

CASE HISTORY



STEEL MAKER USES THAYER LOSS-IN-WEIGHT FEEDER SYSTEM TO IMPROVE PROCESS

The Background

Midrex Technologies, Inc., Charlotte, NC a division of Kobe Steel designs, develops, engineers, and supplies direct reduction plants and associated equipment around the world. It offers direct reduction (steel making) process that converts iron ore into direct reduced iron for use in steel and iron making, and foundry applications.

One of the most significant innovations in direct reduction-grade iron ore has been the introduction of oxide coating.

Iron oxide pellets have a tendency to be sticky during direct reduction at elevated temperatures. The degree of stickiness of the pellets depends on their chemical composition and physical properties. For efficient furnace operation in direct reduction operation, it is extremely important to prevent pellets from adhering to one another and forming clusters. By coating the pellets with a thin layer of limestone, cement or bauxite, the reducing gas temperature can be increased significantly, resulting in a pellet production increase of up to 20 percent.



Challenge

When looking for the right feeder to accomplish the task of meeting the demanding 24/7 process of steel making, Midrex checked out several manufacturers equipment. Because the feeder is such a critical component to improve the steel making process, Midrex evaluated its needs and operating conditions before soliciting bids from feeder manufacturers. The critical points were the ability to meet the feed accuracy, the feeder would be required to run unattended for long periods of time, and run under harsh environmental conditions from the desert climate of middle east where temperatures can get as high as 120 degree F, to Russia where the temperature can be as low as -25 degree F.

After soliciting bids from several feeder manufacturers, Midrex engineers decided to order from THAYER SCALE who not only offered the Loss-In-Weight Feeder but took system responsibility and combined with it the material storage silo discharge equipment and custom control panel.

System Design

The system is comprised of a 5 ft diameter bin discharger mounted to a 12 ft diameter silo. The Bin discharger was required to assure material would discharge from the silo without bridging or ratholing. At the outlet of the bin discharger is an air operated butterfly valve. The valve provides the flow regulation for the material. When the Loss-In-Weight feeder control calls for material the butterfly valve opens, the material is discharged into the feeder hopper and the butterfly valve closes and forms a leak proof seal required when using a Loss-In-Weight Feeder.

To accurately meter the material Thayer's Model PF-SC-S Loss-In-Weight ScrewFeeder was chosen. The unique patented design of the feeder and the scale were of great importance to the customer since equipment was to run for long periods of time unattended, the feeder ability to handle the material and the scales ability to measure the feed rate under adverse conditions was required.

The Loss-In-Weight Feeder has an independently driven, transversely rotating agitator above the feed screw that conditions the material in the trough to ensure uniform material density and consistent screw-flight filling.



To weigh the material the exclusive “FMSS” Cable Suspension design provides extremely high sensitivity. Feeder “dead load” is mass-counterbalanced so that only material weight (live load) is measured. This feature helps assure excellent control in “noisy” environments.

All of the articulate parts of the scale mechanism are supported from “axially inextensible, but laterally yieldable” suspension elements (stainless steel pre-stressed aircraft cable), which are arranged to hang freely, thereby avoiding any appreciable spring or hysteresis effects, variations in mechanical advantage, or binding due to imperfect leveling.

