TECHNICAL PROPOSAL FOR IMPROVING THE ELASTIC COUPLINGS USED IN MINING

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Abstract: The technical proposal relates a flexible coupling for transmitting the rotational movement from the electric motor to a mechanical reduction of speed. The elastic coupling, is composed of left and right semicouplings with slots, of elastic elements axially introduced in the left semicoupling that are retained by a metallic disk, and in the right side by the breaking sheave.

Keywords: elastic couplings

1. GENERALITIES

The fast industrialization produced in the world until the mid-twentieth century required Romania to align the technical progress of large consumer of electricity. This way, in our country the problem of electricity production has undergone several stages of production in the central oil and gas, hydro and thermal power in coal. Currently, the national energy system has an installed power of over 20,000 MW, of which the thermo power stations with coal is of 39.5% and the electricity production based on lignite is the of 30% of the national production.

In Romania the lignite remains on long term a reliable source of energy, and the significant reserves that are available show that the operation will be possible until 2050. It can be estimated that in Romania on the restructuring and relaunch economic growth in the future will witness a significant increase in demand for electricity.

The social mission entrusted by society to the mining area, whether by the great financial effort made by the economy and the technical complexity of these systems excavation - transportation - wasted dumps require a considerable reduction in the risk of failure over time and ensure the efficiency in exploitation. The recorded

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results on technological lines, compared to design parameters during the operation and productivity levels are between 50-75%.

Given that on worldwide plan in the surface mining domain appeared acting and modern solutions, the design of rotor excavator shows some moral usage, but also their replacement in the current context is unprofitable, they must modernize their equipment to extend the operation safely.

To revitalize the mining activity, the levels of production and to improve the quality of coal extracted is necessary an infusion of technique and new technologies, to ensure:

- the performance increase of existing machines;
- reducing the energetic and material consumptions;
- the achievement of economic and technical parameters comparable with those from the developed countries.

To achieve these goals at the mining establishments were founded and implemented processes of rehabilitation, modernization and re machinery and equipment in the quarries.

The lignite careers in Romania are equipped with modern technological lines with the rotor excavators (99 pcs), conveyor belts (320 km), wasted dumps machines and other equipments for storage and complementary, which provide a productivity of 200,000 m3/day, transport and wasted dumps of 300,000 m^3/day.

The rotor excavators, and other career tools, machines are work machines 50% of metal construction on which are mounted the specific work organs. These machines must meet a number of conditions and be adapted to various requirements which are determined by the very purpose for which they were constructed.

They must be displaceable, the excavator must ensure cutting the rocks on a large acting ray, to make the cut slope angles required at heights greater than the front, to ensure the material transport excavated on a certain distance and to load the conveyors or discontinuous modes of transport. The are imposed hard work conditions, with a temperature to -20 °C (+40 °C), the inclination of the work plane and displacement, normal wind and even catastrophic events, some abnormal, but possible during operation, in which equipment must be back to resist deterioration. The cutting forces relatively large to the excavators raise the difficult balance and stability problems.

All external forces, as cutting force, the weight of transported material, weight etc., act on the construction of metal-bearing equipment in which they are transmitted in the soil.

The mechanism of displacement on caterpillar tracks ensures the movement of equipment in front or on the platform assembly career and career platform repairs. This mechanism is composed of three pairs of double caterpillar tracks, and each pair of caterpillar tracks one of which is actionable. The mechanism of acting of the caterpillar consists in the electric motor, elastic coupling with washer brake, brake with electro hydraulic brake shoes and redactor, lubrication system (Fig. 1).

Fig. 1. Mechanism of caterpillar acting

To replace the elastic couplings that ensure the transmissions of motion from the engine to redactor are followed these steps:

- disposing screws fixing the electric motor on the pedestal;
- moving axial electric engine with hydraulic presses for the release area for the replacement elastic couplings;
- elastic elements are replaced;
- moving axial electric engine in its original position;
- is made an axial adjustment - radial (this is the most important operation on the execution time having as execution time the largest values towards the previous operations);
- are collected the screws fixing the electric motor on the support pedestal.

In conclusion replacing the elastic couplings in training groups of the displacement mechanism on caterpillar at the rotor excavators is a long operation (approximately 60 minutes), having the effect of reducing the main index used extensively.

2. IMPROVEMENT PROPOSAL

It is known that an elastic coupling (patent no. 3837179 - Germany), consists in a clutch with semicoupling concave milled, with a top flange that screws another semicoupling with concave milled claws that allow mounting and dismantling the elastic elements under the form of crown with casks, placed between the claws concave milled of the coupling. It has the following disadvantages:

- complex construction due to the claw concave milled;
- additional consumption of rubber;
- reduced capacity of shock depreciation;
- fixing screws on the semicouplings blocks are required at time of shearing through the transmission of rotation from the engine reduction;
- exigent circumstances to mount and unmount elastic elements.

