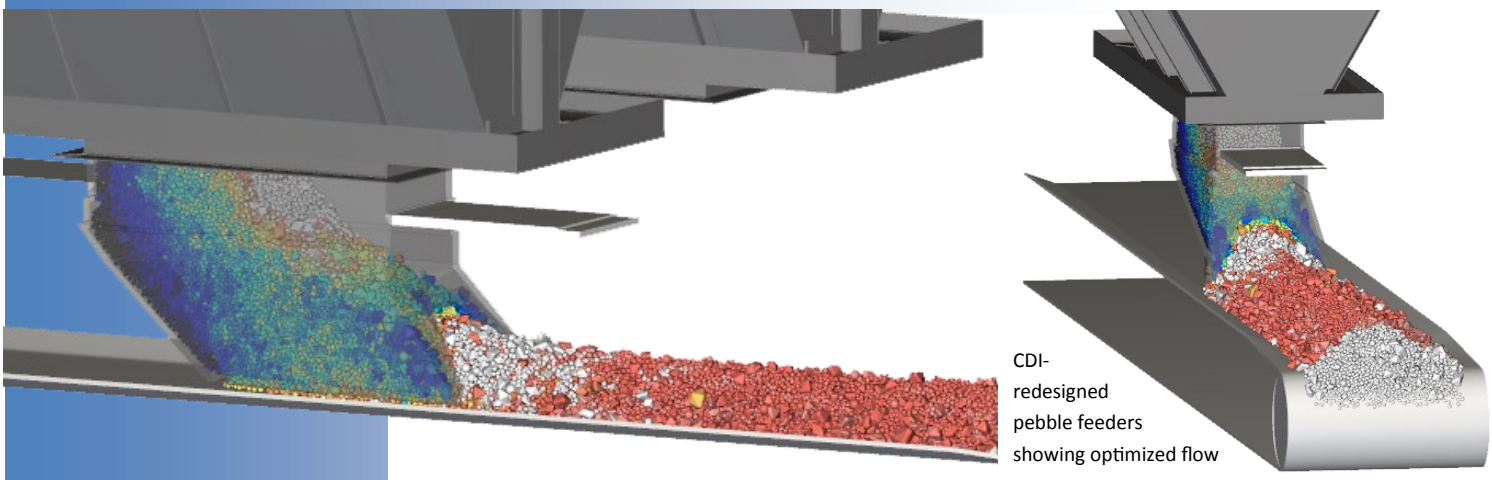
CASE STUDY

Teck
Highland Valley Copper



CDI-redesigned pebble feeders showing optimized flow

CDI Uses Rocky DEM to Evaluate and Optimize Two Existing Crushed Pebble Feeders

Conveyor Dynamics, Inc. (CDI) was contracted by Teck Resources Limited to analyze and redesign two crushed pebble feeders located within their Highland Valley Copper (HVC) mine site in British Columbia, Canada. To save costs and limit downtime, HVC asked us to design for solutions that limited changes to the existing equipment while still meeting the following goals:

- Increase the combined throughput from 1000 MTPH to 1300 MTPH
- Increase the maximum lump size from 101 mm (4 in.) to 152 mm (6 in.)
- Eliminate belt damage from ore getting trapped between the feeder belt and the feeder discharge box

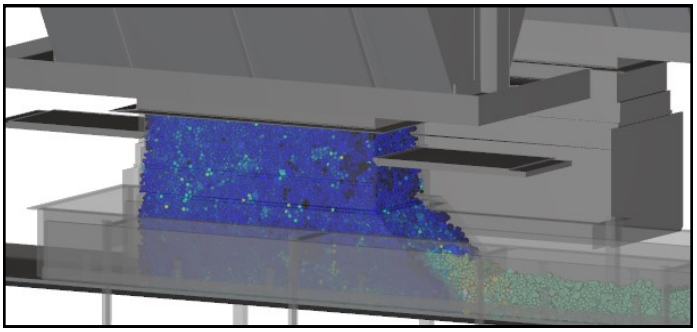


Image 1: Rocky simulation of the original feeder design showing stagnant / starved flow (dark blue particles) due to a poorly optimized design and increased maximum lump size

- Reduce the loading zone shear wear on the receiving belts
- Increase the mean-time-to-failure (MTTF) of the skirt board wear plates

To test and validate our design changes, we relied upon Rocky Discrete Element Modeling (DEM) software to quickly and accurately simulate how the ore was likely to behave when inside the equipment. We started our analysis within Rocky by developing a representative material calibrated specifically for the HVC project. We then created a simulation using this calibrated material along with the original chute geometries (Image 1). After comparing the simulation results with the existing conditions and ensuring they were a close match, we then used the results as a design baseline for testing our future solutions.

