Radar guided blasthole drilling improves product recovery.

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ABSTRACT

This paper shows the latest technical development of a radar-based blasthole guidance drilling system. It is often difficult to get the correct standoff distance in coal blasthole drilling. Standoff distance is designed to leave a protective cap of rock above the coal seam to prevent mixing of overburden with product when blasting. Incorrect standoff distance typically costs the industry 10-15% in lost product. Mine models are often not detailed enough to accurately predict top-of-coal depths for blast drilling, particularly when the geology is varying. Fitting a forward-looking radar to the blast-drill bottom subassembly has been shown to detect the top of coal to ±0.2m, an accuracy required for accurate blasthole drilling. Automatic analysis of the radar signal is used to predict the distance to the approaching top of the target coal seam relative to the drill bit. Using the retrofitted radar with real time communications up the drill string and automatic signal analysis, allows accurate standoff distances to be consistently drilled by supplying the driller with images of the top of coal ahead of the current drill bit position. Our laboratory and field results demonstrate the feasibility of employing this system in routine coal blasthole drilling to obtain up to 15% more product for no additional overburden removal. The system is also well suited to through-seam blasting by providing accurate top and bottom of seam depths to be mapped while drilling the blasthole, thus removing the extra step of logging after drilling. The feasibility and limitations of employing this system for blasthole drilling in geology other than coal are also discussed.