

Project Summary : GEN 207

Project Title: Develop a quiet non-atmosphere polluting blast hole drilling system 70p.		
Author(s): G S Harper and T Scanlon	Agency:	CSIR
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Summary

Past research has shown that to a large extent, specific noise sources within blast-hole drilling systems can be individually addressed but, in general, such solutions have been found to be impracticable for underground application. In reviewing past work in this area a novel concept was identified which would enable the practical application of previously identified noise reduction methods and technologies. The basis of the concept was to integrate the rockdrill and the thrust leg into one device, i.e. the drill becomes a piston within an enlarged thrust leg. This configuration not only provided an effective method of applying identified noise reduction methods, but also afforded several advantages in the operation and handling of the drilling system. The noise level of a commonly used pneumatic rock drill was reduced from 111 decibels on an A-weighted scale (dBA) to 87 dBA while running in over travel and from 115 dB to 92-93 dB during drilling. However, subsequent evaluation of the system identified several limitations in the area of dynamic seals particularly those involved in the provision of the thrust force. These limitations were of a magnitude that prohibited the development of a viable blast hole drilling system based on such a thrust arrangement. However, in recognising that the concept is the only one identified to date that permits the effective application of existing noise reduction methods, it is strongly recommended that further efforts be applied in the development of improved thrust systems within this original concept.

Conclusions

From results of the surface testing of the first prototype quiet blast hole drilling system it is evident that while there is a very positive indication that this type of arrangement can significantly reduce the noise emissions of pneumatic rock drills to levels which, at typical drilling shift times in South African mines, would permit compliance with the legislative requirements, significant further re-engineering will be required to develop an effective mining tool. The concept has resulted in the production of a device that can drill at rates better than conventionally thrust drills at significantly lower noise levels. Comparing the noise levels of a standard unmodified drill of 115 dB against that of the prototypes at 92 dB there is real cause for optimism regarding a major contribution to the reduction of noise induced hearing loss in the South African mining Industry.

However, it is very evident that the thrust method used in the first prototype is not acceptable for the following reasons:-

1. Tie rods are required to react the rotation and add un-necessary mass to the device.
2. A large number of low pressure seals are required which failed repeatedly as a result of hysteresis heating.
3. The low pressures required to provide the thrust were difficult to control when the seals leaked.
4. The drill steel requires significant modification to provide a closed loop water flushing system.

In light of these problems an alternative method of providing the thrust should be sought as a matter of priority.