CENTRALIZED SYSTEM OF TRACKING BEHAVIOUR IN SPARE PARTS, SOLUTION TO IMPROVE THE TECHNICAL AND ECONOMIC COAL MINING INDICATORS AT C.N.H - PETROŞANI

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Abstract: Current activity in the extraction of coal mines in the Jiu Valley permanently faced with technical events that may have multiple causes, events significantly affecting the normal production process and thus influence the value of the technical-economic assessment. A significant proportion of events occurring during the extraction of coal is the electromechanical faults occurring in the technological flow.

The influence of the events of electromechanical nature, implicitly defects in transport flows on global indicators of coal mining at CNH S.A. Petrosani can be quantified by using a centralized filing system in the long term these events on types of cases that can allow determination of frequency and duration indicators that could allow an estimate of unscheduled shutdowns influences on production and productivity achieved and implicitly on economic indicators underground coal exploitation.

Key-words: events such electromechanical, spare parts, centralized information system, coal mining, database, defects.

1. INTRODUCTION

Exploitation of underground deposits of useful minerals, particularly coal deposits consists in an activity with high specificity compared to any other sector or industry, on the one hand due to the specific conditions in which the activity is carried high uncertainty about the fate and effects of events and factors such as geo-mining conditions and restrictions related to the environment in which it operates (limited space, the existence of aggressive environmental factors and potentially dangerous for

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both staff and means of production used), and on the other hand the high inertia of mining production system to rapidly reconfigure to compensate for production lost due to the occurrence of a technical accident, no matter of its nature, the period of replacement of production capacity lost due to a special event can be spread over periods of months or even years for major events (gas explosions, fires endogenous massive landslides, etc).[2]

Except for major events, which may even lead to complete cessation of activity of a mine, current activity of extraction, constantly faced with technical events that may have multiple causes, but significantly affecting the normal production process and significantly influence the value of indicators technical and economic assessment.

A large proportion of small-scale events but high frequency of appearance in the underground coal extraction at CNH-SA, is the electromechanical faults occurring in the technological flow nature of the extraction itself on the face up to the stage loading and production to customer delivery. Previous statements are supported by the development of three major global indicators (Figure 1, 2 and 3), following a major event occurred in EM Petrila in autumn 2008 (methane explosion).
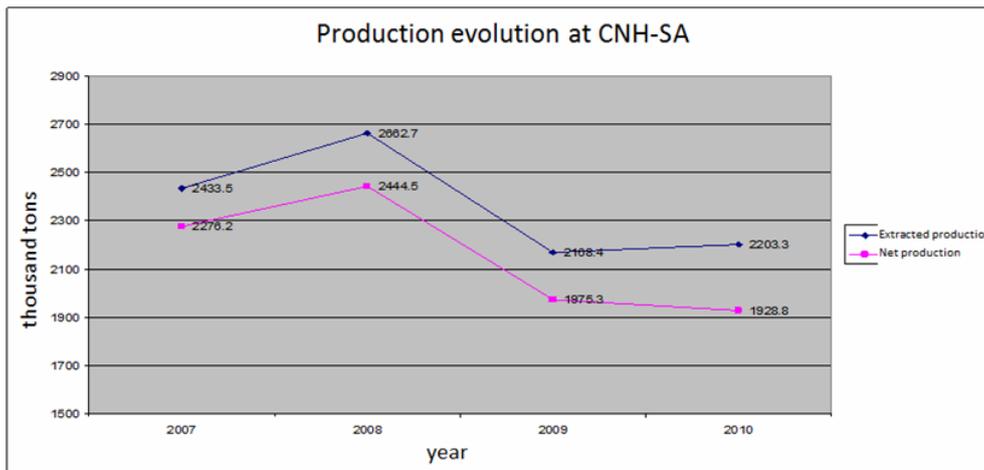

