

## MODULAR MINING

### LOCATION

A coal mine in  
Indonesia

### GOAL

Reduce fuel  
consumption in haul  
trucks

### RESULTS

Fuel consumption  
improvement of 18%,  
representing an annual  
fuel savings of nearly  
US\$3.4M

## Indonesia coal mine reduces haul truck fuel consumption by 18% with MineCare and Performance Assurance

Modular Mining's Performance Assurance (PA) program helps mining customers uncover and achieve untapped potential, helping them realize the most value from their Modular Mining technologies. Regular site visits, done remotely where necessary to ensure health and safety protocols, conducted by experts in both mining and Modular Mining technology solutions, help mine sites worldwide drive significant improvements in productivity, efficiency, and safety.

A large coal mine in Indonesia leverages Modular Mining's MineCare® Maintenance Management system, as well as the DISPATCH® FMS and ProVision® Machine Guidance systems, to optimize their operations.

### Challenge

Recognizing erosion of their profit margins resulting from excessive haul truck fuel consumption, the mine requested help from Modular Mining's PA team to identify the root cause and improve their fuel burn rates.

The mine also reported excessive oil filter events, identified in real time by their MineCare system, which was severely affecting overall engine reliability. Blocked oil filters indicated heavy contamination in engine oil, resulting from friction-related metal particles and combustion byproducts, that caused the oil to thicken and lose its lubricity and viscosity. As a result, the truck engines were working harder to overcome the oil's sludgy composition - burning more fuel and causing the engine to run hotter and less efficiently. The overworked engine also reduced the haul truck's horsepower and caused excessive, unnecessary engine wear, potentially threatening the truck's long-term durability.

## Solution

To monitor the mine’s fuel burn rates, the PA team leveraged the site’s existing MineCare system to initiate Trend Monitoring for the affected haul trucks - collecting fuel consumption rates, engine load, and payload data.

The team then coached the site’s MineCare users to identify critical issues, such as low injector pressures and oil filter blockages, and established custom, User-defined alarms to notify them, in real time, to these issues.

Finally, the team helped the mine standardize their work order method to ensure proactive action against events affecting fuel burn rates, especially:

- Incorrect fuel injector pressure
- Incorrect fuel injector timing
- Oil filter blockages

## Results

By carefully monitoring, and proactively addressing, potentially-critical issues that were directly affecting the haul trucks’ fuel consumption, the PA team and MineCare system helped the site improve their fuel consumption by more than 18%, from an average 373 liters per hour prior to Modular Mining’s involvement, to 305 liters per hour (at max engine load and empty payload<sup>1</sup>) after, as shown in figure 1. This equates to a potential ~US\$160,000 fuel savings per year, per truck<sup>2</sup>. 21 of the mine’s 39 trucks of this make and model were

