of their existing equipment fleet.

A mining operation in Zambia recently approached Modular Mining for help in identifying opportunities to improve loading efficiency. In response, members of Modular Mining's Africa-based Performance Assurance (PA) team sat down with

mine personnel to gain an understanding of the mine's challenges and develop a mutually-agreed-upon corrective course of action.

The PA team worked on site to review and evaluate the mine's loading processes and procedures. They identified an opportunity to improve payload accuracy by implementing the payload feature of the already-installed DISPATCH Fleet Management System (FMS).

To enable the flow of data between the equipment units and the FMS, the PA team updated the version of the DISPATCH System and installed and configured the applicable ModularReady truck payload interfaces. A set of custom-developed Loading Efficiency reports and Payload Dashboards afforded operations personnel and mine management greater insight into payload accuracy, operator efficiency, and equipment performance.

How it works

The FMS' integrated payload functionality captures real-time payload information from the onboard payload monitoring system (PLM) of DISPATCH FMS-equipped haul trucks. When configured to do so, the PLM data can be set to display on the operators' in-cab mobile devices in the shovels and trucks.

Prerequisites for implementing this functionality include: an installed PLM on the haul truck, the existence of an original equipment manufacturer (OEM) interface for the PLM and purchase of the applicable ModularReady interface licence(s).

The key benefits of the FMS-integrated payload functionality are the real-time capture of data for the tonnage being loaded into a truck with each pass, the number of tonnes remaining before the truck is at optimal capacity, and the number of buckets required to fill the truck bed. This information, communicated to relevant equipment operators as loading is in progress, is important for achieving tightly correlated target-to-realised production values, and for ensuring accurate cost analysis and production reporting.

By calculating material-weight as it accumulates, shovel operators are less likely to under- or overload the haulage units. Underloading can lead to trucks running below capacity with unrealised production opportunities, additional trips between loading and dumping locations, resulting in wasted fuel, unproductive drive time, and increased tyre and component wear. Overloading poses a greater risk of damage to chassis, suspension components, brakes, and tyres.

Results

To establish a baseline for analysis, 2018 data was collected from June 21 - August 20, and again from August 21 - September 9; with and without the PA team's changes in place, respectively.

Analysis of the before-and-after data revealed that loading efficiency increased significantly in the 12 months following implementation and configuration of the FMS' payload functionality.

Production of material moved in areas outside of the pit (ex-pit), increased by more than 14%; an amount that equates to nearly US$2.5 million of additional revenue, per year.

The realised benefits are summarised in the following graphs:

