

# PMCA Rotary Feeder

## Service & Maintenance Manual



Feeder Size: \_\_\_\_\_

S/N: \_\_\_\_\_



Congratulations!

You have purchased the most rugged and durable rotary feeder offered to the cement industry and you should experience long, reliable service from the Precision PMCA Rotary Feeder.

Please carefully review all of the material in this Service & Maintenance Manual. It contains important information about the installation of the PMCA Rotary Feeder, the start-up and run-in of the feeder, and descriptions of simple maintenance procedures.

By fully understanding how your feeder is constructed, assembled, and operated, you will be able to properly install and maintain it for long and trouble-free service.

We stand ready to answer any questions and assist you as necessary to help you get the optimum performance from your PMCA Rotary Feeder. Please contact our office in Eugene, Oregon USA at (541) 484-9841.

If there is anything further that we can do to assist you, please contact us. Your feedback is important to us.

Thanks for your business!

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## **Safety**

Safety is a primary concern at Precision Machine and Manufacturing, Inc. and we encourage our customers to make it their top priority also.

State and local rules vary from location to location, and it is the user's responsibility to follow those standards. These procedures are a must for the safe operation and maintenance of the Precision PMCA Rotary Feeder:

- Personal Protection Equipment must be worn while working on the feeder.
- All guards and safety devices must be in place while the feeder is in operation.
- If maintenance is performed with the feeder in place, all appropriate lockout and tag-out devices must be in place to prevent power to the feeder.
- Normal operation of the feeder may create burrs and sharp edges. Caution must be taken when handling the feeder and its components.
- The feeder and many of the components are very heavy. Sufficient manpower and/or hoists must be used when they are moved.

The safety decals, shields, and other protective features designed into the PMCA Rotary Feeder and furnished with it or recommended for it are there for your protection.

The operation and maintenance of the PMCA should be restricted to only those personnel trained in its use.

The various precautions and recommendations detailed in this Service & Maintenance Manual are not necessarily all inclusive. This Manual is designed to provide general safety and operational guidance relating to typical installations with which we are familiar.

If you have any safety or operational questions pertaining to the design, operation, or application of your PMCA Rotary Feeder, we encourage you to contact Precision for assistance.

## **Warnings**

1. Lockouts required for this equipment should be installed prior to initial start-up and operation.

→ *These lockouts are not the responsibility of Precision Machine & Manufacturing, Inc.*

2. Rotary feeders can cause severe physical injury if proper safety procedures are not observed during the course of operation, maintenance, inspection, or clearing of an equipment jam.

→ *The drive motor must be locked out before inspection or service of this equipment.*

3. Welding or burning on any part of the rotary feeder is not recommended. Any distortion of the feeder caused by welding or burning could cause the rotor to seize in the housing.
4. Power and control wiring should be installed by a licensed and experienced electrician to assure safe and productive operation of the PMCA Rotary Feeder.

## **Introduction**

The PMCA family of rotary feeders was designed specifically to meet the needs of cement manufacturing operations where it is critically important to have a durable, highly reliable feeder to handle material flow into a raw mill or a finish mill.

The PMCA will provide long, trouble-free service with minimal daily or weekly maintenance required. Close tolerances between the rotor and the feeder housing minimize the possibility of introducing false air into the mill.

There are four standard sizes in the PMCA product line:

Model	Capacity – CFR (cubic feet per revolution)
PMCA-35	15.0 CFR
PMCA-48	39.7 CFR
PMCA-60	80.0 CFR
PMCA-72	144.3 CFR

The PMCA feeders are bi-directional and the rotors can be operated in either a CW or a CCW direction without impacting throughput or performance.

