



FEATURE ARTICLE



WHAT YOU NEED TO KNOW ABOUT FEEDERS FOR CEMENT PLANTS



by Lynn Sullivan,
Eastern Sales Manager
lynns@premach.com

Cement plants take a harsh toll on their equipment. There is abrasive material involved from the beginning to the end of the process: limestone, shale, iron ore, clay. The plant needs to handle everything from dust to large rock pieces at hundreds of tons per hour. Every material handling station is a potential bottleneck if it fails, and plant owners, plant managers and maintenance managers bet their business on every piece functioning as advertised.



Figure 1. Large manufactured and machined rotary feeder used to handle raw materials in cement plant operations. Shown here is Precision's PM-48 Rotary Feeder.

After the material is removed from the quarry and goes through the hammer mill, the first piece of equipment that takes the harshest beating during plant operation is the rotary feeder. *If your plant uses a "triple gate" method, please continue reading.*

Cement plants are engineered and constructed differently; however, their end product is basically the same. Rotary feeders (Figure 1) are typically used to meter raw materials at a controlled rate, going into the primary rock crusher and then from the crusher into the kiln for firing. Additional rotary valves control the flow of clinker material from the kiln, and others control dust from the bag house, as well as the flow of finely ground cement mix into the bagging and shipping operation.

Different vendors construct their rotary feeders differently to take the strain. Some rotary feeders are made from a steel casting that uses a replaceable barrel liner made of a harder material. The barrel liner is sacrificed as the rotary feeder wears out and is then replaced. Other rotary feeders are fabricated and machined from a hard steel material that is specially treated in order to withstand heavy abrasive wear. Still other rotary feeders are constructed from bolt-together components that can be serviced quickly to minimize plant downtime and plant inventory when service is required.

Special materials are used in manufacturing some rotary feeders and valves to lengthen the useful life of the units. These include Tri-Braze® 500 Brinell; a steel alloy with high levels of nickel, chromium, and molybdenum and a hardness of approximately 49 on the Rockwell scale.

This same material may be used in other areas of the cement plant, for example: in-feed shoots, formed liners, screw conveyors, and screw troughs. Because Tri-Braze is an alloy rather than a plating applied over a casting (which is used on most all cast rotary valves and cast rotary feeders), the steel is hardened throughout its thickness, resulting in very consistent wear throughout the life of the rotary valve or rotary feeder. In the case of a cast rotary valve or feeder, once the plating begins to wear through to the casting, the wear accelerates at a very fast rate and failure happens quickly.

Besides the material that is used in construction, the tolerances to which rotary feeders or valves are manufactured are a critical factor in increasing the units' operational life. As a rotary feeder or rotary valve begins to wear, the clearance between the rotor vanes and the barrel or housing wall begins to increase and the rate of wear accelerates. Therefore, rotary feeders and rotary valves that are manufactured with tighter tolerances between rotor vanes and barrels or housings historically last the longest.

Manufacturing a close tolerance between the rotor and barrel or housing is not easy to accomplish for any cast valve manufacturer. If the rotor and barrel or housing walls are made from different materials, they will expand and contract at different rates and by different amounts as the operating temperature of the material changes. Therefore, rotary feeders and rotary valves that use the same materials throughout have an advantage in being able to maintain the proper operating tolerances.

These factors combine to cause a very wide range of mean failure times that exist in the rotary feeder and the rotary valve industry. Some rotary feeders and rotary valves that are optimized for low initial purchase cost typically last one or two years, while others that are designed to leverage the advantages of advanced metallurgy and tighter tolerances can last from three to four years or more. Each application is different in terms of volume, bulk density and operating temperature being handled, but the buyer should consider the above factors before making a purchase decision.

Another important factor in rotary feeder and rotary valve selection is the manufacturers' lead times. If replacement parts are required, do they need to come from halfway around the world or are they available more locally? Are critical components available from the manufacturers stock or do they need to be specially fabricated? Given a plant's dependence on keeping the material flowing, lengthy periods of downtime need to be avoided or at least planned in advance.



Figure 2. Precision Machine & Manufacturing's PMV rotary valves are modular. Components can be replaced quickly and easily when necessary. All components are in stock.

One supplier of rotary feeders, rotary valves and screw conveyors to the cement manufacturing industry is Precision Machine & Manufacturing, Inc. of Eugene, Oregon.

For handling the raw material, Precision fabricates and machines their rotary feeders using Tri-Braze material with a material thickness up to 1.5" on the barrel or housing and up to 1" thickness for the rotor to handle raw material up to 12 inches in size, or larger in the case of specially-ordered units. For handling clinker, which typically is produced in lumps or nodules smaller than an inch in diameter, or for handling cement powder, Precision's modular PMV® valves are often used.

The PMV rotary valves are unlike rotary valves that are machined from castings. Instead, they are produced from components that are fabricated and machined to bolt together (see Figure 2). Because they are modular, they are quick and easy to disassemble when maintenance is needed. If a particular PMV rotary valve part begins to wear, only that part needs to be replaced. The barrel sides are reversible top-to-bottom and side-to-side so that those components can continue to be used longer than any cast rotary valve. The wear plates protect the end bells from wear. The PMV valves and components for the cement industry are all made from the same Tri-Braze material as Precision's larger valves and feeders. This enables operating tolerances of the PMV rotary valves to be maintained much longer than with rotary valves made with different materials, resulting in longer overall operational life.

One of Precision's cement manufacturing customers upgraded from a cast rotary valve from another manufacturer to use a PMV-8 (8") rotary valve for a clinker handling application. As of this date, that PMV rotary valve has been running for over three years, whereas their previous cast rotary valve needed to be replaced every year. This is a case in point that suggests that operating lifetime and the cost of maintenance and downtime are factors that need to be considered when choosing the correct rotary valve for a cement plants manufacturing requirements.

Another cement manufacturing customer of Precision's upgraded two of its rotary feeders from fabricated units manufactured by a foreign supplier, to raw mill feeders from Precision Machine & Manufacturing that were each specially-designed to handle 350 tons per hour (TPH) with a bulk density of 100 pounds of raw mill cement. These Precision rotary feeders have been running over three years without any interruption in production. The foreign feeder continually needed service.

Each rotary feeder or rotary valve application is different, but the selection of quality feeders and valves is just as important as the choice of the "primary crusher" for the health of a cement plants operation. Longer operating life and less down time is what Precision Machine & Manufacturing offers each and every customer they serve.

**For more information,
call toll free 1-800-722-9841
or email sales@premach.com.**



PRECISION
PRECISION MACHINE & MANUFACTURING, INC.

1290 S. Bertelsen Road
Eugene, Oregon 97402-5700
541-484-9841 main
541-484-4094 fax

www.premach.com