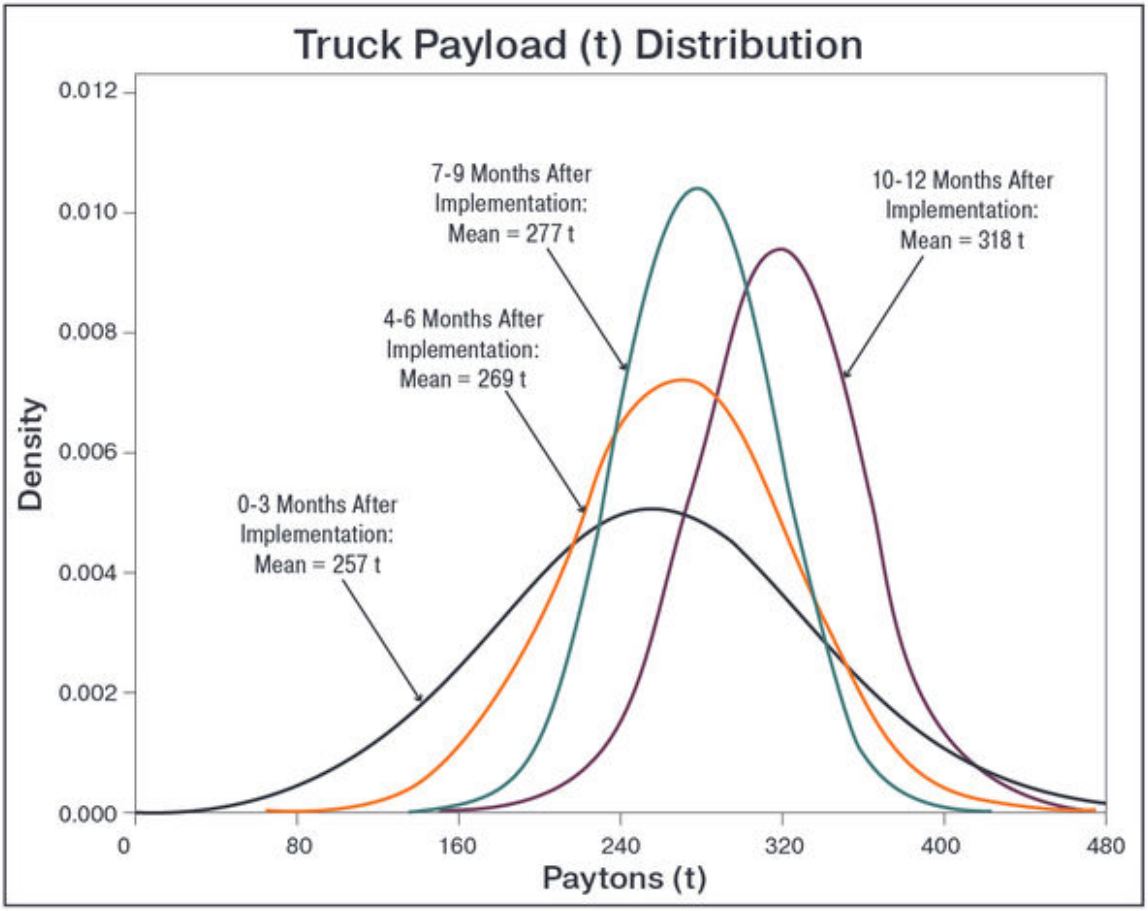

Figure 1: Payload analysis showing payload distribution improved by 23%. Data source: DISPATCH FMS

