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CLASSIFICATION OF ALUMINA C X 25 IN HARDINGE AIR CLASSIFIER ON REQUEST FROM ALUMINUM COMPANY OF CANADA

by

R.A. Wyman

Industrial Minerals Division

Note: This report relates essentially to the samples as received. It shall not, nor any correspondence connected therewith, be used in part or in full as publicity or advertising matter.

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Technical Director
Alum. Co. of Can
Arvida

CLASSIFICATION OF ALUMINA C X 25 IN HARDINGE AIR CLASSIFIER ON REQUEST FROM ALUMINUM COMPANY OF CANADA

Three hundred pounds of Alumina C X 25 was sent to the Industrial Minerals Division with the request that trials should be made to see if a product composed almost entirely of -325 mesh particles could be classified off. This grade of alumina is the "flowry" type, a special product composed largely of tiny plates, and soft enough to grind very readily. The material also appears to break down to some extent during handling and makes consistant screen analysis difficult to obtain.

As an example of this several screenings on a sample riffled out as representative of the feed gave from 24 to 33% -325 mesh, with an average of 30% -325 mesh.

Test Work

A series of preliminary trials indicated that for a feed rate of 30 pounds per hour settings in the range of 2.5 - 3.5 on the air classifier produced the most indicative results, for example 66 - 80% -325 mesh in fine product. This feed rate also appeared to be close to the machine's capacity on this material, faster rates tending to back up at the feed inlet. A strong tendency was also noted for fines to hang up in the cyclone section of the machine and discharge after the tests were completed.

A good deal was dislodged only on tapping the cyclone with a stick to induce vibration.

With a feed rate of 30 pounds per hour and a setting of 3.5 on the machine a run was made in an attempt to secure the maximum fineness of product from one pass. At this setting approximately 15% of the feed passed into the fine fraction while a setting of 4.0 produced almost no fines. The 3.5 setting was therefore considered to be the best possible for this material. The fine production was found to contain 80% -325 mesh.

Since it was desired to obtain a product of almost all -325 mesh it was decided that the machine was not capable of producing this result in one pass on Alumina G X 25 feed containing 30% - 325 mesh.

A composite was made up composed of all the fine products from tests to this point. This composite contained approximately 60% -325 mesh as averaged from prior analyses and also analysis of a riffled sample. With this material as feed two trials were made using a feed rate of 25 pounds per hour and machine settings (a) of 3.5, and (b) of 3.0. These tests were designed to indicate the possibilities of two stage classification, or of some preliminary grinding.

Results are given below:

TABLE I

Setting	Coarse Product		Fine Product	
	% Wt.	%-325	% Wt.	%-325
3.5	83	52	17	98.9
3.0	9	37	91	93.6

Results for the 3.0 setting suggested faulty sampling - possibly a sudden drop of hung up material into the fine samples. One further trial along the same lines but with more definitive methods was therefore decided upon. For this final trial fresh material was used as a starting point and fines from the material run were retreated using two different settings of the machine. Samples were taken over a 5 minute period in all cases and portions were riffled from them for screen analyses. Results of this trial are shown below:

TABLE II

	Feed Rate (lb/hr)	Setting	Coarse Product		Fine Product	
			% Wt.	%-325	% Wt.	%-325
(a)	18	3.25				56.0
(b)	31	2.75	19.5	31.7	80.5	65.8
(c)	26	3.25	47.7	29.8	52.3	88.3
(d)						94.3

(a) Alumina C X 25 as received.
(b) Fines from pass (a)
(c) Fines " " "
(d) Sample riffled from material hung up in cyclone (about 80% of the fines were hung up).

Two trials of grinding without classification were made in the Fahrenwald Mill. For the first 2000 grams of fresh alumina ~~were~~ was ground 5 minutes with burundum pellets. This gave a product containing 85.3% -325 mesh. In the second trial 2000 grams ~~were~~ was ground for 10 minutes to give a product containing 94.6% -325 mesh.

Discussion

Results obtained on Alumina C X 25 were definitely below the performance expected from the Hardinge machine. Alumina C 1, a harder and more spherical material, had been classified to 99% -325 mesh in this machine at an earlier date without difficulty, and did not hang up in the cyclone. Both the high percentage of hang up, and the poorer classification on C X 25 are probably due to its "flowry" or platy nature. As indicated in Table II hung up material is finer then that discharging regularly.

It was noted too that this material reacted rapidly to rather small changes of setting on the classifier. For example in the final test a setting of 2.75 on the machine gave a ~~46%~~ 66% -325 mesh product while a setting of 3.25 gave a ~~93%~~ 94% -325 mesh product.

The Fahrenwold mill is designed for a very high reduction rate yet produced only 95% -325 mesh after 10 minutes. Possibly the small amount of residual Alumina C 1 present would account for this. Alumina C 1 has proven hard to grind in the past.

Conclusions

A satisfactory classification of Alumina C X 25 to 98 or better % -325 mesh with the Hardinge machine could probably only be made by accepting a small yield of product from two stages of classification, or from a partially ground feed.

The Fabrenwold mill might be useful in the development of the desired product.

R.A.Wyman,
Head, Milling Section.