CASE STUDY

3D-P Demonstrates Immediate Production Improvement through Real Time Data Collection

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A production study performed in March 2017 at a medium size mine in the Eastern Goldfields, Western Australia demonstrated that a 10% production improvement could be immediately achieved though the implementation of 3D-P Production System, powered by iVolve, on their excavators and trucks.

Current Situation

The mine, which operates several open pits in the region, was recording productivity data manually. The data was recorded by the operators, handed in at end of shift, and manually entered by an administrator. The process was known to lack accuracy and granularity to identify problem areas, as well as the timeliness of information needed by management to pro-actively respond.

With a strict focus on production, the study highlighted 3 areas of gain using the 3D-P Production System:

- ✓ **4%** through excavator efficiency improvement
- ✓ **2%** through truck pairing efficiency improvement
- ✓ **4%** through haul circuit efficiency improvement

Excavator Efficiency: Reported Problems

1. Large spread in the number of buckets used during a load cycle, affecting predictability and truck waiting time.
2. Considerable variation in swing speeds, affecting predictability and truck waiting time.
3. While the study was performed, an overload event occurred resulting in a 7-minute production loss and a load loss.

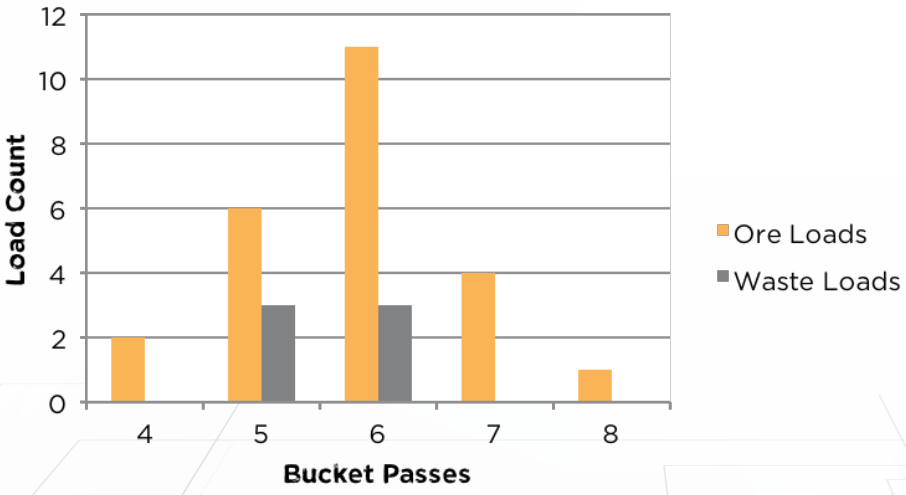

Fig. 1 - Despite a waste target of 6 passes and an ore target of 5 passes, the excavator proved to be repetitively over its ore target.

3D-P Technology Connected

Excavator Efficiency: Productivity Opportunity Using the 3D-P Production System

1. Through implementation of the 3D-P Production System, the mine would become able to record and review production data in near real time resulting in improved bucket pass consistency and truck waiting time predictability. Operators training requirements would become evident to management.
2. At the operator level, the in-cab screen of the 3D-P Production System would provide real-time visualization of the bucket pass, total tonnage and centre of gravity allowing immediate improvement and consistency of each bucket pass. Real-time visualization of the information would also prevent overload events, potentially resulting in OEM warranty void.

Fig. 2 - The in-cab excavator operator screen provides tonnage and CoG of the truck it's loading in real time.

Truck Pairing Efficiency: Reported Problems

1. Despite two under-trucked circuits, trucks showed to regularly queue empty resulting in productivity loss.

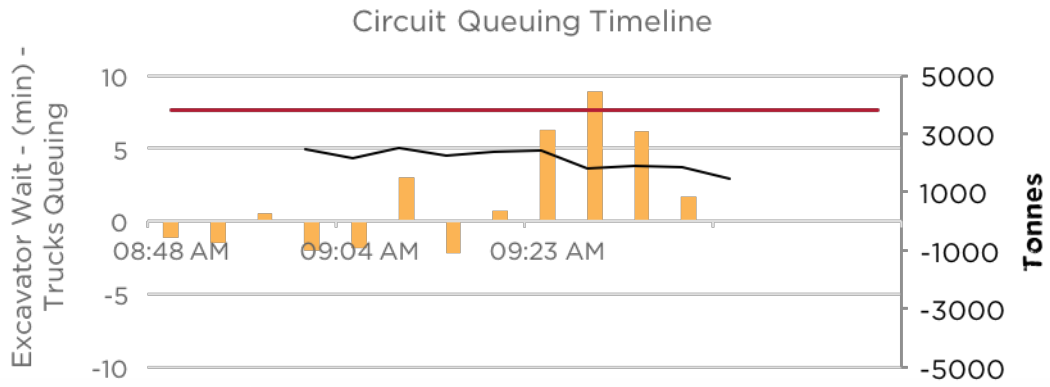

Fig. 3 - The study revealed significant trucks queuing time and moderate excavator waiting periods, highlighting opportunities for improvement.

2. Two circuits showed to be under-trucked day after day, resulting in excavator sub-optimization.
3. Recorded tonnage was known to often be inaccurate as many operators would simply record the tonnage capacity of the truck rather than the actual weight preventing management from optimizing circuits and implementing appropriate training

Truck Pairing Efficiency: Productivity Opportunity Using the 3D-P Production System

1. Through implementation of the 3D-P Production System, real-time visualization of production data, either at site or remotely, including truck queuing and spotting would allow management to re-direct trucks or ask to have their speed adjusted (resulting in fuel savings).
2. The real-time visualization of the circuit using the 3D-P Production System would highlight under-trucked circuits and allow for adjustments during shifts. In this study, it was calculated that the addition of 2 trucks would equate to a 1,072 t/h increase over two circuits, or a production increase of 7Mt per year (based on an available time of 6518 hours per year for the excavator).
3. At the operator level, the in-cab screen of the 3D-P Production System would provide real-time visualization of the bucket pass, total tonnage and centre of gravity allowing immediate improvement and consistency of each bucket pass. Real-time visualization would also ensure improved tonnage spread for reduced wear and tear.
4. At the operations level, in the office or remote operation centre, supervisors are able to monitor in real time the production status across the whole site and easily drill down into any load/haul circuit to quickly assess current production against target.

Fig. 4 - Operational view of the excavators' performance providing real time production status to the site supervisors.

Fig. 5 - Drill down showing detailed performance of an excavator.

Haul Cycle Efficiency: Reported Problems

1. Productivity data was manually collected and entered leading to resource inefficiency, errors and delay in decision making.
2. Idle time couldn't be measured using manual data recording.

Haul Cycle Efficiency: Productivity Opportunity Using the 3D-P Production System

1. The use of the time manager module, available as part of the 3D-P Production System, would provide management with real time visibility on trucks idling time. A previous study completed by iVolve at another site yielded $80k per annum realized savings while looking after idle time.
2. At the operator level, it is expected that real time visualization of production targets will rapidly generate production improvements, as well as reduce radio chatter between truck and excavator operators.

Following completion of the production study, the site has started implementation of the 3D-P Production System, powered by iVolve at one of its sites.

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