

## **Technology Can Help Us Achieve Our True Wealth**

By Lynette Mhlongo, Grade 12, Pinetown Girls' High School

If a country's wealth was based on their mineral wealth, South Africa would be the richest country in the world. This young, emerging country of ours holds 90% of the platinum, 80% of the manganese, 73% of the chrome, 45% of the vanadium and 41% of gold reserves in the world. Interestingly, these figures only encompass the reserves that we have found in our country.

However, the mining industry only made up about 9.4% of South Africa's GDP last year. This does not reflect the mineral wealth of our country. Granted, the mining sector saw a lot of scandal last year such as the "Marikana Massacre" and the Anglo-American platinum miners' strike. This did result in a loss of foreign investment and a loss of about \$36 million a day. Our economy took a huge knock as inflation rose to 8.8% and the rand fell to almost R12 to the dollar.

The situation can be turned around if productivity can be increased. Technology is helping us to do this. Our dream of increasing productivity is slowly becoming a reality thanks to innovation and research into new mining methods. These new methods have showed great progress and if implemented in our mines, can increase our mining output and ultimately our country's wealth.

One of these new mining innovations is being spear-headed by engineers at AngloGold Ashanti. Many of South Africa's minerals are deep underground in very thin reefs that are too expensive and dangerous to mine out. These engineers have designed new boring machines that are smaller, thinner and have better precision than traditional boring machines that get between the layers of rock to punch out the gold reefs. This can be likened to removing a slice of cheese between two slices of bread by pushing it out. This means less rock is wasted and that they will be able to drill closer to each other machine and less gold is left behind. In a research facility at the Tau Tona mine in Carletonville, 1250 ounces of gold was extracted during the research period. Just imagine the increase in gold output and revenue if this is rolled out into every gold mine.

Usually, coal reserves deep underground are deemed too difficult to mine. Eskom, in partnership with other companies, are looking into a process called Underground Coal Gasification (USG). At Majuba in Mpumalanga, a coal seam was found 280-300 metres deep. This coal seam was used a research test for UCG. This process converts coal to gas while the coal is still underground. Wells are drilled into the unmined coal seam. Some of these wells are used to inject the oxidant (air, oxygen and steam) in the coal to ignite the coal seams and keep the coal burning at a temperature of 700°C up to 1500°C. The rest of the wells are used to bring up the gas produced by the combusting coal. The gas consists of carbon dioxide, hydrogen, carbon monoxide, methane and various nitrogen and sulphur oxides. This highly pressurised gas can be used to fire up power stations, industrial heating, natural gas and diesel fuels. The process uses coal reserves that would normally remain untouched while being lower in greenhouse gas emissions and doing less damage to the environment as there is minimal surface mining.

Of course, these innovations are still being researched. Yet, there are some new technological advances that are being used in some of our mines. There are being used to find new mineral deposits that can be mined out to increase our mining output. One of these is called SQUID: Superconducting Quantum Interference Device which is a device sensitive to weak magnetic fields. The device sends out magnetic impulses which interfere with the magnetic fields of the minerals buried in the rock. This information is then sent back to the device which tells the project managers where to dig.

Another one of these technological advances is called MMI or Mobile Metal Ions. This new technology allows companies to target buried deposits with deep soil cover to discover new and bigger ore deposits. This device measures the presence of metal ions that travel upwards from mineral seams deep underground and get deposited onto surface materials like soil, sand etc. By carefully examining the data collected by the device, mining companies can find new mineral seams that couldn't previously be found. This technology has been found to have a high success rate with low limits in its detection abilities.

Today, we live in a world that has become smaller. We can communicate with other countries and share ideas. So, we can also learn from other countries and see how their innovations have helped increase their productivity. For example, scientist have used the ancient art of alchemy to change platinum-nickel deposits into high grade platinum that can be sold for the same price as an average grade platinum brick. Australia is looking into the use of automated cars that can be designed to navigate the mine and operate automatically in various situations. This could limit the number of miners needed in mines, decreasing operation costs and saving lives in deep cast mines. Projections estimate that it can increase productivity and revenue by \$0, 2- \$1, 9 billion dollars a year. This would give South Africa the cash injection it needs to increase its wealth.

A Chilean company also created an intelligent jacket which can replace the many fixed monitors that line many mines today and cost mining companies hundreds of thousands to install and maintain. This jacket uses a smartphone connected to sensors via internet or Wi-Fi to monitor the miners' physical and environmental conditions. This could help to increase productivity while reducing the risk of injury or even death. This would mean more revenue for the company and ultimately the country while reducing the money used on compensation paid to miners for injuries.

These are just some of the many technological advances that the mining industry has seen and will continue to see in the new future. These could revolutionise the way we get the minerals out of the ground and could possibly lead to us finding new ways to turn them from rocks into manufactured goods. If we can put these advances to good use we can benefit greatly from our mineral wealth. We can increase our gross domestic product levels greatly. We can get more foreign investment into our country which we can use to improve basic services and infrastructure. We would be able to grow our economy even in these tough economic times. All it will take us is a little innovation and a lot of hard work to make it all a reality.

## Bibliography

DEL CAMPO, G. 2013. Chilean Company Develops New Technology For Mining Industry <http://www.ilovechile.cl/technology-mining-industry/94750> (accessed 10 April 2014).

Jamasmie, C. 2014. Scientists find way to turn base metal into precious one <http://www.mining.com/scientists-find-way-to-turn-base-metal-into-precious-one> (accessed 08 April 2014)

Haber, A. 2013. Automation earns its stripes <http://www.miningaustralia.com.au/features> (accessed 12 April 2014)

Unknown Author Mining <http://www.careerssa.net/mining/south-africa> (accessed 11 April 2014)

Unknown Author, Mobile Metal Ions(MMI) <http://www.sgs.com>Home>Mining>Services-for-industry-challenges>advances-in-tech>Mobile-Metal-Ions> (accessed 12 April 2014)

Seccombe, A. 2014 Technology makes difficult gold more accessible <http://anglogoldashantitechnology.com/news> (accessed 04 April 2014)

Kolve, L. 2013 Underground coal gasification holds significant opportunity for SA <http://www.miningweekly.com/article/underground-coal-gasification-holds-significant-opportunity-for-SA> (accessed 15 April 2014)

Hannah, J 2011 Coal gasification demo plant design underway <http://www.miningweekly.com/article/coal-gasification-demo-plant-design-underway> (accessed 16 April 2014)