

What happens to work when mining technology becomes autonomous?

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ABSTRACT

What role will humans play in the increasingly autonomous mining workplaces of the future? This paper is about how work is affected by implementation of autonomous haulage systems (AHS) in open pit mining. There are many benefits with using autonomous haulage systems for mining. Such as improved safety by removing the operator from dangerous areas (Lever, 2011; Fiscor, 2018), increased efficiency (Carter, 2008; Conway, 2020), financial benefits such as increased utilisation and reduced fuel consumption (Parreira, 2013; Felsch, Oliveira and Ortiz, 2019), reduced tyre wear (Price *et al.*, 2020), and more predictable maintenance (Parreira, 2013).

Komatus autonomous haulage has been commercially used for more than a decade now with the first implementation in 2008 at the Gaby Mine in Chile (Abdellah *et al.*, 2022). In 2018 the system reached the milestone record for more than two billion tons of material autonomously moved (Roth, 2018). A figure that was doubled by 2021 (Leonida, 2019). The AHS system was in 2020 implemented on 11 mine sites (Morton, 2020), which makes it a well established technological system in the industry. Many technological benefits to the AHS system that has been well documented in previous research.

However, none of the non-technical implications relating to work and ergonomics have been investigated previously. The present study aims to fill this gap by questioning in which ways the AHS system changes the nature of work. The study also seeks to identify what can be done to promote healthy and attractive work environments in relation to autonomous haulage systems. The study follows an implementation of the AHS system in an open pit mine in north of Sweden. Qualitative methods were used to investigate the operator perspectives. The study identifies both potentials as well as risks with the development towards increasingly autonomous mining workplaces of the future.

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