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PERFORMANCES OBTAINED USING A FULL MECHANIZED COMPLEX AT LUPENI COLLIERY - ROMANIA

У статті розглядаються результати дослідження операції механізованого комплексу на шахті Лупень. Після короткої презентації гірничо-геологічних і операційних умов, а також конструктивно-експлуатаційних параметрів комплексу, у співвідношенні з отриманими результатами, приводиться ряд висновків, які сприяють поліпшенню експлуатаційних характеристик даного комплексу.

В статье рассматриваются результаты исследования операции механизированного комплекса на шахте Лупень. После краткой презентации горно-геологических и операционных условий, а также конструктивно-эксплуатационных параметров комплекса, в соотношении с полученными результатами, приводится ряд выводов, которые способствуют улучшению эксплуатационных характеристик данного комплекса.

In article results of research of operation of the mechanized complex on mine Lupen are considered. After brief presentation of mountain-geological and operational conditions, and also design data-operational of a complex, in the ratio with the received results, a number of conclusions which promote improvement of operational characteristics of the given complex is resulted.

Jiu Valley is the largest coal basin in Romania, where energetic bituminous coal is mined. Lupeni Mine is a subunit of CNH-SA Petrosani, its object being exploitation of Jiu Valley's bituminous coal reserves, the exploitation perimeter being in the western part of the valley, mining out seam 3, which in the area of blocks IV and IV west is 25 m thick as an average, 10˚ gradient, with no complicated tectonics, thus the mine can be mechanically mined out.

Considering the programme of modernization and restructuring of CNH-SA Petrosani the main direction is continuous development of technologies, exploitation methods and high productivity equipment in order to improve coal extraction in long powered faces. In the year 2007 a Polish Tabor type powered complex was purchased, which was mounted in block IV, panel 1C and panel 2C(Fig. 1) to mine seam 3 by inclined slicing method.

Tagor type powered complex is made up of TAGOR-18/37-Poz type powered sections, KSW-460NE type continuous miner and TAGOR 260/750 type conveyer.

The elements of the face support(Fig. 2), related to its portent capacity, are: beam as part of the support, individual or compound, that takes over the pressure of the rock in the roof to the section, the foot one of the main subassemblies of the support, transmitting the pressure of the roof to the floor, by hydraulic props

articulated lemniscates, posterior framing shield, meant to process, totally or partially, horizontal forces stressing the support, as well as framing and isolating the support's workspace, from the relaxed rocks as a result of roof collapse, coupling parts of articulated lemniscates representing construction elements used to longitudinally stabilize the support, by which the framing shield is connected to the foot. They represent integrating elements of the support directing system, providing a correct monotonous trajectory (permanently in parallel with the roof surface), the beam, during changing the height of the section.

