

Improvement strategies for accurate underground drilling and blasting effectiveness at the Barrick Kibali Gold Mine

F.M. Senda¹, JP.S.Kayumba², I. Traore³, K.Musumali⁴

1. *Drill and Blast Engineer, Kibali Gold Mine, Wtsa. Felly.Senda@kibaligold.com*
2. *Drill and Blast Enginner, Kibali Gold Mine, Wtsa. jpkayumba@gmail.com*
3. *Technical Services Manager, Kibali Gold Mine, Wtsa. Ismail.Traore@randgold.com*
4. *Mine Manager, Kibali Gold Mine, Wtsa. Kayombo.Musumali@randgold.com*

Abstract

This paper highlights strategies used at the Barrick operated Kibali Gold Mine (KGM) to improve the drilling accuracy and blasting effectiveness for long hole open stopping. The mine currently uses Solo DL421 for the required stope drilling and has experienced an average deviation of 10%. Strategies are raised to eliminate or at least mitigate the adverse effects of blasthole deviation. The integration of deviation trends in the design would allow the actual blastholes to be established within their required positions to then facilitate a proper energy distribution with the eventual production blasting. The implementation of stope undercutting reduces the hole length from 35m to 30m which in return decreases blast hole deviation by 3%. Another strategy adopted to improve the drilling accuracy is to slow down the penetration rate with the use of several operating approaches, including 135MPa percussion pressure, 65rev/s rotation speed and 17MPa feed pressure. To this penetration rate, a constant k factor is applied to increase the rate when the bedding inclination is less than 45° from the horizontal or when the hole length is under 10m. This reduces deviation by a further 4%. Where the rock mass is highly jointed it is advised to use the average penetration rate over the entire length of the hole. Furthermore, the paper shows the effect of deviation on the blasting results through a prediction of blasting model optimised with reduced deviation and highlights the effect of the timing delay on the blasting effectiveness. Although the size pattern increases with deviation, a strategy pertaining to timing delay with blasting would be to align to the work of Grant (1990) where the optimum hole to hole delay is found to be between 7-10ms per metre of spacing, while the optimum delays between adjacent rings varied between 110-160msec.