

Mining Operational Technical Study Pit Gaharu Blok 44-45 On Site Sambarata PT. Berau Coal

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Informasi Artikel	Abstract
E-ISSN : 3026-6874, Vol:1, No:2, Desember 2023 Halaman:1087-1092 Keywords: <i>Actual and theoretical Positive deviation 97.3% negative deviation 11.8%</i>	<i>PT Berau Coal as one of the National Coal mining companies operating in Berau Regency, East Kalimantan, is always trying to increase its coal production. PT Berau Coal's production target in 2014 is 23 million tons (Source: PT Berau Coal's 5-year long-term plan document). This increase in production can basically be achieved in 2 (two) ways, namely: 1. This is done by adding heavy equipment such as loading equipment and production transportation equipment so that production capacity becomes greater. 2. This is done by maximizing the productivity of mechanical equipment, namely existing loading and transport equipment. Increasing production capacity by maximizing the productivity of existing mechanical equipment is a relatively cheaper way than adding heavy equipment. Efficiency is the key to increasing the productivity of existing mechanical tools. Based on considerations of the company's need to increase production, one of which is by maximizing the productivity of existing mechanical equipment, this research aims to conduct a study on the productivity of PC1250 loading equipment and HD465 transportation equipment carried out at the Agaru Pit mining block 44-50 at the Samabarata site. PT Berau Coal so that the results of this study can determine the productivity of each mechanical device. The research method is carried out using direct computation, tabular method, and comparison between theoretical and actual and using the theory of calculation equations. Where the supporting data for analysis is in the form of field data as primary data and literature data as supporting (secondary) data. The results of this research study are the productivity of PC1250 loading equipment and HD465 transportation equipment where there are deviation values between actual and theoretical, both positive deviation (the optimum positive deviation between actual and theoretical is 97.3%) and negative deviation (optimum negative deviation between actual and theoretical is -11.8 %).</i>

Abstrak

PT Berau Coal sebagai salah satu perusahaan pertambangan Batubara Nasional yang beroperasi di Kabupaten Berau, Kalimantan Timur, senantiasa berusaha untuk meningkatkan produksi batubaranya. Target produksi PT Berau Coal tahun 2014 ini adalah sebesar 23 juta ton (Sumber : *Dokumen Rencana jangka panjang 5 tahunan PT Berau coal*). Peningkatan produksi ini pada dasarnya dapat dicapai melalui 2 (dua) cara, yaitu Dilakukan dengan penambahan alat berat seperti alat muat maupun alat angkut produksi sehingga kapasitas produksi menjadi lebih besar. Dilakukan dengan memaksimalkan produktifitas dari alat-alat mekanis yaitu alat muat dan angkut yang sudah ada. Peningkatan kapasitas produksi dengan memaksimalkan produktivitas dari alat-alat mekanis yang sudah ada merupakan cara yang relatif lebih murah dibandingkan dengan melakukan penambahan alat berat. Efisiensi menjadi kunci peningkatan produktifitas dari alat-alat mekanis yang ada. Berdasarkan pertimbangan adanya kebutuhan perusahaan untuk meningkatkan produksi salah satunya dengan cara memaksimalkan produktifitas alat-alat mekanis yang ada, Penelitian ini bertujuan untuk melakukan kajian tentang produktifitas alat muat PC1250 dan alat angkut HD465 yang di lakukan pada penambangan Pit Gaharu blok 44-50 di site samabarata PT Berau Coal sehingga hasil dari kajian tersebut dapat diketahui produktifitas dari masing-masing alat mekanis tersebut. Metode penelitian yang dilakukan dengan cara direct computation, Tabular method, dan perbandingan antara teoritis dan aktual serta menggunakan teori persamaan-persamaan perhitungan . Dimana data-data penunjang untuk analisa berupa data lapangan sebagai data primer dan data-dat literature sebagai data penunjang (sekunder) Hasil dari Kajian penelitian ini adalah Produktifitas alat-alat muat PC1250 dan alat angkut HD465 dimana terdapat nilai deviasi antara

Kata Kunci : Aktual dan teoritis, deviasi positif 97.3 %, deviasi negative 11.8 %.

