Complexity and productivity
31 December 2009

If you were to ask a mining executive why their mines' equipment performance has reduced over time, apart from spluttered expressions of disbelief from some you would certainly get the issue of mining complexity fairly high in the excuses. This is because site people use this excuse almost universally when asked why their performance has reduced. It seems logical that mines dig the easiest / most profitable areas first and conditions do generally become more difficult over time.

When executive management starts holding site people accountable for the equipment performance it is interesting to see what happens. It usually goes something like this;

1. Dry up the source of the bad news – ie. stop benchmarking. "We know we are 40% below best practice so why keep telling Executive Management".
2. Advise management that reducing performance is a function of complexity of the mine. "We know it is getting worse and we know it must be the increasingly complex mine we are running."
3. Create a picture of how complexity reduces digging hours or increases cycle times, etc.

However, should equipment achieve less output as the mine becomes more complex? This really is a perfect example of not letting the truth get in the way of a good story. We have looked at this issue from multiple angles and we can't find any evidence to support this notion that complexity reduces the performance of a particular piece of equipment. Even for trucks if you use an appropriate measure of truck performance there is no consistent reduction in performance. Of course as a mine gets deeper and more complex, more equipment may be needed. This is a completely different issue.

So let's look at the truth.

Head Office
Brisbane Technology Park
Unit 2 / 53 Brandl St
Eight Mile Plains Q 4113
Australia
Ph: +61 7 3147 8300
Fax: +61 7 3147 8305
Email: gbi@gbimining.com
www.gbimining.com

South African Office
8 Corridor Crescent
Building B Ground Floor
Route N4 Business Park
Ben Fleur X11 Witbank 1035
South Africa
Ph: +27 13 6564114
Fax: +27 13 6564114
www.gbimining.com

The absolute key to the performance of any piece of equipment is payload. I can't find any logical explanation as to why complexity should consistently impact payload. The only possible impact could be in bench heights and/or pit layout. However, if superintendents and engineers do their job there is rarely a reason not to set the pit up to ensure optimised payload. The differences in payload (eg. The difference between dragline best practice and average is 17% and other equipment is similar) are inevitably caused by other factors. The most common and most distressing is mines telling operators not to fill up the bucket or truck body and kicking the operator when they do!!! For heaven's sake the operator's job is to fill up the bucket and he/she should be encouraged to do this to the best of their ability every time. If it is overloaded then don't blame the operator; this is a management failure.

OK so it can't be payload. Is digging time related to complexity? The key area that gets blamed is operational delays and most specifically waiting on equipment or blast. We have tracked operational delays and we know that when productivity drops, about 20% of the drop can be linked to operational delays but only about 3% is linked to waiting on something. So really it has little to do with waiting on equipment or blast. Yes there is a relationship between complexity and operational delays but the major loss in productivity is found elsewhere.

Most times the major contributor to a loss in productivity over time is availability. What happens is that there are two key relationships. Complexity increases with time and availability tends to reduce with time. The truth is the two relationships are only linked in a very minor way. So is it equipment getting older and harder to keep going? Maybe, but old equipment does get replaced and the trend does continue.

It is my theory that the corporatisation of the mine site is to blame for the reduction in availability and consequent productivity. It is the focus on process and not the result. Managers are often judged on how they do their job, not the end result, and a declining result can be hidden behind exceptional processes. Part of that change is an increasing focus on safety but not the majority of it. Because most managers have

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little real natural management expertise they embrace the processes which are encouraged by corporatisation. Six Sigma or Lean are great because they provide the manager with a focus on process.

A bit of a wake-up call here. Commodity prices (maybe with the exception of gold) are going to decline. You won't be able to keep making money without focusing on the real reason you are in business. You need more of your commodity going out the gate at a lower cost, not a new business improvement process every week or month.

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