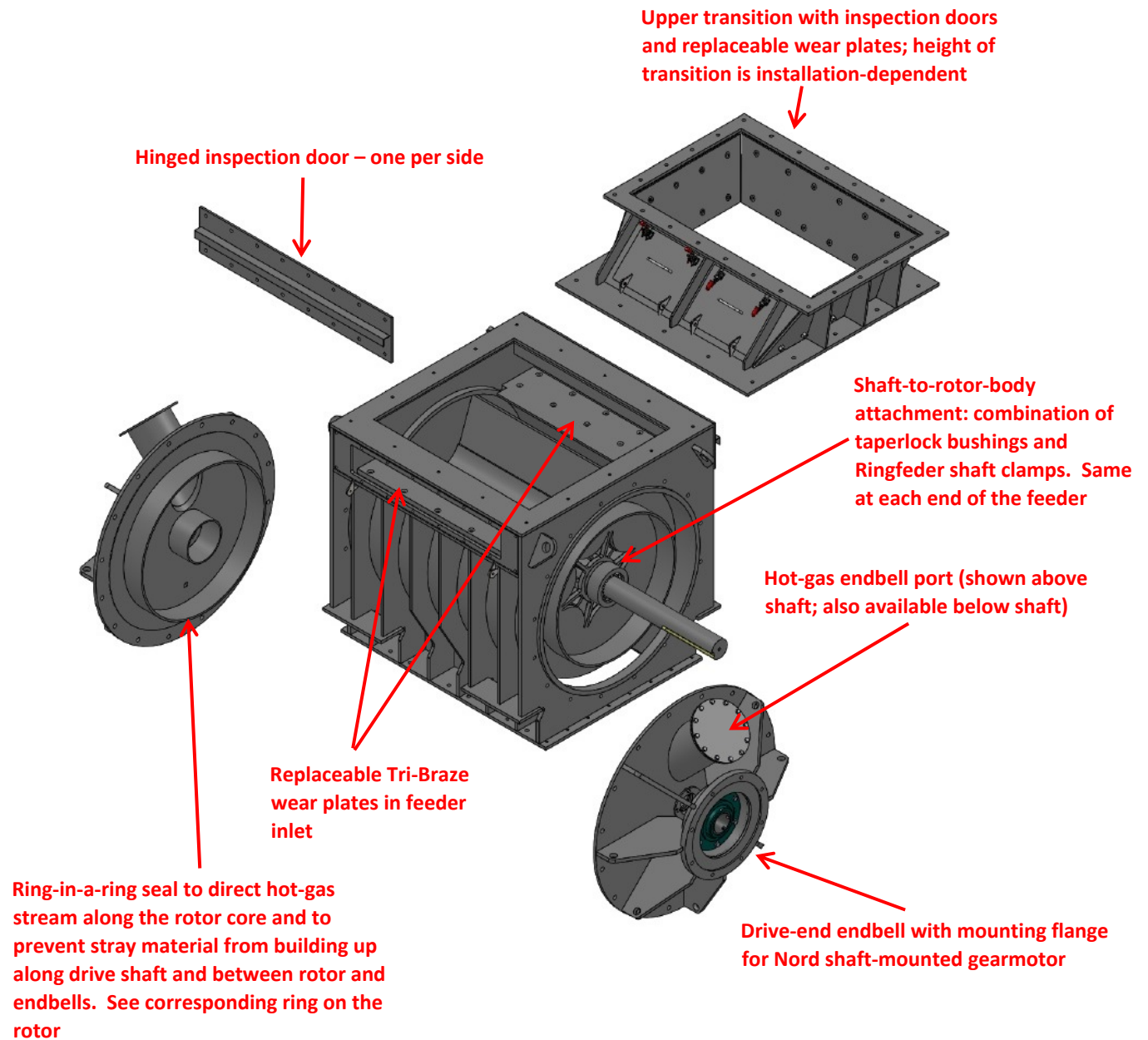
The rotor body and barrel in a PMCA feeder are manufactured of Tri-Braze DuraPlus abrasion resistant steel for long life even when handling limestone, gypsum, silica, and clinker. Tri-Braze is a 500-Brinnell alloy steel with wear-resistant chemistry and consistent through-hardness. The Tri-Braze DuraPlus barrel is overlaid with an industrial hard-chrome to a thickness of 0.005” to 0.006” for added durability.

