Truck and Loader Optimisation 2
27 April 2010

It might seem like a crazy thought but I wonder if the apparent return to boom conditions in the mining industry is actually a good thing for our long term viability. History says about 25% of our time we will be in "boom" times and 75% in "bust". Every time the industry booms you hear it everywhere, "It is different this time". This boom is about the emergence of China and India driving a super cycle which will give us boom conditions for 50 years. For someone who graduated in 1985 and spent the first 16-17 years of their career in depressed conditions – I don't buy the super cycle argument. The current optimism in the mining industry and the world in general is defying logic so we will see.

You would also be aware that we learn more from negative experiences than positive ones so we actually need the "bust" times to get smarter. The last extended down turn in overall mining investment lasted from around 1986 to around 2001 (or maybe a little later). During that time many companies made attacks on labour numbers and increased output per manyear substantially. This was a good thing which would never happen during boom times. I have also predicted that the next "bust" would be characterised by companies getting smarter with their equipment. More output with less input. We are already seeing evidence that companies making extraordinary profits (compared to historical returns) make more money producing more of their commodity regardless of the input cost. This is great for the industry (including me) in the short term but what happens when the real downturn does come?

In my last column I introduced a method of measuring how well a mine is implementing the truck and loader strategy determined for it by executive management. That is, do we want to overtruck or undertruck or do we actually want to try and operate efficiently with respect to both volume and cost. In the past a General Manager may have said, "We will undertruck" and the only way to determine whether it was being followed was to count the number of trucks parked on the washdown pad or to see how many trucks were queuing at the loader.

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An understanding of skewness through the distribution of KPI's has been used to forecast truck and loader productivity. Many truck and loader simulations use Monte Carlo simulation algorithms in predicting likely performance. However, I am talking about something different. I am talking about the analysis of what is happening on the ground in order to change / refine the mine's approach to truck and loader usage.

My first question is, "Do the people running the truck and loader operations on a mine know what the strategy is?" Then there are a range of other questions raised. "Does the mine manager understand the strategy?" "Does the Mine Manager have sufficient resources to implement the strategy?" "Does the Mine Manager have the time to really understand their own operation and make changes? Etc, etc….. The saying "Too busy fighting crocodiles to drain the swamp" certainly applies to many Mine Managers and the people under them.

In the last column I promised a case study. The case study is from a mine employing a number of truck and loader fleets. This mine, at the time of the analysis was following a strategy of balancing output and cost due to limitations of how much coal they could get on trains. Consequently we are looking for a balancing of skewness and waiting times.

I stated last week a significant difference in skewness statistic / standard error of skew for wait on trucks cf wait on loader is an indicator of overtrucking (skew of wait on truck is stronger than wait on loader) or undertrucking (skew of wait on loader is stronger than wait on truck). For the case study the wait on trucks had a skewness measure of 600 while wait on loader had a skewness of 50. Now firstly, these are both highly skewed being higher than the cut-off of 3.29, but that is what we expect. The excessively high wait on truck skewness indicates overtrucking which is contrary to the strategy set for the mine and indicates inefficiency.

Another way of measuring the efficiency of truck and loader usage is the proportion of time where the truck and loader wait for less than 30 seconds (excluding spotting). An indicator of inefficiency is when these proportions are significantly

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different. In the case study 89% of cycles had less than 30 seconds of waiting on trucks and 48% of cycles had less than 30 seconds wait on loader. This is interpreted as there being significant
queuing at the loading units (which is consistent with the previous methodology – it doesn't hurt to have checks and balances on your analysis).

As a final measure of efficiency, the optimised operation is defined as that period of time where the truck and loader both wait for less than 30 seconds. The overall efficiency of the case study operation is 37% which is about average.

It should be noted that the capacity of your equipment to deliver the volume of your commodity required will have an impact on the absolute results. What this means is that if your equipment is really pushed to achieve what is set for it then you may need to overtruck to ensure the loading unit just keeps producing. The important consideration is the relative result every week. If your balance is out or your strategy is not being delivered then you need to change. Do you remember the sequence I have mentioned a few times; collect the data, create information, engage the recipient to turn it into knowledge and then determine strategies to change what you are doing to add value?

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