2. Традиційні та нетрадиційні системи енергозабезпечення урбанізованих та промислових територій України: монографія /Моногр. за заг.ред. Г.Г. Півняка. – Д.: Національний гірничий університет, 2013. – 334 с.

3. Snihur, V., Malashkevych, D., Vvedenska, T. (2016). Tendencies of coal industry development in Ukraine. Mining of mineral deposits, Vol. 10(2), 1–8.

4. Медяник, В.Ю. (2015). Про необхідність нової наукової концепції проектування вугільних шахт / В.Ю.Медяник // Міжвід. зб.наук. праць НАН України Ін-т геотехнічної механіки ім. М.С. Полякова: Дніпропетровськ, – Вип. 123. – С.107–115.

5. Медяник, В.Ю. (2105). Комплексний видобуток і використання корисних копалин / В.Ю. Медяник, М.В. Нетеча, Ю.І. Демченко // Розробка родовищ: Зб. наук. пр. - 2015. – Т. 9. – С. 93-100.

6. Sotskov, V. Medyanyk, V., Malashkevych, D. (2018). Integrated evaluation of the worked-out area partial backfill effect of stress-strain state of coal-bearing rock mass / Trans Tech Publications Ltd, Цюріх, Швейцарія ISSN print 1012-0394, ISSN cd 1662-9787, ISSN web 1662-9779. –P. 213-220

7. Малкин А.С., Пучков Л.А., Саламатин А.Г., Еремеев В.М. Проектирование шахт: Уч. Для вузов под общ.редакц. Пучкова. 4-е изд. Доп и перер. – М. Издательство Академии горных наук, 2000. – 375 с.: ил.

8. Шестаков В.А. Проектирование горных предприятий: Учебник для вузов. – 3-е изд., перераб и доп. – М.: Издательство Московского государственного горного университета, 2003. –795 с.

9. Піньковский Г.С. Організація і технологія проектування шахт: Моногр. / Г.С. Піньковский. – Д.: Національний гірничий університет, 2013. –600 с.

10. Проектирование технологических систем шахт: учебное пособие / С.С. Гребенкин, В.В. Мельник, В.И. Бондаренко и др: под общей редакцией С.С. Гребенкин, В.В. Мельник и В.И. Бондаренко – Донецк: ВИК, 2014. – 511 с.

DEVELOPMENT OF COMPUTING MODEL OF GEOMECHANICS SYSTEM «LAYERED MASSIF - WORKING SUPPORT» AT PHYSICAL PARAMETERS OF ROCKS

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Purpose. Substantiation of method forecasting of manifestation rock pressure in the system «layered massif – working support» based on the detection of patterns displacement any point of circuit the preparatory working during the simulation experiments.

Methods. Carrying out the simulation experiments were performed on the basis of the finite element method using the solid computational domain, provided

transcendent non-linear behavior of the simulated material. The use of numerical grid methods allows creating geometrically and physically complex simulation models and manipulate them state in a wide range.

Findings. The calculations were defined that the weak links between adjacent layers, acting shear stresses destroy them in the vicinity of working, and related rock layers deform with slide concerned to each other. Analysis of reduced stress area allow to substantiate with sufficient accuracy for mining settlements averaged single structure of computational domain that most reflects all the main features of a real mining massif, having influence on the inaccuracy of calculations. This choice provides the scale contributed of inaccuracy within 10% in entire range of change mechanical parameters rock layers of the rock massif.

Originality. Stress-strain state frame support and patterns of change with increasing depth are non-linear, especially when passing nearby rock layers in the transcendental state; creation system of plastic hinges on a contour frame support furthers the development of its movements, which except the possibility of further exploitation working.

Practical implications. The elaborated method allows to determine the optimal indicators of maintaining working driven in the fine-grained rock massif, which allows to significantly reduce operating costs.

Keywords: working, stress-strain state, frame support, nonlinear deformation, the rock massif

References

1. Бондаренко, В.І., Кузьменко, О.М., Грядущий, Ю.Б., Гайдук, В.А., Колоколов, О.В., Табаченко, М.М., & Почепов, В.М. (2005). Технологія підземної розробки пластових родовищ корисних копалин. Дніпропетровськ: Національний гірничий університет.

2. Lapko, V.V., & Fomychov, V.V. (2013). Peculiarities of rope bolts usage during maintenance of stopes in mines of Western Donbass. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (5), 31-36.

3. Fomichov, V.V., Zuber, R.V., & Spivak, G.P. (2010). Features of computing design of interaction of anchor and rock of mountain massif. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (6), 21-25.

4. Lapko, V., Fomychov, V., & Pochepov, V. (2013). Bolt support application peculiarities during support of development workings in weakly metamorphosed rocks. Annual Scientific-Technical Collection – Mining of Mineral Deposits, 211-215. https://doi.org/10.1201/b16354-39

5. Kovalevskaya, I., Fomichov, V., & Vyvcharenko, A. (2011). Optimization of frame-bolt support in the development workings, using computer modeling method. In 22nd World Mining Congress & Expo (pp. 267 278). Istanbul, Turkey: Aydoğdu Ofset.

6. Sotskov, V., & Saleev, I. (2013). Investigation of the rock massif stress strain state in conditions of the drainage drift overworking. Mining of Mineral Deposits, 197-201. ttps://doi.org/10.1201/b16354-36

7. KD 12.01.01.201-98. (1998). Raspolozhenie, okhrana i podderzhanie gornykh vyrabotok pri otrabotke ugol'nykh plastov na shakhtakh. Kiev: Tipografiya UkrNIMI.

8. Geleskul, M.N., & Karetnikov, V.N. (1982). Spravochnik po krepleniyu kapital'nykh i podgotovitel'nykh gornykh vyrabotok. Moskva: Nedra.

UTILIZATION OF WASTE MATERIALS OF PRIDNEPROVSKA TPP

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Purpose. Study the possibility of fly ashes full recycling of Pridneprovska Thermal Power Plant (PTPP) by their refining in industrially valuable products using gravity classification of dry ash from electrostatic precipitators and water-gravity separation of the ash from a dump.

Methodology. Classification of fly ashes using the modernized processing equipment has been carried out in the laboratory in two ways. First one is ash pneumatic separation directly from the electrostatic fields using specially selected vibrating screen. The second way is to hydro divide the original product from an ash dump using the upgraded centrifuges and hydrocyclones.

Findings. Technological solution for complex processing of fly ashes, based on the "dry" gravitational separation of ash from electrostatic precipitators and "wet" gravitational separation of ash from thermal power plants and storage dumps has been developed. It is established that the addition of active ash up to 33% on 1 m^3 of concrete allows saving up to 25% of cement and increasing strength of concrete structures up to 5%. Addition of products produced from thermal power plants waste, for production of building materials allow to reduce the share of energy consumption up to 20 – 25%, which is essential for the competitiveness of construction products. A mixture of alumina-silica products can reduce the industry clay using to 50%. Carbon products are cheap substitutes for the individual production of sorbents.

Coal combustion at thermal power stations results in accumulation of considerable amounts of ashes and slag waste. In particular, coal combustion at PTPP results in 0.5 mln tons of ash; the available ash storage facilities occupy the territory of 200 ha being constant source of contamination for soil, air and water basins.

According to [1, 2], the accumulated amounts of solid waste of thermal energy may be utilized with high economic efficiency. However, use of ash in various industries is rather limited due to inhomogeneity of its composition and high