STANDARD OPERATING PROCEDURE

Disc Mill, 12" Diameter

Model: 12 D.M.
Manufacturer: Andritz Sprout Bauer
Location: Wet Processing Pilot Plant, 1091 Food Sciences Building
Publication Date: 01/29/2014
Description and Uses

The disc mill is designed to size-reduce whole corn kernels. The disc mill consists of 12" diameter stator (stationary) disc and a 12" diameter rotor (revolving disc). The gap between the stator and rotor is adjustable. The gap width determines the size of the corn particles produced from the incoming whole corn kernels. Initially, the corn kernels are scooped into a feed hopper on top of the disc mill, which has a feed auger located at the bottom of the hopper. Whole corn kernels are feed directly into the mill’s grinding chamber by a feed auger. The feed auger speed is adjustable by means of a variable frequency drive. The feed speed is generally 400 RPM for corn grinding. The speed of the rotor in the mill is adjusted by a variable frequency drive (VFD). The rotor speed is generally 1200 RPM for corn grinding. The resulting ground fractions are collected together at the exit point located at the base of the mill. The disc mill is a wet grinding mill so water must be flowing down through the mill from the feed hopper by means of a cold-water hose during grinding.

Power Specifications

<table>
<thead>
<tr>
<th>Mill</th>
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<tbody>
<tr>
<td>Motor: Reliance Duty Master A-C</td>
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<tr>
<td>Horsepower: 65 HP Maximum (40 HP Continuous Drive)</td>
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<tr>
<td>Voltage/Amperage: 230/460V; 25.6/12.8 A, 60 Hz</td>
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<tr>
<td>Speed: 1735 RPM</td>
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<table>
<thead>
<tr>
<th>Feeder</th>
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<tbody>
<tr>
<td>Motor: Reliance Duty Master A-C</td>
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<tr>
<td>Horsepower: 1/2 HP Feeder (10 HP Continuous Drive)</td>
</tr>
<tr>
<td>Voltage/Amperage: 208-230/460V; 1.6/0.8 A, 60 Hz</td>
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<tr>
<td>Speed: 1140 RPM</td>
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Potential Hazards and Safety Precautions

**Electric Shock/High Voltage (208-230V/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.

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

- Never remove grid from hopper while feeder/mill is being operated.
- 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.

Nothing, except the grain for which the mill is intended to grind, should ever be placed into the hopper while it is running.

**Flying Debris/Potential Eye Damage**

- Wear safety goggles while mill is in operation.

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### 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

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### Training

**Required Training**

*Denotes courses offered online*

- Machine & Site-Specific Training
- Fire Safety & Extinguisher Training*
- Lab Safety: Fundamental Concepts*
- Personal Protective Equipment*

**Recommended Training for Frequent Users**

*Denotes courses offered online*

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

1. Set the desired gap for the mill by rotating clockwise the stainless-steel wheel to decrease the gap width.

2. Shift power supply lever to the upright “ON” position.

3. Turn on the mill rotor by pushing the “START” button on the VFD for the mill. This VFD is labeled mill. Desired rotor speed in RPM can be set by using the up and down arrow buttons to change the speed up or down, respectfully. Current rotor RPM value appears in the LCD window located on the face of the VFD.

4. Turn on feed rotor by pushing the “START” button on the VFD for the feeder. This VFD is adjacent to the mill VFD and is smaller. Desired rotor speed in RPM can be set by using the up and down arrow buttons to change speed up or down, respectfully. Current rotor RPM value appears in LCD window located on the face of the VFD.

5. Turn on adjacent cold domestic water hose located on adjacent wall and feed water into the feed hopper in preparation for grinding. The hose can be held by one operator or clipped or clamped to the hopper to allow water to be fed in without being held. Large water flow isn’t required.

6. Place small sample of corn into the feeder and test for proper gap size by observing resulting particle size. Adjust the gap if needed to achieve desired size. Caution, do not to adjust gap too tight as to gnash the rotor against the stator. There is no stop present to avoid doing this, so operator must be aware.

7. When ready to start actual grinding trial place the plastic drum directly under the mill to collect all material and water coming through the mill.

8. Feed the corn into feed hopper by means of the plastic scoop. While grinding, maintain a constant feed of corn by ensuring that some corn is always present in the hopper.

9. Store, analyze or further process the collected fractions as needed.

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. After completion of grinding, continue to run auger and mill rotor and continuously run water for 10 minutes from the adjacent wall hose through the feed hopper. Continue to collect all materials that wash out through the mill into a sample drum.

2. Shut off feeder first, then the mill.

3. Open the mill chamber by loosening the ¾” bolts around the mill chamber door’s periphery and open the hinged mill door about an inch. Directly spray the rotor and stator with cold water and collect washings in a sample drum.
4. Swing the mill door open to its widest position and pick out residual materials by using a metal pick or spatula. All materials removed this way are collected similarly in sample drum.

5. Using soap and water and brushes on the pilot plant cleaning cart to remove and remaining debris. These washings are not collect but rather washing down the sanitary drain.

6. Inspect and sweep up any corn material that might have inadvertently fallen on the floor adjacent to the disc mill. Discard debris in the appropriate place.

7. Report any problems to the pilot plant manager.

**Machine Care and Maintenance**

- 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.

**Accessories**

¾" Spanner and two sets of discs