

Safety In Mines Research Advisory Committee

Project Summary: SIM 02 05 04

Project Title:	Ergonomics of mining machinery and transport in the South African mining industry (1 volume, 78 pages)		
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Summary

Local and international safety statistics indicate that ergonomic factors underlie many of the accidents occurring in mines, and could impact negatively on the effective and efficient operation of mining machinery and transport systems.

The objective of the study was to conduct an ergonomics evaluation of the mining machinery and transport systems generally used in mining. This evaluation is based on the consideration of the complete ergonomics system to identify the ergonomics-related hazards that could impact on the operators' ability to work safely and efficiently.

Conclusions

Operators of mining vehicles have a range of conditions to contend with and often have less well-designed cabs and seats than their road transport counterparts. Inadequately sized cabs situated in inappropriate locations on the vehicle, and with poorly designed displays and controls, compound the stresses placed on the operators.

An added problem in underground mines is that many mining machines and vehicles may not have suspension systems of any kind. This shortcoming, together with a lack of appropriate seat suspension and having to travel on poorly maintained roads and uneven surfaces, could result in operators being exposed to unacceptable whole-body vibration levels. All these factors, in conjunction with other physical stresses typical of the mining environment, such as noise and poor visibility, can make vehicle operation unnecessarily tiring at best and hazardous to health and safety at worst.

The observed occupational health and safety risks resulting from ergonomics-related factors can be ascribed predominantly to workstation designs based on anthropometric data that are not entirely suitable for the South African user population.

Recommendations

From an ergonomics point of view, improvements aimed at reducing the risk of the musculoskeletal disorders and worker fatigue associated with the cabin design of mining machinery and transport systems will depend heavily on the availability of anthropometric data pertaining to the user population in the South African mining industry, both male and female. Current information on the body dimensions of South African mine workers is rather dated (Schoeman *et al.*, 1981) and only covers male mineworkers.

In view of the importance of this information in the design of the operator workstations (the 'operator space envelope') of mining equipment, and mining tasks in general, it is recommended that studies be carried out to determine the functional anthropometry (i.e. those body dimensions that are essential for the design of workstations) of South African mine workers (both male and female).

The latest South African anthropometric data are based on a representative sample of males and females from an SANDF survey. It is recommended that a small sample representative of the mine worker population be measured for the critical anthropometric variables used in workstation design and specification, in order to verify whether indeed the military data are applicable to the mining community.

It is recommended that a concerted effort be made to upgrade the seats of mining machinery and transport systems. Seat maintenance programmes and the training of operators to adjust their seats properly to meet their personal requirements are indicated.