

Model:	RMS 9x12 Triple Pair Commercial Mill
Drive Ratio:	1.5:1
Belts:	(2) 5VX1060, (5) BB130, (2) 5VX1220
Belt Tension (lbs.):	9.6 – 10.2, 10.1 – 10.8, 3.5 - 3.8
Bearings:	(12) 4-Bolt Flange 2 7/16 SXR Ball Bearings (1) 4-Bolt Flange 2 7/16 SC Ball Bearing
Grind Capacity:	Approximately 3.2 Ton/Hr @ 700 Micron

Table of Contents

Lubrication	Page	1
Gap Settings and Roll Alignment	Page	5
Roll Maintenance	Page	8
Roll Corrugations	Page	9
Belt Tension	Page	10
Belt Alignment	Page	11
Motors	Page	12
Electrical Instructions	Page	14
Feed Roll	Page	16
Adjusting the Scalper	Page	17
Installation	Page	18
Frequently Asked Questions	Page	19
Parts and Service	Page	21
Additional Services	Page	22
Contact Information	Page	23

Lubrication:

Why Greasing is Important

The environment around roller grinder bearings is dirtier than standard bearing conditions. As such, using a larger amount of grease to frequently purge (over-fill) the bearings helps to flush out contaminants from the inside of the bearing. While bearings with more grease will run warmer, bearings with contaminants run even hotter and experience much more wear. It is better to replace a depleted grease tube than a bad bearing or the resulting broken roll shaft.

With this in mind, all bearings on all RMS Machines cannot be over-greased. Any excess grease will purge through the seals on the front and rear of the bearing. Purge simply means grease is leaking out of the bearing, and it signifies that the bearing is full of grease. This purging is the best protection against bearing contamination. An example of a correctly lubricated bearing with grease purging around the seal is shown below.

Figure 1. A correctly greased bearing has grease purging around the perimeter.



In dirty environments around roller grinders, the manufacturer recommends frequently greasing the bearings to purge until fresh grease comes out. Old grease will be discolored or dirty, whereas fresh grease will look nearly identical to what comes out of the tube. Doing this ensures that your bearing has as little outside contamination as possible. The less foreign material entering your bearing, the better. Refer to the next page for greasing schedule recommendations.



Greasing Schedule

Following this schedule should ensure that your bearings are fully greased. If fresh grease does not purge out of the bearing after 6-8 pumps, continue greasing.

Figure 2. Recommended greasing schedule

Greasing Schedule		
Hours Run per Day	Pumps of Grease	Interval
1 - 8	6 - 8	Twice Monthly
8 - 16	6 - 8	Weekly
16 - 24	6 - 8	Twice Weekly

Quick Tips for Greasing

- Grease bearings while the machine is running to ensure grease is evenly spread around the circumference of the bearing.
- Always wipe down grease zerks before greasing. Otherwise, any dirt on the grease zerks will be forced into the bearing.
- Bearings from RMS come greased and ready for operation. Bearings from the manufacturer should be greased until fresh grease comes out.

Other Lubrication Guidelines

- Feed roll bearings do not need to be greased as often as the main bearings that hold the corrugated rolls. Grease feed roll bearings once every few months.
- Gearbox lubrication guidelines for feed rolls can be found in the Feed Roll section on page 16.
- Motor lubrication guidelines can be found in the Motors section on page 12.

Note: RMS suggests any lithium-based NLGI #2 grease such as “Feedmillube” which can be purchased through RMS or online at Feedmillube.com

Grease Lines

Inspect grease lines prior to greasing to make sure none have “blown out”. If you notice a blown out grease line, install a grease zerk directly on the bearing and apply (2) pumps of grease. The bearing may or may not take grease in this case, which is why the grease line blew out. It is important to monitor the temperature of this bearing until it can be changed, possibly making it to the next roll change. If the bearing takes grease, measure the blown out line and order a replacement. Replacement parts can be ordered from RMS.

Because of the maximum pressure (PSI) constraints of the RMS grease dispersion system, using a hand-operated grease gun is recommended. If the use of an automatic or pneumatic grease gun is preferred, then it is necessary to insert a pressure reducing valve in-line between the grease gun and the supply air. We recommend using an adjustable pressure (PSI) type not to exceed 100 lbs. This valve can be purchased from RMS.

