

## **Mining sector to benefit from the CSIR's multidisciplinary research, development and innovation approach**

South Africa's Council for Scientific and Industrial Research (CSIR) continues to undertake research, development and innovation to benefit the South African mining sector. The organisation was recently selected as a partner organisation to deliver the Mine Health and Safety Council's Centre of Excellence.

The CSIR helps address national priorities through focused research and development for health; the natural environment; defence and security; energy; the built environment; and industry, with a specific focus on advanced manufacturing and mining. A staff complement of around 2 400 – of whom some 65% are scientists, engineers and technologists with diverse and specialised skills – pool their skills to work in these areas.

"This multidisciplinary nature of the CSIR positions us to help solve the increasingly complex challenges of our time. Mining in particular can benefit from a multidisciplinary approach to its challenges," says Executive Director for CSIR Natural Resources and the Environment, Prof May Hermanus.

Hermanus says that this is also the reason that the organisation's response to mining sector challenges is now undertaken and managed from an organisation-wide perspective.

"Instead of housing small cores of teams that work exclusively in the mining sector, which was the case with the CSIR Centre for Mining Innovation (CMI), we are opting to design teams from competence clusters across the organisation, based on the very specific challenges presented. We believe that this will harness the extensive technical expertise within the CSIR to offer the best mining solutions. We can, for example, make up a project team drawing on experts in information and communications technology, microbiology, geology, mechanical engineering or mathematical modelling, as needed. This allows us to have critical mass in a large number of competencies."

Competencies that previously resided at CSIR CMI, such as

mechanisation and automation; seismology and geophysics; real-time monitoring and associated decision-support systems; and the know-how to address human factors to optimise safety and productivity have been integrated into the organisation for maximum impact.

The CSIR continues to develop fatigue, dust and noise management programmes for a variety of industries, including mining. Dedicated occupational hygienists are working in one of the most advanced facilities for monitoring dust exposure in the workplace in South Africa.

The CSIR continues to address technologies that will enable mechanisation and automation for both underground and surface mining, including underground positioning, location and navigation, and the development of autonomous mining systems and related sensor networks.

Mine safety remains a core focus for the CSIR. One of the most recent monitoring systems is 'GoafWarn' – a sensor system that provides warning prior to the onset of a collapse in coal mines and warns miners who may be affected. Furthermore, geophysical techniques and seismological applications continue to allow various on-mine risk mitigation strategies and support for analysing natural hazards.

The CSIR also manages a fires and explosion testing, training and research and development (R&D) facility at Kloppersbos, north of Pretoria. The facility conducts research into the explosive characteristics of South African coals. It is one of five CSIR testing laboratories and this has been used to provide a full-scale surface-testing facility for the evaluation of underground explosion suppression systems; the flammability of conveyor belts; dust suppression systems for continuous miners; and similar investigations.

“At the CSIR, we are very conscious of the fact that mining R&D does not take place in isolation. Mining activities are part of much larger social, economic, and natural systems. We therefore also undertake research that supports post-mining landscapes, decision-making processes and enterprise-creation development, particularly in areas such as water, air quality, and land use,” says Hermanus.

“Mining has a powerful contribution to make in the context of the goals of the National Development Plan. It also carries with it a legacy of environmental and human health impacts, as well as socio-economic concerns. What the sector needs are innovative, multidisciplinary solutions that will ensure the continuation of the economic and developmental contributions of the sector to the country, but also enhanced safety, reduced environmental impact and options for alternative land-use post-mining. The CSIR is now better positioned to deliver on this important mandate,” concludes Hermanus.