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FEATURES OF COAL SLUDGE PROCESSING ON CDF "GUKOVSKAYA"

Results of improvement of technology of dewatering coal slimes not float size of the high-frequency screens type SHF by applying sections of the working surface of a different angle, that allowed to reduce the humidity of saleable coal production by 0,2%.

As is known, the technology of sludge processing products defines a level of water– sludge facilities perfection of any coal-separating factory. In this connection processing coal sludge on CDF "Gukovskaya" is rather interesting.

The enrichment technology of ordinary anthracite at factory consists in the following.

Ordinary anthracite -100 mm sized from heat-sink bunkers by tape conveyors (pos. 86) moves on string screen ГСС-41 (pos. 87) where its dressing occurs on two classes of +3 and -3 mm. The class of -3 mm with ash level equal ordinary coal ash level and in amount up to 12 % from ordinary coal, is moved by tape conveyor system (pos. 88, 89, 90) to shipping of AS grade. A +3 mm class by conveyors (pos. 141 and 149) is moved on deslimer DS-2 (pos. 157) where coal water-saturation is occurred after which it is carried out for wet classification on size 3 mm on two machine classes of -3 and +3 mm on screen HCTP-42 (pos. 154). A machine class of -3 mm with screens HCTP-42 (pos. 154) moves on control size classification on screen HCTP-42 (pos. 190-5), which under sieve product is transferred to screen SHF-41. Over sieved product of screen HCTP-42 (pos. 154) moves to a heavy – middle bath separators СКВП-20 (pos. 158) for its enrichment. The concentrate heavy-middle separators acts on cleaning magnetite and dehydration on two – sieve screens HCTP-42 (pos. 168a), equipped sieves of 6 mm and 1,5 mm sized. Over sieve product of +6 mm size with the help of the tape conveyor (pos. 303) it is transferred for sorting out to consecutive installation screens HCTP-62 (pos. 168-1 and 168-2) where grades AM, AK, AC, AO are allocated. Between – sieved product from screens HCTP-42 (pos. 168a) with the help of the scraper conveyor (pos. 302) is allocated on centrifuges CFSH-1.00 (pos. 190-3), which dehydrated product is transferred in grade AIII. Centrifuge fugat moves to a undersieve product tank of screen SHF-35 (pos. 264) capacity 50 m³.

Under sieve product of screens HCTP-42 (pos. 168a) is sub-standard suspension and by gravity it is transferred to tanks HKC-30 (pos. 250).

Roc from heavy– middle separators moves on screen HCTP-42 (pos. 190-1) where there is a basic dump of sub-standard suspension and further on two-sieve screen HCTP-42 (pos. 190-2) on which three products are allocated.

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Oversieve product (rock size +15 mm), межсieveный a product (1,5-15 mm sized rock) and under sieve a product (sub-standard suspension). Rocky screen under sieve products move by gravity to tanks НКС-30 (pos. 250), between sieve product of screen НСТР-42 (pos. 190-2) with the help of tape conveyors (pos. 107 and pos. 108) is transferred to the rocky bunker and over sieve product of screen НСТР-42 (pos. 190-2) moves to crusher ДДЗ-6 (pos. 300) where it is crushed up to -18 mm size. Crushed rock by the tape conveyor (pos. 301) is transferred to over dressing in heavy-middle separator СКВП-20 (pos. 306). The similar decision allows reducing coal losses with waste products heavy– middle enrichments.

Emerged fraction from heavy– middle separator СКВП-20 (pos. 306) moves on magnetite cleaning and dehydration on screen НСТР-62 (pos. 307), which over sieve product 1-20 mm size is transferred by the tape conveyor (pos. 316) to the scraper conveyor (pos. 318) and it is also distributed on bunkers (pos. 319), from which they are loaded by tape conveyors (pos. 320, 322, 324) in box-wagon as grade АШК.

Sunk fraction of heavy– middle separator СКВП-20 (pos. 306) is unloaded on screen НСТР-42 (pos. 308), which over sieve product is transferred to the tape conveyor (pos. 107 and 108) and further in rocky bunkers.

Screen under sieve products (pos. 307 and 308) are sub-standard suspension and move to tank НКС-30 (pos. 250).

From tanks НКС-30 (pos. 250) sub-standard suspension is pumped by pumps SHN-270 (pos. 250) to electromagnetic separators ПБР80/170 (pos. 158) where there is its regeneration in 2 stages. Magnetite moves to tanks КС-30 (pos. 239), and tailing moves on screen НСТР-42 (pos. 190-5 and further in a sludge water tank (pos. 200).