Whether manual or automatic greasing is employed, this action should never replace visual inspection of the greased elements as the primary method of determining its effectiveness. We recommend the creation of an inspection procedure to be carried out once a month, at a minimum. This procedure will help aid your maintenance team in the identification and resolution of any problems related to greasing, such as a blown out grease line.

Figure 3. Grease banks located on the front of the machine for easy access



Grease Compatibility

Did you know you can't mix just any grease with any other grease? It's true - doing so can cause catastrophic damage to equipment. And it's true even if the grease *types* are the same.

Why is this the case?

Grease consists of two parts - the actual lubricant (normally oil) and a carrier, or *base*. Each has its own function. It's the bases that are not compatible. Always know the base of the grease you are adding and the base of the grease you are adding to. Once you know those things, you can use the compatibility chart below. A "Yes" indicates compatibility.

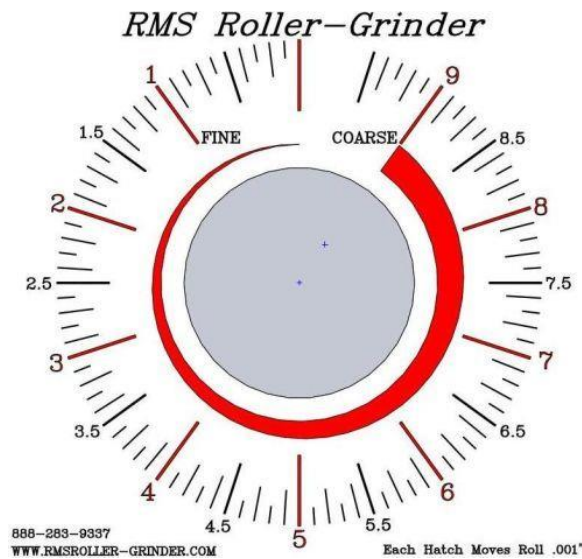
Figure 4. Table showing the compatibility of grease bases

Grease Bases	Lithium Complex	Lithium	Al Complex	CA Complex	Ba	Na	Bentonite	Si Gel	Polyurea
Lithium Complex	Yes	Yes	No	Yes	No	No	No	Yes	Yes
Lithium	Yes	Yes	No	Yes	No	No	No	Yes	Yes
Al Complex	No	No	Yes	No	No	No	No	Yes	No
CA Complex	Yes	Yes	No	Yes	Yes	No	No	No	No
Ba	No	No	No	Yes	Yes	No	No	Yes	No
Na	No	No	No	No	No	Yes	No	No	No
Bentonite	No	No	No	No	No	No	Yes	Yes	No
Si Gel	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
Polyurea	Yes	Yes	No	No	No	No	No	No	Yes

Gap Settings at Startup & Roll Re-Alignment:

Your mill is equipped with roll adjustment points. These are located on the front of the machine - see image below. Setting and keeping the roll gaps is essential to target your desired grind. Keeping rolls in parallel is essential for proper wear on the rolls and consistent output.

Figure 5. Stickers like this can be found on the adjustment points of your mill.



- **SECTION I:** Starting up the mill for desired crack
- **SECTION II:** To compensate for normal roll wear
- **SECTION III:** In the event foreign material knocks the rolls out of adjustment

SECTION I: Starting up the mill for desired crack:

Your feed gate should be completely closed with no grain entering the rolls. The guide arms or T.A.S. below the hopper should be set just slightly from touching the rolls. The T.A.S. adjustment bolts can be found on the side of the hopper.

RMS suggests beginning with a roll gap of 1/8", or approximately 2 revolutions of the adjustment bolt.

You can now start up the mill. Once started, slowly open the feed gate until the max amps or capacity desired is reached.

Note: DO NOT over amp your motors or motor failure will occur. If over amp occurs, close the gate down a half turn until you are back under the max amperage.



SECTION II: To compensate for normal roll wear:

Re-align rolls approximately every week, or whenever the desired micron size cannot be obtained, or full motor amperage cannot be maintained.

1) With the machine running, stop the flow of grain going into the machine.

Important: The machine must be empty before adjusting rolls.

2) Locate the roll adjustment points. (Shown in the picture on previous page.)

3) There are (2) adjusting hex nuts per set of rolls. Turning either nut clockwise closes the rolls on the side turned. Counter-clockwise rotation opens the rolls on the side turned.

4) Start by turning the left nut clockwise until you hear the rolls just start to nick each other. Make note of the position of the pointer when the rolls start to nick.

