

On 30 January 2015, the Honourable Minister of Mineral Resources, Advocate Ngoako Ramatlhodi, issued a statement announcing the 2014 health and safety statistics for the South African mining industry. To quote, '*There has been a marked improvement in health and safety in the sector over the past twenty years, as result (sic) of renewed focus by the Department as well as collaboration with key stakeholders.*' Results over this period show an 86% reduction for all mine fatalities, thereby achieving the lowest ever number of fatalities in the mining sector in 2014.

I am not commenting on specific statistics because, as we know today, all fatalities are ultimately preventable. And yet, not so long ago (when I was a young mining engineer!), this statement would not have been accepted by many in the industry. Safety achievements were measured in months – today they are measured in years. Of course, various industry pundits have widely diverging opinions on how these remarkable statistics were achieved, ranging from the degree of stakeholder collaboration to the impact of industrial action on underground shifts worked. Personally, I would like to believe that the pace of cultural change, technology adoption, and leadership style is now having a material and lasting effect. It caused me to cast about in my recent reading for new ideas and innovations that may have a significant impact on the mining industry in the years ahead. Here are a few that I came across.

1. The 'Internet of Things'

Many futurists predict that within the next 5 to 10 years just about any device we can imagine could be controlled through an IP address. One drawback is how to power these devices. Enter wireless charging with sound waves. In this process, conceived at the University of Pennsylvania, mechanical vibrations (sound) are turned in to electrical energy. There are plenty of vibrations in mines and we need to monitor our physical environment more efficiently with remotely powered devices. First products are due to ship in 2017.

2. Application of new materials

IBM Research has (accidentally, like all good inventions) developed a new form of tough, hard recyclable plastic (thermoset) called 'Titan' together with its derivative 'Hydro' which has a property that when cut it automatically closes and re-bonds. If these technologies were combined with work being done by the University of Manchester (2010 Nobel prize in physics) in building new 'super' materials at an atomic level (think graphene) could we one day have a lightweight, robust exoskeleton that can be worn by underground workers, providing them with their own environmental bubble and safety cocoon? These technologies are still in the laboratory.

3. Safety vision

Forty per cent of 40-year-olds need glasses and 8% of all men suffer from colour deficiency. This has a direct impact on how people can work – especially in hazardous or difficult conditions. The University of California and MIT have developed vision correcting displays that are in the pre-production phase and could potentially be fitted to all devices that use digital screens (e.g. on machine dashboards) and are 'tuned' to the user's specific eyesight. Most sight impairments could be compensated for with the technology – especially in developing countries where it is sometimes easier to get a mobile phone than a pair of prescription glasses.

4. Energy from low-grade heat

According to the US Environmental Protection Agency, a third of all wasted energy is 'lost' at temperatures below 100°C. It is reported that MIT has developed new efficient battery electrodes that can convert temperature differentials to electricity at temperature differentials of around 50° C. This is done by exploiting the thermogalvanic effect (look it up!). Given the temperature gradients we have in our deep gold and platinum mines, are we potentially sitting on an undiscovered new energy source for Eskom?

Enough of this – there is plenty of innovation out there if you look and apply your own imagination.

Lastly, please remember that the SAIMM annual banquet is on Saturday 14 March at the Sandton Convention Centre. It is an ideal time to refresh old acquaintances, make new ones, and have some rest and recreation at a time where everyone seems too busy. I spoke earlier about changing leadership styles. Taking a table at the banquet is a solid investment in the motivation of your team and maintaining energy levels, even when budgets are constrained.

[Sources: Time Magazine, Fortune Magazine, Scientific American, and the internet].

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