In many raw material and clinker applications, the flow of material into the feeder can be highly variable depending on plant operating needs, infeed systems to the feeders, and other factors. This makes throughput calculations challenging. Precision normally uses an assumption of 35% pocket fill when calculating feeder capacity.

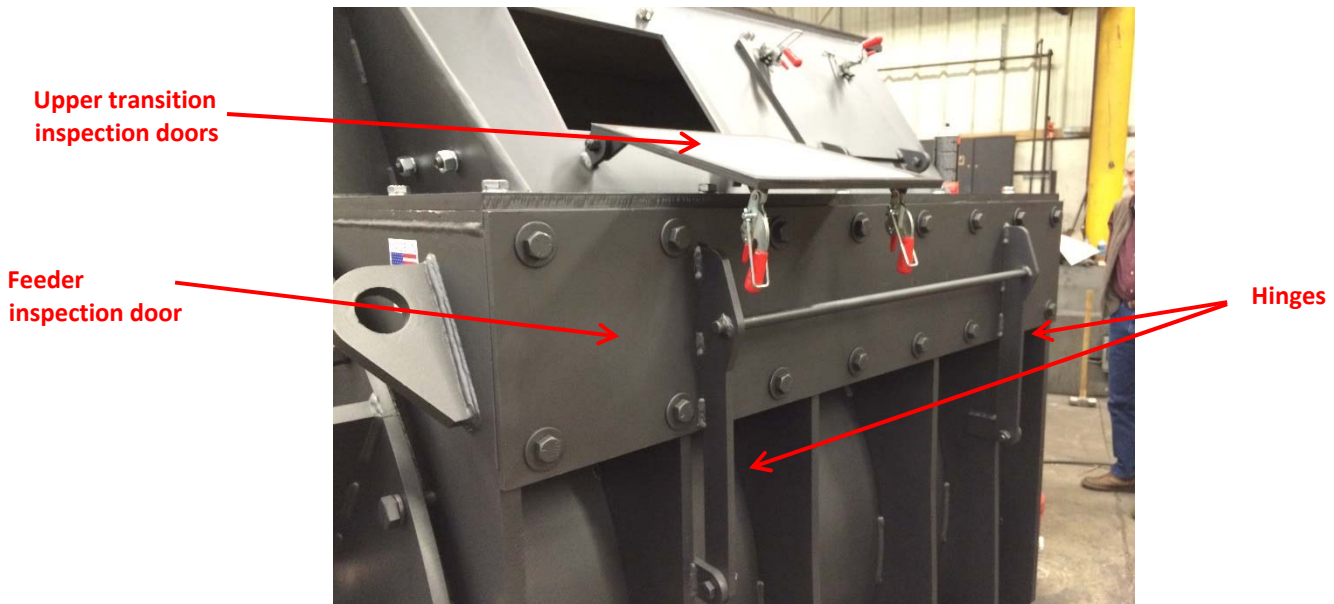
Precision also recommends that the feeders be operated slowly with speeds typically in the 6-10 rpm range. This slow speed prolongs the life of the feeder and provides for good pocket fill which improves mill efficiency.

The rotor-to-barrel clearance in PMCA feeders with a Tri-Braze DuraPlus barrel are tighter than most competitive feeders with typical rotor-to-barrel clearances of .030” to .055” per side, depending on feeder size and material temperature.