The water-sludge circuit of factory provides accumulation of all sludge waters in a sludge water tank (pos. 200). For the size control before a modular sludge water tank there is a screen SHF-41 (pos. 264), which over sieve product +3 mm size moves on dehydration in centrifuges CFSH-1.00 (pos. 190-3).

From a modular sludge water tank (pos. 200) water-coal suspension is loaded by a pump SHN-500 (pos. 200-5) to hydro cyclones HC-350 (pos. 200– Б) for a condensation, and having poured from tank sludge water moves by gravity in sludge pool.

The condensed product of hydro cyclones HC-350 (pos. 200-Б) moves for enrichment on screw separators MX-7 (pos. 259), and tipplings – in a tank with capacity of 8 m³. The concentrate of screw separators moves on dehydration on two screens SHF-41 (pos. 262-1, 2) directly or through a lamellar density (pos. 250). Over sieve screen product of +0,2 mm size is transferred with the help of the tape conveyor (pos. 207) for final dehydration in centrifuge CFSH-1.00 (pos. 190-3, and under sieve the product comes back in a modular sludge water tank (pos. 200).

Waste products МВС move on dehydration on screen SHF-41 (pos. 262-3), which over sieve product moves on rocky dump, and under sieve one moves in a tank in capacity of 10 m³ whence are pumped over by pumps SHN-500 (pos. 208) to a gravitational thickener (pos. 500). Tipping of a lamellar thickener (pos. 260) moves to a tank in capacity of 8 m³, whence together with hydro cyclones HC-350 tipping it is moved by a pumped SHN-270 in hydro cyclones HC-75 (pos. 265), which tipping

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moves in a tank № 1 and further in a gravitational thickener, and condensed moves on dehydration to screen SHF-41 (pos. 262-1, 2).

An under sieve screen SHF-41 product of waste products MBC, hydro cyclones HC-75 tipping and sludge water from sludge pool (pos. 341) are exposed flocculation in a gravitational thickener (pos. 500), which tipping product is turnaround water, and then through the external sediment sludge bowl is moved by pumps SHN-500 into a turnaround water tank, and the condensed product is injected in tankers by pumps SHN-270 and K40-250 (pos. 503-1, 2) and is transported on rocky dump for joint warehousing with heavy– middle separators rock.

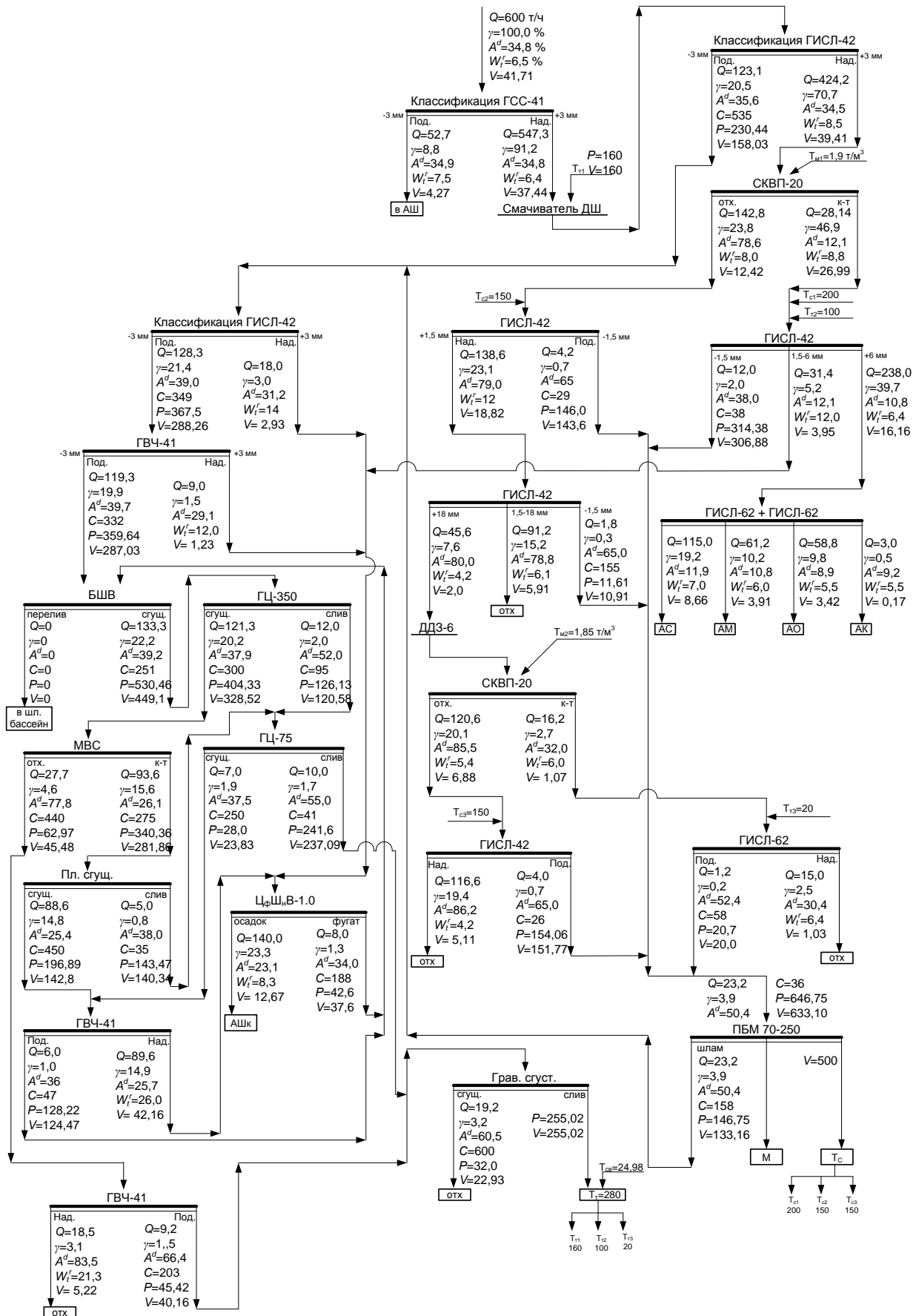
Qualitative – quantitative and water-sludge circuit of CDF "Gukovskaya" is resulted in figure, enrichment product balance is shown in tab. 1.

