

ASPECTS REGARDING THE TECHNICAL EXPERTISE OF THE ROTATIONAL MECHANISM OF COAL MINING MACHINE - Part I

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Abstract: *In this paper we presents technical conditions for the rotational mechanism of the coal mining machine after we made technical expertise. The rehabilitation at the rotational mechanism will be subjected, it will be done by performing the intervention works who will restore both the structural part and the functional part in the normal operating parameters. The paper presents the defects found in the rotational mechanism as well as the proposed solutions for its repairs.*

Keywords: equipment, coal, modernization, interventions.

1. INTRODUCTORY NOTIONS REGARDING OF THE ROTATIONAL MECHANISM

The rotating mechanism is an assembly which is part of the coal mining machine bucket wheel in the coal depot and required particular attention to its technical expertise because this rotation occupies most of the time in a cycle [1], [2], [3] and [4]. The rotating mechanism of the superstructure mounted on the rotation platform has the role of engaging through the toothed crown, transmitting the moment of rotation from the rotation reducer and thus rotation of the superstructure over the infrastructure, fig.1, [5], [6] and [7].

Table 1 presents some of the technical features of the rotor mechanism of the coal-mining machine.

Tab.1. Characteristics of the rotational mechanism

The peripheral speed at the wheel's edge with cups	0 ÷ 36,8 m/min
Nominal power of the electric motor	16 kW
Rated speed of the electric motor	0 ÷ 970 rot/min
Transmission gear ratio	368
Total transmission ratio	5642,5
Angle of rotation	210°
Moment transmitted by overload torque	750 daNm
The type of overload coupling	of lamellar friction
Brake; Diameter of the brake washer	315 mm
The braking torque	23 daNm
Type of electrohydraulic lifter	REH 32/50 N5CA
Active lifter duration	DA 100%

The whole assembly is in balance with the center of gravity of the superstructure inside the supporting and rotation bearing, in equilibrium, it has on balance the counter-arm support and the ballast.

2. THE ROTATION DURATION AND ROTATION MODE

Rotation time and rotation are defined by the rotation angle b_R , the moment of the I_R inertia of the rotating part, the power and efficiency of the rotational mechanism HR, and the external characteristic of the M_R engine given by:

$$M_R = f(n) \quad (1.1)$$

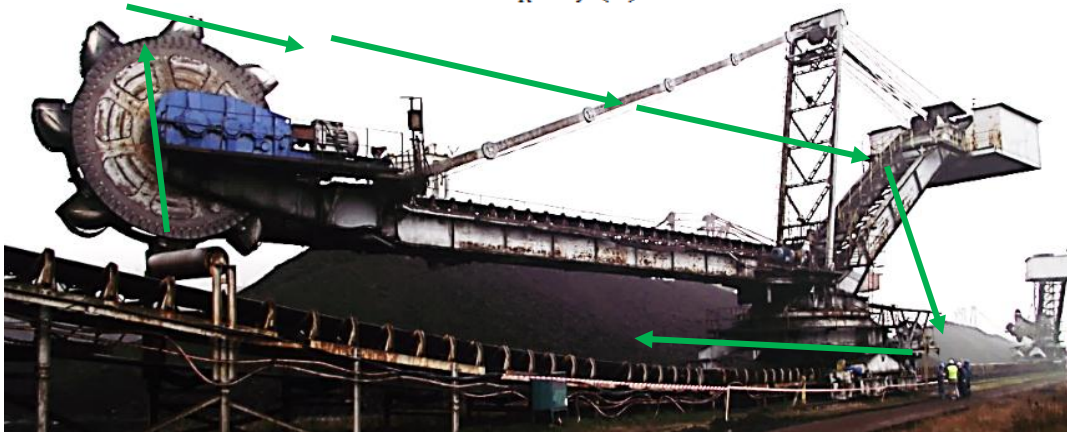


Fig.1. The coal mining machine positioning of the rotational mechanism

Also the external characteristic of the drive motor depends on the laws that vary the angular acceleration e_R and the angular velocity w_R as time functions, i.e. the acceleration time t_{Ra} and the braking duration t_{Rf} , respectively the duration of the whole rotation t_R . The values M_R , M_d , M_s și M_i are related by relations:

$$M_R = M_d + M_s + M_i \quad (1.2)$$

which gives the motor torques necessary to overcome the torques resisting due to dynamic, static and inertial loads of the organs in rotation of the rotating mechanism reduced to the engine shaft .

