Rhonda Knotts, Modular Mining, USA, explains how global experience, local presence and personal relationships add up to increased value for customers.

LEND A HELPING HAND

In June 2015, Modular Mining introduced its performance assurance (PA) programme. This service-focused initiative reflects the company's strategic commitment to helping its customers, worldwide, realise maximum applied value over the life of their Modular investment.

Based on the Japanese principle of GEMBA (loosely translated as 'going to the place where value is created'), PA engagements take place at the customer site. There, a dedicated PA team collaborates with mine personnel across multiple levels to develop tailored, flexible, proactive solutions; establish mutually-defined goals and milestones; and create quantifiable key performance indicators. Programme participants have reported a wide range of benefits, including enhanced truck productivity, reduced truck queue times, shorter shift change durations and lowered equipment maintenance costs.

This article presents three real world case studies highlighting how Modular's PA teams helped a trio of coal operations – two in Australia and one in the US – achieve or exceed their respective operational improvement goals.

Australian coal operation put the brakes on overspeed incidents

Modular's PA team commenced work on a new project in November 2017 at an opencast coal mine in New South Wales. Throughout the engagement, part of an ongoing PA relationship, the team collaborated with mine personnel to address one or more aspects of their continuous improvement plan.

As with many opencast mines in Australia, the traffic control methods used along haulage routes differ from those used on public roadways. For example, instead of 'stop' or 'give way' signs posted at

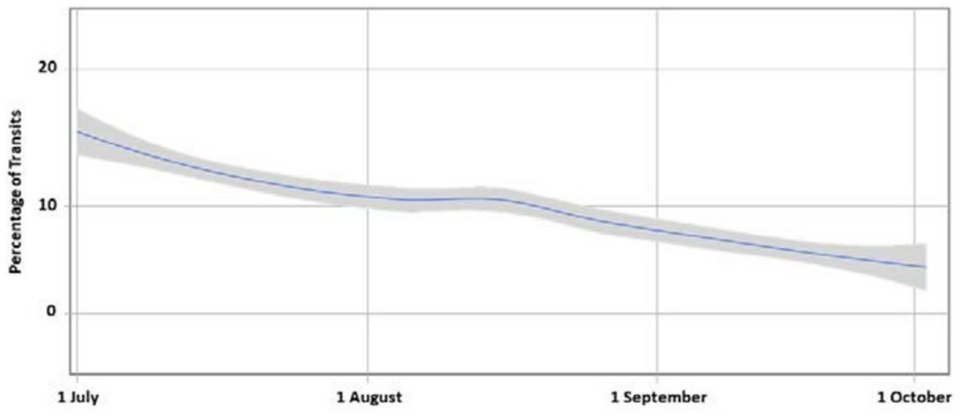

Figure 1. Reduction in the percentage of overspeed incidents at all speed-restricted intersections.

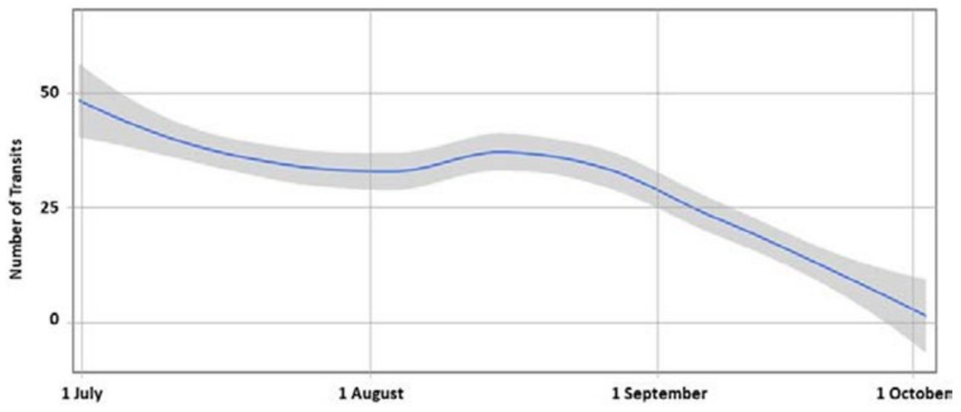

Figure 2. Reduction in the number of overspeed incidents at a specific speed-restricted intersection.