5) Turn the nut back counter-clockwise until the nicking stops.

6) Once again, turn the nut clockwise but stop turning just short of where the rolls start to nick. The idea is to leave the nut set in the direction of closing the rolls, but just shy of where the rolls nicked.

7) Repeat the process with the nut on the right side.

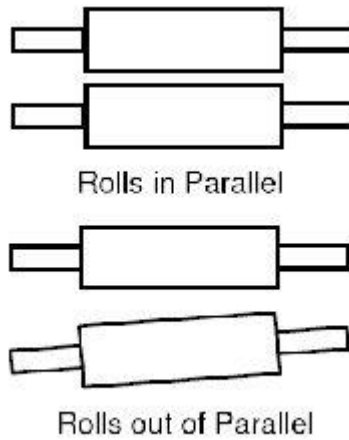
8) Continue doing this adjustment on both sides at least three (3) times. This ensures the rolls are precisely parallel.

9) All pointers should now be reset at zero.

To view this process in video form visit:

www.rmsroller-grinder.com, under Links, then Industry Links

Figure 6. Rolls in parallel vs. rolls out of parallel



Section III: Rolls have been knocked out of alignment (out of parallel).

Follow the same procedures listed in Section II if the following events are observed:

- A foreign object is known to have been run through the mill.
- During normal re-alignment, you find that you must turn one hex nut further than the other in order to nick the rolls, indicating that the rolls are out of parallel.

Roll Maintenance:

Factors to consider which affect roll sharpness:

- Rolls must be fed uniformly.
- Rolls being out of parallel will increase roll wear. Your facility should have a program in place to regularly adjust your rolls, to ensure they are in parallel. If you use your machine daily, parallel the rolls daily.



Roll Corrugations:

You will eventually need to get your rolls re-cut or re-corrugated. Roll sharpening can lessen your roll life, but RMS uses specialized techniques to maintain your roll diameter, therefore allowing your rolls to be re-sharpened multiple times.

When is it time to have your rolls sharpened?

Indications of rolls being dull:

- Measure the time between mill shut down to no load amps. For sharp rolls, the amps on the motor should drop immediately within 5 seconds after shutting down. When the rolls are dull the material “floods” the rolls and does not pass through.
- Can’t pull amps; meaning the rolls are not sharp enough to grab the material and pull it through, they lack traction.
- Less capacity (lost traction)
- Typically the interval between roll sharpening/exchanges is constant; meaning that if you ran (x) amount of bushels through the mill two years ago and you needed a roll sharpening, then you can assume at the same amount of bushels you will need to sharpen the rolls again in two years.

How do I know if I have the right corrugations?

RMS has the ability to test your ground/cracked product to ensure you are reaching your target micron size and standard deviation. Based off this information we will be able to recommend roll corrugations to meet your application’s needs.

Belt Tension:

Belts stretch over their lifespan. Therefore, belts should be checked periodically for proper tension and alignment, especially when the mill is first used or if new belts have been installed.

Figure 7. How to measure V-belt tension



Belt Tension:

- 1) To maximize v-belt life and optimize your machine's performance make sure the proper belt tension is maintained.
- 2) Adjust belt tension only when your rolls are in the position that they run the majority of the time.
- 3) V-Belts should be tensioned only as tight as required to prevent belts from slipping. If the belts start to slip, simply tension more. But DO NOT over tighten the belts!
- 4) If the belts are over tensioned, it may result in shaft failure or motor failure.
- 5) Lastly, to ensure the best performance out of your belts, and the longest life, you must make sure they are operating within the recommended load limitations. You must monitor the motor amps while the machine is in operation to ensure the work is being evenly distributed between your sets of rolls.

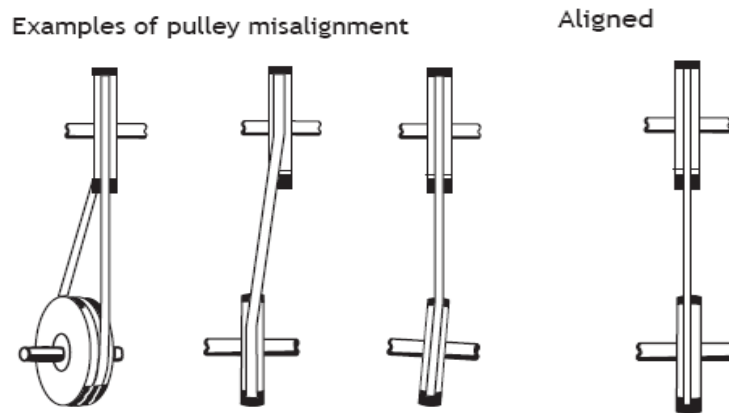
Warning: Never remove belt guard covers when machine is operating!



