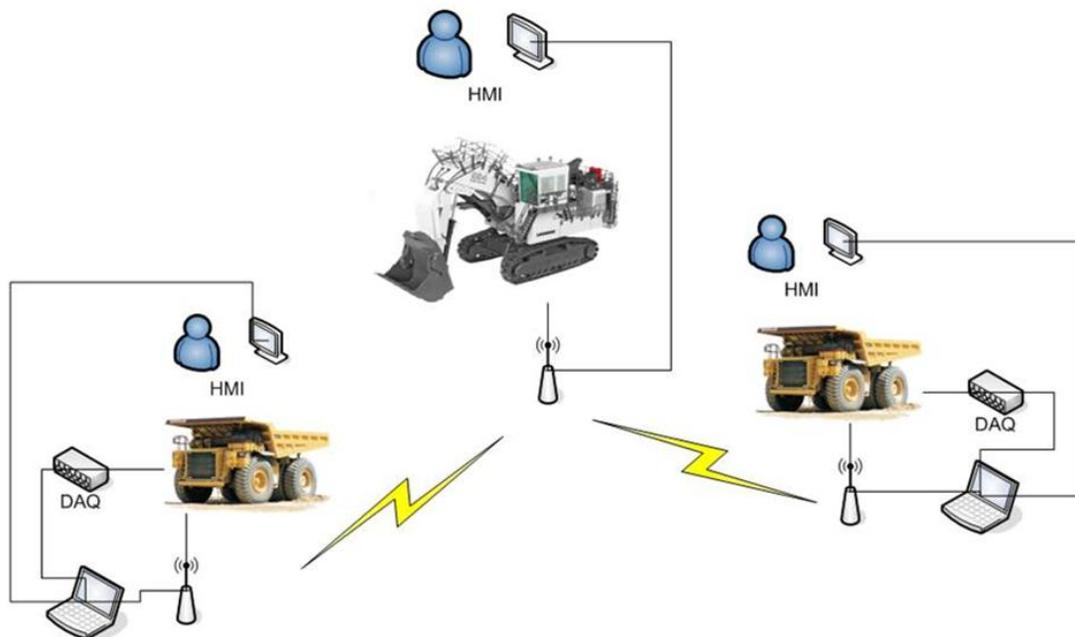
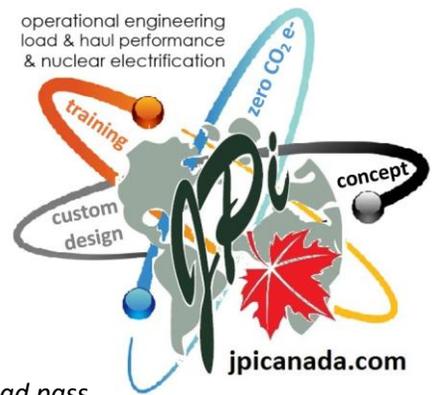


## JPI “LoadPerfect” design concept

The direct benefit from “LoadPerfect” to a HEX or e-rope shovel is principally operator assistance in creating a pass by pass more balanced hauler load, with operator visual direction for successive load placement; the greater benefits are to the haul fleet in both achieving payload delivery and significantly reducing adverse rack pitch and roll motion; that in turn impact (a) hauler structural fatigue, availability and maintenance (b) tire life, (c) operator WBV and (d) running surface quality. The latter directly impacting rolling resistance, hauler cycle time, road maintenance and longevity (impacting costly road profile construction thickness design outlays). JPI sees the overall benefit to any end user of such a product as a major assist in operations controlling operating and maintenance costs, downtime and extending the productive capability of a fleet.



Since the initial 2009 “LoadPerfect” concept, JPI has progressed, with the assistance of academic researchers, the development of hauler body limited progressive multi-cone geometric analysis, to capture a generic algorithm process that could be determined solely for any known body geometry and hauler suspension pressures transmitted in close quarters IP acquisition from hauler to HEX/shovel, per specific hauler ID, body specs.



## **JPI “LoadPerfect” algorithm** (*origin source code after J. Henze*)

### **1. Import Strut Data**

Hauler body dimensions

1 Hz suspension pressure data x 4 *limited by significant change triggered by load pass*

### **2. Create & Display Truck Model**

Auto-generate the truck body boundaries: floor, front and side walls and orientation

Pre-set Body Length and Width to nearest integer

Initialize Body Floor Coordinates *in a* Surface3D array

Use Body Length and Width, and a set Grid Size to determine array length

Determine total number of grid points

For each point in Body Floor Coordinates, determine z-coordinate

Create triangle mesh of Body Floor Coordinates

Create model of body sides

Find center of x, y and z ranges

Display models

Clear any variables saved from last truck

### **3. Collect Strut Reading**

Close IP acquisition via on-board system

Input pass *suspension* data as cumulative load pass signals

Select values corresponding to the load pass strut pressures

### **4. Determine and Display Load Shape and Position “Visual screen only for excavator/shovel ops”**

Auto-add loads by pass

Get input Settings Data and Sensor Readings from Main Model

Input pre-set Body Length and Width

Initialize Surface3D arrays for Body Floor Coordinates and Cone Coordinates

Use rounded Body Length and Width, and Grid Size to determine array length

Calculate change in sensor readings from previous load or empty state

Calculate weight and estimate volume of most recently placed load pass

Calculate centroid of placed load using sensor readings

*Calculate Body Floor Coordinates* to determine z-coordinate

Determine shape of cone with above body volume that meets ‘*a single conical material shape*’

Calculate shape which meets estimated load volume *and Calculate Centroids*

Search to determine shape with centroid closest to measured and output coordinate of cone peak

Create a Surface3D array to represent a simple cone with peak located at previously output coordinate

Assign colors to each point in the array based on the z-coordinate

Color gradient goes from blue to yellow to red

Create triangle mesh model of array

Apply View Matrix to translate and scale the model to match and display the body model

### **5. Repeat Steps 3 & 4 until all load passes have been modelled and displayed**