

# STUDY THE POSSIBILITIES OF IMPROVING TECHNOLOGICAL EQUIPMENT MAINTENANCE ACTIVITY FROM QUARRIES

Tihanov Tănăsache Daniel, Eng. PhD Student

Florea Vlad-Alexandru, Eng. PhD, Assoc. Prof., University of Petroșani

**ABSTRACT:** Continuous operation, safety and with high efficiency technological equipment that forms the technological flow of magmatic rocks quarries, can ensure by improvement maintenance activities but also reliability and in finally the equipment availability. In the same time all maintenance actions must be directed also to recondition equipment by methods to restore their initial technical characteristics and allow prevent wear their working part. Present paper deals with the issue of reducing and preventing accidental falls implications in increasing the period of operation equipment from the equipping quarries in which are obtained crushed rock required construction of roads.

**KEY WORDS:** flow sheet, technological equipment, maintenance activity, magmatic rock, crusher

## 1. INTRODUCTION

Continuous operation in complete safety and with profitableness of technological equipment that forms the flow sheet of magmatic rock quarries can be ensured by improving maintenance activities, but also the reliability and availability of equipment.

At the same time all maintenance actions must be directed to recondition equipment and methods to bring back the original technical characteristics and allow their active prevention of wear parts.

This paper deals with the issue of reducing and preventing accidental falls with implications for increasing the life of the equipment from endowment of quarries in which are obtained aggregates for constructing the roads.

## 2. MACHINE MAINTENANCE OF CAREER

### 2.1. General

In the Bata career, placed in Bata locality, Arad county, belonging to SC Diabas Bata Ltd., extract, process and sell magmatic rocks with priority destined for highway construction and other civil works.

Production flow consists of mobile and semi-mobile equipment structured as follows:

- flux primary crushing;
- flux crushing-secondary sorting-tertiary;
- flux loading-transport rock unrocked;
- feed storage loading finished products;
- flow sorting refuse tertiary crushing;

### 2.2. Maintenance equipment Bata career

Maintenance activity flows above is done on a yearly maintenance schedule of equipment that make production workflows above, drawn at the end of the year for next year, which includes specific work so periodic maintenance system functional type preventive-planned, namely: periodic test ( $V_p$ ), partial revisions ( $R_p$ ) overhaul ( $R_o$ ) and system of repairs-planned preventive: technical revisions ( $R_t$ ), current repairs ( $R_c$ ) and capital repairs ( $R_k$ ).

Figure 1 shows the annual maintenance schedule for tertiary crusher production belonging flux crushing-secondary sorting-tertiary. Annual maintenance graphic is drawn up taking into account the expected sales volume for the year to which it relates, each unit being the budgeted number of hours required to achieve production. Graph annual maintenance include planned interventions daily, weekly, monthly and yearly.

Due to uncertainties regarding sales volume, availability of equipment or other causes which can intervene in the production process at the end of each month to prepare for the next month, a weekly maintenance schedule in figure 2, which are referred to specifically, depending the situation, scheduled maintenance and current repairs.

Interventions daily, weekly and monthly by the operators of the quarry equipment, based on daily maintenance sheet (fig. 3), weekly maintenance sheet (fig. 4) and monthly maintenance sheet (fig. 5).

Annual intervention are made by service technicians belongs to a service firm approved by the equipment manufacturer and is based on annual maintenance sheet (fig. 6).



Daily maintenance tertiary crusher Sandvik UH 420					
Tertiary crusher Sandvik UH 420					Data:
No	Operation	When	Page	Check	Observations
1	Check the oil level in the tank lubrication	Before starting the crusher	66		
2	Check the oil level in the tank Hydroset	Before starting the crusher	83		
3	Check that all shut-off valves between the tanks and pumps are fully open	Before starting the pumps and crusher	--		
4	Check that no material accumulated on the lower body arms	Before starting the crusher	--		
5	Check lubricating oil back into the tank and clean	After starting the pump lubrication	66		
6	Check for broken oil lines	After pump start	--		
7	Check lubrication circuit works correctly pinion shaft	Idling	80		
8	Check the value CSS	Idling	29		
9	Check that the material did not block the feed hopper or distributor and does not block loading aperture	Idling	--		
10	Check if abnormal noises crusher	During crushing	--		
11	Check if you can hear noises in the pump lubrication	During crushing and before	--		
12	Check the oil temperature return	During crushing	70		
13	Check the current or power consumption of the motor	During crushing	31		
14	Check the pressure Hydroset and if amortization of manometer is correct	During crushing	83		
15	Check the temperature of the pinion shaft housing	During crushing	--		
16	Check the oil pressure in the main system and lubrication system lubrication pinion shaft normal operating temperature	During crushing	69, 80		
17	Check for oil leaks	During crushing	--		
18	Check for loose screws	During crushing	--		
19	Check the oil heaters work	Out of work crusher	74		
20	Check the distance between the nut end and as bearing	Out of work crusher	96		
21	Check for any contamination increase or change the filter oil decanter return eg: an abnormal amount of metal particles	Out of work crusher and lubrication pump	78		
22	Clean the return belt drums	Out of work crusher	--		
PERFORMED: NAME AND SIGNATURE					