INTRODUCTION

PT Berau Coal as one of the national coal mining companies operating in Berau Regency, East Kalimantan, is always trying to increase its coal production. PT Berau Coal's production target in 2022 is 23 million tons (Source: PT Berau Coal's 5-year long-term plan document).

Increasing production capacity by maximizing the productivity of existing mechanical equipment is a relatively cheaper way than adding heavy equipment. Efficiency is the key to increasing the productivity of existing mechanical tools. Based on the consideration of the company's need to increase production, one of which is by maximizing the productivity of existing mechanical equipment, it is necessary to carry out a study to assess the productivity of mechanical equipment used in the coal exploitation process at PT Berau Coal so that the 2022 production target and increase production in the following years can be achieved according to the long-term plans set by the company.

Apart from that, to support the efficient use of these mechanical tools, field factors that are directly related to the working surface of the mechanical tools must be taken into consideration, such as excavation and blasting as well as the problem of water entering the pit. The blasting process is needed when digging with mechanical tools does not have economic value because mechanical digging tools have difficulty digging rock and will cause wear on the digging teeth if they are forced. Handling water at the bottom of the pit is needed to prevent pit flooding which will cause mechanical equipment to not work optimally. This effort to remove water that enters the excavation site is called the pit dewatering process. In connection with this, the production target at the Sambarata pit Gaharu site for 2022 is 1.8 million Mt, where the daily production target is 5 thousand Mt, which is sometimes missed according to the plans that have been made.

So that the production target that has been set according to plan does not miss and minimizes the percentage of deviation from the target, this encourages the author to carry out research or studies targeting the productivity of mechanical equipment, especially PC1250 loading equipment and HD465 transportation equipment in Sambarata Pit Gaharu Block 44-50 with the title "Technical Operational Study of Mining Pit Agarwood Block 44-50 at PT Berau Coal's Sambarata Site."

METHOD

The direct computation method is a calculation method that takes into account the factors that influence the productivity of each tool. All conditions that may be encountered have been taken into account based on available field data. Tabular Method

Comparative Method: Comparing the productivity of mechanical devices as a result of observations in the field with the results obtained from literature studies. Secondary data relating to the productivity of loading equipment and conveyance used in PT Berau Coal site Sambarata coal mining as well as the mine dewatering process. Literature studies used include Komatsu handbooks, MF or MultiFlow pump handbooks, company data such as PT Berau coal's 5 year long term plan documents.

RESULTS AND DISCUSSION

At the Gaharu Pit there are three coal seams that are mined, namely seam H, seam I, and seam J. Mining activities that take place in blocks 44-50 are undercut reduction, overburden stripping and coal getting which are divided based on the three coal seams, as well as the mine dewatering process. The reduction in the undercut for blocks 44-50 is planned to reach an elevation of -60. Meanwhile, H, I and J seam coal will be mined to an elevation of -120 in accordance with the pit limit design. The process of lowering or stripping the overburden (cover layer) is carried out using mechanical equipment after the rock has been blasted first. The mechanical equipment used is Komatsu PC 1250 for loading equipment

and Komatsu HD 465 for transportation equipment. The mine dewatering process in this block is in the form of temporary pits in block 50/51 above seam J coal and tandem wells in block 42/43, above coal seam I block 44/45. From these two wells, water is pumped into the well in the block 41 disposal area using the MF 420 pump. Then from the tandem well the water is pumped again into the channel using the MF 390 pump. In a circuit like this the MF 390 is called a booster. To determine the daily capacity of ongoing mining operations, the productivity parameters of each of these tools are used, namely the productivity of overburden excavated, loaded, transported every hour (Bank Cubic Meter / hour) for overburden stripping and the capacity of water transferred or distributed every hour (cubic meters/hour) if the pump is activated. As explained in the previous chapter, the productivity of each tool can be calculated using the existing formula. The data used for productivity calculations can come from actual data (data collection in the field) or literature data provided by the manufacturers of these tools. Calculations using literature data will produce theoretical productivity which can be used as a reference or guide for how large the equipment capacity is each hour. If actual data is used, actual equipment productivity data in the field is obtained. These two data are compared and assessed if there are differences between the two.

