

Can robots break the bottle-neck in Drill&Blast in underground roadway development in hard rock?

N. A. Sifferlinger¹, M. Berner², E. Fimbinger³

(initials and surnames only)

1. Professor, Montanuniversitaet Leoben, Leoben, Austria, 8700. Email: Nikolaus-august.sifferlinger@unileoben.ac.at
2. Senior Scientist, Montanuniversitaet Leoben, Leoben, Austria, 8700. Email: Michael.Berner@unileoben.ac.at
3. Senior Scientist, Montanuniversitaet Leoben, Leoben, Austria, 8700. Email: Eric.Fimbinger@unileoben.ac.at

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ABSTRACT

Today the advance rate of underground roadway development by Drill&Blast operation is limited by the need to ventilate the toxic blast fumes after each cycle. In deep mines this usually is only possible during shift changes when the related mine sections are free of persons.

This results in roadway development advance rates of 4 meters per shift, or 12 m per day. For long roadways this is a limiting factor in mining development in deep mines.

To overcome this bottle-neck serious R&D efforts into disc cutting mobile miners are done by companies like EPIROC, KOMATSU, ROBBINS and SANDVIK. But today the achieved advance rates are less than 12 m per day in hard rock.

If we achieve full robotization and/or teleoperation from a safe place for Drill&Blast operation of an underground roadway development section, we could eliminate this bottle-neck.

Robots and machines are not affected by poison blasting fumes as long as these fumes do not create aggressive acids.

If we can keep the blast fumes isolated in the roadway development section for the shift until the next ventilation opportunity (e.g. at shift change or designated ventilation times), it is possible to do the Drill&Blast cycle more often in a shift. This will speed up the advance rate significantly.

This needs robotization of all work steps in the section: surveying, drilling, charging of explosives, blasting, loading and transport of material, roof support, installation of infrastructure, etc. Also cache storage of material may be needed.

Special care for the ventilation system to keep the blasting fumes under control in the section is necessary.

The paper will discuss the aspects needed to achieve this robotization and the related technical and operational tasks.