

TR13-142-144

R. 561

WET AND DRY GRINDING OF SAVAGE RIVER IRON ORE IN THE SEIBTECHNIK MILL

Aim

The object of this project was to study the sizing of ground products from various grinding methods.

Procedure

A sample of Savage River ore was roll crushed to pass 10 mesh. From this crushed sample were riffled—

- (a) a head sample for assay and sizing;
- (b) twenty gram samples for the grinding tests.

The grinding tests were done in the 100 cc vessel of the Laboratory Vibratory Disc-type Grinding Mill manufactured by Seibtechnik G.M.B.H. Muelheim, West Germany. The grinding time was measured from switching on the mill motor to switching it off.

The tests were done wet and dry. In each, 20 grams of sample were ground for varying periods. In the wet tests each sample was ground as a 66 per cent solid pulp.

The ground products were wet screened on 300 mesh, the screen undersize being cyclosized.

Results

The head sample assayed 48.3 per cent HCl. soluble Fe. The sizing is given in Table I, and plotted on the graph (fig. 34).

The sizings of the ground products are given in Tables II (wet) and III (dry), and are plotted on the graph.

In plotting the cyclosizer fractions the micron equivalents have been calculated for magnetite.

The sizes passing 90 per cent of the ground products are:—

Grinding Time (Seconds)	Nominal Aperture Passing 90%	
	Wet	Dry
60	28 μ	33 μ
30	38	45
20	45	57
10	53	86

Discussion

In all cases wet grinding gives a more finely ground product than dry grinding judging by the 90 per cent passing figures. However, in all cases the corresponding curves for wet and dry grinding intersect between 12 and 18 μ .

It will be seen that in corresponding grinds more coarse material and more very fine material results from dry grinding than from wet grinding. Thus the wet ground material contains more in the middle of the sizing range, or in other words wet grinding yields a more uniformly sized product.

In terms of all passing a given mesh we have:—

Grinding Time (Seconds)	Percentage Passing Screen			
	200 Mesh		300 Mesh	
	Wet	Dry	Wet	Dry
60	99.5	99.5	98.5	99.0
30	99.5	99.0	97.5	95.5
20	99.0	96.5	95.0	89.0
10	97.5	85.5	90.5	74.5

Table I
SIZING OF HEAD SAMPLE

Mesh	Fraction	Aperture (μ)	Percentage	
			Wght.	Cum. Wght.
12		1400	14.9	14.9
14		1200	10.9	25.8
18		850	14.5	40.3
25		600	8.6	48.9
36		420	8.8	57.7
60		250	9.8	67.5
100		150	8.7	76.2
200		75	8.2	84.4
300		53	3.7	88.1
C.S. 1		*28	3.0	91.1
" 2		22	2.5	93.6
" 3		15	1.6	95.2
" 4		10	1.4	96.6
" 5		7	0.6	97.2
-C.S. 5			2.8	100.0

C.S.=Cyclosizer fraction. * calculated for magnetite s.g. 5.2.

Table II
WET GRINDING RESULTS

Mesh	Weights Per Cent			
	60 secs.	30 secs.	20 secs.	10 secs.
200	0.5	0.5	1.0	2.5
300	1.0	2.0	4.0	7.0
C.S. 1	9.5	18.5	23.0	29.5
" 2	9.0	11.5	12.0	11.0
" 3	16.0	16.5	14.5	12.0
" 4	17.5	14.5	12.5	9.5
" 5	8.0	6.5	5.5	4.0
-C.S. 5	38.5	30.0	27.5	24.5
Totals	100	100	100	100

Table III

DRY GRINDING RESULTS

Mesh	Weights Per Cent			
	60 secs.	30 secs.	20 secs.	10 secs.
200	0.5	1.0	3.5	14.5
300	0.5	3.5	7.5	11.0
C.S. 1	14.0	22.0	24.0	22.5
" 2	8.0	8.0	8.0	6.5
" 3	10.5	10.5	9.5	8.5
" 4	11.5	10.5	9.5	7.0
" 5	6.5	5.5	4.5	3.5
C.S. 5	48.5	39.0	33.5	26.5
Totals	100	100	100	100

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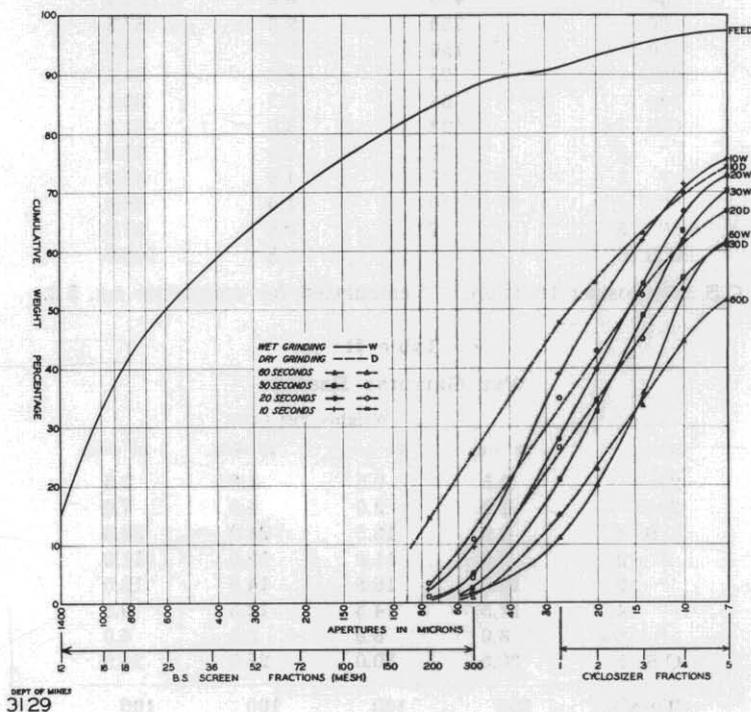


FIGURE 34.

5 cm