Adding Significant Mine-site Value Via Fleet Management Systems (FMS) and Related Technologies

As a prominent mining nation, Australia has an opportunity to be the industry leader in inter-operability, autonomy and data-driven decision-making. With considerable diversity across commodities and mining methods, Australia is ideally placed to lead the future of mining in interoperability, autonomy and the data driven mine.

One of Xenith's Managers work experiences has led him to believe that there are three key aspects relating to the application of technology within the mining environment;

1. Education and awareness of how other industries both within Australia and overseas are approaching data-driven decision making and autonomy.

2. Thinking "outside the box" about how to apply such technologies and innovation within the workplace.

3. Partnering with passionate and innovative people and organisations in order to explore and deliver new ideas.

As a young engineer, Zane Christensen worked on mine sites that had manual and/or low-technology activities as part of the mining cycle. This included time-consuming, manual pit surveys and set-outs as well as routine dig and dump compliance management using laser levels. Due to safety-related standard operating procedures, these tasks also often interrupted the mining operations. In addition to this, there were several inefficient, paper-based recording systems such as timesheets and truck counts as well as manual stockpile and payload management records. These were often time-consuming and prone to error.

In Zane's words, he "hated doing the number crunching which frequently involved the transfer of inaccurate, paper-based data into information for his manager to three decimal places , knowing full well that too much time was being spent on the task".

A strategic career move saw Zane move to a more innovative site with the scope to address many of these manual, time-consuming tasks that he had experienced elsewhere. This included an equipment monitoring system which recorded numerous machine metrics in real-time along with a series of state-of-the-art outputs that included dashboards and fit-for-purpose tables and graphs.

The introduction of a fleet management system (FMS) utilising a high-precision global positioning system was another step in the right direction however, this highlighted shortcomings in incumbent systems. Issues included data management challenges, interoperability issues with other reporting systems as well as poor tactical planning and the lack of an overall, coherent technology and data strategy.

Education and training for system users was identified as a crucial component of the overall project and took time to fully embed. In one particular instance, it was more than 12 months before a site-specific training package was fully embedded.

Having worked through the initial teething phase, the site was committed to change and continued to develop their FMS and related systems.

Pro-active development included the relocation of bulldozer tilt sensors in order to provide more accurate results as well as to provide the ability for operators to view cross-sections when cutting wall batters. A pro-active maintenance and asset monitoring system was also evaluated but, unfortunately, was not implemented due to a resistance to change from some parts of the business.

One of the positive outcomes of the move to FMS was the establishment of a mutually beneficial working relationship between the mine owner and systems suppliers so that the FMS development project could continue to evolve over time. Rather than just becoming a data gathering and reporting system, it became a real-time, decision-making tool which moved the mine one step closer towards autonomous mining.

In today's working environment, FMS data can be used across the business. Applications include the validation of life of mine haulage using actual FMS haulage data, analysing machine efficiency across multiple mine sites and identifying where potential areas of improvement exist.

As a consultant with experience in the transition away from manual-based recording systems, in his current role at Xenith Zane is able to provide valuable insight into benchmark systems and processes against other sites and pin-point areas for improvement.

Other areas of interest for Zane include end-to-end coal supply chains optimisation and machine learning as well as cloud-based computing that assists in solving and optimising complex stockpiling logic. This may include the application of drones in capturing real-time dig and dump faces, and its integration with other systems to enable analysis tasks such as the reconciliation of bucket fill factors with truck payloads and face advances.