STANDARD OPERATING PROCEDURE

Roller Mill, Flaking

Model: Series 16, Model K
Manufacturer: Roskamp Manufacturing Inc.
Location: Dry Processing Pilot Plant, 1851 Food Sciences Building
Publication Date: 03/04/2014
Description and Uses

Roskamp Flaking Mills are commonly used in oilseed applications to prepare materials for mechanical or solvent extraction. Flaking increases the surface area of the material, crushes cells and cell walls, and reduces the distance that the oil or solvent must travel, thus allowing for more efficient oil extraction. For certain high-oil materials, flaking also ruptures some of the oil “cells,” releasing the oil for easier extraction. Materials commonly flaked for oil extraction include soybeans, canola, rapeseed, sunflower seed, safflower seed, cottonseed, corn germ, palm kernel, and copra (coconut).

Power Specifications

Motor: Reliance Duty Master A/C Motor
Horsepower: 10 HP
Voltage/Amperage: 460/230V; 27/13.5A
Speed: Maximum speed is 280 rpm @ 60 Hz.

Potential Hazards and Safety Precautions

**Electric Shock/High Voltage (460V)**

- Make certain to use the correct outlet that is specifically designed to fit the electrical cord plug.
- Make sure the area around the outlet, floor and your hands are completely dry when plugging or unplugging the electrical cord to/from the outlet.
- Make certain that the power source is OFF, unplugged and locked out before attempting to perform maintenance work on the machine.

**Belt-driven Pinch Points/Possible Entanglement of Extremities, Hair, Jewelry or Clothing**

- Make certain all machine safeguards are properly in place before operating the flaking mill.
- Make sure to secure long hair and any loose clothing or jewelry before operating the mill.
- **Never place fingers or hands into the mill without the equipment being shut off and locked out. Contact with rotating rolls will cause severe injury or death.**
- Nothing, except the grain for which the mill is intended to flake, should ever be placed between the rollers or into the mill while it is running.

**Flying Debris/Potential Eye Damage**

- Wear safety goggles while the flaking mill is in operation.

**Elevated Work Station/Possible Fall Risk**

- Be sure that the portable stairway is properly positioned and locked down before feeding material into the hopper.
Required Personal Protective Equipment

- Lab Coat
- Hair Net
- Safety Goggles
- Tie Back Long Hair
- Ear Protection
- No Open-toed or Open-heeled Shoes
- Dust Mask
- No Loose Fitting Clothing

Training

**Required Training**

*Denotes courses offered online*

- Machine & Site-Specific Training
- Fire Safety & Extinguisher Training*
- Lab Safety: Core Concepts*

**Recommended Training for Frequent Users**

*Denotes courses offered online*

- Electrical Safety & Lockout/Tagout
- Safeguarding Mechanical Hazards
- Shop Safety Fundamentals: Basic Procedures & Policies*
Operation

1. Be sure to acquire all required training before operating the roller mill. Operation requires site-specific training on this machine.

2. Be sure to wear all required personal protective equipment (listed in Figure 1) before operating the roller mill.

3. Be sure to familiarize yourself with the operation of this machine prior to using it. Refer to the diagram in Figure 1, the attached page titled “Operating Instructions,” and all the literature available on this machine (located in the pilot plant office, 1951 Food Sciences Building).

4. This machine operates on a 460-V power source. Make certain to use the correct outlet that is specifically designed to fit the electrical cord plug for this machine. Make sure the area around the outlet, floor and your hands are completely dry when plugging the electrical cord to the outlet. Failure to do so can result in severe electrical shock and/or death.

Figure 1
5. Move portable stairway into place for proper and safe feeding. Be sure to lock down the stairway before mounting.

6. Once the power supply is plugged in, ask the pilot plant manager to remove the lock out from the power supply switch. Prior approval from the pilot plant manager must be pre-arranged to use this machine.

7. Move the power supply switch to the ON position (see Figure 2).

8. To start the roller mill, pull out the red start/stop switch (see Figure 2). Refer to the “Operating Instructions” on page 6 for continued operation. When finished, or in case of emergency while operating, push in the red start/stop switch.
OPERATING INSTRUCTIONS FOR SERIES 16 ROLLER MILLS

I INSTALLATION

Set the machine level and bolt to the floor. Be sure that all four corners are equally supported. Steel ships should be used to compensate for uneveness of the floor. On concrete floors it is recommended that 3 x 4" pipe be installed between floor and frame in order to dampen vibration. Leather bolting or hard rubber can also be added.