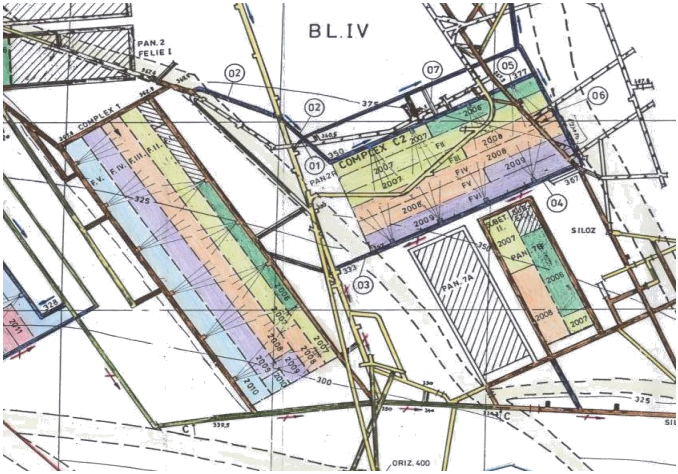

Figure 1 – Lupeni Mine field, block IV, panel 1C and C

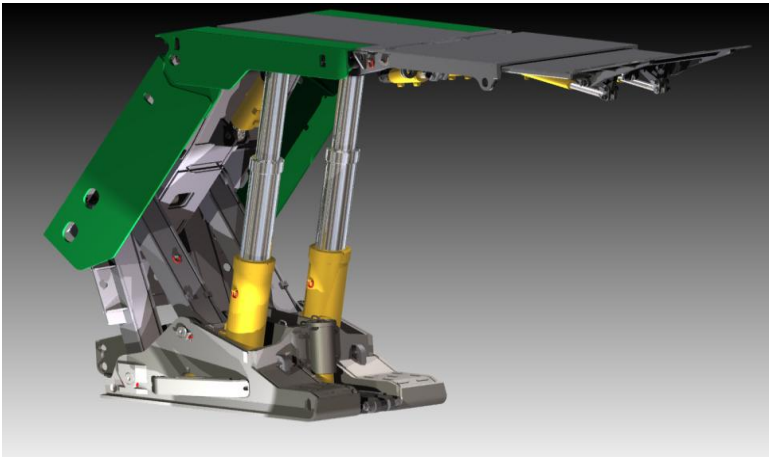
Figure 2 – TAGOR-18/37- Poz type powered section

The powered section is provided with a series of accessories. By accessories we mean all support elements that do not take over and do not transmit support forces, nut are required for the good functioning of the powered support in the face. Among those we mention the shifting system, which is a tool mounted in the foot of the support, used to move the support sections and of the face conveyer, in the direction of face advance, correcting assembly for section, which is a machine mounted in the section foot, used to correct its position, assembly of lifting the shoes is mounted in the support foot, used to move support sections and face conveyer, in the direction of face advance, lateral beam shields, posterior framing shields are machines used to protect the section's work space against ingress of relaxed rock mass, from the collapsed roof, catching shield is a mechanism linked to the support beam, which supports the face and hydraulic control system is made up of hydraulic control system elements, allowing execution of all the support functions of powered face support.

In the powered face support is envisaged to be working with a machine of 0,8 m undercut, a 750 mm wide trough face conveyer and TAGOR-18/37-POz/S and TAGOR-18/37-POz/P type face sections.

KSW-460NE type machine, Fig.3 with electric advance drive, with two booms working on the face conveyer in the Eicotrack type system without traction bar.

It is a two-way extraction with loading the material extracted in the stop of 25° transversal inclination upwards and up to 20° downwards with an up to 35° longitudinal inclination. For the entire inclination range the machine meets the stability requirements both stalled and during operation.

Due to high technical parameters the machine is intended to operate in high efficiency complexes. It is a self-portent machine of a compact design.

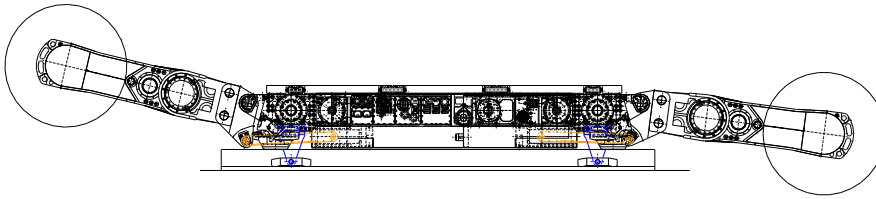

Figure 3 – KSW-460NE type coal cutting machine

The advance of the machine is actuated by two assemblies, each being driven by an asynchronous tri-phase motor. The motors are supplied from the frequency converter in the machine. The frequency converter provides the possibility of fluent regulation of the machine's advance speed, in the range of 0 and 50 Hz, the constant value of the motor couple being maintained(nominal moment of the motor0, as well as in the range 50-120Hz of the constant propulsion power.

The double system of the advance drive wheel, used by the machine, protects the tool against uncontrolled movement in the case of losing the gear of one of the toothed wheels and dividing rule. The un-graded regulation of the height of the extraction facilitates the extraction of wrinkled seam with the variable thickness of the seam.

The machine is equipped with control and diagnosis of functioning, with local control from control panels and from the drive-control assembly or by remote guiding(radio).

The machine can operate in faces prone to methane and coal dust explosion.