Whether I_R moment of inertia of the rotating part, reduced to the motor shaft, so that:

$$M_R = I_R e_R \quad (1.3)$$

Taking into account the relations (1.2) and (1.3) we will obtain:

$$e_R = \frac{M_d}{I_R} = \frac{I}{I_R} (M_{Rmax} - M_s - M_i) \quad (1.4)$$

The momentum of I_R inertia of the rotating masses of a particular machine remains almost constantly throughout the rotation, so the variation of the angular acceleration e_R will be similar to the variation of the torque M_R .

3. THE DEFECTS FOUND AT THE ROTATIONAL MECHANISM

Following the technical expertise of the rotational mechanism of the coal-mining machine there have been a number of technical irregularities and failures.

First of all, there have been several irregularities in the lubrication system, namely: electrical improvisations are made and lubricating fluid losses are recorded. Also, adjusting additions to the electric motor are improvised so that it is aligned with the input shaft in the reducer, fig.2.

Table 1. Determination of weld hardness between inclined soles and plates.

Sudura Cap la cap Duritati [HB]		MB1	ZIT 1	MA	ZIT 2	MB 2
	1	141	121	128	133	141
2	150	115	141	119	145	
3	134	111	150	129	129	
4	136	127	153	137	130	

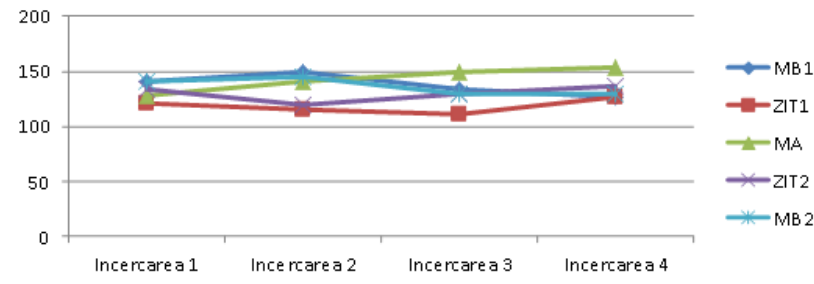


Fig.5. Determining the hardness values graph.

When assembling the balancing arm on the rotating platform with bolts, it was found that the clamping system of the soles and the core of the "I" welded beam profile between the two subassemblies, has been realized with IP (IR) group 10.9 screws. Also, there was found a very advanced oxidation of the heart on the inner side, at catching on the upper base plate, but also between the strap and the sole. Here it is necessary the plating on the inside, after cleaning and measuring, followed by anticorrosive protection [8], [9].



Fig.5. Bookmarks with the red paint of the screws that vibrates.

They have been checking the screws by the impulse method and where the screws vibrated, it was necessary to check them with the torque wrench set at $1.2 * M_{tn}$, fig.5. The screws that vibrated were marked with red paint. Verification of the bolts by this method was repeated on both joists in the joint construction on both the left and the right side of the metal construction. For reinforcement plating, the newly designed solution and consumptions will be introduced, including the replacement screws and straps on the joint of the soles.

Inside the platform, in the clamping area, although the side plates do not have permanent contact with water, rusting the material has occurred since they have not been dyed. On the grip plate of the bearing, the screws are strongly corroded, in this area humidity and coal dust had a visible destructive role. The same phenomenon is also visible when the bearing is held on the support tripod.

3. CONCLUSIONS

A series of conclusions can be drawn from the above, namely:

The wrong execution of the two-point lifting supports does not support the support tripod, deforming or even even leading to operating accidents. For this reason, the execution must be

done at a point, on its face, providing 3-point support, with the correct support control. It is necessary to rehabilitation the welds and the cleaning, painting and sealing operation by installing the missing covers for both subassemblies (it will be necessary to change the electrical cables route with their passage through the presetting and laying on a structure that will definitely avoid the opening holes).

The remediation assembling will be done with the car supported by successive replacements in the following order: on the lower sole, the upper sole and the on the heart's profile of in the beam the welded, first on the left and then on the right.

Reabilitarea ansamblului va fi efectuată pe ambele grinzi de formă "I" și vor fi efectuate reparații pentru celelalte mecanisme montate pe platforma de rotație, iar balustradele de pe platforma de rotație vor fi reparate.

Inside the platform, the soles extension on the main beams of the balance arm (counter-arm) does not show any visible defects, to the repair caps are made that will not allow any accumulation of coal dust in the inside of the rotating platform.

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