Fig 1. Developments extracted and net production during 2007-2010

2. ASPECTS OF DEFECTS IN THE FLOW OF MINING PRODUCTION

Another important aspect is the fact that the structure of such electromechanical accidents, the largest effects on output and productivity they have defects in the goods transport flows, be it flow for a high production (slaughter) whether the general transport stream (which is transported across mine production, although defects in transport flows running a mining (coal job training or job opening), for limited periods of time (a day, a week or a month), have a significant influence on

the two indicators previously nominated in time, the aggregated delay and extend the deadline for completion of the work caused by the frequent occurrence of these defects, major special effects can be due to inability to ensure production capacity replacement.
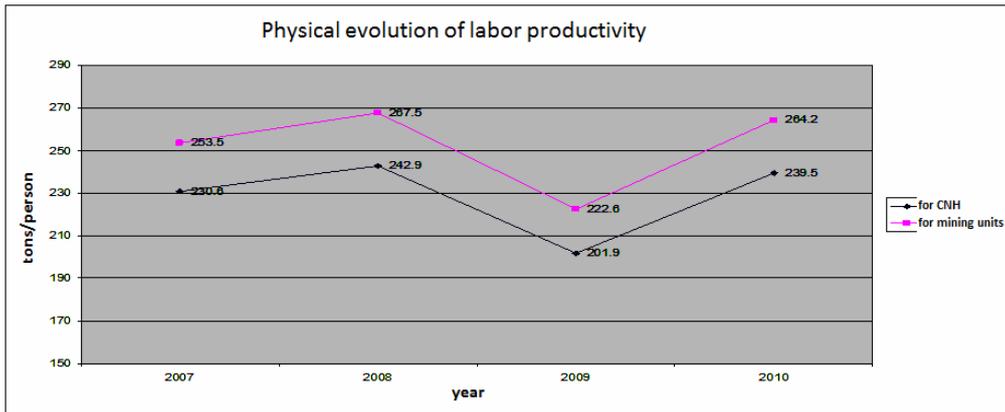
Fig. 2. Physical productivity developments in the period 2007-2010
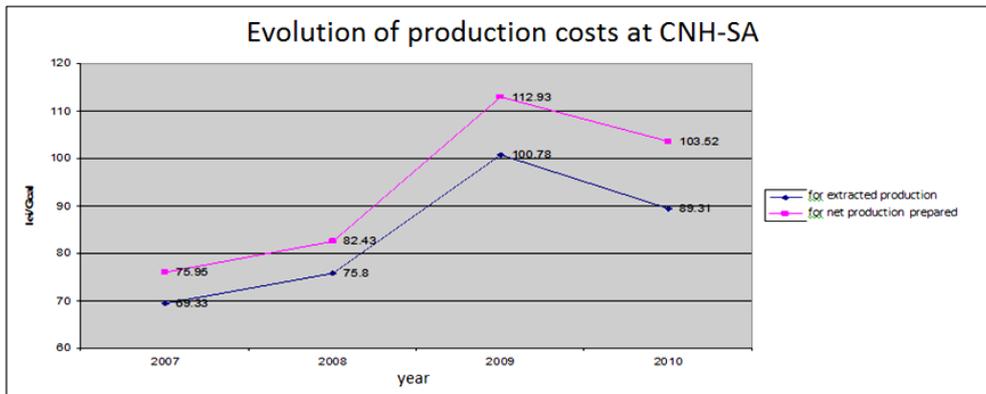
Fig. 3. Development of production costs in the period 2007 to 2010

Statement on the decisive influence of such events occurring in streams electromechanical transport on indicators take the underground exploitation of coal in the CNH-SA is supported by the fact that the production provenance analysis by type of mining methods shows that over extracted 60% of the total production capacity is achieved with conventional mining technology (blasting by drilling, blasting, loading manual, individual support) production capacity at that flow transport operation to normal parameters is essential for achieving planned production and productivity (Figures 4 and 5).[5]

It is difficult to quantify the influence of such events electromechanical, implicitly defects in transport flows on global indicators of coal mining-SA CNH

Petrosani, due to the lack of a centralized filing system in the long run these events on types of cases, which can allow the determination of frequency and duration indicators that could allow an estimate of unscheduled shutdowns influences on production and productivity and implicitly made on economic indicators underground coal exploitation.
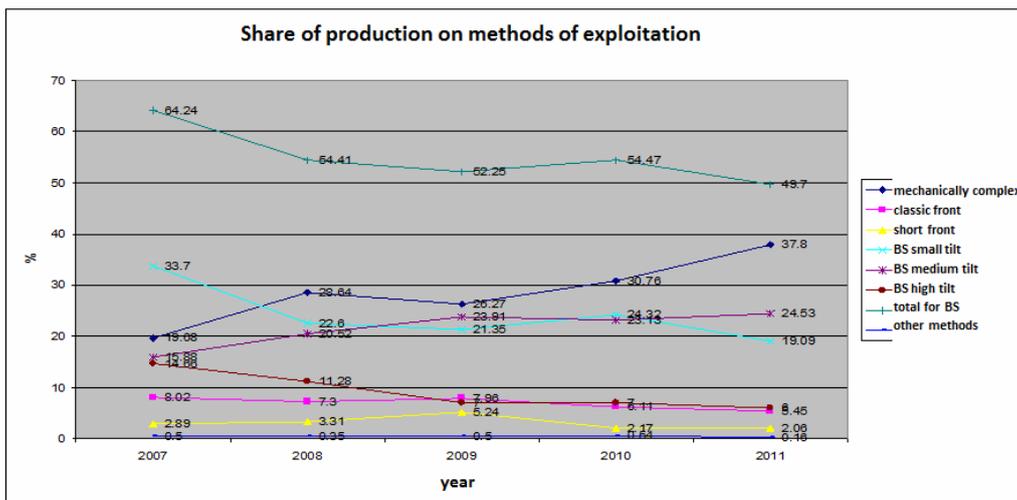