Allow enough room around the machine so that the rolls can be moved when it becomes necessary to have them recrurated. Rolls are removed out each side of the machine, the stationary roll out the front of the machine and the adjustable roll out the back of the machine. All operational handles are at the front of the machine and this side should be facing the working area of the mill room.

II OPERATION

[If your machine is equipped with steam chamber, consult separate manual for operation.]

START UP: Make sure feed control gate #3039 is closed and feed belt tightener handle #2012 is pushed forward so that feeder is not rotating when letting grain into hopper. Raise roll adjustment handle #2012 to a vertical position before starting motor on the mill. Start machine and bring roll adjustment handle #2012 down to near operating position. Start roll feeder #2003 and agitator #2308 by pulling out on feed belt tightener handle #3039, locking in position. Open feed control gate #2032 by rotating hand wheel #2039 counterclockwise to near capacity setting. Increase or decrease roll pressure as desired by moving roll adjustment handle #2012. Lock handle in operating position by T handle #2302. Open feed control gate #5032 to regulation of the capacity of the motor, or of the steam chamber, or of the capability of the rolls to receive the grain. Do not allow build up of grain in the nip of the rolls. Gate lock in position with wing nut located directly behind hand wheel #2029.

WHEN ROLLING: If roll stop #3070 prevents close enough setting of rolls for proper flake, make proper adjustment on threaded rod to allow adjustable roll to move closer to stationary roll. Operator should periodically inspect material flow into the nip of the rolls as it comes off the feeder roll #2033 by opening inspection door #2031. If straw cause flow stoppage, stop at any point in the length of the roller, pull back on spring loaded handle on left side of machine to allow a temporary excess flow of material to come off the roller. If this does not clear the obstruction, it may be necessary to wipe the leading edge of the feed control gate #2032 with a length of No. 9 wire. This can be done through the inspection door. If grain sticks to rolls, this condition may be caused by too wet a grain. Ordinarily a closer adjustment of the roll scrapers #2047 will correct this problem. To adjust scrapers against the rolls, rotate scraper adjustment handle #2049 counter clockwise (note that these are located on the right hand side of the roll at the bottom of the frame, front and back, one for each roll). If pack too tight, remove the rolls for removal by the scrapers, check your steaming operation to cut down on moisture.

SHUT DOWN: As soon as hopper runs empty, immediately raise roll adjustment handle to vertical position. If shut-down is desired while grain is still in hopper, close shut-off gate #2033 and depress handle #2039. Allow all grain to clear rolls before shutting off motor.

RECORRUGATION:

When rolls no longer receive grain into the nip, or it may take an hour or two for them to warm up enough to receive grain at full capacity, they probably need recorrugating. If by reason of distance it is inadvisable to ship them to us for work, there are several competent machine shops throughout the country which can do this job. Ask us for one closest to you.

ROLL REMOVAL:

1. Remove all guards and belts.
2. Adjust scrapers away from rolls.
3. Remove roll adjustment lock plate #2025.
4. Remove front and back panels #2042 and #2043.
5. Remove slot closure plates behind each pressure bar.
6. Measure length of compression spring #2009 and remove it from threaded adjustment rod #2008.
7. Remove the 8 cap screws holding part #2033 to stationary pressure bars #2031. This allows removal of the eccentric shaft #2032 with eccentric housing #2024 and threaded adjustment rod #2008 in one assembly horizontally out of the machine.
8. Remove cap screws holding stationary bar #3031 to frame.
9. Remove 4 cap screws holding bearing #2017 holding bearing to pressure bars #2019, #2020, #2021 and #2022.
10. Remove cap screws holding stationary bar #2022 and #2023 to frame.
11. Drop 4 pressure bars to horizontal position.

12. Roll the rollers in the frame slots to the outside of the machine and remove with hoist.

Before reassembling the newly recorrugated rolls in your machine it is advised to clean thoroughly the interior parts of the frame with a scraper and wire brush. Another coat of paint at this time will help to reduce corrosion due to the steaming atmosphere. For reassembling use the reverse procedure. After the rolls are adjusted to perfect alignment, return the compression springs to their proper length. Readjust the aluminum deflector block down to the nip of the rolls to make sure no whole grain passes over the ends of the rolls.

