

# Technical Article Series

Screen separator maintains size distribution.

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# Circular Screen Separator Ensures Size Distribution

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New fused white alumina plant goes on stream in Australia, with initial yearly production of 1 0,000 tons. Particle size distribution and particle shape are key elements of Japanese technology

CI Staff Report

Construction of a fused white alumina plant at Rockingham means Australia will no longer need to import that material. Estimated Australian annual consumption is 3000 tons. Current annual world consumption of fused white alumina is about 300,000 tons and growing rapidly as more uses are found, such as electromagnetics. The design of the facility allows for staged developments of 10,000, 20,000 and 30,000 tons/yr.

Australian Fused Materials Pty. Ltd. (AFM) is a 50-50 joint venture between Japan Abrasive Co. Ltd. (JACO), Sakai, Japan, and Doral Mineral Industries Ltd., Perth, Western Australia. Initially, the Rockingham plant will produce about 10,000 tons/yr of fused white alumina for refractories industry customers in Australia, Japan, Korea, Taiwan and Europe. The plant also is designed for expansion into the production of other fused materials. The process of manufacturing fused white alumina at Rockingham begins with feedstock from Alcoa of Australia Ltd.'s alumina refinery at Kwinana. It will take about 11,000 to 12,000 tons/yr of low-sodium alumina to produce 10,000 tons / yr of fused white alumina. Small quantities of fluoride will be added to whiten the end product.

Feedstock enters a 3300 kva, three electrode arc furnace at a controlled rate. The shielded tilting arc furnace employs full power for the first three hours to produce fusion, and then power is reduced slightly for the last half-hour .

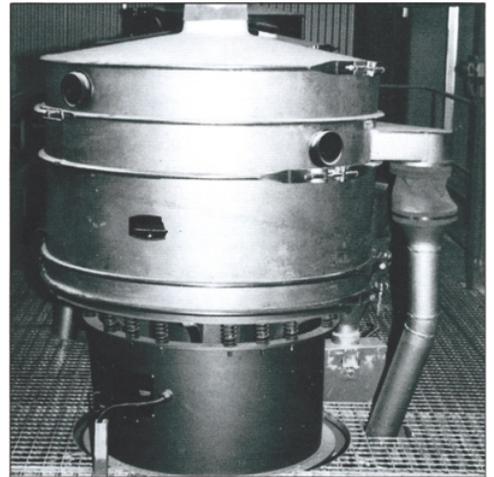
The furnace tilts to tap the molten fused alumina into ingot molds, which then sit for 10.5 hours in a water-cooled spray shower. As molds are tipped, ingots shatter as they fall and hit holding pans. The shards are fed to a grizzly, hydraulic hammer and two jaw crushers.

The process from the furnace to the jaw crusher operates continuously, but from the secondary crusher stage onward, processing occurs during one shift working a five-day week. Between the two stages is a buffer storage bin. From this bin, product goes through impeller breakers.

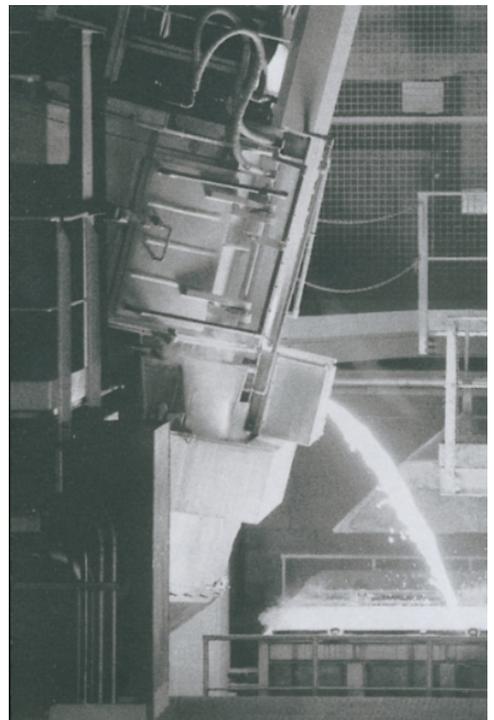
Electromagnetic refining ensures product that is virtually free of iron contaminants. The milling circuit includes a ball mill for the finer size requirements, and the process has the potential for up to 13 different size fractions.

Circular screen separator

The Japanese technology used to produce fused white alumina at the Rockingham plant aims at three



*Kason Corp's Vibroscreen circular screen separator helps Australian Fused Materials Pty. Ltd. size fused white alumina particles with specially shaped crystals before packaging. Five units use screens with mesh sizes ranging from 8 mm to 0.2 mm.*



process requirements. The product must be composed of particles of the correct shape and contamination-free, and size distribution must be strictly controlled.

To achieve strict control of the size distribution, AFM relies on Vibroscreen circular screen separators manufactured by Warman Int'l Ltd., Artarmon, New South Wales, under license from Kason Corp., Linden, N.J.

JACO, the Japanese parent company, specified the screens use with its technology for producing a fused white alumina containing more than 99.5%  $\text{Al}_2\text{O}_3$ . This high purity level results, in part, from the use of electromagnetic separation which removes iron. The third critical parameter, special particle shape technology, is proprietary and closely held by JACO.

The screens are used to size 8-5, 5-3, 3-1, 1F, 0.5F, 0.5-0.2, 0.3F, 0.2F and 2-0.05 size ranges. AFM also uses an alumina-lined ball mill with alumina balls to produce 220F and 325F grades.

Mesh sizes on the screens vary from 8 rnm down to 0.2 rnm. Two 60-in. and three 48-in. units were installed in the AFM sizing plant during construction of the facility in 1991. Operation of the plant began in August 1991.

Each circular screen separator operates at approximately 0.5 to 3 tons/hr with each unit receiving material at different and varying rates. Ultimately, the material passing through the screens will reach 5 tons/hr, according to AFM's general manager, Phillip Paul.

