

## **Ventilation model for training**

### **Glencore – Oaky North Mine**

#### **The Problem**

There are a number of major hazards inherent in underground coal mine ventilation systems and workforce understanding of these hazards is vitally important for their safety and health. As a large underground mine expanded into a new mining area with significantly changed mining conditions, a new and complex ventilation system was required. Effectively explaining the new system and training coal mine workers in its operation was identified as a significant problem. Coal mine workers are typically visual, “hands on” learners and in this instance they required detailed training in something they cannot see or touch. In addressing this problem an opportunity was identified to improve the overall workforce understanding of coal mine ventilation systems therefore improving the safety and health of coal mine workers throughout the entire mine.

#### **The Solution:**

The solution involved the design and construction of a scale model of a mine’s ventilation system to essentially “tell the story” of how a coal mine’s ventilation system works. The model was almost entirely designed and created by the site’s ventilation department.

The model was initially created to demonstrate the mine’s ventilation system where representative airflow quantities and pressures could be measured as part of detailed training for supervisors. Based on positive feedback from initial trials this was extended to include airflow behaviour using current visualisation tools.

The model allows for practical demonstration of how the hierarchy of control process applies to the mine’s ventilation system by visually demonstrating the way a ventilation system works. The model also demonstrates how changes to the ventilation system and the effects of those changes applies to the underground workplace.

#### **Benefits/Effects:**

The major benefit of the system is the ability to cater for all learning styles, including visual, auditory and kinaesthetic learners. This allowed for the successful implementation of the mine’s new ventilation system. Work is underway to extend the use of this learning tool into inductions, general ventilation and spontaneous combustion training, emergency escape scenarios and beyond.

Feedback from the workforce training has been extremely positive, as demonstrated by the following:

“The best ventilation training I have ever attended” – Undermanager

“The scale model is excellent!” – Coal Mine Worker

“The model is an excellent way to learn about the system” – Coal Mine Worker

### Transferability:

The ability to transfer this training tool across the resources industry is virtually limited by the trainer's imagination. For example, accessing confined and hazardous spaces is an inherent risk across almost all sites. A simple tool of this type can easily be created and used to improve the understanding, knowledge and skill of the persons conducting these tasks. Another example is to use air current behaviour to illustrate the movement of respirable dust.

### Innovation:

The use of 3D printing technology in conjunction with air current visualisation tools to create a simulated learning system has proved to be a very successful new innovation in the field of ventilation training. Virtually any safety feature of a coal mine's ventilation system can be illustrated using this innovative approach to training, including escapeway separation, goaf gas behaviour, hazardous areas, ventilation failures and many more. Visualisation tools that are integrated into the learning system include air currents (smoke), ventilation measurement instrumentation, adjustable ventilation control devices and fans, and the ability to change between various different mining methods and sequences. The system also allows for a conventional whiteboard markup of the system using a simple perspex cover.

Another innovative aspect of the system is how it can be adjusted to illustrate how changes to the mine's ventilation system can affect the health and safety of coal mine workers. This feature allows for the training of mine officials in the laws of ventilation, the operation of ventilation measurement tools and how these systems can be applied to "fault find" problems in the mine's ventilation network.

### Approximate Cost

The materials used to fabricate the initial model cost less than two thousand dollars, which included the purchase of a basic 3D printer.



Model Mine Ventilation System