4800XPC AC Case study

Three Pass Loading Ultra Class Trucks: A case study at Teck Fording River

Project challenge

To increase production, Teck, a leading producer of the metallurgical coal used in making steel, added a number of ultra-class haul trucks to its haulage fleet. While the site was successful in moving more material, it needed a way to fill the new 400-st trucks at a faster rate. In response, Teck began to explore its options, one being Komatsu's largest electric mining shovel — the 4800XPC AC. Designed to load ultra-class trucks in three passes instead of four while providing standout mechanical availability and efficient load cycle times, the 4800XPC AC was a clear match for Teck's material movement goals and long-term life-of-mine outlook.

Solution design

Teck and Komatsu personnel collaborated to address the site's loading unit productivity. Key areas of focus for the mine were faster, more efficient loading of their ultra-class trucks and retention of the standout availability and uptime provided by their current loading fleet.

Based on the long-standing success of the P&H electric rope shovel lineup, and with extensive input from Teck, Komatsu presented the 4800XPC AC as a solution that could help the mine achieve its loading productivity goals.

Upon reaching an agreement, Teck's local and corporate personnel partnered with Komatsu staff to facilitate the sign-off, manufacture, delivery, and first-ever implementation of the 4800XPC AC to the Fording River operation in southeastern British Columbia.

The solution

Before putting the 4800XPC AC to work, Teck and Komatsu personnel conducted an analysis to understand the potential ripple effect that increased production might have across the mine site. Specifically, data was collected and assessed to determine how significant gains in shovel productivity might affect the truck allocation, life-of-mine planning and ongoing maintenance. The results of the analysis are, as follows:

Elimination of one loading pass

A simple model, which factored in no changes to regular site conditions or workflow, was used to evaluate the effects of three- vs. four-pass loading.

Assumptions

Asset availability: 91%
Asset life: 20 years
Cycle time: 32 seconds
Operator efficiency: 53 minutes per hour
Propel time: 6%
Basic haul cycle: 30 minutes, on average
Truck exchange time: 30 seconds

Criteria for analysis	Three passes	Four passes
Payload per pass (st)	121.00	90.75
Average cycle time (sec)	32.0	32.0
Load out (sec)	96	128
Total load out (min)	2.10	2.63
Truck payload (st)	400	400
Trucks loaded per hour	23.72	18.92
Trucks required per hour	14.69	11.92
Productivity (STPH)	9,490	7,568
Yearly production (st)	56,937,143	45,405,570

Analysis conclusions

During the analysis phase, where operators performed three-pass loading, an additional 1,922 st were loaded per hour. Thus, eliminating the fourth pass could potentially equate to an additional 11,531,573 st of material loaded, per year.

All factors remaining constant, the three-pass loading scheme would enable the shovel to service nearly five additional trucks per hour at the loading unit and nearly three additional trucks overall during the assumed 30-minute haul cycle.

Asset life

Each electric mining shovel has an anticipated 20+ year lifespan. Extrapolation of the yearly production gains with three- vs. four-pass loading nets an additional 230,631,465 st loaded over the life of the shovel.

The potential loading gains can be equated to mining 25 years' worth of material in 20 years – the aim being to pull the net present value forward which could significantly reduce the mine's overall cost per ton (CPT).

Parts commonality and availability

When integrating the 4800XPC AC into Teck's existing fleet of 4100XPC AC shovels, maintenance of parts commonality and preservation of the mine's existing supply chains were important considerations. Commonalities between the two shovel models are, as follows:

- Major and critical parts: 81%
- Commissioning parts (drive system): 100%
- Consumables: 99% (100% if the same hoist rope diameter is utilized)

The results

Successful transition to three-pass loading of 400-st haul trucks

With the 135 st of additional payload capacity, and a right-sized ultra-class dipper based on site-provided geologic information, the 4800XPC AC enabled Teck to achieve its loading goal.

Availability and reliability

Teck personnel report that the overall availability and reliability of the 4800XPC AC have been excellent. Because Teck already had a number of 4100XPC AC shovels in its fleet, the learning curve for the 4800XPC AC was greatly reduced. Machine familiarity and support from Komatsu Engineering and local field representatives led to standout mechanical availability.

What Teck had to say about the 4800XPC AC…

"The P&H 4800 shovel is an impressive unit. It's highly productive and its availability has been fantastic since it's been here."

"This shovel has honestly been the easiest transition for new technology that I've seen come into a large mining application."

"Three-pass loading ultra-class trucks, in the Komatsu 980Es we've got here, has been a great benefit for us."

Lower TCO

With the 4800XPC AC making three-pass loading of ultra-class trucks a reality, the cost to move material in a truck/shovel operation has never been lower. By enabling Teck to move their material faster, more efficiently, and in the same safe manner they are accustomed to, the 4800XPC AC will help the mine expand its plans for economic advancement.