The Evaluation of Technological Mining Systems Based on the Operational Indicators

Livia Iliaş, Iosif Andraş, Inga Cioară, Florin Nicolae

Universitatea din Petroşani, Str. Universităţii nr. 20, Petroşani, Romania

Abstract

Technological systems for evaluating proposed mining operational following indicators: the level of mine technology, the level of concentration of work and the level of intensity of mining work. Adopted indicators is assess the technological scheme of mine, and the technical solutions chosen for exploitation.

Key words: *indicators, mining technology, production of the mine.*

Introduction

In terms of dialectical improving technology is to follow the development processes on behalf of deepening knowledge during its completion. To analyze ways to improve the technology of mining should be defined and subject to its field of application.

Technology is the innovating improve mining production. Techno (from the Greek techne) - art, craft, skillfully ... logia (from the Greek logos) - notion, skills. Technology - all methods of exploitation, manufacturing, change of status, property form the material in the process of production.

Purpose of the technologies that science - the discovery proprieties physical, chemical, mechanical and others for the purpose of determining the use and practice in the most efficient and productive economic processes.

Production mining - the process relating to the recovery of subsoil, prospecting and exploitation of deposits and extracting useful mineral substance. Mining production is identify with the mining company, under which the process (middle) who carried out the general technological scheme for extraction of useful mineral substance.

Technological scheme of the mining technology - all mining opening training (transport and ventilation) and working and also the means of mechanization and automation processes and supporting basic, which allows for an organization determined to work to make extraction substance useful minerals. General technological scheme of an enterprise scheme includes mining technology and supporting basic, which are assembled and may be part of a stand-alone mining technology company. At the basic technology to include schemes for the opening, training and operating reserves of mineral substances useful.

Evaluation of technological systems for mining are proposed the following operational indicators: mining technology level indicator, the indicator level of concentration of work and level of intensity indicator of mining works.

The Indicator Level of Mining Technology

The indicator level of mining technology is defined for evaluate share part of each process technology of mining in the general level of mining technology company.

From this point of view the most preferred indicator of the level of technology is the consumption working to 1000t daily production of the mine.

The expression for determining the level of technology mine N_m is:

$$N_m = \frac{1000 P_m}{S_m} = \frac{1000 P_m m \gamma}{A}$$

(1)

where: P_m - the number of posts to draw in 24 hours; S_m - area operated layers in 24 hours, m^2; A - daily production capacity of the mine, t; m - average thickness of the layer, m; γ - volumetric mass of coal, t/m^3.

The Indicator Level of Concentration of Work

The notion of concentration of work in the mining industry is composed of two main elements: the concentration of production and concentration of mining works.

The main indicator, which determines the concentration of production, is the production capacity of the mine. If the concentration of production is expressed by the size of production capacity of the mine, then the main indicator of the overall level is longwall face of that back to 1000 t average daily production of the mine.

The indicator level of concentration of mining $K_{c.l.}$ is determined by the formula:

$$K_{c.l.} = \frac{1000 n_{t.a.}}{A}$$

(2)

where: $n_{t\,a}$ - the total number of longwall face of mine; A - average daily production of the mine, t.

The concentration of mining work in the mines - notion that determines the degree of concentration of work in the mine field. Its level depends on many factors: the total number of longwall face and the fronts of training in mine, the number of panels, blocks, and layers and horizon which is operated simultaneously in the mine field, extent of mining works.

The main factor that determines the level of concentration of mining work, is the total number of longwall face the mine, which provides its production. With decreasing number of longwall face or their specific indicator, (the total number of longwall face for 1000t daily production of the mine) to reduce the number of panels, blocks, and layers and horizon that is operating at the same time. This in turn leads to lower specific extent of mining in the mine. Thus, the indicator passed the level of concentration of work (expressed by the relationship of the total number of reported longwall face to 1000 t daily production of the mine).

With the increased concentration of mining reduced capital expenditures and the size of specific funds for the work of the mining costs are reduced consumption of resources and labor for

maintenance work and mining in some transport, which leads to a final balance to reduce the size of the costs expenditure and expenditure on these kinds of works (in the cost of coal).