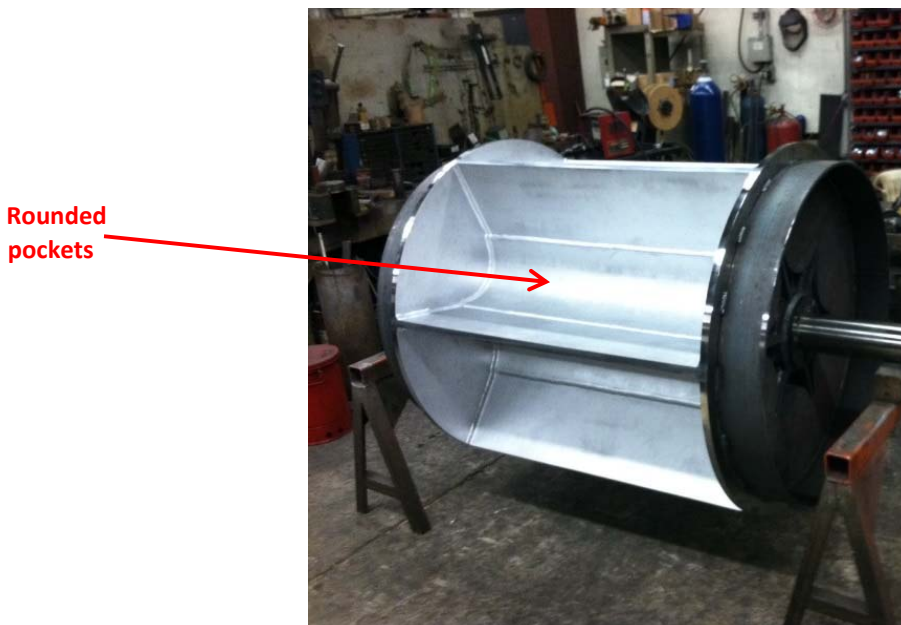
## PMCA Rotary Feeder Diagram



All PMCA feeders have two inspection doors in the inlet of the feeder. These doors are hinged and provide access to the top of the rotor in the unlikely event of a jammed condition where the rotor will not turn. The doors also provide access for removing and replacing the Tri-Braze wear plates in the feeder inlet and in the upper transition (if equipped.)



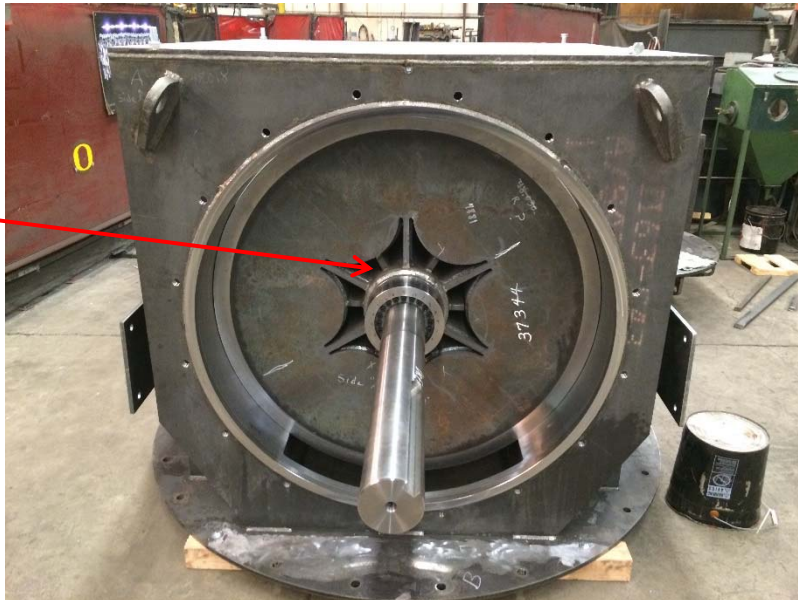
The rotor pockets on all PMCA feeders are a rounded design in order to minimize material build-up in the pockets in the case of high-moisture raw materials or outside storage of raw materials.





The standard configuration of the PMCA feeders includes hot-gas vent ports in both end bells for directing a plant-supplied hot-gas stream through the rotor core to assist in preventing the build-up of sticky material in the rotor pockets. Clinker applications do not normally require hot-gas assist.

Open  
rotor core



Feeders configured for hot-gas include a “ring-within-a-ring” seal arrangement between the rotor ends and the inside of the end bells. This seal is designed to route the flow of incoming hot-gas through the rotor core and out the discharge in the opposite end bell.