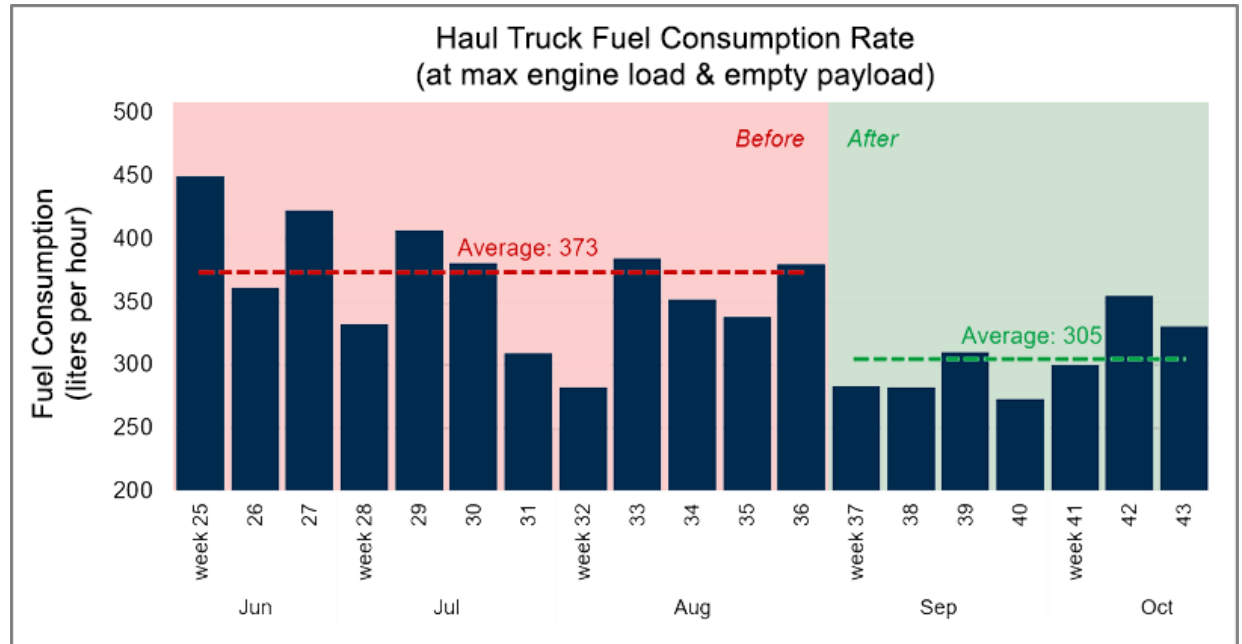


Figure 1. The mine’s haul truck fuel consumption rate declined by 18% after Modular Mining’s involvement.

<sup>1</sup> For consistency, conditions recorded at engine load = 100% and payload = 0 tonnes

<sup>2</sup> Fuel calculation: 18% x 3,700 liters per tank x US\$0.8 per liter x ~300 days operation per year (~80% availability)

affected by injector and oil filter issues; extrapolating the \$160,000 annual savings across all 21 affected trucks equates to an annual fuel savings of nearly US\$3.4 million.

Additionally, since the mine’s maintenance staff were now monitoring for these potential issues, and leveraging the MineCare system’s user-defined alerts to identify problems before the OEM sensors did, they were able to pinpoint and remedy these issues before they could become major inhibitors of efficient fuel consumption. As a result, the number of fuel injector and oil filter blockage events were reduced from a peak of 255,000 OEM events per week (before Modular Mining’s involvement) to 0 OEM events per week after (figures 2 and 3).

