6. Myronova, I. (2015). Changing of biological traits of winter wheat that vegetate near emission source of iron-ore mine. Mining Of Mineral Deposits, 9(4), 461-468.

7. Khomenko, O., Kononenko, M., & Petlovanyi, M. (2015). Analytical modeling of the backfill massif deformations around the chamber with mining depth increase. New Developments In Mining Engineering 2015, 265-269.

8. Myronova, I. (2016). Prediction of contamination level of the atmosphere at influence zone of iron-ore mine. Mining Of Mineral Deposits, 10(2), 64-71.

9. Khomenko, O., Kononenko, M., & Myronova, I. (2017). Ecologic-and-technical aspects of iron-ore underground mining. Mining of mineral deposits, 11(2), 59-67.

10. Khomenko, O., Kononenko, M., Myronova, I., & Sudakov, A. (2018). Increasing ecological safety during underground mining of iron-ore deposits. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (2), 29-38.

11. Khomenko, O., Kononenko, M., & Bilegsaikhan, J. (2018). Classification of Theories about Rock Pressure. Solid State Phenomena, 277, 157-167.

DEVELOPMENT OF TECHNICAL SOLUTIONS AIMED AT IMPROVING TECHNOLOGICAL CAPABILITIES, DESIGN CHARACTERISTICS AND INCREASING THE SERVICE LIFE OF BRIQUETTE PRESSES

BAIUL Konstantin[1], VASHCHENKO Sergey[1], KHUDYAKOV Alexander[1]
PROKUDINA Elvira[1] & SOLODKA Nataliia[2]
[1]Z.I. Nekrasov Iron & Steel Institute of National Academy of Sciences of Ukraine, Dnipro, Ukraine
[2]SHEI Ukrainian State University of Chemical Technology, Dnipro, Ukraine

Purpose. Development of technical solutions for manufacturing and further use advanced roller press having advanced technological capabilities and increased resource exploitation.

Methodology. Analysis of the designs of modern roller presses has shown that for today in the metallurgical and mining industry roll presses with a productivity of 0.5 to 100 t/h are used to produce briquettes from fine fraction raw materials that ensure the processing of a wide range of materials in the low and medium pressing pressures (up to 150 MPa).

Findings. Analysis of modern roller presses has shown that for today in the metallurgical and mining industry, roll presses are widely used. Their various modifications provide productivity from 0.5 to 100 t/h when processing a wide range of raw materials in the range of low and medium pressing pressures (up to 150 MPa). The analysis of constructive decisions of roller presses shown that the main tendencies in the development of modern presses are:

- creation of supporting elements of presses in form of frame structures allows to reduce metal consumption of equipment, manufacturing, mounting repair and operation cost;

- optimized driveline development, taking into account specific technological conditions, including controls and overload protection.

- effective rolls calibration methods and operating modes development in order to increase of exploitation period and production of quality briquettes;

- creation of effective mechanisms for regulating the supply and pre-pressing of the briquetting material;

- development of reliable and effective devices for rolls overloads protection.

A new design solution for a press frame from three construction elements: drive frame, roller frame and rolls support frame proposed. Such a technical solution allows performing the press structure synthesis on a modular principle by rational combination of drive and the roller block components. Improved roll construction developed. It provides press high productivity and has high maintainability, reliability and operational resource due to:

- use of two pairs of pressing tires with a synchronizing gear between them, which allowed to double the productivity of the press (up to 50 t/h), while balancing load distribution on bearing units of roller block, increasing life of the press;

- for fastening hubs and pressing tires on rolls quick-release clamping elements used. They have enough torque reserve; allow fixing the parts of rolls with precisely set torque and spacing;

- use of quick-release clamping elements and pressing tires with a specific profile of working surfaces makes it possible to unify and make them interchangeable with other presses designed earlier at the Institute.

A hydraulic device to protect press from overloads up to 3000kN designed. This device has:

- ability to quickly open the rolls at sharp increase of pressing forces and disconnecting drive, which creates conditions for protection roller block and elements of the drive from overloads;

- precise regulation of allowable pressing force and system operating conditions, taking into account briquetting process technological features and rolls working surfaces wear;

- work of roll press protection system at pressure in hydraulic system not higher than 32MPa (320atm), which ensures its high reliability, safety and operational life.