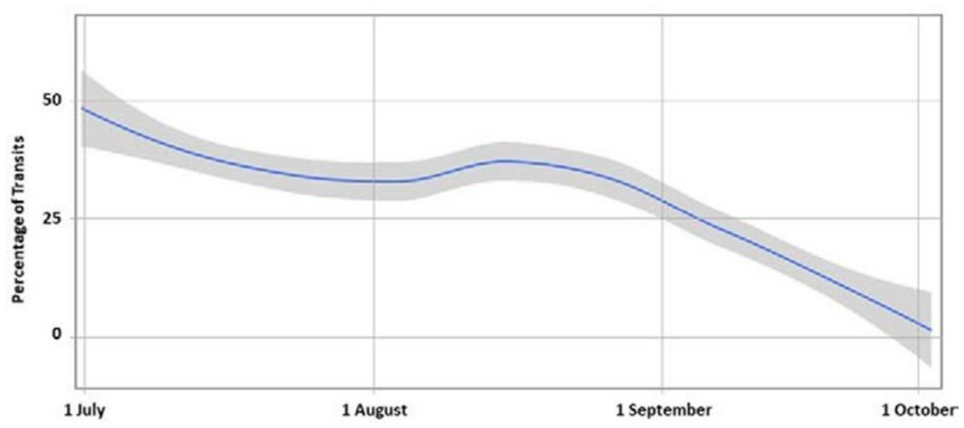

Figure 3. Reduction in the number of overspeed incidents of more than 10 km/hr at a specific speed-restricted intersection.

intersections as one might encounter on a standard thoroughfare, the site manages in-pit traffic flow through a hierarchical system based on vehicle size and type. The Priority Pit Traffic Rules not only reduce congestion and bottlenecks for increased productivity, they also improve safety because the right of way is given to vehicles approaching from the left, where visibility is best for haul trucks. Additionally, one of the site's best practices dictates that drivers must slow their speed to 40 km/hr at the mine's busiest intersections, as indicated by coloured markers.

The PA team evaluated the mine's haulage efficiency by analysing speed variations among old and new trucks in the fleet during a June 2018 site visit. While observing the haulage routes, the PA team discovered and reported that operators routinely travelled through high traffic intersections at speeds above the mine's prescribed limit. Concerned with the potential safety risks, mine personnel requested that the PA team turn their attention to investigating and resolving the problem.

Problem

Investigation results from early June through early July revealed that drivers routinely proceeded through intersections at speeds above the defined limit. Upon being made aware of the issue, the mine operator asked the PA team to narrow the scope of their analysis to the seven intersections governed by the 40 km/hr restriction.

Not long after the PA team began its targeted research, a serious truck-on-truck accident occurred at the site. To help in the reconstruction of events leading up to the incident, the PA team extracted GPS location data from the mine's DISPATCH® fleet management system (FMS) database. Mine personnel and investigators used the Modular-provided data as a tool in identifying the circumstances of the accident, later determined to have been the result of driver fatigue.

Following the accident, the mine held safety briefings with the operators and erected reminder signage at speed-restricted intersections. The mine also took steps to further improve driver intersection visibility by ensuring that all crossroads were at 90° angles (no obliques), windrows were at the correct height and placement, and all signage and delineators were well maintained and clear of dirt and debris.

Results

When the PA team returned to the site for a follow-up engagement, they reported upon the data collected and analysed during the intersection overspeed investigation. The improvements, illustrated in the graphs and described throughout the article, are directly attributable to the mine's adoption and execution of the PA team's recommendations for change.

Incidents of overspeeding at all seven 40 km/hr restricted intersections dropped from 15% to 4%, for a 73% overall improvement in compliance (Figure 1).

With a dramatic decline of nearly 100% in the number of overspeed events at an intersection where close to 50% of the through traffic previously exceeded the 40 km/hr restriction, incidents of overspeeding at all seven 40 km/hr restricted intersections dropped from 15% to 4%, for a 73% overall improvement in compliance (Figure 2).

