

MODERNISATION

Frequently asked questions



**MINERALS COUNCIL
SOUTH AFRICA**

Formerly the Chamber of Mines of South Africa

Q WHAT EXACTLY IS MODERNISATION IN MINING?

A Modernisation is a process of transition and transformation of the mining industry of yesteryear and today to that of tomorrow. It is not simply mechanisation and/or the gradual implementation of new technology. And it is not the replacement of people with machines or a euphemism for job losses.

Modernising the mining industry involves:

- Turning to account South Africa's mineral resources in the safest, healthiest, most efficient, cost-effective and sustainable manner possible
- Recognising that people are at the heart of our industry with focus on improving skills, health, quality of life and fulfilment of employees
- Conserving natural resources, preserving and restoring of the environment
- Contributing to the development of local and labour-sending communities
- Recognising that metals and minerals are valuable, useful and necessary
- Recognising that transformation and growth are key imperatives of the mining industry and the nation

Q WHY DOES THE INDUSTRY NEED MODERNISATION, ESPECIALLY IF IT WILL MEAN JOB LOSSES, AS MANY PEOPLE BELIEVE?

A The South African mining sector has, for more than 100 years, been considered a labour-intensive industry, using physically demanding manual drilling methods with blasting and cleaning on a stop-start basis, predominantly in narrow-reef, hard-rock mining, particularly for gold, platinum and chrome.

Labour-intensive work has the direct drawback of being relatively, or even inherently, unsafe although mining companies do their utmost to reduce underground accidents.

Furthermore, most deep-level underground mines are aging with travel times to the face sometimes reaching an hour or more. Consequently, with increasing depth and distance from the shaft, actual drill time at the workface has contracted, accounting for increased health and safety challenges, shrinking production and contributing to burgeoning costs.

The recent volatile price environment has been exacerbated by rising costs and decreased productivity.

Operational inefficiencies impinge on each mine's profit and its ability to pay wages while inefficient mining shortens the life of any mine thereby, again, affecting job opportunities. All of these drawbacks are exacerbated as our mines become progressively deeper; reaching depths where, using current, conventional, labour-intensive mining methods, workers cannot work safely. Again this leads to early closure of a mine, reducing the need for labour. The deeper a mine's workings, the greater the rock temperatures and stresses, and the more difficult it becomes to support working places and to keep them open.

In a nutshell, working labour-intensive operations at ever-greater depths can be inefficient, unsafe and unhealthy. This is a combination of drawbacks against which no mine can fight for very long if it is to be profitable, sustain jobs and share equitably the benefits of mining with all stakeholders.

Modernisation is the one single solution as it leads to enhancing employees' skills, makes their working conditions safer and healthier, and contributes to a mine's longevity and profitability.

WHAT ARE THE MAIN OBJECTIVES OF MODERNISATION?

Modernisation aims to:

- Significantly extend mine life
- Preserve mining employment
- Improve safety and health
- Allow the mining of lower grades as well as deeper resources

The eventual objectives are systems that combine to deliver 24/7 mechanised operations with costs that permit the exploitation of ores at significantly lower cut-off grades. Extensive and fundamental research is required into mine-worthy, reliable, non-explosive rock breaking in a hard and high-stress rock environment.

WHY SHOULD THE MINING INDUSTRY MODERNISE?

Modernisation will help to improve safety and health, facilitating the quest for zero harm. It will also contribute to increased skills development, employment, exports and revenue; and will have subsequent benefits for local communities.

The impacts of modernisations are:

- Increased safety as people are removed from high-risk areas
 - Improved health as people are removed from dust and noise sources
 - Profitable deep-level mining
 - New investment potential
 - More skilled jobs for future mining activities and mine suppliers
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WHAT WILL HAPPEN IF THE INDUSTRY DOES NOT MODERNISE?

Ultimately, without a shift in mining methodology, the industry will fail to mine South Africa's deep-level complex orebodies profitably. This could result in the sterilisation of resources, accelerated and premature mine closures and job losses.

HOW DOES MODERNISATION CONTRIBUTE TO THE IMPROVEMENT OF SAFETY?

Mining is still largely a labour-intensive process. The mining industry makes use of a wide range of technologies to reduce and prevent incidents related to health and safety.

Central to curbing underground accidents is, as far as possible, the removal of miners from working-face dangers and in-stope health hazards. Where that is not possible, technology is directed at protecting employees.

Some of the more conventional mining techniques start at the stope face. Before drilling or cleaning occurs, roofs or hanging walls are secured with rope netting fixed to roof bolts. Should a rock break away, it will be retained by the net. It is a simple technique that adds to the mining cycle time and to costs but its efficacy comes from simplicity.

Hydro-powered rock drills are faster and quieter than compressed air rock drills. Drillers spend less time at the stope face while, in development ends, wholly mechanised drills carry out the drilling.

In terms of blasting, new water-based emulsions can be loaded quickly and safely into blast holes, to be detonated electronically from surface at a set time throughout the mine, allowing for sufficient time to allow any dust particles to settle.

In terms of hauling, technology developed and used includes electronic control systems that allow trains to be operated by the driver or the guard. This system incorporates remote sensing.

The technology currently used by the mining industry represents incremental improvements but significant contributions to making mines safer places to work.

Furthermore, South African mining companies are collaborating with each other and equipment producers to develop better and safer working methods and technology.

The safety, health and wellbeing of our employees are integral components of our day-to-day operations. The mining sector is fully committed to achieving zero harm where every mining employee returns from work each day, sound in health and body.

HOW WILL MECHANISATION BE ACHIEVED?



If the process of mechanisation and the manufacture of high-tech, robust and specialised mining equipment is to be achieved, an *ad hoc* approach cannot be contemplated. The industry, manufacturers, researchers and developers will need to collaborate to the full, sharing their knowledge and skills for common good.

The aims are to develop, manufacture and use remotely controlled mobile equipment to break, load and haul ore continuously. Breaking will need to be explosives-free and the equipment must, as far as possible, be self-correcting.

WHAT WOULD BE THE MAIN FOCUS AREAS OF NEXT GENERATION MINING?



The four key enablers of modernisation have been identified as:

- Research and development (R&D)
- Mining manufacture
- Sustainability issues
- Legislative certainty

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WHAT HAS BEEN DONE/ACHIEVED SO FAR?



The Minerals Council South Africa (Minerals Council) has identified the products, technologies, people and infrastructure required to mechanise the stoping and development cycle with remotely operated equipment by 2020. Similar requirements have been developed for a 24/7 mechanised mining system that operates without explosives by 2025.

Detailed plans have been developed to accelerate progress on all the building blocks for modernising mining through a partnership between the public and private sectors. The Minerals Council will participate actively in the implementation of these plans. Mining companies have spent over R500 million annually over the past couple of years on innovation and the Minerals Council has advocated that substantive investments be made by government to accelerate these efforts.

In addition, some Minerals Council member companies already have plans to introduce new technology, and some have already implemented these strategies.

WHAT IS THE MINING HUB AND WHAT IS ITS PRIMARY OBJECTIVE?



To facilitate and accelerate the process of mining innovation, a Mining Hub is being set up to co-ordinate R&D, mining equipment manufacture and skills development by mining companies, original equipment manufacturers, research entities, skills-development entities and government in collaboration.

The hub is envisaged as a public-private partnership with a view to "open innovation" so that the costs and rewards of R&D will be divided equitably among contributors.

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