The screw prepressing mechanism was developed and tested in industrial conditions, which allows obtaining a stable process of compaction and production of quality briquettes from materials with small bulk density – 0.2 ... 0.6 g/cm3, which allowed expanding the technological capabilities of the roller press.

This publication is based on the results of studies that were carried out within the framework of the project under the agreement P7.9 - 2018 of the target program "Reliability and durability, structures, equipment and structures" (Resource-2), funded by the National Academy of Sciences of Ukraine.

Key words: roller briquetting press, hydraulic protecting device, screw prepressing mechanism

References

1. Roll-press briquetting: compacting fines to reduce waste handling costs by Thomas P. Barnett (Powder and Bulk, Volume 24, Number 10, October 2010).
2. Majmur B. N. Sovershenstvovanie konstrukcii i uluchshenie ehkspluatacionnyh harakteristik valkovyh briketnyh pressov // B. N. Majmur, V. I. Petrenko, A. T. Lebed' / Byul. nauchno-tekhnicheskoj i ehkonomicheskoj informacii «Chernaya metallurgiya» – №12. – 2011. – S. 67-71.
3. Noskov V. A. Sozdanie i vnedrenie pressovogo oborudovaniya dlya briketirovaniya melkofrakcionnyh metallugricheskih othodov: Dis... d-ra tekhn. nauk: 05.05.08 / NAN Ukrainy; Institut chernoj metallurgii im. Z.I. Nekrasova. – Dnepropetrovsk, 2001. – 318l. – Bibliogr.: l.288-304.
4. Noskov V. A. Valkovyj press dlya briketirovaniya melkofrakcionnyh othodov proizvodstva i syr'ya / V. A. Noskov // Metallurgicheskaya i gornorudnaya promyshlennost'. 1999. № 2-3. – S.100-102.
5. Pat. 88846 Ukrainy. Valkovij pres dlya briketuvannya dribnofrakcijnih materialiv; opubl. 25.11.2009. Byul. № 22.
6. Valkovij pres dlya briketuvannya dribnofrakcijnih materialiv. Patent Ukrayini № 19268 na promislovij zrazok; opubl. 27.07.2009. Byul. № 14.
7. Majmur B. N. Razrabotka i ispytaniya sredstv kontrolya usiliya pressovaniya v valkovyh pressah // [B. N. Majmur, K. V. Bayul, A. T. Lebed, V. I. Petrenko, S. V. Vashchenko i dr.] / Fundamentalnye i prikladnye problemy chernoj metallurgii: Sb. nauchn. tr. — Dnipropetrovsk.: IChM NAN Ukrayiny, 2009. — Vip. 20. — S. 320-327. – Bibliogr.: 3 nazv. – ros.
8. Maymur B. N., Khudyakov A. Yu., Petrenko V. I., Vashchenko S. V., Baiul K.V. Briquetting of metallurgical raw materials. Urgency and ways of development. Byulleten «Chernaya metallurgiya». 2016. No. 1. pp. 74-81.
9. Baiul K. V. Analiz proizvodstvennoj i tekhnologicheskoj ehffektivnosti valkovyh pressov / [K. V. Baiul, S. V. Vashchenko, A. Yu. Khudyakov, N. A. Solodkaya] // Materiali Vseukraïns'koï naukovo-tekhnichnoï konferenciï "Mekhanika mashin – osnovna skladova prikladnoï mekhaniki", chastina 2. – Dnipro: NMetAU, 2017. – S.355-358.

FORECASTING OF ECOLOGICAL AND ECONOMIC CONSEQUENCES OF FLOODING OF COAL MINES

PISTUNOV Ihor M. & ANTONIUK Oxana
Dnipro University of Technology, Dnipro, Ukraine

Purpose. The main objective of the paper is to determination of the impact of groundwater near coal mines on the health of the local population in order to compensate for this impact on the cost of treatment for people