It is also known that an elastic coupling (patent no. 108372 - Romania), composed of a left clutch semicoupling concave milled, with some holes bored through which are introduced some elastic elements having a barrel, retained in position with a flange provided with some bossages, ensured with some screws on the left semicoupling.

The elastic elements are self-centered in the cylindrical semicoupling between the left and right semicoupling. This presents the disadvantage of a complex construction due to the claw concave milled, and changing the elastic elements is slowness in the axial direction.

These types of flexible couplings are used in the current act mechanism of displacement of the rotor excavator, conveyor belts acting on the rotor excavator conveyors, commutations acting in the case of extensible bends, and acting for the bend conveyors stations, etc.

The technical proposal relates a flexible coupling for transmitting the rotational movement from the electric motor to a mechanical reduction of speed.

The elastic coupling (Fig. 2), is composed of left and right semicouplings with slots, of elastic elements axially introduced in the left semicoupling that are retained by a metallic disk, and in the right side by the breaking sheave.

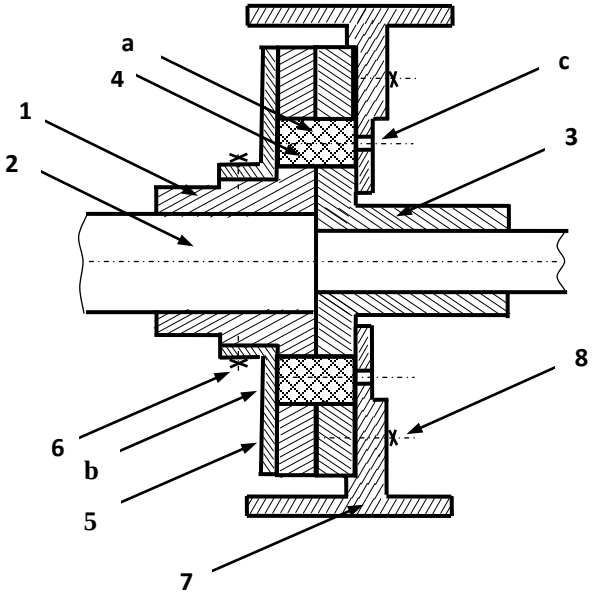

Fig. 2. Section of elastic coupling proposed

According to the proposal, flexible coupling consists in the left semicoupling (1) which transmits the rotational movement from the tree (2) a right semicoupling (3) by means of elastic elements (4), mounted on axial directions equidistance in the slots

(a) of the semicouplings. The elastic elements are retained in the left by a metallic disc (5) (foreseen with windows (b) of introduction and extraction of the elastic elements, disk which is fixed with screws (6) of the left semicoupling log (1) so that windows may not match the semicoupling slots), and in the right the brake's sheave (7), (foreseen with holes for the used elastic couplings elimination), fixed by the flange of the right semicoupling (3) with screws (8).

Taking into account that the share of replacement couplings flexible act takes away the mechanism of the rotor excavator is high and the time required to the replacement of the elastic couplings is large, we have dimensioned the proposed elastic coupling (Fig. 3).

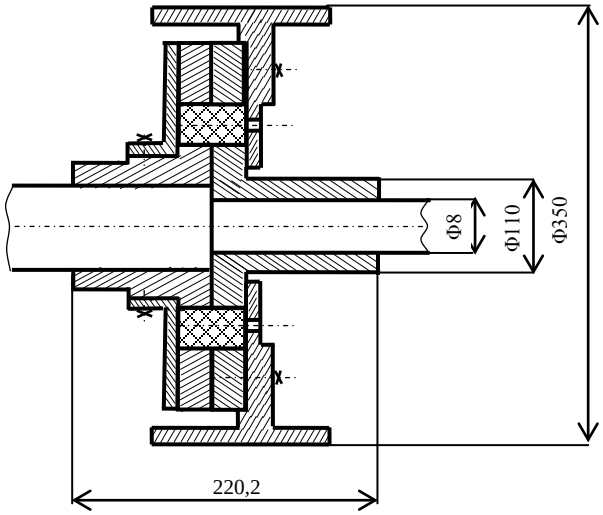

Fig. 3. Gauge dimensions of the proposed elastic coupling

In the figure below are shown images of the proposed elastic coupling:

Fig. 4. Ensemble elastic coupling

Fig. 5. Assembly coupling and retaining disc 5

Fig. 6. Semicoupling 1

Fig. 7. Semicoupling 1 with restraining disc 5 mounted

Fig. 8. Semicoupling 2 with brake sheave 7 (view on the left, right)

3. CONCLUSIONS

The technical advantages of this proposal are:

- simple construction;
- elastic elements are reusable materials (elastic elements are made of carpets with insertion of tissue);
- large sustainability of elastic elements;
- allows the couplings replacement without moving the electric motor, eliminating the operation of electric motor center;
- time reduction of replacement (approximately 10 minutes).

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