

Vibra Screw Equipment vital to success of automated, continuous refractory production process.

Customer: Valley Mineral Products Corp., St. Louis, Missouri, a leading manufacturer of blended refractories.

Vibra Screw Equipment: Three 3 ft. diameter Bin Activators, two $\frac{3}{4}$ in. Live Bin Feeders and one Model VB-2 Vibra-Blender.

The Problem: To assure correct proportioning of ingredients in a continuous process for producing dry or tempered magnesia, zircon and alumina refractories.

Valley Mineral Products' fully automatic and highly sophisticated process is designed to produce blended refractories under automatic control with a precision of $\pm 0.5\%$ of the amount of each particular ingredient. Seven or more ingredients can be blended into a finished product.

In the system, refractory fractions, stored in 7 feeder bins, discharge to continuous feeders which, in turn, deposit material onto a common collecting belt in sequence. In this way, a continuous "sandwich" is built on the collecting belt with one ingredient layered upon another in correct proportion with no excess of any ingredient at the beginning or end of any run. Small quantities of chemical additives can be added to the belt before the "sandwich" is discharged to a bucket elevator.

The bucket elevator delivers the raw material sandwich to a dry continuous blender which combines them into a uniform product. The blended material is delivered either to packaging machinery or to a tempering blender where liquid bond is added.

One of the key reasons for installing the automated, continuous process was that quality control would be more effective than in old style batching operations. However, because operation is continuous, reliable flow of raw materials from storage to process is mandatory.

Of the seven raw materials used in various formulations in blended refractories, three — milled tabular alumina, ball milled MgO, and milled zircon — cause flow problems. Each of these materials is a heavy, extremely fine powder with a tendency to flow erratically due to bridging, plugging or ratholing in the storage bin and to flood or flush through feeding or metering devices. Tabular alumina must be discharged from storage at a rate of 2 tons/hr., ball milled MgO at 1 ton/hr., and milled zircon at 3 tons/hr.

Either of two chemical additives are added to the sandwich of refractory fractions in small quantities before it is discharged to the bucket elevator. Positive, accurate feed and flexibility in product changeover are essential to automated operation. Required feed rates are 20 to 40 lbs/hr.

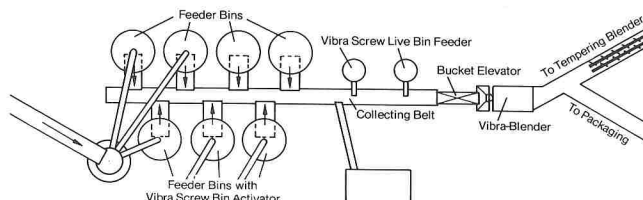
The Solution: Valley Mineral Products installed a 3 ft. diameter **Vibra Screw** Bin Activator with preassembled mounting ring construction on each of the three storage bins handling fine powder raw materials, two **Vibra Screw** Live Bin Feeders, each with $\frac{3}{4}$ in. screw

and 3 cu. ft. hopper, to meter chemical additives to process, and a **Vibra Screw** Model VB-2 Vibra-Blender to combine the ingredients.

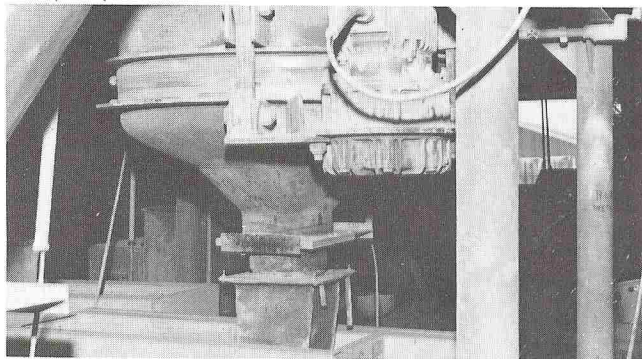
The **Vibra Screw** Bin Activator is a vibrated bin bottom which replaces the converging bottom of a static bin, thus removing the compaction area which is the major source of flow problems. A gyrator assembly attached to the Bin Activator produces powerful vibratory thrusts throughout the stored material to assure positive withdrawal without bridging or compaction. In addition, the controlled vibration releases entrained air in the material, densifying it and eliminating flushing.

The Live Bin Screw Feeder also employs vibration — of the hopper and feed screw — to assure consistent, highly accurate metering of additives to the sandwich. The Vibra-Blender combines vibration and the mixing-folding action of a slowly rotated paddle to fluidize and stir solid materials, providing thorough, precision blending at rates to 30,000 lbs/hr.

The Results: The Bin Activators and Live Bin Feeders provide consistently accurate flow of refractory fractions and chemical additives to the blending process. The Vibra-Blender does an excellent job of blending raw materials at the planned maximum production rate of 16,800 lbs/hr. Valley Mineral Products has achieved their goal of a highly automated, continuous processing operation with effective quality control.



Bin Activators, Live Bin Feeders and Vibra-Blender provide feeding and blending accuracy and flexibility — the fully automated system operates at 16,800 lbs./hr.



Three, 3 ft. Bin Activators deliver accurate, controlled flow of extremely fine, powders from storage to process.