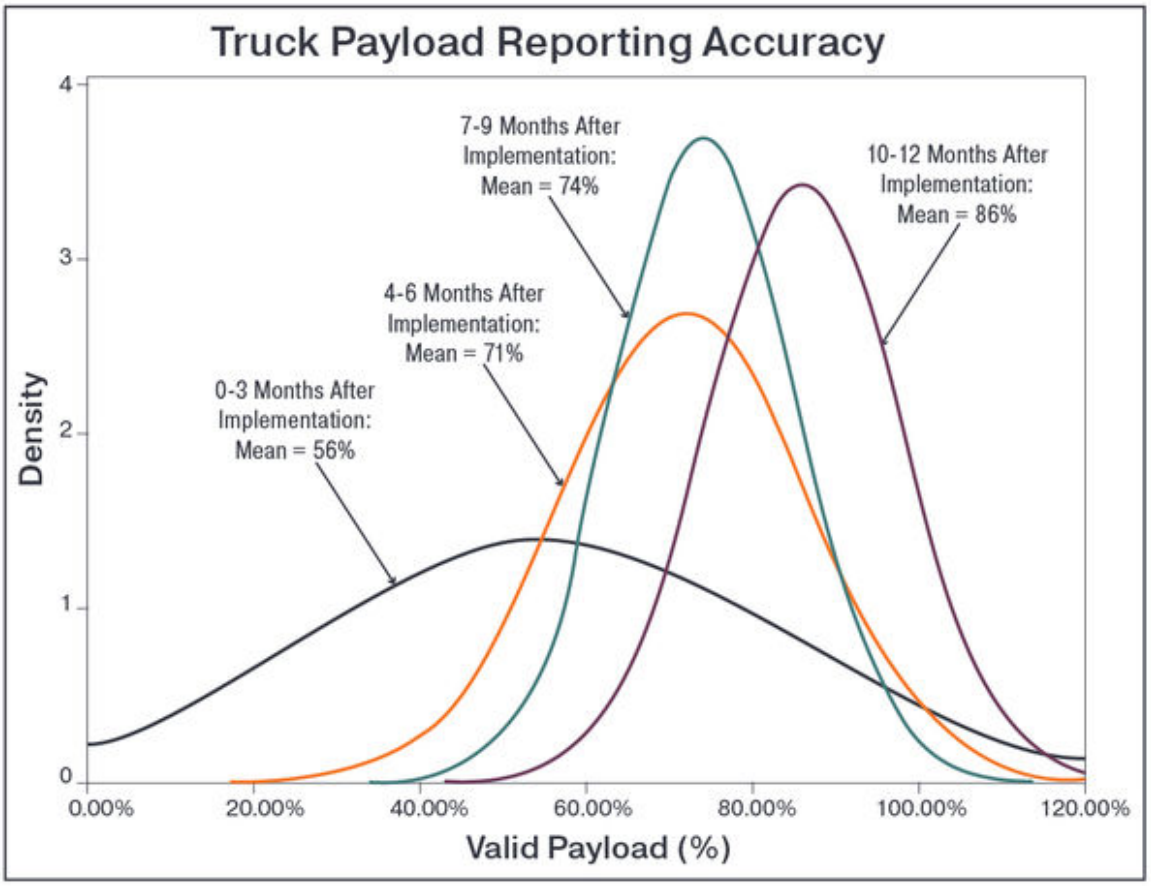

Figure 2: Payload reporting analysis showing payload reporting accuracy improved by 30%. Data source: DISPATCH FMS

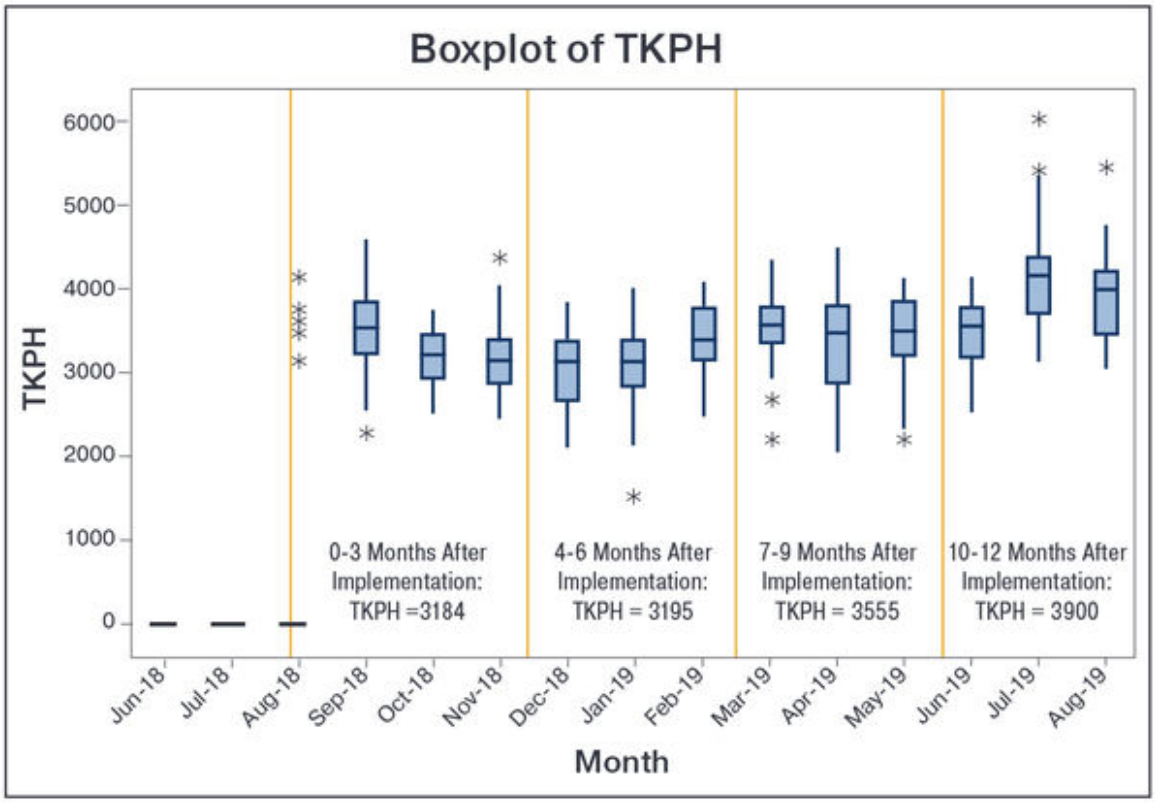

Figure 3: Tons kilometre per hour (TKPH) analysis showing TKPH improved by 22.4%. Data source: DISPATCH FMS

