

Passing with Flying Colours

Bob Chase, Pennsylvania Crusher Corporation, and Mark Kluesner, Buzzi Unicem, explain how Pennsylvania Crusher's Posimetric Feeder has cost-effectively improved efficiency and decreased downtime at Buzzi Unicem's Cape Girardeau plant, USA.

Introduction

Buzzi Unicem's Cape Girardeau plant is located on some 2186 acres of land in Cape Girardeau and Scott Counties, Missouri, USA. The original plant was built in 1910 and the Marquette Cement Company acquired the facility in 1923. A second, wet process plant was constructed on the same site in 1957. In 1969, the dry plant was shut down, followed by the closure of the wet plant in 1981, at which time the present 4-stage precalciner plant came online. Lone Star Industries acquired Marquette Cement in 1982, and in 1999 Dyckerhoff purchased Lone Star Industries. Buzzi Unicem took control of all US Dyckerhoff operations in 2004.

The plant was originally designed for 1 million tpa. However, through various modifications and upgrades over the years, the plant is currently producing some 1.48 million tpa.



Figure 1. Buzzi Unicem's Cape Girardeau plant.



The project

Buzzi wanted to replace the raw mill triple gate, which was notorious for allowing a high volume of air infiltration into the system. In addition, it hoped to reduce the maintenance costs so often associated with the triple gate. The plant chose the Posimetric Feeder from Pennsylvania Crusher to solve these production and maintenance problems.

Installing the feeder offered a few challenges due to limited space surrounding the raw mill. The amount of space between the raw mill feeder belt and the Posimetric Feeder required a creative and custom-made solution.

A specially designed surge bin (designed by Phoenix Process Engineering) provided the maximum amount of storage and allowed the feeder to work within the confines of the raw mill superstructure. Although the tank is oddly shaped, it experiences no build-up and was able to maintain the air seal.

The feeder was delivered completely assembled, and installation was carried out by building slides (Figure 2) to set the feeder into its proper position.

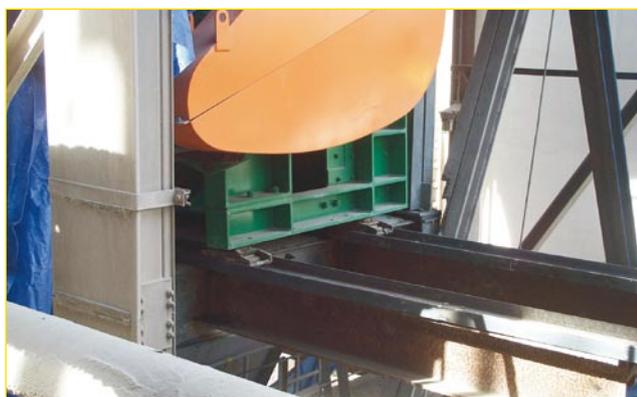


Figure 2. Installation was carried out by building slides to set the feeder into its proper position.

Positioning it correctly was imperative to eliminate any flow problems. This proved to be a clever approach to solve an access problem during installation.

The Posimetric Feeder

The Posimetric Feeder is designed to be a self-cleaning, positive displacement device with only one internal moving part, consisting of disks connected to a hub to form an internal rotating spool with one or more ducts. Material entering the feeder becomes locked between the disks and is conveyed to a discharge point as the spool rotates (Figure 3). There is, by design, no relative motion of the material with the hub, and the slow rotational speeds make the machine virtually maintenance-free.

The positive displacement action consolidates the material as the spool rotates, providing a metered output that is linearly proportional to rotational speed. The feeder delivers a precise quantity of material in direct response to process control demand. This delivery is not affected by moisture variations, thus avoiding feeder-induced process variations. More than 250 Posimetric Feeders are in operation today, most of which are in coal mill service.

In 2005, Buzzi installed these feeders on two coal mills. Each mill had originally been equipped with a triple gate to seal against false air infiltration. However, the typical problems associated with triple gates forced the plant to look elsewhere for a solution. The company then installed a custom-designed compaction screw to provide the seal against false air. While this approach did provide a better seal, the abrasive nature of the coal resulted in very short life for the screws. It subsequently installed two Posimetric Feeders. The success of these machines gave Buzzi the confidence to proceed with the installation of a model L-1548X3 feeder, based on its success at Ash Grove Cement's Leamington, Utah plant in 2001.