The loading equipment whose productivity is calculated is the Komatsu PC 1250 Backhoe type (to find out the specifications of the loading equipment, see Appendix B) with empirical data as follows (cycle time data is attached in Appendix (1))

Tabel 1 Data Cycle Time

Parameter	Lambang	Asumsi	Range Data		
			maksimum	average	minimum
*Material			Overburden		
*cycle Time	Ctl		0.61	0.41	0.30
*Faktor Bucket	k	Loading blasted rock	0.80	0.80	0.80
*Faktor Konversi	f	normal	1.0	1.0	1.0
*Efisiensi waktu	El	Average	0.75	0.75	0.75
Avaibility	MA		0.85	0.85	0.85

The transportation equipment used is a Komatsu HD 465 (for equipment specifications in Appendix B) with a maximum capacity of 55 tons. The following is the empirical data used to calculate HD 465 productivity

Tabel 2 Data Empiris Produktivitas Hd 465

Parameter	Satuan	Range Data		
		Minimal	Average	Maksimal
Dump Truck Capacity	Ton	55	55	55
Bucket Capacity	m3	6.7	6.7	6.7
Density OB	Ton/BCM	2.21	2.21	2.21
	Ton/LCM	1.77	1.77	1.77

Bucket Factor		0.80	0.80	0.80
Loader Cycle Time	menit	0.61	0.41	0.30

Then, to be able to calculate the productivity of the Komatsu HD 465, a theoretical cycle time calculation is required using equation (2-5). The average speed of the conveyance, calculated using the performance curve from HD 465 (see attachment A). Rolling resistance (RR) and grade resistance (GR) values were obtained based on field observations. Calculate the average speed as follows:

Tabel 3 Data Menghitung kecepatan rata-rata

		Jarak (meter)	GR	RR	Total resistance	Kecepatan maksimal	**Faktor kecepatan	Kecepatan rata-rata
Hauling (loaded)	Mendaki	1250	5%	3%	8%	21km/jam (350m/min)	0.85	17.85 km/jam (297.5 m/min)
	Datar	1750	0%	3%	3%	*40km/jam (666.7m/min)	0.85	34km/jam (566.7 m/min)
Returning (unload)	Datar	1750	0%	3%	3%	*40km/jam (666.7m/min)	0.85	34km/jam (566.7 m/min)
	Menurun	1250	-5%	3%	3%	*40km/jam (666.7m/min)	0.85	34km/jam (566.7 m/min)

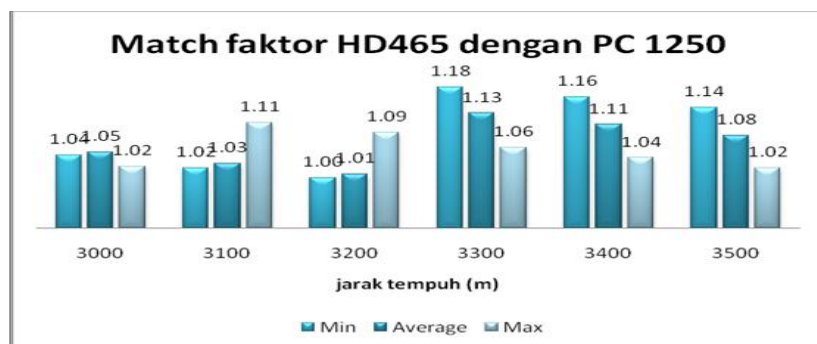
Tabel 4 Data Data aktual pemompaan pit Gaharu

