



COALTECH 2020

Task 4.8.1

Dewatering and drying of fine coal: Survey of dewatering costs

by

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1. INTRODUCTION

During Phase 1 of this project, a techno-economic evaluation of various dewatering techniques was carried out. This indicated that the choice of dewatering technique could have a significant impact on the economic viability of a specific colliery.

From the initial exercise, it became clear that it is necessary to have accurate cost information in order to carry out this type of evaluation. It was felt that the information used to calculate the operational cost of the different dewatering techniques needed confirmation.

It was therefore decided to approach the various plants to provide accurate operating cost information on the dewatering equipment used in industry. This information would then be used to re-evaluate the previous exercise so as to validate or refine the findings.

2. METHODOLOGY

A list of dewatering equipment types for which data were required was drawn up and plants where such equipment was in use were identified. The plant managers of these plants were requested to provide information on specific items of dewatering equipment in their plants. A standardised format for reporting operating costs was compiled and agreed to by the Coal Processing Sub-committee. This format was supplied to the plant managers together with the request for information.

The list of plants and the format for the required data are attached as Appendix A.

Over the next nine months, the duration of the period for collecting the data, individual managers were reminded of the request and visits were conducted to most of the plants from which information had been requested.

3. RESULTS OBTAINED

Information was eventually received from eight of the 16 plants to which requests for data had been made.

The information received was analysed and is summarised in Table 1.

Table 1: Summary of dewatering cost data received from plants

Dewatering unit	Operating cost per ton dewatered (average)	Surface moisture of final product (average %)	Number of units in survey
Screenbowl centrifuge	R 2,78	15,7	3
Scroll centrifuge	R 2,04	13,3	3
Horizontal belt filter	R 1,39	26,8	3
Filter press	R 2,22	25,0	2
Dewatering screen	R 0,25	27,7	9

A more detailed analysis of the results received is shown below in Tables 2, 3, 4, 5, and 6.

Table 2: Screenbowl centrifuges

Colliery	Bank 2	Goedehoop	Koornfontein	Average
Tons per annum	156600	388800	324000	
Operating Labour per annum	R18,000		R151,200	
Flocculant				
Screens/cloths				
Electricity	R238,680	R554,931	R44,712	
Maintenance:				
Labour	R42,000		R19,048	
Spares	R96,000	R735,000	R600,000	
Total per annum	R394,680	R1,289,931	R814,960	
Cost per ton	R2.52	R3.32	R2.52	R2.78

Typical product moisture (% tot)	16	15	16	15.7
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Table 3: Scroll-type centrifuges

Colliery	FC 1200 Greenside	H 900 KK	H 900 Koornfontein	Average
Tons per annum	138000	432000 (three units)	324000 (three units)	
Operating Labour per annum	R11,232		R152,820	
Flocculant				
Screens/cloths		R65,332		
Electricity	R53,788	R670,680	R16,767	
Maintenance:				
Labour	R2,814		R6,048	
Spares	R121,000	R550,000	R400,000	
Total per annum	R188,834	R1,286,012	R575,635	
Cost per ton	R1.37	R2.98	R1.78	R2.04

Typical product moisture (% AD)	11.5	18	15.0	13.3
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Table 4: Horizontal Belt Filters

Colliery	New Vaal	Durnacol	Grootegeeluk	Average
Tons per annum	474000	290976	1656000	
Operating Labour per annum	R21,600	R60,000	R360,000	
Flocculant	R151,642		R2,757,240	
Screens/cloths	R150,000	R23,667	R204,000	
Electricity	R78,000	R10,649	R561,600	
Maintenance: Labour	R30,000	R15,360	R87,000	
Spares	R300,000	R3,000		
Total per annum	R731,242	R112,675	R3,969,840	
Cost per ton	R1.54	R0.39	R2.40	R1.39

Typical product moisture (% AD)	30	23.6	30	26.8
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Table 5: Filter Presses

Colliery	Koornfontein	Twistdraai	Average
Tons per annum	324000	129600	
Operating Labour per annum	R152,820	R148,000	
Flocculant			
Screens/cloths	R178,200		
Electricity	R33,720		
Maintenance:			
Labour	R6,048		
Spares	R200,000	R200,000	
Total per annum	R570,788	R348,000	
Cost per ton	R1.76	R2.69	R2.22