More than 10 km/hr reduction in overspeed events at some speed-restricted intersections (single intersection shown) where the average travel speed dropped dramatically, from 53 km/hr to 43 km/hr (Figure 3).

To further increase safety risk mitigation, the mine elected to add the DISPATCH Speed Management module (which measures equipment velocity as it travels through GPS-monitored zones) to its FMS configuration. When the Speed Management module is used in conjunction with the FastFeedback module (already installed at the mine), supervisors and operators will receive simultaneous, real time speed violation notifications, facilitating heightened driver awareness, immediate corrective action and ongoing behaviour modification.

With the help of Modular PA, the mine was able to identify a previously undetected issue with potential safety risk implications. The mine was then able to resolve the problem by utilising functionality within its existing DISPATCH FMS and by adding real time speed management capability to improve procedural compliance in the future.

Australian coal operation increases truck availability through automated fuelling assignments

In September 2017, Modular's PA team consulted with personnel at an opencast operation in the southwest of Western Australia. During the engagement, the mine requested assistance in identifying opportunities to increase both truck availability and production, at a minimal cost to the site.

After reviewing a number of options, the PA team recommended that the mine focus on automating its refuelling process by leveraging underutilised capabilities of its DISPATCH FMS. With the mine's approval, the PA team began working to understand and evaluate the operation's fuelling-related practices.

Problem

Through analysis, observation and discussion, the PA team identified that 95% of the mine's fuelling assignments were manually initiated by dispatchers when fuel levels dropped below 40%. In contrast, the 5% of DISPATCH FMS-initiated fuelling assignments occurred at fuel levels between 30% and 27%; a site-configured threshold that resulted in fewer unproductive trips to and from the fuel bay.

Resolution

Modular returned to the mine in October and worked with dispatch personnel to enhance fuelling optimisation at the site. Together, they fine-tuned the DISPATCH system configuration and developed training and process documents for the management of fuelling assignments. The PA team and mine supervisors then met with the dispatchers and operators to convey how the new fuelling process would reduce the time trucks spent in the fuel bay, resulting in increased truck availability, production and overall profits. With the help of the PA team, the dispatchers and operators gained an understanding of not only what the new process would consist of, but also how implementing it would benefit operations. As a result, the dispatchers and operators were more likely to accept and adopt the new practices with less resistance to change.

In the initial phase of the plan, the PA team configured the DISPATCH FMS to optimise fuel assignments when fuel reserves reached 30%. If fuel levels continued to drop, the FMS would then assign a truck for fuelling when fuel levels dropped to the 'critical' mark at 27% remaining. Five months later, the PA team expanded the fuelling configuration to include custom parameters that would enable refuelling assignments for specific trucks to occur between 24% and 19%, or 25% and 20%, depending on truck type.

Results

Between September 2017 and May 2018, the PA team identified a reduction in non-productive travel time (time from receiving assignment to arrival at fuel bay) and fuel delay time (time spent at the fuel bay). Across the fleet, non-productive travel time dropped from 80 hours to 42 hours, for a gain of approximately 38 truck-hours (Figure 4).

