



“Gheorghe Asachi” Technical University of Iasi, Romania



OPTIMIZATION OF UNDERGROUND ENVIRONMENT BY IMPROVING THE MANAGEMENT OF VENTILATION NETWORKS

**Marius Simion Morar^{1*}, Sorin Mihai Radu², Constantin Lupu¹,
Doru Cioclea¹, Ion Gherghe¹**

¹*National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX,
32-34 G-ral Vasile Milea Street, Postcode: 332047, Petrosani, Hunedoara County, Romania*

²*University of Petrosani, 20 University Street, Postcode: 332006, Petrosani, Hunedoara County, Romania*

Abstract

In the process of underground coal mining a complex network of vertical, horizontal and inclined mine workings with the purpose of extraction, transportation and evacuation to the surface are utilized. The mining workings are also being utilized for ventilation network system, which is also used for ensuring the oxygen supply necessary for workers, as well for diluting explosive gases and/or toxic substances and, ultimately, for exhausting the heat resulted from underground workings. For air flow pumping, special fans, of high capacity, located at the surface of the main ventilation stations are used. The fan operating mode depends on aerodynamic parameters and also on the structure of the ventilation network. Knowledge of specific local network parameters leads to the optimization of air flow distribution. The novelty presented in the paper consists in analysing and optimising the complex ventilation networks of Lonea mining unit, based on the depresiometric, flowmeters measurements and the status parameters specific to each branch. Worldwide, in high developed mining countries, solving a complex ventilation networks it's being carried out with the help of specialized software such as VentSim, VentGraft, VentPri, 3D Canvent etc., through discontinuous operating at the mining unit quarter or to a distant location, where upon the results obtained are presented to the ventilation specialists. The complex ventilation network afferent to Lonea mining unit was rendered, fixed and optimised, up-to-date, using 3D Canvent software.

Keywords: aerodynamic parameters, fans, management, ventilation

Received: May, 2016; *Revised final:* May, 2017; *Accepted:* May, 2017

* Author to whom all correspondence should be addressed: e-mail: marius.morar@insemex.ro; Phone: + 40 254541621; Fax: +40 254546277