Ring-in-a-  
ring seal



## **Installation**

Wherever plant conditions allow it, Precision strongly recommends that the PMCA feeder be installed such that the vertical drop of raw materials or clinker into the feeder be kept to the minimum possible height. A vertical drop (measured from the free fall point to the PMCA rotor) of less than 5' is recommended.

If a larger vertical drop is required due to the plant configuration, it is recommended that baffles, chains, or other means of interrupting or slowing the fall of material be incorporated into the system above the feeder. Please contact Precision for recommendations.

In addition to minimizing the vertical drop, Precision recommends that the infeed system be arranged in such a way as to "aim" the flow of material into the feeder so that the material impacts the replaceable wear plate in the upper transition first rather than falling directly onto the rotor vanes.

Minimizing the vertical drop and aiming the material inflow will add to the life of the feeder – resulting in maximum uptime and productivity and possibly reducing the cost of a feeder rebuild.

Power and control wiring of the PMCA feeder and Nord drive should be completed by a qualified electrician.

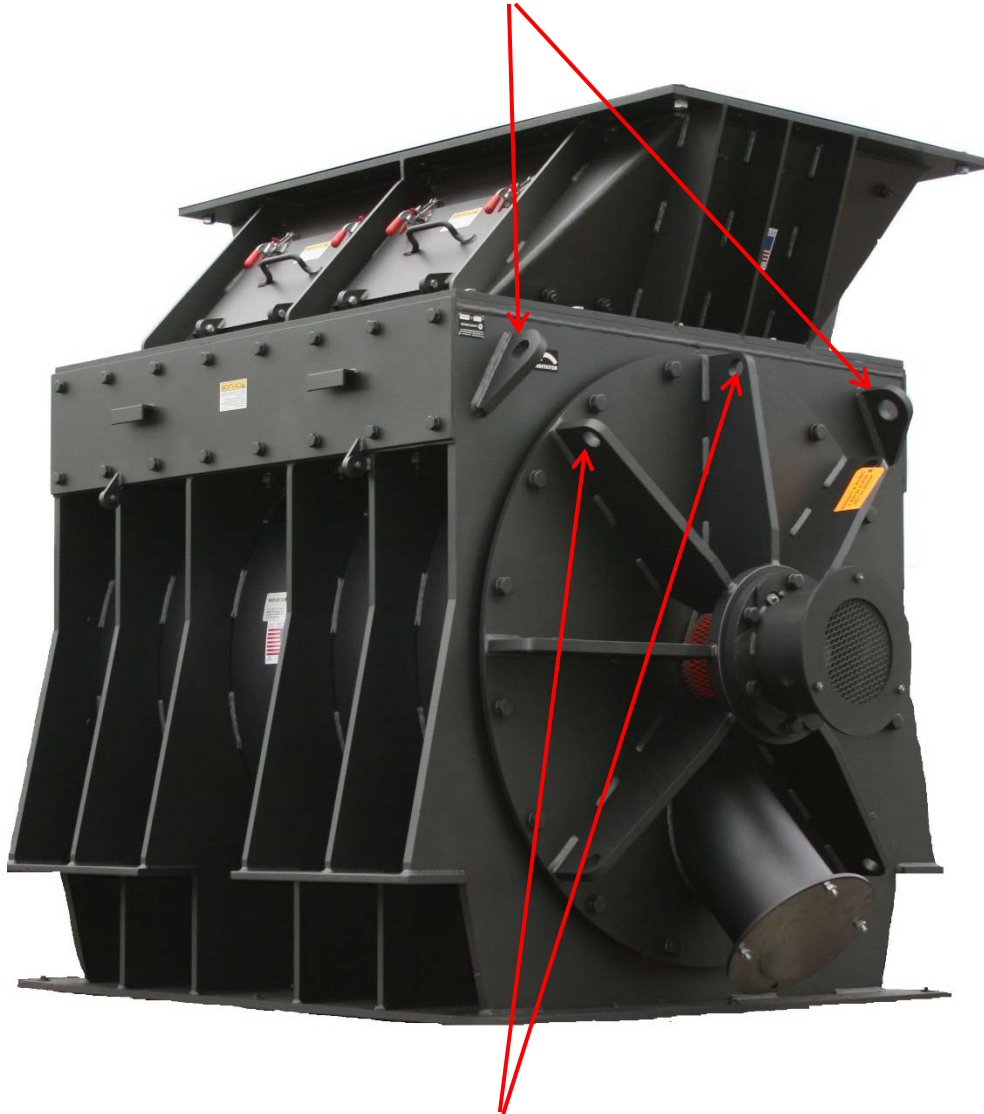
As mentioned in the Warnings section on page 5 of this Manual, cutting or welding on the feeder should be avoided as deformation of any of the components of feeder may cause it to become inoperable.