After a suitable adjustment of the machine parts, they can operate from up downwards, from down upwards or mixed mining method due to suitable boom design.

The machine is equipped with shoes adjusted to the cam profiles(trough with cams)., shoes that support it and which glides on the cam of the face conveyer.

The machine is equipped with upper shield with hydraulic control. The supply conductors of the machine are fixed to a suspension device by shoes. During the machine's normal operation the position of the suspension device is established by a safety wedge.

The Tagor type face conveyer is an iron-cased conveyer with 1 x 65 / 200 KW installed power at the dump point and 1 x 65 / 200 KW at the return point, the supply voltage is 1000V, with lateral(right, left) or front dumping version, $\pm 35^0$ maximum longitudinal inclination, $\pm 25^0$ maximum transversal work inclination, forged-welded troughs, 1000 t/h conveyer discharge.

Four hydraulic units with T-125/32 type pump situated in PTS Cpx transformation post provide hydraulic agent(high pressure) for powered support.

The machine, chain conveyer and belt conveyer are supplied with 1000 V electricity from EH 1250/6/1/3 transformers situated in PTS Cpx.

The powered unit is equipped with a monitoring-dispatching system providing monitoring and displaying the position of the face machine and its working parameters, monitoring and displaying operating parameters for the sections, the hydraulic agent's pressure, the water spraying pressure, the state of the tools.

This paper endeavors the show the developments of Tagor powered complex in the exploitation of panels 1C first and second slice and panel 2C, first slice, block IV Lupeni Mine.

In the autumn of the year 2007, Tagor powered complex was commissioned in panel 2 of block IV of Lupeni Mine , seam 3, length of the face line 100 m, maximum 10^0 seam inclination, length of direction of the stope field 250 m. Movement of the complex to the next face panel 2 first slice was made transporting the sections without being dismounted in subassemblies with the help of a monorail and of a device including entire sections. Thus the time required for commissioning the face was reduced by 30 % compared to the classical mounting-dismounting

method with special rooms of mounting-dismounting, shortening by 20 days the movement meaning an additional 24000 tons.

The geometrical elements of panel 1C first slice are 100 m face line, 250 m on the advance direction with 10˚ inclination descending. After the extraction of the first slice, at the stop line, the advance sense was reversed by reversing the powered sections one by one and their depressing in the second slice. At the level of the second slice the face line reached 94 m to achieve at the face end the advance direction being 450 m, with 10˚ ascending.

The developments will be presented in the following and analysis of indicators obtained at the exploitation of the three previously mentioned faces, that is:

- Advance in the direction expressed in meters done on direction per month;
- Production achieved per month, tons;
- Efficiency or productivity showing the relationship between productivity obtained and number of posts, tons per post;
- Number of posts per month.

Analysis of the four above mentioned indicators are results obtained in the exploitation of the Tagor powered complex in the exploitation of the abovementioned faces for 24 months.

For a comparative analysis of the behavior of the Tagor powered complex in the exploitation of the three faces, considering that for each of them the exploitation conditions are different, a diagram will be presented for each and every indicator with the note that in the fifth and the sixth month the complex was stopped.

- diagram 1 represents the advance in meters each month;
- diagram 2 represents the production in a month in tons;
- diagram 3 represents the number of posts with which the production was achieved each month;
- diagram 4 is efficiency this month this being the ratio between production achieved in a month and the posts executed that month.
- Amount of bituminous coal mined out in the two years of use of Tagor powered complex was 164296 tons for panel 2C first slice, 147984 ton bituminous coal for panel 1 first slice, 158910 ton bituminous coal for panel 1C second slice, that is a total of 471190 ton bituminous coal.

The analysis of diagram 1 advance on direction of powered complex shows an average advance of 37,91min the extraction of slice 1 panel 1 and 26,06m for the extraction of slice two of the same panel. This significant difference in advance is largely due to the artificial roof from two layered wire gauze plus a third one at the second slice. Production is directly proportional to the advance per direction, diagram 2 showing that as an average, production obtained in the face of the second slice is lower than that obtained in the faces of the first slice. Diagram 3 shows the number of posts per month and it is seen that the average in decreasing, thus in the

first face panel 2C first slice , the average achieved is 1872 posts per month and in panel 1 first slice the average of posts per month 1637 posts and in panel 1 second slice the average of posts is 1325 posts. The decrease in the number of posts is directly influenced by retirements.