Fig. 3. Daily maintenance sheet tertiary crusher

Weekly maintenance tertiary crusher tertiar Sandvik UH 420					
Tertiary crusher Sandvik UH 420					Data:
No	Operation	When	Page	Check	Observation
1	Inspect the oil filter (check the red button on the sensor pressure drop) main lubrication systems and pinion shaft	Crusher and lubrication pumps off	68, 77, 84		
2	Clean dirt separator and inspect oil tank main lubrication system	Crusher and lubrication pumps off	67, 75		
3	Check joints against wear and damage	With crusher off	96		
4	Check for noise from the pump	During crushing	68, 81, 84		
5	Check V-belts wear and stretch	With crusher off	--		
6	Clean damping valve gauge Hydroset	With crusher off	86		
7	Check air pressure (blower or regulator in operation) of super pressure sealing system against dust	Operation in idle	49		
8	Check hose and filter system with super pressure sealing against dust and seal the tank	With crusher off	49		
9	Check condition of the belts conveyor	With belts conveyor off	-		
PERFORMED: NAME AND SIGNATURE					

Fig. 4. Weekly maintenance sheet tertiary crusher

Monthly maintenance tertiary crusher Sandvik UH 420					
Tertiary crusher Sandvik UH 420					Data:
No	Operation	Page	Check	Observations	
1	Clean the drain plug pinion shaft housing	59			
2	Check that the sealing ring is worn dust	46			
3	Check the condition of rotating scraper dust over the necklace	46			
4	Check all screws	--			
5	Check the clearance between the sleeve and the sleeve bearing spindle top	94, 98			
6	Check the level of the upper bearing grease	60			
7	Clean the ventilation of the upper bearing cap and upper body	94			
8	Check operation of oil return flow switch	70			
PERFORMED: NAME AND SIGNATURE					

Fig. 5. Monthly maintenance sheet tertiary crusher

Annual maintenance tertiary crusher Sandvik UH 420				
Tertiary crusher Sandvik UH 420			Data:	
No	Operation	Check	Observations	
1	Check whether the clearance pinion and shaft eccentric			
2	Check (using gauges) between the centerpiece and mantle and between the upper body and concave ring			
3	Check the bearing grease seal superior in terms of wear			
4	Check the gas pressure in the accumulator			
5	Empty oil tank			
6	Change the oil filter element and clean the dirt separator system Hydroset			
7	Check upper bearing clearance			
8	Check wear upper body and lower body			
9	Check the seal wear chevron			
10	Check the contact tapered upper and lower body			
11	Check wear and corrosion spindle sleeve			
12	Check the lower ring seal is worn			
13	Check clearance between bar and hub sprocket mounting			
14	Check wear and eccentric scratch			
15	Check the wear plate and eccentric wear			
16	Check scratch and wear of the bush lower body			
17	Check the thickness of the axial bearing assembly, check the wear and scratch			
18	Check wear gear			
19	Check the barrel bushing wear and scratch Hydroset			
20	Check operation temperature indicator			
21	Check operation of safety thermostat TG1 and thermostat heat exchanger TG2			
PERFORMED: NAME AND SIGNATURE				

Fig. 6. Annual maintenance sheet tertiary crusher

Observations operators arising both from technical revisions, current repairs and equipment are recorded from the operation logbook equipment (figure 7) and take knowledge of the maintenance department head.


Logbook equipment.....					
Data	Hours equipment	Description of work performed	Duration	Who made	
S.C. DIABAS BATA S.R.L.					
Cheveresului prelungire Nr. 53, RO 300701 TIMISOARA / Romania					

Fig. 7. Logbook equipment for quarry machinery

### 3. CONCLUSIONS

After analyzing the risk of possible failure of production flux based on entries operators, plan and prioritize current and capital repairs.

Planning and prioritizing current repairs are made taking into account a number of issues such as:

- the impact of possible failures on production flux career;
- the complexity and time to repair;
- availability of spare parts;
- possibility execution repair with its own personnel or service contracted personnel;
- the cost of current repairs.

Programming to perform capital repairs of equipment production flux is based on manufacturer

recommendations for specific equipment parts who reached their maximum quote of wear and that through the failure can cause loss of life, loss of equipment, contamination of the environment.

Programming for capital repairs taken into account the technical inspection prior capital repair and logbook entries from the equipment during operation of two current and capital repairs.

So after the current repairs and capital repairs inspection work is done by the head of the maintenance department personnel assisted by interventions performed, inspection is completed by accepting the work performed followed by putting into service of equipment or refusal to accept work and remediation any deficiencies.

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