Belt Alignment:

Belt alignment, like belt tension, is critical. Improper alignment of the motor pulley to the roll pulley(s) can result in reduced horsepower transfer, belt failure, and/or motor failure.

Figure 8. Misaligned pulleys vs. aligned pulleys



There are two aspects of proper motor pulley alignment:

- 1) The motor pulley must be positioned properly on the motor shaft. If the mill was ordered with a motor(s), the pulley alignment should be correct.
- 2) The motor shaft must be parallel to the roll shaft; i.e., the motor should not be cocked. Using a straight edge, make sure the motor is not cocked due to belt tension. Place the straight edge flat against the face of the motor pulley, but so it just misses the roll pulley. Now raise or lower the straight edge at the roll pulley end and check to see whether the straight edge just touches the face of the roll pulley. Adjust the motor mount threaded rods accordingly.

Important:

For the final adjustment, the threaded rod furthest from the belts should not be pulling the motor; it must push the motor back toward the mill in order to overcome the belt tension's tendency to "cock" the motor.

For more information on Belt Tension and Alignment in video form visit:

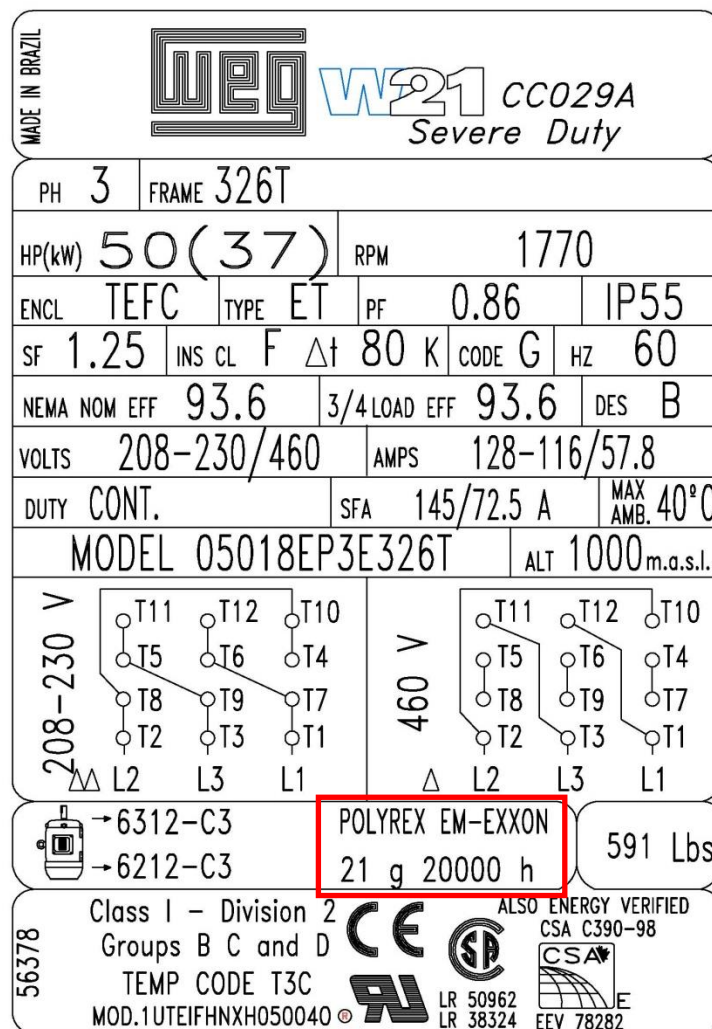
www.rmsroller-grinder.com, under Links, then Industry Links



Motors:

The recommended greasing schedule of the motor bearings should be listed on the nameplate, located on the motor. Below is an example of what the nameplate could look like. The red box shows a typical example of greasing guidelines, but these will vary by the motor. In this example the type of grease is listed on top (Ployrex EM-Exxon). The amount of grease (21g) and the hours between greasing (20,000 h) are listed on the bottom. This greasing schedule is for a best case scenario: a clean environment with the motor running for 8 hours per day. If this information is not located on the nameplate or if you are running your machine under different conditions please contact RMS or the motor manufacturer.