Fig. 4. Share of production on methods of exploitation from 2007 to 2011
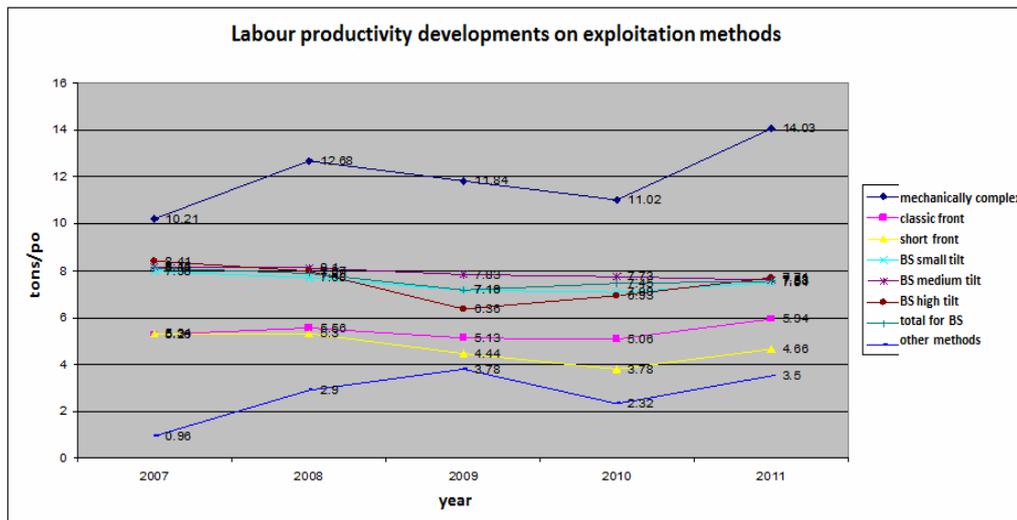

Fig. 5. Labour productivity developments on exploitation methods from 2007 to 2011

An analysis conducted in March 2012, shows that compared to a normal day in which there was found no technical event at any branch CNH-SA (March 28), a day

where production was 8394 tons, production fell to 7398 tons carried on 16 March when cumulative events of any kind in all branches CNH-SA totalled 12 hours and 30 minutes (figure 6), and 7082 tons on March 22, when two events produced complex mechanized stops front panel of the EM 4 North Livezeni led to his parked for a period that exceeded during an exchange (Figure 7). [5]

NATIONAL COAL COMPANY – PETROSANI		DATE: 16.03.2012	
REPORT OF EVENTS			
MINING UNIT	DISRUPTION IN PRODUCTION	BETWEEN THE HOURS	TIME
Lonea	MINING SECTOR. I, Coal layer. 3/III.C.S.39, electrical fault,	15:55 – 17:45	1.50
Lonea	sectioned two-phase power cable TD 39	18:00 – 20:15	2.15
Paroseni	MINING SECTOR. II, Coal layer. 3/II, FRONTAL stope. 24, TR3, nr. 3, electrical fault in electric switch box.	3:40 – 5:10	1.3
Lupeni	MINING SECTOR. II, FRONTAL stope. pan. 1, str. 5 bl. II, mining oriz. 250: rocks besides stepping devices 65 66 MINING SECTOR. III, FRONTAL stope. coal block. 8B, TR3 chain conveyors: break the chain.	20:45 – 23:40	2.55
Lonea	- MINING SECTOR. II, Coal layer. 3, coal block. 3, mining oriz. 300, FRONTAL stope. dir. 35-34B, C.D.28: broken line - MINING SECTOR. II, Coal layer. 3, coal block. 3, mining oriz. 300, FRONTAL stope. 35-36 C.D. 8; CH4=2%-09: 40; CH4=3.5% – 09: 50 - MINING SECTOR. II, Coal layer. 3, coal block. 3, mining oriz. 300, dig. 34B C.D.33; CH4 = 2,41% – 08:45; CH4 = 3,31% – 9:53 Cause: work program, circuit modification in methane detection	8:12 – 12:12	4.00

