



FEEDING THE PLANT

**LYNN SULLIVAN, PRECISION
MACHINE & MANUFACTURING CO.,
USA, ILLUSTRATES THE
IMPORTANCE OF CHOOSING HIGH
QUALITY ROTARY FEEDERS FOR
CEMENT PLANTS.**

Cement plant processes take their toll on 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 tph. Every material handling station is a potential choke point if it fails, and plant owners, managers and maintenance managers rely upon every piece functioning as advertised.

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 plant's operation.

Deterioration of rotary feeders and rotary valves

After the raw 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. Cement plants are engineered and constructed differently; however, their end product is basically the same. Rotary feeders, as seen in Figure 1, are typically used to meter raw



Figure 1. Precision's PM-48 rotary feeder. A large manufactured and machined rotary feeder used to handle raw materials in cement plant operations.

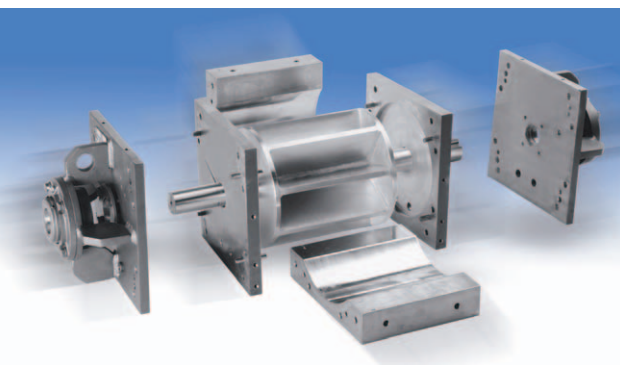


Figure 2. The PMV rotary valves are modular. All components are in stock, and so can be replaced quickly and easily when necessary.

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, dust from the baghouse, as well as the flow of finely ground cement mix into the bagging and shipping operation.

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 from a hard steel material that is specially treated in order to withstand heavy abrasive wear. Still other rotary feeders are constructed from components bolted together that can be serviced quickly to minimise plant downtime and inventory when service is required.

Lengthening life

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 can be used in other areas of the cement plant, for example infeed chutes, formed liners, screw conveyors and screw troughs. As Tri-Braze is an alloy rather than a plating applied over a casting (as is used on almost all cast rotary valves and cast rotary feeders), the steel is hardened throughout its thickness, resulting in 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, the deterioration accelerates at a very fast rate and failure happens quickly.

A critical factor in increasing the units' operational life is the tolerances to which rotary feeders or valves are manufactured. 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 deterioration accelerates. Therefore, rotary feeders and rotary valves that are manufactured with tighter tolerances between rotor vanes and barrels or housings usually last the longest.

It is not easy for any cast valve manufacturer to create this close tolerance between the rotor and barrel or housing. 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 wide range of mean failure times that exist in the rotary feeder and rotary valve industry. Some rotary feeders and rotary valves that are optimised 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,

and the buyer should consider the above factors before making a purchase decision.

Importance of the manufacturer

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.

One supplier of rotary feeders, rotary valves and screw conveyors to the cement manufacturing industry is Precision Machine & Manufacturing, Inc. Precision fabricates and machines its rotary feeders using Tri-Braze material with a thickness of up to 1.5 in. on the barrel or housing and up to 1 in. thickness for the rotor. This enables the rotary feeders to handle raw material up to 12 in. in size, or larger in the case of specially ordered units. For handling clinker, which typically is produced in lumps or nodules smaller than 1 in. dia., or for handling cement powder, the company's modular PMV® valves are often used.

PMV rotary valves

The PMV rotary valves are not machined from castings; instead they are produced from components fabricated to bolt together (Figure 2). Since 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 will need replacing. 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 the PMV rotary valves to maintain operating tolerances much longer than rotary valves made with different materials, resulting in longer operational life.

Success stories

One of Precision's cement manufacturing customers upgraded from a cast rotary valve to a PMV-8 (8 in.) 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 shows that operating lifetime, the cost of maintenance and downtime are all factors that need to be considered when choosing the correct rotary valve for a cement plant.

Another cement manufacturing customer upgraded two of its rotary feeders to raw mill feeders from Precision Machine & Manufacturing that were each specially designed to handle 350 tph with a bulk density of 100 lb of raw mill cement. These rotary feeders have been running for over three years without any interruption in production.

Conclusion

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 plant's operation. 🌍