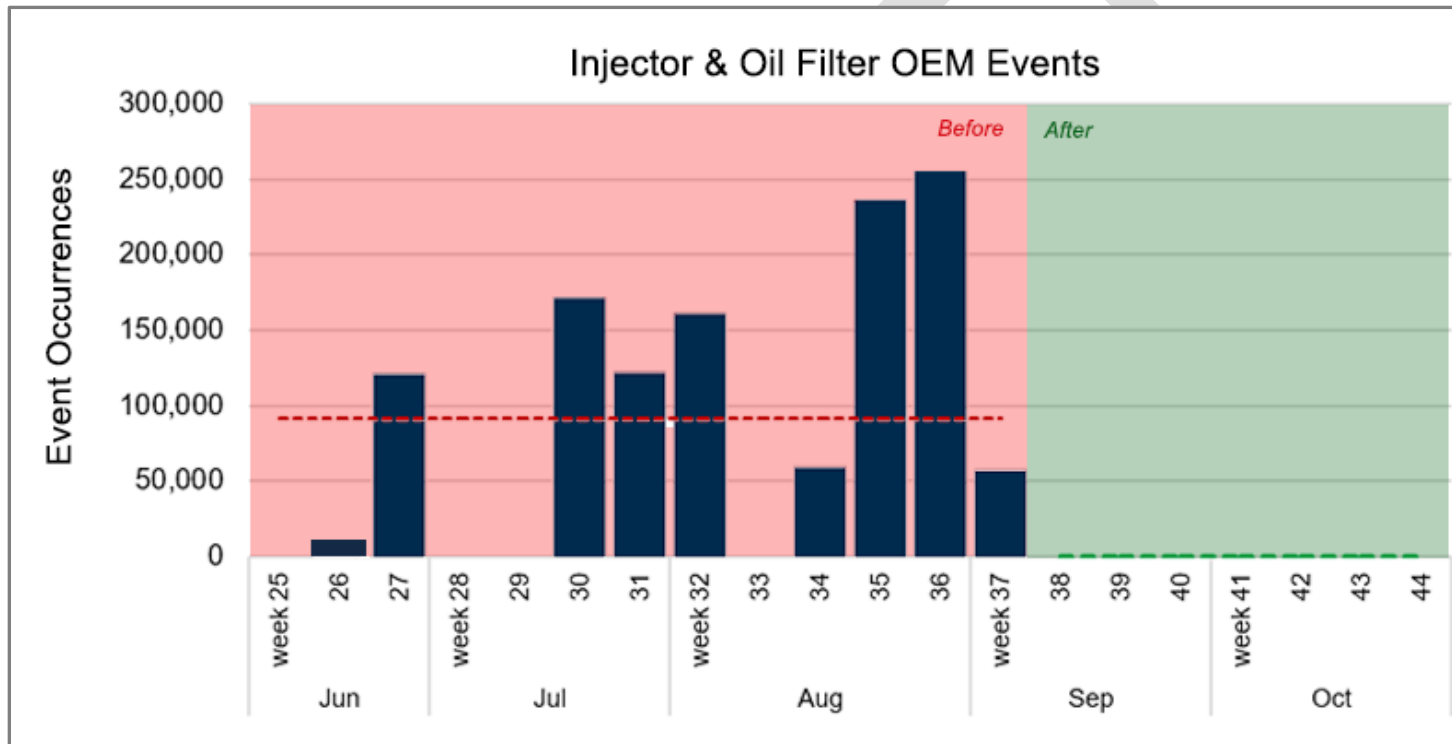
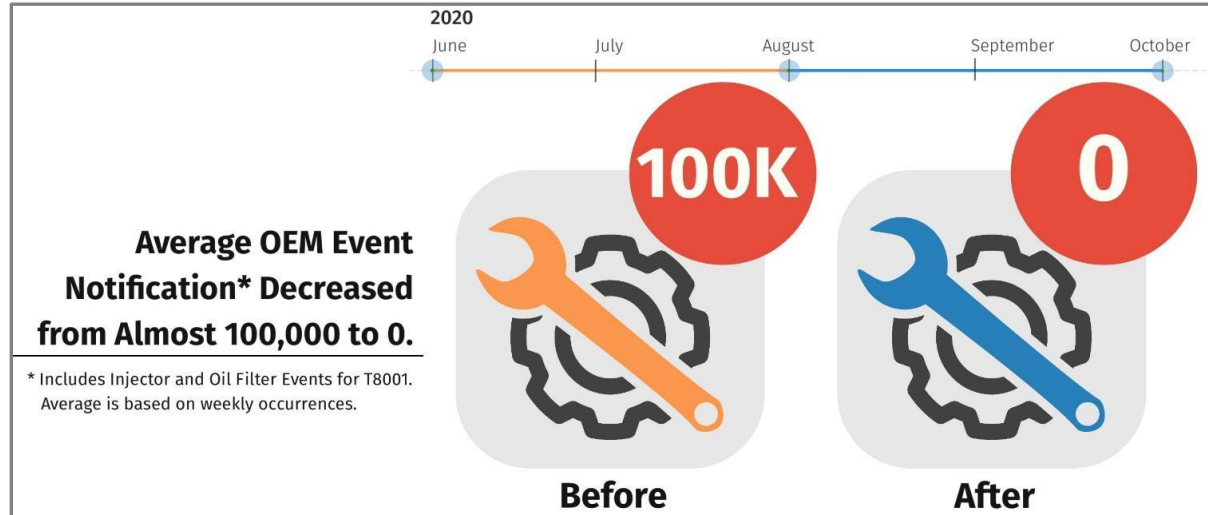


Figure 2. After completing the necessary maintenance identified by Modular Mining and the new MineCare alerts, the mine eliminated its OEM events related to injectors and oil filters.

## MODULAR MINING CASE STUDY

Figure 3. Prior to Modular Mining's involvement, the mine saw an average of 100,000 OEM event notifications related to haul truck injectors and oil filters per month.

After Modular Mining's involvement, the site has eliminated these OEM event notifications.



### Conclusion

Fuel represents a large portion of many mining organizations' operating costs. By optimizing their fuel consumption and minimizing their unnecessary fuel burn, this coal mine, with the help of the Modular Mining PA program, was able to reduce their average fuel consumption by more than 18%, saving an estimated US\$3.36M in fuel costs per year across their affected trucks.

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