Fig. 6. Event Report dated 16.03.2012

NATIONAL COAL COMPANY – PETROSANI		DATE: 22.03.2012	
REPORT OF EVENTS			
MINING UNIT	DISRUPTION IN PRODUCTION	BETWEEN THE HOURS	TIME
Lonea	MINING SECTOR. II, FRONTAL stope. 34-24, TR-3 nr.1: chain conveyors: break the chain..	9:30 – 12.20	2.50
Livezeni	MINING SECTOR. II, Coal layer. 3/VI, mining oriz. 300, coal block. 4N, mining rupture front in the right of stepping sections 68-69 (ensure the roof rock).	4:00	
Paroseni	MINING SECTOR. I, Coal layer. 3/V, mining oriz. 250, coal block. 2, change eccentric of KS-3M slaughter combine.	5:00	

Fig. 7. Event Report dated 22.03.2012

Of the two examples shown there is a high frequency of defects occurring in transportation equipment (chain breaks the chain conveyors), defects usually lead to

stops for periods of 2-3 hours.

Occurrence technical events leading to repeated stops for periods of time sufficiently large, able to affect the sustainability of the operation may have multiple causes based on factors such as geological or technical-mining factors (case falls rocks, or breaking the front, which can lead to blockage of flow transport equipment), to factors related to the quality and reliability of parts used in the maintenance and repair of equipment.

3. TRACKING BEHAVIOR IN FUNCTIONING OF SPARE PARTS BY USING A CENTRALIZED IT SYSTEM

Given the above considerations it is clear that improving the business management of spare parts inventory, including tracking and component behaviour functioning, can lead to significant improvement in the economic indicators of coal mining at CNH-SA Petrosani. In theoretical and experimental research conducted were built conceptual models and logical models for data organization. [2] [5]

This activity management parts requires the use, storage and processing large volumes of information and documents. This volume of information has been subjected to logical modelling for building physical model database. Since the main reason that the company's investment budget is reduced hardware and software solutions of system composition was intended to be some minimal cost. [1] [3] As far as possible were chosen technologies freely available under the GPL software, but solutions that deliver security, stability and processing performance. [4]

Using these technologies to build unique database that will contain the data necessary for such activities stored in the relational model. The database schema entities appear in tables only for activities that are in contact with the management of spare parts, and did not want to create a database for the entire mining activity. Source of Information system is the database. [4] The research undertaken in the previous step to choosing a system relational database model and was chosen MySQL as DBMS, free of charge, fast processing of large amounts of data, easy to implement and maintain. Tables are built up database for storage of spare parts inventory data, managing their stock events including technical defects occurred in the production process, time trouble-shooting, daily production of coal made. [7]

All these data provide information base for decision-making system in order to reduce time delays in the production process by improving procurement and increasing the quality of products purchased. Through this, the project aims to increase productivity within the Company. Management modelling parts using single database system is a complex process that is done in close collaboration with the customer, and to increase the productivity of the mining company. [6]

4. CONCLUSIONS

Analysis performed on the procurement system parts at CNH-SA Petrosani

demonstrate the existence of disrupters factors relating both to legislative restrictions given ownership (state owned) and the gaps on how to preparation of annual procurement plan for how to check the quality of products purchased and how to track time behaviour of the products purchased. All these issues were presented in detail and to correct deficiencies have proposed a number of solutions to remedy.

Given the major effect of unscheduled shutdowns (defects), production and productivity, thereby affect economic performance of exploitation difficult to quantify but demonstrable effect becomes obvious need to implement an effective inventory management of spare parts for CNH-SA Petrosani necessity dictated by the impossibility of quick response supply system (due to the time interval covered by the procurement law) requests the production system.

Implementation and proper management of such a tracking system operational behaviour of new parts will result on the one hand correct sizing of the necessary spare parts supply plan and the other economic effects generated by replacing parts with structural deficiencies at no additional cost and shorten unscheduled stoppages continue improving maintenance procedures and operating conditions. [7]

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