Increased concentration of lead mining works to reduce basic funds for consumption of exploitation and increased labor productivity and therefore reduce the cost of coal and related costs, raising efficiency of production.

Reduce considerably the number of longwall face ensure that the production capacity of the mine, that is, increased concentration of mining work, is possible only on increasing production of longwall face.

Therefore longwall face production is the main determining factor, which provides increased production in the panel, block, layer, thereby improving the horizon and technical-economic indicators of the mine.

Achievements in the field of technology and technical exploitation of groundwater has opened avenues to increase substantially the production capacity of the longwall face, which in turn helped further increase both the level of concentration of work and production capacity of the mine - the main indicator of concentration production.

The Level of Intensity Indicator of Mining Works.

As an indicator of the intensity of mining $I_{l.m.}$ accept the size of the area operated layers on average per hour (days) per longwall face actively.

The expression for determining $I_{l.m.}$ is:

$$I_{l.m.} = \frac{A}{24 n_{a.a.} m \gamma} \tag{3}$$

where: $n_{a.a.}$ - the number of longwall face actively; m - average thickness of the layer, m; γ - volumetric mass of coal, t/m^3.

To compensate for variations technology scheme or technology for making the work of longwall face to the same conditions geology-mining intensity of mining work can assess the speed of advancement of longwall face or medium volume of coal extracted from working in 24 hours.

For indicator that the technical level of openness and prepare, analyze the mine field, the dimensions on which direction they note with S_{cm} the slope with H and the total scope and volume of business of mining and preparation of opening the mine field, carried out throughout the service to the mine through L and V. Then specific scope and volume V_s of these works to reserve industrial 1000t can be determined from:

$$L_s = \frac{1000 L}{H S_{cm} m \gamma c} \tag{4}$$

$$V_s = \frac{1000 V}{H S_{cm} m \gamma c} \tag{5}$$

where: c - coefficient of extraction of the reserve if the expressions (4) and (5) L, V, H, S_{cm}. - are consistent, then sizes L_s and V_s will depend on the values of m and γ, that is the same size of the mine field, depth of layers, technical solutions and parameters of the system of opening

and training, specific sizes of the extent and volume of business from mining 1000 *t* industrial stocks will depend on the thickness and mass of volumetric layers coal.

Therefore as a technical indicator of the level of the openness and readiness to take mine field specifies the length and volume of work and preparation for opening the mining field to 1000 m^2 surface layer of the exploited.

Conclusions

The indicators adopted to allow both outline assess mining technology and technical solutions chosen for exploitation. Schemes of mining technology applied in mining geology determined values of the best indicators mentioned above, provides not only consume minimal work and minimal costs.

References

1. C e a u ş u I . - *Encyclopedia management.* Academic Publishing Management, Bucharest, 2000.
2. S u r u l e s c u , D . , P o p e s c u . C - *Restructurarea mineritului carbonifer din România.* Editura Universitas 2008.
3. D o l e a . G . - *Cercetări în concepţie sistemică în vederea optimizării variantelor de mecanizare a abatajelor cu front lung în condiţiile bazinului Valea Jiului.* Teza de doctorat, Petroşani, 1999.
4. I l i a ş , L . - *Stadiul actual al performanţelor sistemelor tehnologice miniere.* Referat de doctorat, 2005.

Evaluarea sistemelor tehnologice miniere
pe baza indicatorilor operaţionali

Rezumat

Pentru evaluarea sistemelor tehnologice miniere se propun următorii indicatori operaţionali : indicatorul nivelului tehnologiei minei, indicatorul nivelului de concentrare al lucrărilor şi indicatorul nivelului de intensitate a lucrărilor miniere.
Indicatorul nivelului tehnologiei este definit pentru evaluarea cotei parţi a fiecărui proces tehnologic al minei în nivelul general al tehnologiei întreprinderii miniere.
Noţiunea de concentrare a lucrărilor în industria minieră se compune din două elemente principale: concentrarea producţiei şi concentrarea lucrărilor miniere.
Indicatorul cu care se determină nivelul concentraţiei producţiei este capacitatea de producţie a minei.
Indicatorii adoptaţi permit să se evalueze atât schema tehnologică a minei, cât şi soluţiile tehnice alese pentru exploatare.