

Project Summary : COL 236

Project Title:	Assesment of dispersed barrier 22p.		
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Category:	Coal	Technology Transfer	Occupational Health

Summary

This project deals with the evaluation of the dispersed barrier system to stop the flame propagation of coal dust explosions in the 200 m test gallery at the Kloppersbos Research facility. The dispersed barrier system was tested in two distinctively different applications: firstly, as a passive explosion barrier and, secondly, as a stone-dust supplement, i.e. to supplement the legal requirement where coal dust layering occurs in the underground work environment.

The purpose of the dispersed explosion barrier is to stop the flame from propagating by ensuring adequate stone dust throughout the mine and thus limiting, or even obviating the need for re-stonedusting of work areas where coal-dust layering does occur.

A standard test explosion against which the effectiveness of the dispersed explosion barrier may be tested has been determined and various methods of closing the stone-dust bag have been evaluated.

The standard test is a simulation of low-pressure coal-dust explosion, as experienced in practice, for the purpose of determining the effectiveness of the barrier in stopping the flame from propagating.

For the evaluation of the initial systems a development explosion was used. The test set-up showing the placement of the stone dust bags for this explosion is illustrated in Figure 1.

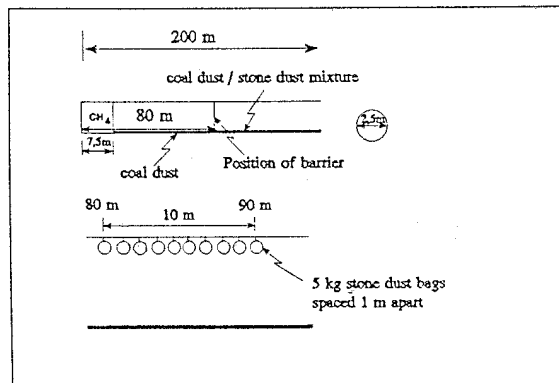


Figure 1. Test layout for development explosion.

The initial tests were conducted to determine the best way of closing the bag and the most suitable type for the bag to give good dispersion of the stone-dust in the event of a weak dynamic pressure wave reaching the stone dust bag. The test layout for the dispersed barrier explosions is shown in Figure 2.

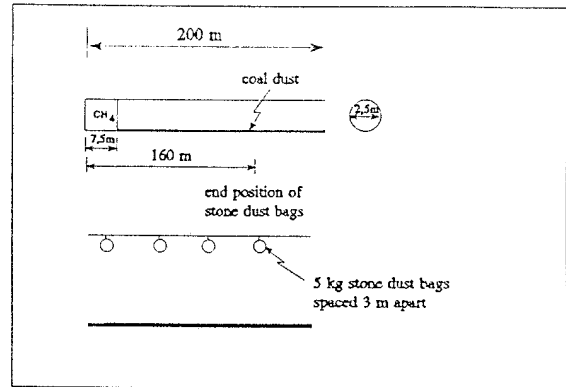


Figure 2. Test layout for dispersed barrier explosion

Although the tests were conducted under extreme conditions, i.e. where no stone dust was mixed into coal dust, the stone dust bags were still able to stop flame propagation.

Conclusions

- The test results show promise for both the applications tested, i.e. as a passive stone dust barrier and as a stone dust supplement.
- The use of stone dust bags as a passive explosion barrier seems to have merit as smaller concentrations (as little as 20 kg/m) were able to arrest the fire propagation.
- The use of stone dust bags to supplement stone-dusting underground in specific areas where coal layering does take place has been proved viable for the set conditions of the test gallery.
- The present results should, however, be interpreted in the context of the test facility utilized and should be confirmed for larger cross-sectional areas and even weaker explosions in an experimental mine.