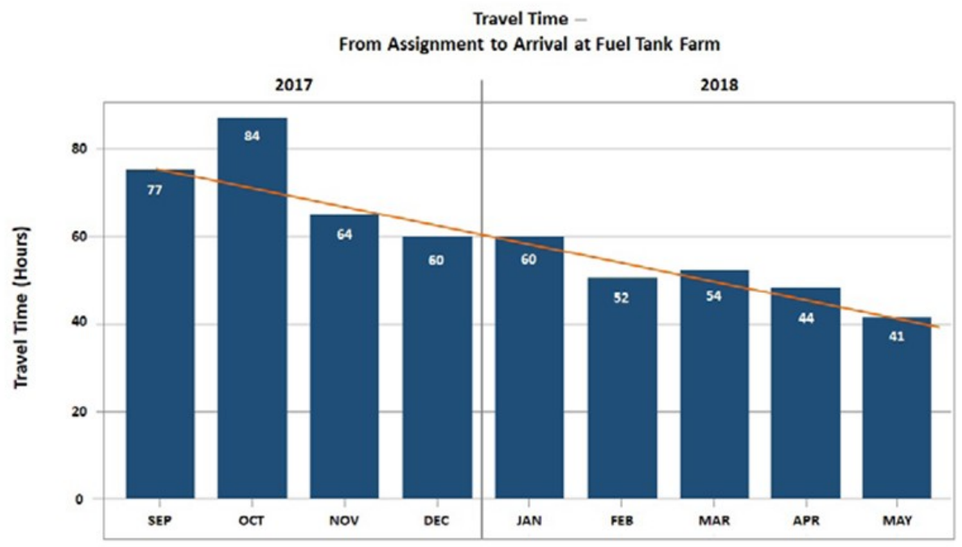

Figure 4. Reduction in travel time.

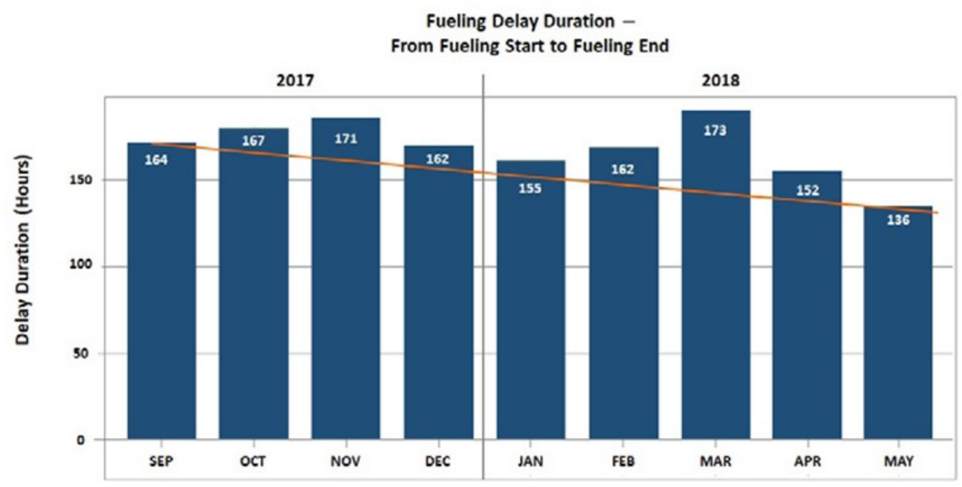

Figure 5. Reduction in fuelling delay duration.