Diagram 4 shows that productivities obtained in the exploitation of the three faces re lose to each other, panel 2C first slice 13,61 ton/post, panel 1C first slice 14,37 ton/post, panel 1 second slice 13,39 ton/post, these being less that productivities from EU due to seam conditions, namely short face line, exploitation on reduced direction(less than 450 m),slice height maximum 3,5 m, high labor consumption in execution of face joints as well as artificial floors.

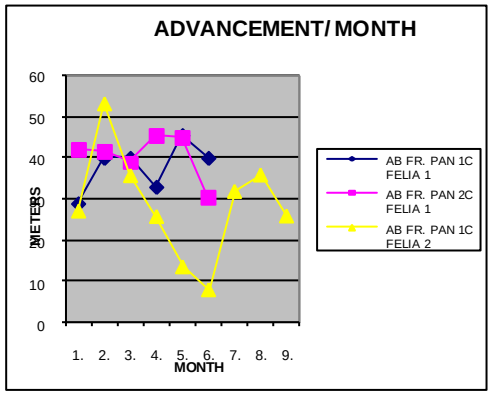

Diagram 1 – Advance per month in meters

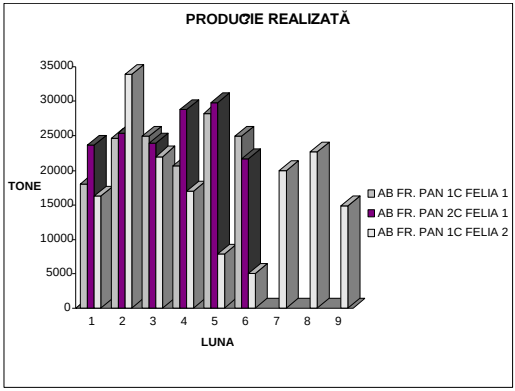

Diagram 2 – Production achieved per month in tonnes

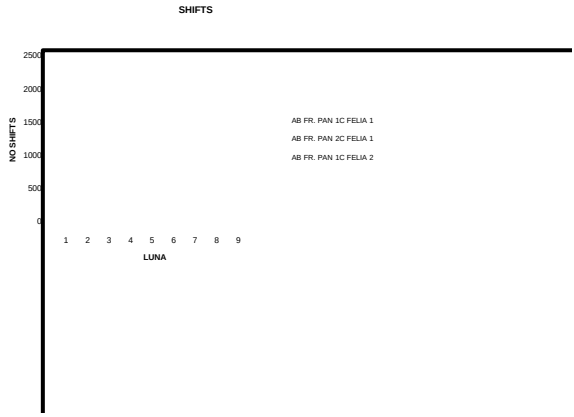

Diagram 3 – Shifts achieved per month

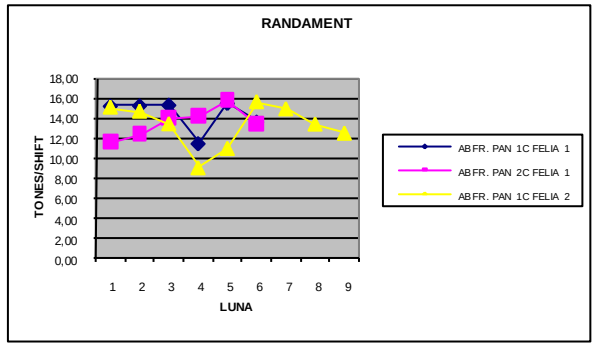

Diagram 4-Efficiency per month

In conclusion, in order to increase performances for Tagor powered complex in Lupeni Mine a number of minimum posts are required to cover the labor consumption to execute the intersection of the face and the artificial floor or finding solutions to mechanized intersections of faces and finding solutions to replace wire gauze with synthetic resins which should provide compact covering rocks as well as a resilience required for the exploitation of the following slices.

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