Keynote Speech

Application of Tracer Gas – A Versatile Technology for Mine Ventilation Systems Study

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Abstract

Ventilation is an important and integral part of any underground mine. Proper ventilation is required for comfortable breathing by the mine workers, dilution of gases & dust, removal of heat & humidity, and thereby, providing with a congenial working environment – to improve the productivity as well as mine safety.

Anemometer is the most commonly used instrument for measuring air quantity in underground mines. However, it has some serious limitations. Using this instrument, one cannot measure the leakage airflow as well as very low quantity airflow such as in metalliferous mine stopes. Even while measuring quantity of airflow having perceptible velocity, anemometer is subject to errors up to 20 percent. Accuracy of anemometer is also influenced by the turbulence in the airways of irregular cross-section.

Tracer gas technology can be effectively applied for measuring airflow of any range – from very high to very low – with high accuracy and repeatability. In this method, quantity of airflow is measured directly – instead of separately measuring the air velocity and cross-section of the airway, as in the case of an anemometer application.

Tracer gas technology can be called a ubiquitous method for studying various mine ventilation systems with accuracy. A few representative application areas are outlined in this presentation, such as

- Estimation of airflow in mine airway
- Effectiveness of face ventilation at development heading
- Study of leakage through permanent stopping
- Study of leakage through Longwall gob packing
- Study of recirculation in multilevel mine due to natural ventilation

Only a few application areas of mine ventilation have been discussed here. It remains on the far-sight of the ventilation engineer to work out an appropriate scheme for the application of tracer gas technology for studying simple to complicated cases of ventilation systems.

The mines of Europe and other countries are accruing the benefits of the tracer gas technology. But in Indian mines, only some sporadic trials have been given. Full-fledged R & D is yet to be done on this versatile technology for the benefit of Indian mining industry as well.

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