From given tab. 1 follows, that the concentrate output is 74,3 % with ash 18,2 % and a moisture of 7,1 %. An waste product output is 25,7 % with ash 82,7 % and a moisture of 17,4 %.

Table 1

Balance of enrichment products				
Products	Q, т/ч	γ , %	A^d , %	W^r , %
Dry screening AIII	52,7	8,8	34,9	7,5
AK	3,0	0,5	9,2	5,5
AO	58,8	9,8	8,9	5,5
AM	61,2	10,2	10,8	6,0
AC	115,0	19,2	11,9	7,0
AIIIк -18 mm	15,0	2,5	30,4	6,4
AIIIк -3 mm	140,0	23,3	23,1	8,3
The total concentrate	445,7	74,3	18,2	7,1
CKBII waste	116,6	19,4	86,2	4,2
MBC waste	18,5	3,1	83,5	21,3
Gravitation thickener waste	19,2	3,2	60,5	600 г/л
total waste	154,3	25,7	82,7	17,4
total	600,0	100,0	34,8	–

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Qualitative – quantitative and water-sludge circuit of CDF "Gukovskaya"

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With the decrease purpose of enriched products humidity, factory has been solved to improve technology of sludge product dehydration by translation high-frequency screens SHF-41 in high-frequency screens SHF-41M. Difference of these screens is, that screen SHF-41M has three working surface sites with different incline: the first one with a negative inclination corner up to -20° , the second – with an inclination corner of 0° , the third – with a positive inclination corner up to $+15^\circ$. Screens are equipped with a dehydrating surface as rubber sieve of 0,2 mm by OC" AHA-TEMC " with the characteristic size of apertures.

The screen SHF-41 and SHF-41M characteristics are resulted in tab. 2.

In tab. 3 and 4 parameters of screen SHF-41 work on concentrate MBC dehydration with the condensed product of hydro cyclones HC-75 and waste products MBC are resulted.

According to these data, over sieve product humidity can be reduced for a condense product from 26-28 % up to 20-22 %, for waste products from 21-22 % up to 14-18 %.

Table 2

Characteristics of screen			
№	Index	Screen	
		SHF-41	SHF-41M
1	Sieve square, m ²	6,7	6,7
2	Amount of sieve layer, pcs.	1	1
3	Productivity according to initial (solid) feed, t/h	до 60	до 60
4	Sieve length, mm	4200	4200
5	Sieve weight, mm	1600	1600
6	Amount sieve area, pcs.	1	3
7	Incline angle of sieve area, degree:		
	area № 1	0	до -20
	area № 2	0	0
	area № 3	0	до $+15$
8	Mass of vibration part, kg	3400	3400
9	Amplitude of vibration, mm	1,5-2,0	1,5-2,0
10	Frequency of box vibro moving, min ⁻¹	972-1450	972-1450
11	Engine power rating, kV	2×5,5	2×55
12	Dimensions, mm:		
	Length	4200	4200
	Weight	2820	2820
	Height	1580	1580
13	Screen mass, kg	3800	3800