PMCA feeders are very heavy and care should be taken in lifting the feeder. Qualified riggers and crane services are required to install or remove the feeder.

Each PMCA feeder is manufactured with lifting eyes welded to the feeder body at the four top corners of the feeder. It is **very important that only these lifting eyes are used** when lifting the feeder. Attempting to lift the feeder by any other point, particularly by the Nord drive, by the drive shaft, or by the lifting eyes in the endbells, may result in damage to the component parts and/or misalignments that may make the feeder inoperable.

See page 11 for more information on lifting points.

**Feeder lifting eyes**



**Endbell lifting eyes -  
DO NOT ATTEMPT TO LIFT FEEDER WITH THESE**

## **Inspection and Preventive Maintenance**

The PMCA feeders require very little in the way of maintenance but there are some important steps that should be taken to assure continuous service.

***NOTE: BEFORE ANY INSPECTION OR MAINTENANCE, YOU MUST FOLLOW STANDARD 'LOCK-OUT/TAG-OUT' PROCEDURES FOR ALL POWER SOURCES AS DEFINED BY OSHA. SEE WARNINGS***

### **Shaft Packing Run-In:**

After approximately 8 hours of initial operation, the shaft packing seals should be adjusted.

The PMCA rotary feeders incorporate a shaft seal/packing gland that is filled with square graphite impregnated mechanical packing, and is located between the bearing and the back of the end bell. These seals should be checked on a regular basis and if air or dust is found to be leaking, then the packing gland should be tightened.

Adjust the shaft packing seals by tightening the four (4) packing gland bolts evenly until resistance is detected. At the end of its life, the packing gland will bottom out and the packing material must be replaced. The procedure for replacing the packing material is described on page 13.

### **Daily Inspection:**

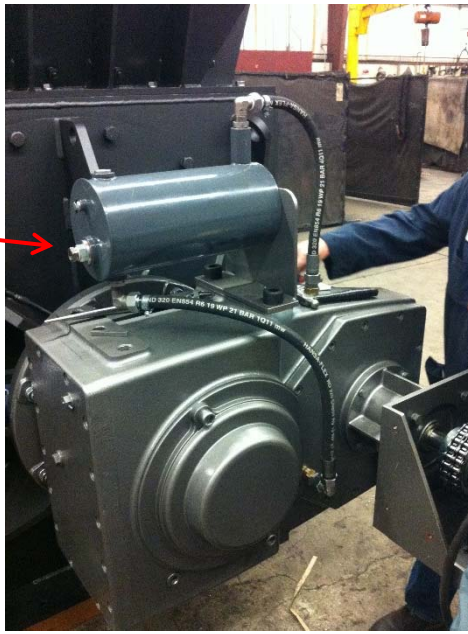
- Listen carefully to the feeder in operation; if the sound of metal-on-metal scraping or knocking is heard, discontinue operation, lock-out the drive, and visually inspect all components for wear or mis-alignment.
- Visually inspect bearings for evidence of adequate grease supply.