		24-Mar-2022	25-Mar-2022	26-Mar-2022	27-Mar-2022	28-Mar-2022	29-Mar-2022
elevasi air		-75	-79	-79	-77.8	-77	-79
volume sump	Ltr	22037529	1983446	1983446	7715559	11088326	1983446
head total	m	95	99	99	97.8	97	99
jam kerja pompa	hrs	16.1	2.1	2	7.7	3.7	4.8
flow rate	Ltr/s	172	162	162	111	111	151
Rpm		1520	1500	1400	1421	1450	1450
volume air yang dipompakan	Ltr	9969120	1224720	1166400	3076920	1478520	2609280
Efesiensi	%	72	70.5	69.8	65	66	70

As previously explained, mining operations in the Agarar pit block 44-50 are divided based on coal seams, namely, seam H, seam I, and seam J, as well as undercut. Apart from that, there is also a pit dewatering process. The actual productivity of this mining operation can be seen directly from the

reduction in elevation and daily overburden removal as well as the amount of water in the temporary well in the Gaharu pit which is channeled to the WMP

Grafik 1. Match Factor PC 1250-HD 465 dengan Berbagai Jarak Hauling



CONCLUSION

Written using Cambria font 1.0 pt, Bold, spacing 1.15 spacing before 10 pt Contains conclusions that can be given according to the research results obtained. Conclusions are purely from the results of research conducted and must not include references or sources obtained or cited from other people's research results.

From the results of the analysis and calculations, a comparison was made between theoretical and actual productivity, there was a positive deviation value (the optimum deviation between actual and theoretical was 97.3%) and a negative deviation value (the optimum deviation between actual and theoretical was -11.8%) regarding tool productivity. The deviation value is negative, which means that the actual productivity is greater than the theoretical calculated productivity. This is caused by the location of the work surface being flooded, the location close to the sump, so that the material being loaded is wet and mixed with water. Because wet materials and water are loaded, the amount of excavator loading to the hauler is less than dry material. From direct observations in the field it is known that if the material being loaded is wet or mixed with water, the loading rate will be three to four times, whereas it should be six times for dry blasted material. This will directly reduce the cycle time of excavators and haulers, so that the productivity of these two tools will increase if calculated from the number of cycles per HD, while the relatively large positive deviation is caused by this because the number of HDs in the fleet is 6 out of 8 HDs. needed according to theoretical calculations. The deviation value between theoretical productivity and actual productivity is generally large if the actual number of conveyances in one fleet is less than the number of HDs required according to theory and this deviation value is small if the number of conveyances in one fleet is the same as the number of conveyances theoretically required over a certain distance. .

To calculate the theoretical capacity of the MF 420 pump which is the result of a plot on the performance curve of the pump. From this table it is known that for a total head of 90 m to 100 m, the pump efficiency ranges from 62% - 73%. Meanwhile, daily pumping data at the Gaharu pit. In the table it can be seen that the MF 420 pump works in the rpm range 1400-1520 with a flow rate of 111 Lps - 172 Lps for a total head of between 95m - 99 m, with the actual efficiency of the pump being around 65% -72%. The results of this comparison are still in agreement between theoretical and actual calculations.

Based on theoretical calculations using actual HD number data, the match factor value = 0.83 (MF <1). This value shows that the loading equipment is waiting for the transportation equipment so that the actual productivity is smaller than theoretical. It can be calculated that the waiting time for the loading equipment is around 5 minutes/hour. So that compatibility between the loading equipment (PC1250) and the transportation equipment (HD465) is not achieved.

As for making wells or sumps by following a sequence based on the decrease in elevation of each sequence (until mid-March and early April 2022)

Conclusions are prepared in paragraph form (not in numbering form), which are arranged logically and show the correlation of each research result obtained and its main implications in the field of education or the general public.

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