

MODERNIZATION M4A COAL EXTRACTION MACHINE

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Abstract: *The machine has expired lifetime and current physical condition is characterized by the existence of significant structural degradation which in turn can affect the functionality and safety of personnel working in this.*

It is estimated that an increase of about 8-9%, or a maximum of 10% of the torque moment, to be sustained by the current drive group, is necessary. It remains only the change of the belt drive group on the porthole wheel arm and / or the change of the drive drum, the cups, the frontloading transmission bunk.

Keywords: equipment, coal, modernization, interventions.

1. Introduction.

The coal extraction machine, M4A, from the warehouse serves the solid fuel storage facility of the Rovinari, thermal power plant [1]. From a construction point of view, the machine bon-emitting machine is a lattice-like metallic structure that moves on a CF track.

The machine tool, the cup wheel, is located at the end of the pickup arm. The pickup arm can perform a rotation motion along the track axis as well as a lift-down movement.

The excavated (removed) coal from the wheelhouse depot is deposited, via the conveyor, on the stationary conveyor from the ground. The power supply is made by cables, which, in the machine translation motion, wind up on the power supply cable drum.

The M4A charcoal, initially with a 31.5m (now 30.7m) arm and an average hourly capacity of 1200 t/h (originally projected 1300 t/h), was manufactured in 1980-1981 by UM Timisoara, for the Anina thermal power plant and relocated to the thermoelectric plant in Rovinari.

2. Modernization m4a coal extraction machine

Upgrading versions to achieve productivity of 1300 to/h.

I. Rebuilding the charcoal machine and increasing the capacity of the cups (as suggested in the CS) from a capacity of 550l capacity to a capacity of 630l.

II. Changing the cup wheel and its drive with the initial wheel of the machine for resistance, balancing and stability calculations.

III. Change of drive, wheel drive, existing with a 110 kW motor and a 120 kW reduction gear having a transmission ratio of 182-max 200.

Proposed scenarios:

Scenario A - Variant I - Rehabilitation, repair and modernization by increasing cup capacity (as required in the specification)/It is estimated that an increase of about 8-9%, or a maximum of 10% of the torque moment, to be sustained by the current drive group, is necessary. It remains only the change of the belt drive group on the porthole wheel arm and / or the change of the drive drum, the cups, the frontloading transmission bunk.

Scenario B - Variant II - Rehabilitation, repair and modernization by changing the cup port and its drives. It is a cost-effective solution, less applicable and not recommended by us, considering the service life and state of the machine after 35 years of operation.

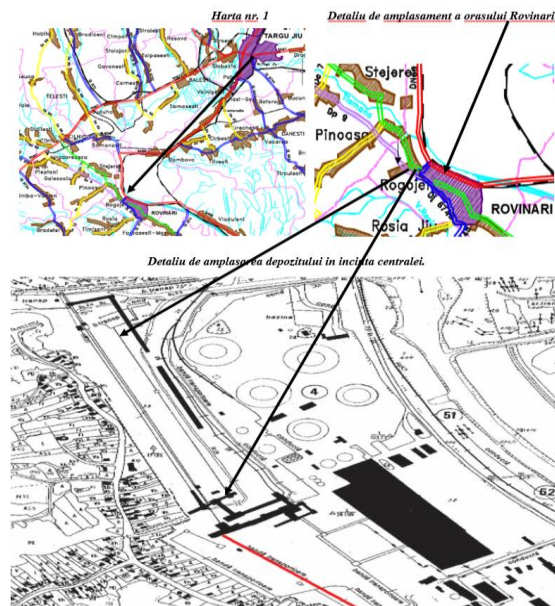


Fig.1 Location plan in the area.

Scenario C - Variant III - Rehabilitation, repair and modernization through change of ownership It assumes the purchase of engine, gearbox, brake, hydraulic coupling and metallic fault, with redesigned reducer (costs that can not be appreciated except with great approximation) and executed in prototype mode, not yet applied on any type of machine.

Expert recommendation on the technically and economically optimal solution for development in the documentation for the approval of the intervention works.

Our recommendation is variant I, to machinery out all the rehabilitation and repair operations recommended by us, following their execution the machine will operate in normal parameters, the lifetime will increase by 10 years and at the same time will eliminate the accidental interruptions for the interventions, the elimination peak dead times (six months), elimination of the risks of technical and human accidents. At modernization we propose to increase the capacity of the cups, as required in the 550l specification at a capacity of 630l, which implies an enlargement of the cup outwards (radially), directly implies an increase of 8.3% of loads (due to the increase of the volume of the cup) by the motor-reducer group, due to the increase in the weight of the wheel, to which is added the moment of the change of the centers of weight of the cups and the load (lignite), which is necessary to be taken over by the action group.

It is estimated that an increase of about 8-9%, or a maximum of 10% of the torque moment, to be sustained by the current drive group, is necessary. It remains only the change of the belt drive group on the porthole wheel arm and / or the change of the drive drum, the cups, the frontloading transmission bunk.

3. Conclusions

Description of the basic and necessary work to be done for repair and upgrading M4A Charcoal - including running track.