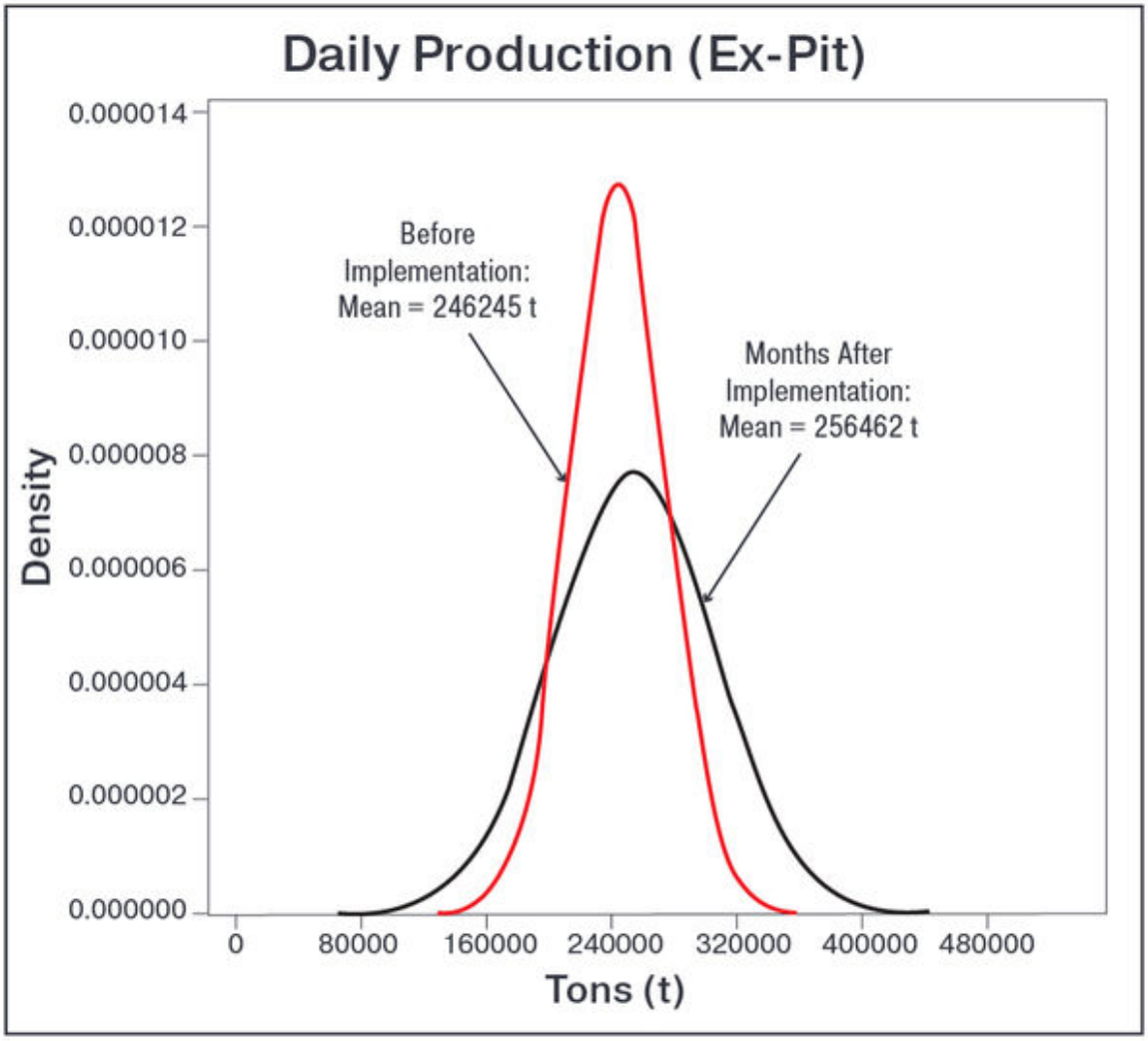

Figure 4: Daily ex-pit production showing 4.15% improvement, equivalent to US$2.46 million of additional revenue per year. Data source: DISPATCH FMS

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