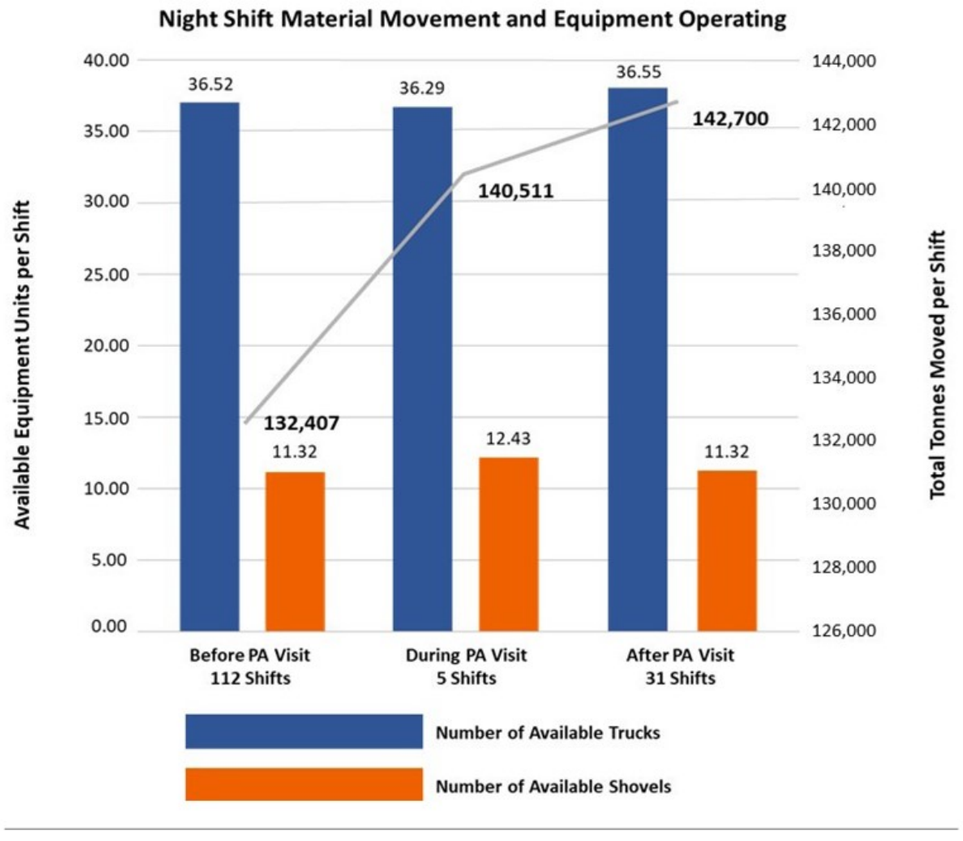

Figure 6. Productivity improvements after PA engagement.

Despite a slight spike in March, resulting from a truck running out of fuel because of a broken sensor, overall fuel delay time between September 2017 and May 2018 was reduced from 164 hours to 136 hours – a gain of approximately 28 truck-hours (Figure 5).

Bear Run mine increases nightshift production by nearly 8%

FMSs are deployed at the majority of opencast mines, where the systems provide numerous operational efficiencies and productivity gains. However, not all mines utilise the technology to its full potential, thus leaving value behind. This was the case for the nightshift operations at Peabody Energy's Bear Run opencast coal mine in Sullivan County, Indiana (USA).

Problem

On the dayshift, Bear Run's dispatchers took full advantage of the DISPATCH FMS functionality. Their utilisation of the system's capabilities – including automated truck-shovel pairing, real time dynamic assignment changes and haulage optimisation – was evidenced by the dayshift's consistently high performance. In contrast, despite having the same access to the DISPATCH system as the dayshift, nightshift performance was routinely low; a concern that mine personnel brought to the attention of the Modular PA team.

As part of an onsite engagement, the PA team observed the mine's operating practices for five nights and collected production data for analysis. The PA team learned that the nightshift dispatch crew had a high percentage of new-hires. Limited experience with the DISPATCH system and a lack of understanding of the FMS' ability to control the fleet, led the dispatchers to specify which shovel each truck would (or would not) use for loading. Because these methods, known as locking and barring, do not consider changes in pit conditions or equipment status when making assignments, they often lead to decreased performance and lower production totals. In contrast, running the DISAPTCH system unlocked, as done during the dayshift, takes full advantage of the FMS' dynamic fleet optimisation capabilities for increased productivity and efficiency.

Resolution

PA team members worked alongside Bear Run's nightshift dispatchers to explain the importance of key FMS functions and show the dispatchers how correct FMS utilisation would have a positive impact on performance. The PA team also conducted targeted coaching and mentoring sessions to reinforce how the accuracy of the FMS' haulage route map affected the system's ability to optimise truck assignments for maximum efficiency. A site-specific dispatcher daily checklist was also provided to help the dispatchers manage system configuration and parameters.

Results

According to Eric Griffith, Lead Dispatcher at Bear Run, one month after the PA team worked with the dispatchers, Bear Run's nightshift production rates and truck availability increased by 7.77%. This equates to nearly 10 300 additional tonnes of material moved per shift – an estimated monthly gain of US$1.6 million.

"The PA team from Modular and the fleet management team at Bear Run; working together through planning, weekly follow-up and quarterly site visit execution, have improved optimisation practices by the dispatchers," said Griffith. "Every cycle visit, we look forward to the continuous improvement we are experiencing, together."

The improvements shown in Figure 6 can be directly attributed to the dispatcher coaching sessions and Bear Run's willingness to alter a number of their operating practices based on the PA team's recommendations. WC