ROLL ALIGNMENT:

After the rolls have been recorrugated and reinstalled in the machine be sure to examine the distance between them at each end. Two thin pieces of cardboard may be used to check the end to end adjustment. Compare the depth of crease in each piece after passing them through the rolls at each end. Do not make this test with motor running. Turn the rolls by hand. If it is found the rolls are not together at one end then on the other, make the proper adjustments by turning the nuts on the threaded rod #2032. Be sure to count the number of turns made on the inside nuts and make an equal number of turns on the outside nuts in order to maintain proper tension on the spring.

III MAINTENANCE

LUBRICATION — Main Bearings:

LUBRICATE ALWAYS ONLY HIGH TEMPERATURE, NON WAX BASE GREASE

Grease must be added daily to keep moisture condensation inside bearing housing at a minimum. Bearings cannot be overgreased — are prone to overheating. Remove excess oils (or remove entire cap of housing) and flush with No. 2 oil twice a year. Repack with grease. Some greases recommended are: "Preventive Maintenance" — Blue Films 80/102TV with suffix "Hydrox". No. 600 Non-Melt and "Labrico" — Density M-46.

ROLL ADJUSTMENTS:

Spring tension on the rolls is set at factory. Stones will cause pounding and vibration and will cause excessive wear on rolls. A dentist is strongly advised. Should the rolls become out of adjustment, other parts can be adjusted by loosening the lock nut 2017 ahead of spring 2009 and adjusting holding nut to allow spring to move pressure bar 2021 forward. However, whether the holding nut is moved, the back up nut behind spring should be adjusted a like amount.

IV CHECK LIST USED IN OPERATION

In the day to day operation of a roller mill it is advisable to consult a check list to prevent overlooking one or two items that may hinder the performance of the mill. Here is a suggested list:

DAILY:
1. Clean hopper of trash, stones, etc. Wipe condensation, grease and dust off exterior of machine.
2. Clean off magnet if installed in line.
3. Check drive belts for tightness. The 5V sections belts used in Roskamp supplied drives should be tensioned considerably past the standards B section drive.
4. During operating check end-to-end roll adjustment by comparing samples of rolled product from each end of rolls. (Variation here may be caused by uneven flow of whole grain from feeder.)

LONG TERM:
1. Check rolls for wear. Excessive wear on one end indicates uneven flow of material from feed roll, or rolls are out of adjustment.
2. Check end-to-end roll adjustment by means of cardboard strips or sheet metal plate.
3. Check tram (horizontal parallelity of rolls.) This may be done by placing a level on the barrel of the rollers. Compensating adjustment screws are located under the pillow block bearings #2017 on the bottom of the pressure bars.
4. Clean out inside areas of machine wherever dust can pile up. In steam rolling, wet fines will pack up on vertical sides in a short time. This should be scraped off at least once a week. With a highly polished steaming operation you may get a build up of a jelly-like sheet, opaque and rubbery, that may come off an interior surface in one piece and clog the flow-through. This material may even pass through the rolls and cause a sudden noise, adhearing to the roll surface.
5. Check drive belts.
6. Check set screws in bearings, sheaves, or pulleys and see that screws, bolts, and other fasteners remain tight around the entire machinery.
7. Check roll scrapers.

If it becomes necessary to order any parts, consult the parts list for positive identification and order by number and name. Your order will be given prompt attention.
Clean-up Procedures

Please note that these clean-up procedures are for non-transgenic grains only. Transgenic material has a separate, more thorough clean-up procedure, as all transgenic material must be accounted for. For more information, see special standard operating procedures for the handling of transgenic material.

1. Make certain that the power source is OFF, unplugged and locked out before attempting to clean the machine.
2. Be sure to wear all required personal protective equipment, including a dust mask, before cleaning the machine.
3. Clean hopper of all trash, stones, etc. Use a brush and air hose to clean machine of all dust and debris.
4. Be sure to clean the roller magnets, if installed inline (refer to Operator’s manual).
5. If “steam rolling” is used, be sure to remove all wet material from the machine.
6. Wipe all condensation, grease and dust off the exterior parts of the machine.
7. After clean-up, have the machine inspected by the pilot plant manager and report any problems to him.

Machine Care and Maintenance

• The roller mill must be properly cleaned and inspected after each use.
• All inspections are performed by the pilot plant manager.
• Motors and moving parts should be properly lubricated on a regular basis by the pilot plant manager or a trained service technician. When lubricating, use only high-temperature resistant, non-wax base grease.
• All belt and roller-gap adjustments must be completed by the pilot plant manager or a trained service technician.

Accessories

Portable Stairway (for proper feeding and operation)