

# Wits research unearths innovation in mining

The sustained, high level of quality research at Wits School of Mining Engineering puts it at the cutting edge of mining innovation. This is reflected in the doctoral work of five students, which are geared to solve real problems in the mining industry.



Jana Jacob

## Seismic instability under Joburg CBD

In his PhD, Sarfraz Ali highlighted the future risk to the safety and stability of buildings in the Johannesburg central business district arising from mining-induced seismicity. The risks arise from the many steeply-dipping geological formations under the CBD area, underlain by flooded and abandoned mines. He has applied advanced numerical modelling techniques to simulate various source mechanisms for estimating site-specific ground motions.

## Deregulate precious metals?

Ashok Kumar Damarupurshad's doctoral thesis is the first attempt to analyse the current debates on regulating the precious metals industries in South Africa. Noting that South Africa is the only country in the world – apart from the Russian Federation – that regulates the possession, trade and fabrication of gold and platinum group metals, Damarupurshad explores whether the local precious metals industry should be deregulated in the light of changed conditions.

## Air flow for safer coal mines

In his PhD research, Tariq Feroze aimed to enhance safety in coal mines by applying a mathematical model to air flow rates close to the face of a heading – where the majority of methane explosions have been found to occur. His research revealed that Computational Fluid Dynamic's advanced numerical code, ANSYS Fluent, was an appropriate tool to evaluate the face ventilation of a heading in a three-dimensional environment using full-scale models.

## Diamond potential off Namibia's coast

In her research, Jana Jacob focused on new methods of quantifying exploration risks in the absence of hard data, with reference to diamondiferous coastal deposits along the south western coast of Namibia.

“The submerged beaches within the 4km coast parallel strip hold great potential for being highly diamondiferous,” said Jacob. Her thesis illustrated how virtual orebodies can be created, based on geological proxies as a basis to assess and rank different sampling and drilling strategies.

## **Improving pillar design**

Investigating the bord and pillar design procedure in chrome and platinum mines, Rudiger Kersten concludes in his doctoral research that improvement is essential – as current methodologies “suffer from drawbacks that can be detrimental to the mining industry due to overdesign or rendering an excavation unsafe”.

His solution introduced the “mine stiffness” concept to determine the pillar load, “which automatically included the influence of the pillar and strata stiffness, excavation spans, pillar yield and failure”.

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