On the runway:

- Replacing all deformed or corroded fasteners (nuts, pliers, washers, spring rings) with new ones of the same quality as existing ones.
- Removing and re-mounting the track segments with horizontal deviations above the

permissible limit (± 4 mm) so as to provide a 7000mm gauge. Where it is not otherwise possible, the fixing holes of type 49 plates will ovalitate so as to allow horizontal translation.

- Repair all parts of the track affected by corrosion by cutting and replacing with the same quality rail. The joint will be done by welding together;
- After repair, all track segments will be translated so that the maximum joint size is 6mm;
- The corrosion protection of the metal fastenings will be restored
- Modify the buffers at the ends of the tread so that they can retrieve the loads produced by the loaded machine according to the rules in force, replacing the current inadequately welded grip.

For the load bearing structure:

1. Replace all screw-disassemble assembly assemblies from the metal structure (of resistance structure) of the IP 8.8; 10.8; 10.9 group and those BM 8.8 which, when checked with the torque wrench calibrated on the stand, do not correspond to length (less than 2 threads out of the nut, but no more than 3.5 threads outside).
2. Measurement charts for boreholes and shafts of mechanisms and for metal construction, as well as for sliding bearing and roller bearings.
3. Set-up charts are made for all machine mechanisms with particular focus on: reducers; couplings; braking systems;
4. The lifting mechanism shall extend to all shafts, spindles, toothed wheels, couplings, brakes, cable rods, axles to the roller blocks, the lifting cable and its clamping system, including non-destructive methods, on the drum cable.

For the following parts and subassemblies:

- a) Coupling between cable drums and lifting gear.
- b) Couplings between motor and gearbox.
- c) Brake discs on the input shaft in the gearbox and the motor.
- d) The axles of the roller blocks on the mast and the platform of the lifting mechanism and the axis of the deviation roller from the mobile gearbox.
- e) Tread areas on which toothed gears are mounted in the lifting gear will be controlled by LP and US.
- f) The choices in which the roller blocks and boreholes are mounted in which the deviation rollers from the movable luggage box (with US and LP) are mounted for the specified theoretical breaking points, including the welding areas on the construction of the parts that make up them the other landmarks.
- g) Control areas (with US and LP): the center of the swing beam and the complete spherical support; guiding beams of the guide beam; the oscillating beam shall be machined by drilling to ensure the drainage of water from the precipitations under the spherical support. In this area, the protective bellows will be replaced.

Checks are machineried out, verified and approved by authorized persons.

5. For machine safety, control will be extended to:

- a) Tier I (with US): area of welds and boreholes between sections; ellipse and pole pockets; the collapsing area; the clamping axes in the above-mentioned areas.
- b) Pillar: welding clamps of the landing points for: the roller blocks; tie I and tie II; clamping the platform of the rotation mechanism;
- c) Metal construction from: supporting tread (Claw beams); oscillating beam; ladder; platform of the rotating mechanism; tilting arm (Balancing); platform of lifting mechanism; all weldings from welding elements "X"; head to head; "Y" and "K" will be non-destructive and destructive, if any, where defects are found with exceeding the quality class stated in the

construction documentation of the machine.

All welding quality welding above the class of the documentation will be recovered and reconsidered by a technology that the machine assembler will make (on a case-by-case basis). All measurement files will have sketches, kinematic schemes and/or photos of areas, subassemblies controlled or all of which will be interfered with in order to comply with the execution documentation regarding the dimensions and/or quality classes required by the documentation. The control of the gears and mechanisms, but especially the parts of the lift mechanism, will be machineried out by specialized personnel in workshops equipped with the necessary equipment, as well as by specialists certified by competent bodies. The measurement files will be certified by high-quality experts certifying the areas chosen for control and respecting the quality classes required by the documentation.

6. Repair steps will be completed with a P.V. which has the FM annexes, the hidden worksheets and specifying the partially incorporated parts, repaired in the plant or completely replaced each with their weights.

Checks prior to the start of the repair for the "Tire Machine" machine - which has a capacity of 1200 t/h in an area adjacent to the operating site, at the end of the line with the stripped belt conveyor and the ticked and signaled area. Elinda will sit at an angle of 90° from the axis of the conveyor and the balance arm to the access path from the outside of the belt conveyor. In the event that no access can be made to the work area, the movement will be made in a lateral path chosen by the beneficiary. Description, where appropriate, of the modernization work machineried out at the Machine mine -including "after repair/rehabilitation". Increasing the capacity of the cups (as specified in the specification) from 550l to a capacity of 630l, which means increasing the cup outward (radially), directly implies an increase of 8.3% in load bearing (due to the increase of the volume of the cup) by the motor-reducer group, due to the increase in the weight of the wheel, to which is added the increase of the moment of changing the centers of weight of the cups and the load (lignite) to be taken over by the action group.

It is estimated that an increase of about 8-9%, or a maximum of 10% more torque, to be sustained by the current drive group, is necessary. It remains only the change of the belt drive group on the porthole wheel arm and/or the change of the drive drum, the cups, the frontloading transmission bunk.

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