After analyzing the baseline results, we determined that we needed to completely redesign the feeder boxes and shear openings (Image 2). Key features of the final design included the following:

- Increased the belt width from 1219.2 mm (48 in.) to 1320.4 mm (52 in.)
- Increased the belt speed from 0.49 m/s (1.61 ft/s) to 1.0 m/s (3.28 ft/s)
- Reduced the length of the feeder discharge box by adding an angled back wall to the feeder
- Tapered the lower discharge opening from front to back
- Reduced the top opening of the feeder box from 1500 mm to 800 mm
- Adjusted the design of the front shaper by increasing height and adding an angle to the sides

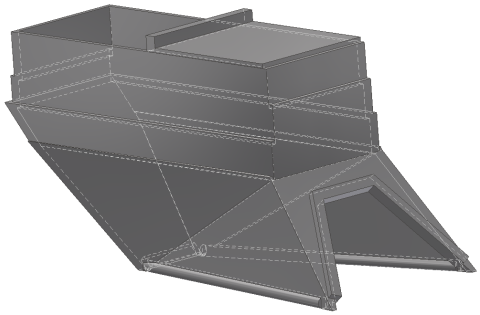


Image 2: 3D rendering of optimized feeder box redesigned by CDI

As demonstrated by further Rocky simulations, this new optimized design exceeded HVC's goals by producing a calculated throughput of 670 MTPH per feeder (1340 MTPH combined) and completely eliminating the need for the skirting. HVC later opted to keep some of the original skirting only at the loading zone as an additional safety measure. The photo in Image 3 (below right) was taken before the other skirting was removed.

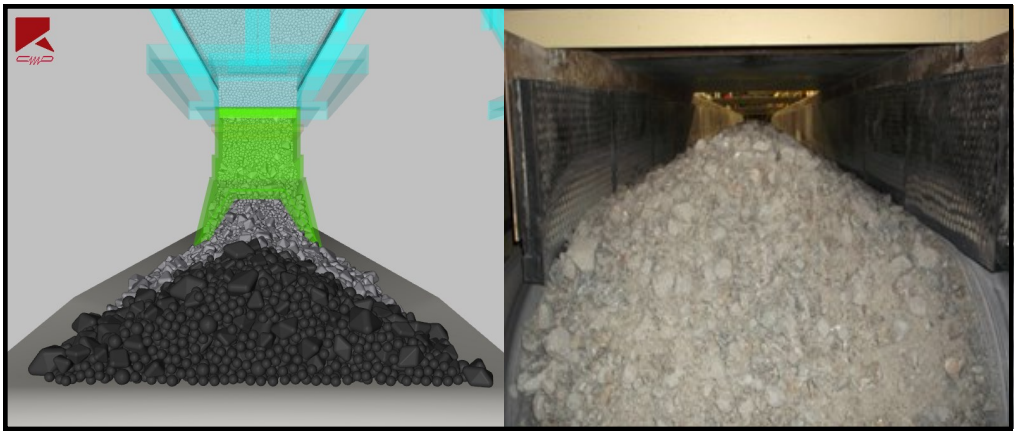


Image 3: Calibrated material profile simulated in Rocky (left). Real material profile after implementing CDI's design changes (right).

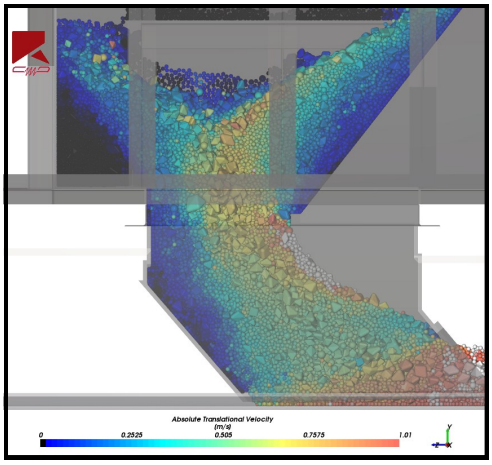


Image 4: Center section cut down middle of redesigned feeder illustrating improved particle flow

The material's more natural flow through the feeder (Image 4) coupled with the reduced loading area on the belt resulted in a drastic reduction in shear wear (Image 5). Additionally, ore was shown to no longer be trapped between the feeder discharge box and the belt, which will significantly reduce belt wear and damage.

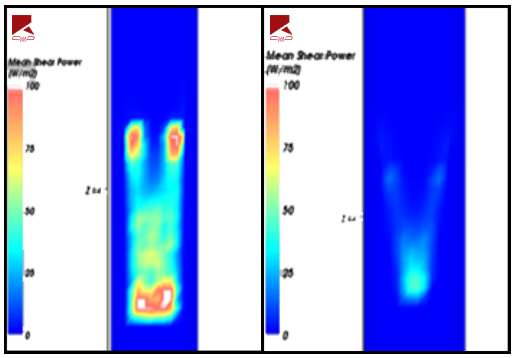


Image 5: Mean shear power comparison: Original design (left) vs. CDI redesign (right)

With the help of Rocky DEM software, CDI was able to redesign HVC's two pebble feeders and then virtually test them to ensure all design goals were met before installation. In this way, HVC was able to implement our solution with confidence.

Since 1981, Conveyor Dynamics, Inc. has proudly served the mining and minerals processing industry as a leading consultant in the analysis and design of material handling systems and conveyor components for construction and manufacturing organizations around the world.

Our design and analysis services cover a wide range of material handling equipment, including:

- Trough belt conveyors
- Pipe belt conveyors
- Feeder conveyors
- Transfer chutes
- Ore comminution (crushing and grinding) equipment

Contact us to learn more about how we can help you optimize your bulk material handling systems.

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