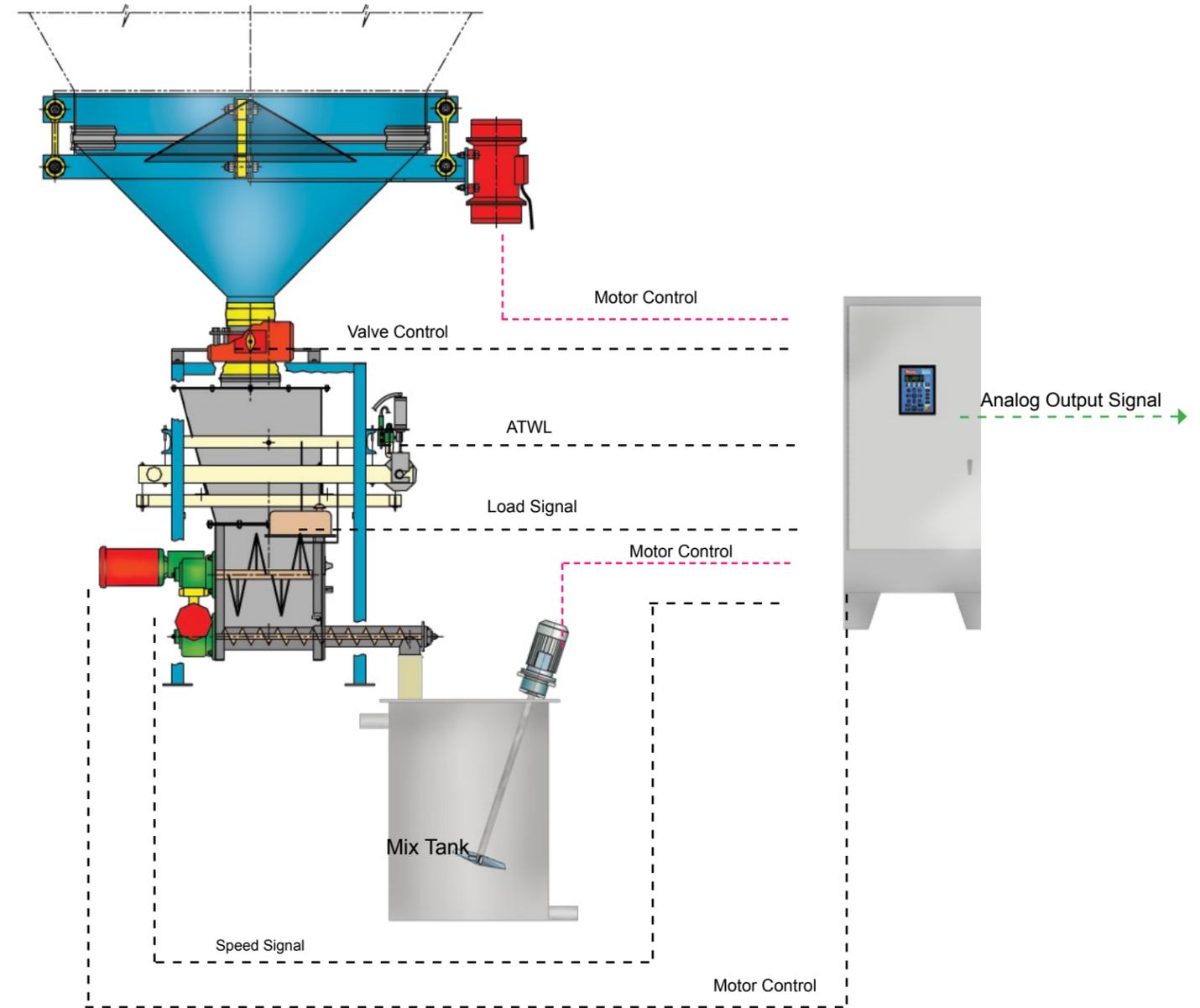
Because of this unique mechanical property of the force transmission system, any laterally directed forces and shocks on the scale or its supported machinery can not cause destructive shear and bending stresses to develop in the elements themselves or at the load cell junction. The system, being yieldable in the lateral direction, is therefore effectively and completely protected by using laterally placed “stops” in proximity of the weighed structure.



The system is controlled through a custom manufactured electrical panel. Thayer's Series 5200 Loss-In-Weight Controller monitors the output of the feeder and makes corrections in screw speed if required to maintain feed accuracy.

When the feeder hopper reaches the low material level, sequencing of the bin discharger motor, butterfly valve and the Loss-In-Weight Feeder is performed by the panel to assure proper refill. Mix tank agitator and mix tank control valves are also interlocked to the panel. The complete feed system is monitored by the customers central control system through analog outputs provided by the Loss-In-Weight Control panel.

The original system was installed in Mesaieed, Qatar in 2002 and since then the customer has installed nine more for locations all over the world.



Founded in 1949, Thayer Scale is a pioneering developer of continuous weighing and feeding equipment for the dry solids conveying and processing industries. Thayer's Belt Scales and Weigh Feeders of both the Weigh Belt and Loss-in-Weight types, cover an extremely wide range of applications in virtually all industries that involve dry solids conveying and processing. From Loss-In-Weight Feeders that feed vitamins into cereals at rates below 1 pound per hour to 6-Idler Conveyor Scales weighing coal at rates up to 10,000 tons per hour, there are more than 100 proven product variations available to suit most application requirements. Thayer Scale enjoys a unique reputation as a supplier of equipment that provides the rare combination of measurement precision and extreme robustness. Equipment installed more than 40 years ago continues to operate reliably and accurately.

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