### **Bi-Monthly Service:**

- Adjust the shaft packing seals: Adjust the shaft packing seals by tightening the four (4) packing gland bolts evenly until resistance is detected. At the end of its life, the packing gland will bottom out and the packing material must be replaced. The procedure for replacing the packing material is described on page 13.

- Lubricate rotor bearings: Precision recommends the use of a good-quality, all-purpose grease that is appropriate for the temperature conditions where the feeder is installed. Too much grease will damage bearing seals, and should be avoided.
- Lubricate grease fittings on electric motor: At each end of the electric motor there are grease fittings to lubricate the shaft in the electric motor; these should be greased per the instruction in the Nord manual supplied with the PMCA feeder.
- Check Nord oil reservoir: There is a sight-glass at one end of the oil reservoir mounted above the Nord gearbox.

Sight glass



### **Semi-Annual or Annual Inspection:**

If plant operating conditions permit it, Precision recommends a comprehensive inspection of the PMCA feeder's condition every six months. At a minimum, the inspection should be completed annually. If adequate advance notice can be provided, Precision will make every effort to have a company representative on-site to observe and assist with this inspection.

The inspection should include the following:

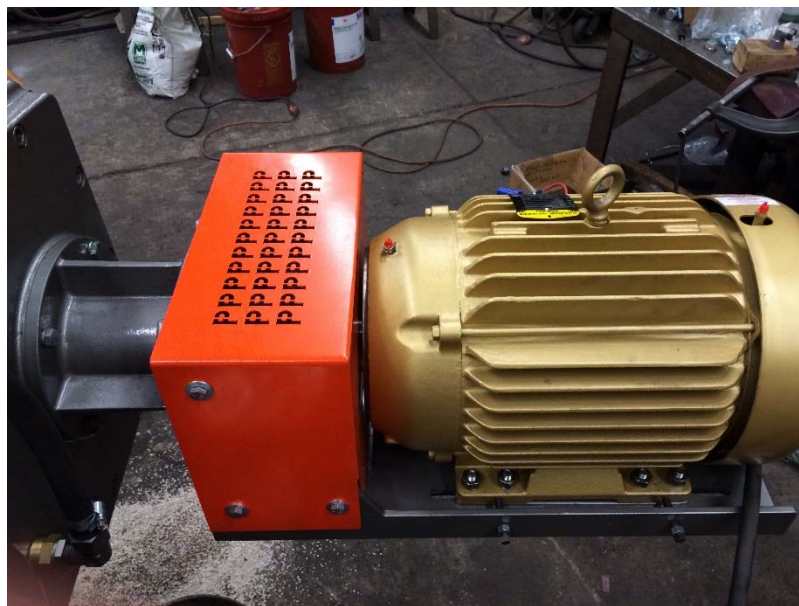
1. Checking the Tri-Braze wear plates in the upper transition and in the feeder inlet for signs of wear and for any loose or missing bolts.



2. Checking alignment of the rotor body to assure that it has not shifted in the feeder housing.
3. Measuring the rotor-to-barrel clearance on both sides of the feeder using feeler gauges. It is helpful to document the results of this measurement at each inspection as it can help predict when a rebuild of the feeder may be required.
4. Checking each rotor vane for any indication of cracks or any “hammering” of the OD that might increase the rotor-to-barrel clearance.
5. Checking all the bolts in the endbells, bearings, and top and bottom flanges to make sure that none are missing or loose.
6. Inspecting the Nord drive:

The connections of the Nord gearbox, the Tsubaki clutch, and the electric motor are aligned in Precision’s factory using dial indicators and there should be no need for field adjustment unless bouncing or other movement of the electric motor is observed. Contact Precision if this condition develops.

The Tsubaki clutch that connects the Nord gearbox to the electric motor is underneath the bright orange guard shown below.



The clutch may require occasional inspection and adjustment depending on plant operating conditions. There are detailed instructions in the Tsubaki information supplied with the feeder.



