VIBRA SCREW

CASE HISTORY

C-259

Live Bottom Bins and VibraMetric Feeder Vital to New Smelting Technology

Customer

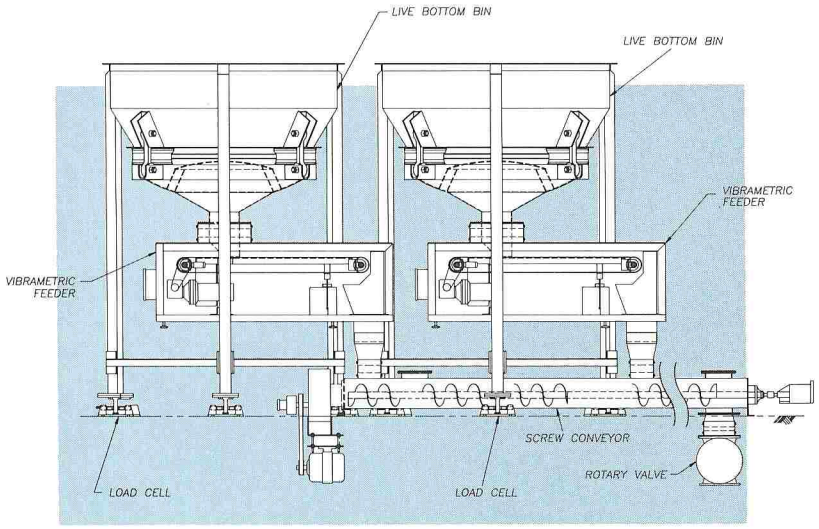
South Carolina Research Authority, North Charleston, South Carolina, under a chromium research project for The Macalloy Corporation.

Problem

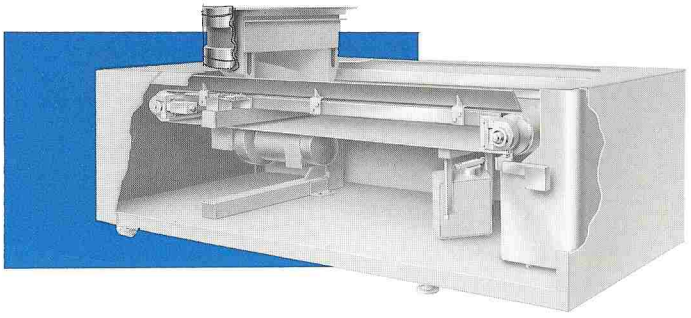
The South Carolina Research Authority led a team including MIT, Clemson University, Arthur D. Little Company and the Macalloy Corporation in the development of improved technology for smelting of Ferrochromium. The team's goal was to develop capability to smelt fine (granular) chrome ores more efficiently, as this type ore makes up the majority of current U.S. stockpiles. Their technology also had to consider stringent new environmental requirements and even stricter controls anticipated in the next century.

Current technology requires the use of open hearth furnaces in which coarse ore (1/2" and larger) is mixed with coke and reductants. To successfully smelt a large portion of the U.S. government's chrome ore stockpile, a method had to be developed to handle fine sized ore.

In its pilot project, SCRA and its team developed a sealed electric furnace which produces ferrochromium more efficiently. The sealed test furnace smelts the fine ore with coal and eliminates reductants. But, the finer ores require feed equipment with considerably increased accuracy in material proportioning.



South Carolina Research Authority led a team in development of new technology for chrome ore smelting.



VibraMetric enclosed weigh belt feeders continually weigh the entire belt assembly for consistent accuracy.

Solution

Two Vibra Screw Live Bottom Bins (for coal and ore) were mounted on load cell weighing systems, over two VibraMetric enclosed weigh belt feeders, supplying a screw conveyor.

SCRA specified four foot diameter, controlled vibration Live Bottom Bins to assure uninterrupted flow of the two ingredients. The VibraMetric units are rugged gravimetric feeders. As the coal and chrome ore move along, each VibraMetric continually weighs its entire belt assembly not just a portion of the belt, as with less accurate feeders. This design provides SCRA repeatability to within $\pm 1/4$ to 1/2% of set rate. To ensure absolute accuracy, calibration of the weigh belt feeders is done on line, using the static bin weigh system with pre-weighed material.

The screw conveyor includes a watt sensor in its controls to provide motor load data via a meter relay with alarm outputs. This unit supplies a rotary valve which feeds the furnace. The entire conveying system, like the furnace itself, is sealed to avoid contamination of the materials or the atmosphere. The sealed system also reduces dependance on the plant dust collection system.

Results

Chrome ore is highly abrasive and required a Vibra Screw design change to the infeed, but the system and the test bed have been operated at capacities as high as 35 pounds per minute of the coal and ore mix without the dust associated with previous open hearth smelting and mass ingredient handling.

The team plans to continue evaluating other strategic materials in the test bed furnace at Macalloy. Through the use of the accurate Vibra Screw material proportioning system, the new test bed will certainly be able to more effectively evaluate these materials vital to our nation's security.