KOMATSU

The impact of eliminating one loading pass

case study

Project challenge

Teck, a leading producer of the metallurgical coal used in making steel, was moving more material after adding ultra-class haul trucks to its haulage fleet. But to fully achieve its goals, the company needed to fill its new 400-st trucks at a faster rate. A key concern was retaining the standout availability and uptime provided by the current loading fleet.

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

Solution design

Teck and Komatsu personnel collaborated to address the site's loading unit productivity. 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.

Komatsu's largest electric mining shovel, the 4800XPC AC is designed to load ultra-class trucks in three passes instead of four. With 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.

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. But before putting it to work, Teck and Komatsu conducted an analysis to understand the potential ripple effect that increased production might have across the mine site.

The solution

Teck and Komatsu personnel collected and assessed data to determine how significant gains in shovel productivity might affect truck allocation, life-of-mine planning and ongoing maintenance. A simple model, which factored no changes to regular site conditions or workflow, was used to evaluate the effects of three- vs. four-pass loading.

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.

Impact on asset life was also studied, keeping in mind that each electric mining shovel has an anticipated 20+ year lifespan. Extrapolation of the yearly production gains with three- vs. four-pass loading netted an additional 230,631,465 st loaded over the life of the shovel. The loading gains can be equated to mining 25 years' worth of material in 20 years – pulling the net present value forward and significantly reducing the mine's overall cost per ton (CPT).

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)	32.00	32.00
Load out (sec)	96.00	128.00
Total load out (min)	2.10	2.63
Truck payload (st)	400.00	400.00
Trucks loaded per hour	23.72	18.92
Trucks required per hour	14.69	11.92
Productivity (STPH)	9,490.00	7,568.00
Yearly production (st)	56,937,143.00	45,405,570.00

Maintenance of parts commonality and preservation of the mine's existing supply chains were important considerations when integrating the 4800XPC AC into Teck's existing fleet of 4100XPC AC shovels. 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

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.

Site 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.

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 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.

For more information, contact your Komatsu representative or visit komatsu.com/success-stories/

KOMATSU

komatsu.com