Development

Posimetrics in service in the utility industry had always required very little maintenance, especially exhibiting a negligible amount of wear. There was every reason to expect the same extraordinary life in this application. As a result, the first machine at Leamington was manufactured from standard materials and was not designed with re-building in mind. However, this was not to be the case. Almost from the beginning, internal parts suffered from gouging and excessive wear-related thinning. PCC and Ash Grove made some rushed “emergency life-support” repairs, then set about re-designing the feeder for long-term performance. In spite of the early problems, the plant remained optimistic. It stated that the cement industry knew how to make things tough, so it was simply a matter of

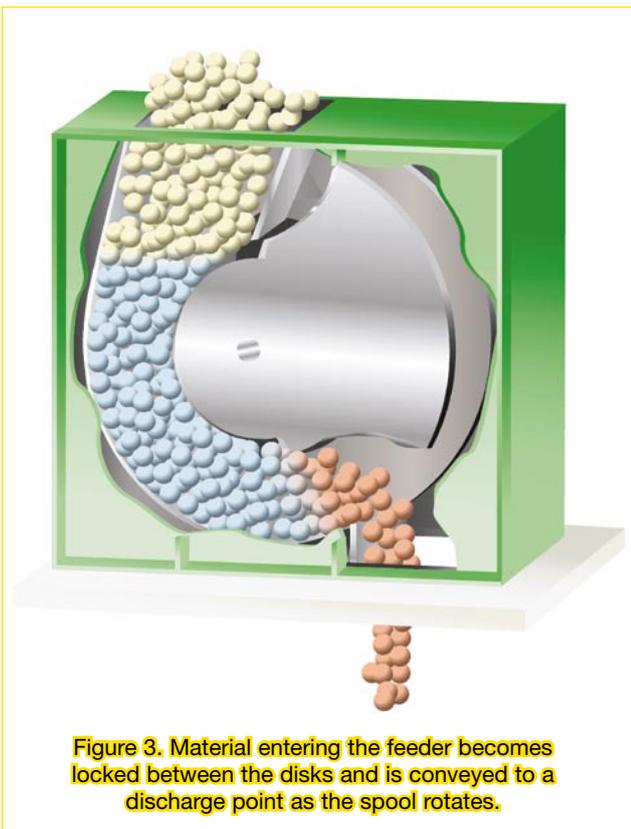


Figure 3. Material entering the feeder becomes locked between the disks and is conveyed to a discharge point as the spool rotates.



Figure 4. L-Series feeder during assembly.

incorporating what the company already knew into the PCC machine. The original goal was to develop a machine that would last from annual outage to annual outage, even if it would ultimately need to be rebuilt. In fact, the plant waited two years to replace the major wear parts. This extremely robust machine was dubbed the “L-” feeder.

A careful look at the types and rates of wear in different areas of the feeder led to interesting conclusions. Plant personnel observed that the disk edges were retreating; that is, the disk diameter was decreasing. However, it appeared that the rate of this decrease was flattening. The conclusion taken from this was that once clearances increased to a certain point, this particular wear mechanism would cease to be a major problem. This required PCC to assess the importance of holding to specific tolerances. The decision that resulted was to open the clearance, as it would not be detrimental to performance. In addition, disk liners were developed with a protective ring of abrasion-resistant material, to further protect the disk edge. This approach resolved the “decreasing diameter” in this and in subsequent machines.

Three primary requirements guided the design philosophy; specifically:

- The most accessible parts, least expensive parts and the parts most readily replaced in a single shift were considered to be sacrificial, i.e., less wear-resistant than the glide plate, which requires a more complete disassembly.
- Due to the uniqueness of each plant’s layout, it must be possible to remove the glide plate through either end of the machine or, alternatively, through the back of the feeder.

Experience

During the first few weeks of using the Posimetric Feeder, the plant processed materials that were wetter and stickier than usual. This was the first true-test of the Posimetric Feeder, and it passed with flying colours.

Additionally, the feeder has eliminated 90 - 95% of the air leaked from the triple gate and mill feed areas. The expectation was to reduce the airflow, and it has performed that task. As a result of the installation of the Posimetric, and other ongoing improvements, the company has realised approximately 6% increased production compared to the same period last year.

In the eight months that the feeder has been running, Buzzi has experienced a 50% decrease in its reported downtime from the same time last year. Maintenance costs have also decreased substantially. The overall repair and maintenance costs through the adoption of the Posimetric Feeder are now at least 50% less than with the triple gate feeder. These cost savings are related to non-wear components, primarily from the elimination of the hydraulic system. Over time, Buzzi expects to realise even more savings with the reduction of wear parts and labour that has historically been spent rebuilding the triple gates during the major outage.



Our feeder gives you the gift of time!



If you and your maintenance team enjoy spending time with your feeders and triple gates to correct plugging, hydraulic leaks and assorted other problems, then our Posimetric feeder may disappoint.

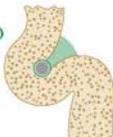
For example, one cement plant compared maintenance logs from their previous feeder against our Posimetric feeder. They found that ours saved them on the order of eight-to-one in maintenance labor hours.

And where our feeder replaced a triple gate feeder, their service & repair hours dropped from 740 hours annually to only fifty!

Our feeder has no messy - and costly - hydraulic system & piping, and it's not prone to plugging. What little maintenance is needed is now done during planned outages. So once you install a Posimetric Feeder, you can do something better with your time, like making more cement!

If you'd like to see first hand how our feeders are saving valuable time at a cement plant, call or e-mail me today to arrange a visit.

Bob Chase, Manager, Posimetric Feeders
Phone 610.544.7200
E-mail: bchase@penncrusher.com

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