## Packing Replacement

When the packing no longer responds to adjustment (as described in the sections above) to seal the end bell at the shaft, the following steps should be followed to replace the packing:

1. Remove the expanded metal MHSA guard from around the shaft. The expanded metal guard is normally held in place with either a zip-tie or hose clamp. Once the zip-tie or hose clamp has been removed, the expanded metal guard can be pulled off.



2. Remove the four (4) bolts from the packing gland, and slide the packing gland back and up against the bearing.
3. Clean out the packing gland area of the end bell; remove any of the remaining graphite-impregnated packing material
4. Install two wraps of new graphite-impregnated packing into the end bell (one on top of the other).
5. Reposition gland in the end bell, and sequentially tighten bolts until snug. **Do not over tighten.**

## Feeder Rebuilding

Precision feeders are designed to make rebuilding a possibility and as cost-effective as possible.

Every plant's operating conditions are different and, therefore, it is impossible to make a definitive statement on when a feeder will require rebuilding. For PMCA feeders operating in raw material or clinker applications feeding a mill, a key consideration will be an increase in the volume of false air introduced to the mill and the separator.

Generally, the increase in rotor-to-barrel clearance as wear develops is a good approximation for the volume of false air in the system. When the rotor-to-barrel clearance has doubled from the original factory clearance, it is safe to assume that false air has also doubled. Each plant must do its own calculation to balance the trade-offs between false air and diminished mill performance with the cost of a feeder rebuild.

Please contact Precision for information on feeder rebuilds.



## Standard Warranty

Precision Machine and Manufacturing, Inc. warrants products of its manufacture to be free from defects in material and workmanship if properly installed, maintained, and operated under normal conditions with competent supervision.

No person, agent, representative or dealer is authorized to give any warranties on behalf of Precision Machine and Manufacturing, Inc. nor to assume for Precision Machine and Manufacturing, Inc. any other liability in connection with any of Precision Machine and Manufacturing, Inc. products.

This warranty shall extend for one (1) year from date of installation provided this equipment has been put into service within ninety (90) days after shipment from Precision Machine and Manufacturing, Inc. factory. If repairs or replacements are made by the Purchaser without Precision Machine and Manufacturing, Inc. prior written consent, Precision Machine and Manufacturing, Inc. warranty shall cease to be in effect. No allowance will be granted for any repairs or alterations made by the Purchaser without Precision Machine and Manufacturing, Inc. prior written consent.

Machinery, equipment and accessories furnished by Precision Machine and Manufacturing, Inc. but manufactured by others, are warranted only to the extent of the original manufacturer's warranty to Precision Machine and Manufacturing, Inc.

Precision Machine and Manufacturing, Inc. agrees at its option to repair at the point of shipment or to replace without charge f.o.b. point of shipment, any part or parts of products of Precision Machine and Manufacturing, Inc. manufacture, which within the specified warranty period shall be proved to Precision Machine and Manufacturing, Inc. satisfaction to have been defective when shipped, provided the Purchaser promptly notified Precision Machine and Manufacturing, Inc., in writing, of such alleged defect.

Precision Machine and Manufacturing, Inc. liability to Purchaser, whether in contract or in tort arising out of warranties, representations, instructions, or defects from any cause shall be limited to repairing or replacing of the defective part or parts as aforesaid, f.o.b. point of shipment.

No liability whatsoever shall attach to Precision Machine and Manufacturing, Inc. until said products have been paid for.

EXCEPT AS STATED IN THIS SECTION AND IN THE PRECEDING SECTION TITLED "WARRANTY" AND EXCEPT AS TO TITLE, THERE ARE NO GUARANTEES OR WARRANTIES OF MERCHANTABILITY, FITNESS, PERFORMANCE OR OTHERWISE, EXPRESS, IMPLIED OR STATUTORY, AND PRECISION MACHINE AND MANUFACTURING, INC. SHALL HAVE NO LIABILITY FOR CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES, HOWSOEVER CAUSED.

DATE INSTALLED \_\_\_\_\_  
MODEL \_\_\_\_\_

SERIAL # \_\_\_\_\_