



DEPARTMENT OF MINING ENGINEERING **RESEARCH FOCUS AREAS**

Rock-breaking and explosives engineering

The importance of improved safety standards, cost effectiveness and productivity has driven technical mining personnel to examine all facets of their operations. Through technically advanced projects, efficient drilling and blasting programmes have a positive impact throughout the mining operation, and invariably lead to an increase in overall profitability. The safe, efficient and innovative use of explosives for rock breaking contributes positively to the overall mining operation.

As part of a research project conducted in the Department, a mechanical rock-breaking device (which has been commercially available for many years) has now been trialled in a deep-level gold mine. This device has mainly been used in surface civil engineering projects and the results appear promising. Although this tool is used within a niche market, it could be applied to remnant areas where selective rock breaking is required.

Flyrock research is another area of major importance due to its inherent risk to the communities and infrastructure surrounding a surface mine. Flyrock is defined as the undesirable throw of rock as a direct result of chemical rock breaking. This research was originally initiated through a request from the coal mines to assist with the evaluation of their mathematical models, as well as accepted empirical standards to predict the safety radii to protect equipment and personnel from flyrock. The present study started with an extensive literature review, which showed that, despite the numerous and theoretical predictive models developed over the last decade, there is no definitive measuring technique to properly test these theories.

The subsequent phase of this research involved the development of measuring tools that may potentially be used to quantify the motion of multiple, random flyrock. The ultimate goal is to determine the final landing position coordinates, as well as the coordinates of the origin of flyrock. This capability will enable mines to build databases of the operation's flyrock, enabling researchers to quantitatively investigate the effect of various blasting parameters on the risk of flyrock, as well as to visualise the data for training and educational purposes.