Typical product moisture (% AD)	25	25	25.0
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Table 6: Dewatering screens

Colliery	New Vaal	Bank 2	GG	Landau	Ghoop
Tons per annum	559200	540000	205000	360000	1500000
Operating labour	R21,600	R18,000			
Flocculant	R0				
Screens/cloths				R18,144	
Electricity	R27,600	R11,016	R32,400	R24,948	R80,784
Maintenance:					
Labour	R30,000	R42,000	R12,000		R40,000
Spares	R276,000	R98,400	R23,000	R98,000	R98,704
Total per annum	R355,200	R169,416	R67,400	R141,092	R219,488
Cost per ton	R0.64	R0.31	R0.33	R0.39	R0.15

Moisture	12% (16x.25)	25 ->28	9 % (170x22)	24	25
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Colliery	Ghoop	KK	KK	Kfontein	Average
Tons per annum	2100000	1572480	1497600	864000	
Operating labour				R152,820	
Flocculant					
Screens/cloths		R525	R875	R6,960	
Electricity	R43,330	R240,327	R400,545	R20,120	
Maintenance:					
Labour	R40,000				
Spares	R238,056	R78,600	R79,332	R21,200	
Total per annum	R321,386	R319,452	R480,752	R201,100	
Cost per ton	R0.15	R0.20	R0.32	R0.23	R0.25

Moisture	25	26	26	31	27.7
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The completed survey forms as received back from the plants are attached as Appendix B, a separate Excel file.

4. DISCUSSION

Relatively good agreement on the operating cost of the different types of dewatering equipment is shown between the plants. This is despite the fact that the breakdown of costs, as reported by the different mines, varies from mine to mine. Some plants, for example, report operational labour and maintenance labour as separate cost items. Other plants include these costs in the total reported maintenance cost. This may be because the different mines use different cost reporting systems. In general, accurate costs are reported for the overall operation of plants but most systems do not make provision for the reporting of specific, isolated activities, such as a dewatering unit.

5. CONCLUSION

The data obtained provide indicative costs for the operation of the different types of dewatering unit employed on South African plants. Although a more precise estimate would have been obtained if all the plants requested to do so had provided information, the data obtained are of value to both this project and the plants themselves.

Appendix A.1

Format for data requested

Survey of dewatering equipment cost

Colliery:		
General		
	Equipment type & model	
	Manufacturer	
	Number of units installed	
	Date installed	
	Size/rated capacity per unit	
	Typical throughput	
	- tons per hour	
	- tons per month	
	Material dewatered	
	Size analysis - feed to unit	
	Ash content - feed to unit	
	Typical feed moisture	
	Typical product moisture	
Operating cost		
	Operating labour	
	Consumables :	
	- Flocculant	
		Type of flocculant
		Supplier
		Cost/kg
		Consumption (kg/t feed)
	- Screen / filter cloths	
		Type of screen/cloth
		Supplier
		Cost per screen/cloth
		Consumption (no of screens/cloths per month)
	- Electricity (installed power)	
		No. of drives
		Total kWh of all drives
		Cost per kWh
	- Maintenance	
		Maintenance labour
		Spares
		Other
	- Replacements	
		Typical life of units
		Replacement cost per unit
		Total cost per annum

Appendix A.2

List of plants

Plant	Contact	Dew. Scr.	Drum Filter	Disc Filter	HB Filter	Pressure Filter	Scrbowl Centr.	H 900 Centr.	CMI Centr.
ATCOM	Graeme Pitts	X			X				
Bank	Chris Swanepoel	X					X		
Douglas	Piet Otto	X						X	X
Durnacol	Willem Zietsman	X			X				
Goedehoop	David Power	X					X		
Grootegeluk	Dries vd Walt	X			X		X		
Kleinkopje	Neville Matodes	X						X	
Koornfontein	Leon Toerien	X				X	X	X	
Leeuwpans	Gerhard Hoffmann	X				X			
MMS	Jaco Scholtz	X				X	X		
Navigation	Tony Weatherby	X						X	
New Vaal	Danelle Vorster				X				
Rietspruit	Barney van Wyk	X					X		
Sasol 2/3	Bernardus de Wet		X	X	X				
Twistdraai	Thulani Ndlovu	X				X			