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Table 3

The average parameters of screen SHF-41 work on dehydration
MBC concentrate of condensed HC-75 product

Class, mm	Products							
	Initial		Over sieve			Under sieve		
	Output $\gamma_{in}, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$
2-3	15,32	24,2	15,32	19,5	24,2	–	–	–
1,5-2	11,12	26,1	11,12	14,1	26,1	–	–	–
1-1,5	12,24	18,4	12,24	15,6	18,4	–	–	–
0,5-1	13,57	17,6	13,57	17,2	17,6	–	–	–
-0,5	47,75	34,6	26,45	33,6	32,5	21,3	100,0	37,4
total	100,0	27,8	78,7	100,0	25,2	21,3	100,0	37,4
humidity $W^r, \%$	425 g/l		28,0 g/l			40 g/l		

Table 4

The average parameters of screen SHF-41 work on dehydration
of waste MBC products

Class, mm	Products							
	Initial		Over sieve			Under sieve		
	Output $\gamma_{in}, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$
2-3	19,32	86,0	19,32	25,7	86,0	–	–	–
1,5-2	18,64	84,9	18,64	24,6	84,9	–	–	–
1-1,5	11,53	84,3	11,53	15,30	84,3	–	–	–
0,5-1	11,33	81,4	11,33	15,0	81,4	–	–	–
-0,5	39,18	68,9	14,48	19,4	71,2	24,7	100,0	67,6
total	100,0	78,4	75,3	100,0	81,9	24,7	100,0	67,6
humidity $W^r, \%$	433 g/l		21,3 g/l			160 g/l		

The average results of modernized screen SHF-41M work is resulted in tab. 5 and 6.

Table 5

The average parameters of screen SHF-41M work on dehydration
MBC concentrate and condensed HC-75 product

Class, mm	Products							
	Initial		Over sieve			Under sieve		
	Output $\gamma_{in}, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$
2-3	17,36	23,5	17,36	24,9	23,5	–	–	–
1,5-2	12,06	22,1	12,06	17,3	22,1	–	–	–
1-1,5	11,22	17,5	11,22	16,1	17,5	–	–	–
0,5-1	12,41	17,3	12,41	17,8	17,3	–	–	–
-0,5	46,95	33,9	16,65	23,9	30,1	30,3	100,0	36,0
total	100,0	26,8	69,7	100,0	22,8	30,3	100,0	36,0
humidity $W^r, \%$	425 g/l		22,0 g/l			42 g/l		

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Table 6

The average parameters of screen SHF-41M work on dehydration
MBC waste products

Class, mm	Products							
	Initial		Over sieve			Under sieve		
	Output $\gamma_{in}, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$	Output $\gamma_{in}, \%$	Output $\gamma_p, \%$	Ash $A^d, \%$
2-3	20,64	85,2	20,64	30,9	85,2	–	–	–
1,5-2	17,70	84,6	17,70	26,5	84,6	–	–	–
1-1,5	12,42	83,5	12,42	18,6	83,5	–	–	–
0,5-1	10,29	81,6	10,29	15,4	81,6	–	–	–
-0,5	38,95	68,0	15,75	8,6	77,4	33,2	100,0	66,4
total	100,0	77,8	66,8	100,0	83,5	33,2	100,0	66,4
humidity $W^r, \%$	433 g/l		16,0 g/l			190 g/l		

Table 7

Index of CDF "Gukovskaya"

Products and its index	With screen application	
	SHF-41	SHF-41M
Concentrate:		
Q, t/h	445,7	445,7
$\gamma, \%$	74,9	74,3
$A^d, \%$	18,2	18,2
$W^r, \%$	7,1	6,9
$V, m^3/h$	34,13	32,85
Waste:		
Q, t/h	154,3	154,3
$\gamma, \%$	25,7	25,7
$A^d, \%$	82,7	82,7
$W^r, \%$	17,4	16,7
$V, m^3/h$	32,56	30,86

From tab. 7 follows, that application of high-frequency screen SHF-41M instead of high-frequency screen SHF-41 for dehydration MBC concentrate with the condensed product of hydro cyclones HC-75 has allowed to reduce a humidity of shipped commodity coal production on 0,2 % from 7,1 % to 6,9 %.

Conclusion

A high-frequency screen application with different incline sites of working surface SHF-41M instead of high-frequency screen SHF-41 in the conditions of CDF "Gukovskaya" has allowed to reduce humidity of shipped commodity coal production on 0,2 %.

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