Figure 9. An example of a motor nameplate



Greasing recommendations, if not listed on the nameplate, are as follows:

- 1) Clean the grease fitting and remove the grease relief plug, usually on the bottom of the bearing housing.
- 2) With the motor running, pump in new grease until clean grease comes out of the relief port. DO NOT OVERGREASE.
- 3) Leave the relief plug out until grease stops coming out; this may take several minutes or more.
- 4) Reinstall the relief plug.

Your motor bearings should now have the correct amount of grease. When you see grease coming out of the end bell around the shaft, you have put in far too much grease. The proper fill is about half the volume of the bearing cavity, allowing for expansion. More motors fail from too much grease instead of too little.

RMS recommends developing a greasing schedule based on the condition of the grease that comes out of the relief port. If the first grease that comes out looks exactly like the grease you are putting in, you can lengthen your greasing interval. If a solid glob or old grease that is discolored and hard comes out, you need to shorten your interval. Please use the chart below as a guideline. Each motor will operate differently based upon its use and environment, so the schedule below is a guideline, not a rule.

Figure 10. Motor greasing schedule

MOTOR BEARING GREASE RELUBRICATION INTERVAL GUIDELINE (In Months)					
RPM	HP Range	8hrs/day Clean	8hrs/day Dirty	24hrs/day Clean	24hrs/day Dirty
3600	0.5-7.5	12	6	8	3
	10-40	9	4	4	2
	50-150	9	4	4	2
1800	0.5-7.5	36	18	18	9
	10-40	24	9	12	4
	50-150	18	9	9	4
1200	.05-7.5	48	24	24	12
	10-40	36	12	18	6
	50-150	12	12	12	6

Electrical Instructions:

Hiring an Electrician

RMS strongly recommends hiring an electrician to wire the motors and other electrical components on your mill. Our engineers can work with the electrician to make sure everything functions properly. Following are some important electrical guidelines.

Main motor start up sequence:

- When wiring the starters to the motor, it is best to have the motor start from the bottom up.
- Consult the wiring legend on the motor as in the photo below.

Figure 11. Motor nameplates include wiring legends.



Motor rotation:

- When looking at the left side of the machine, the motor should be spinning in a counter-clockwise rotation. This is also true of the right side of the machine.

Figure 12. Rolls should spin inwards when motors are spinning counter-clockwise.



Important:

Any electrical work should be completed only when power sources to each motor have been disabled and motors have cooled down!

Check and clean motors at least monthly to ensure they are free from contaminates. This ensures the motors are able to adequately cool themselves and avoid overheating.



Interlocking

Interlocking the electrical components on a roller grinder is one of the most important steps when installing a machine. You must interlock the main grinding motors to the downstream take away equipment, an auger or chain disk conveyance system for example, to prevent them from starting if those downstream components are not energized. This is critical to ensure that the roller grinder shuts off if the one of the components downstream stops running for any reason.

Amp Meter Box

We highly suggest you install an amp meter box on your mill to prevent over amperage of motors, loading to motor failure, or overload. RMS would be happy to suggest an amp meter box suitable for your mill, or we can order and provide one at your expense.



Feed-Roll:

Feed Roll Rotation

While standing on the right side of the machine the feed roll should spin clockwise.

Feed Roll Speed

The feed roll speed is designed to be variable. This allows you to specify the amount of product being fed to the rolls.

Wiring the Feed Roll

The feed roll is powered by either a one or two horsepower motor. This motor is powered and controlled from a variable frequency drive (VFD). The VFD should be interlocked to the main grinding motors such that it cannot be turned on unless the main motors are energized.

Flooding the Rolls

The operator must take care to avoid over-feeding the rolls. Over-feeding the rolls can cause the main motor amps to exceed recommended allowable amps and may result in obstructing product flow altogether, plugging the mill.

Gearbox Lubrication Guidelines

For general temperatures, the greasing guidelines and grease types recommended in the lubrication section are applicable. If, however, the mill environment temperature varies into the extreme hot or cold, a synthetic oil is preferable. RMS recommends Lubriplate Syn Lube 220 L0975-057. The correct lubricant is important, as without the appropriate oil/grease, the gearbox could cease to function properly.

Figure 13. An example of an RMS Feed Roll gearbox and motor.

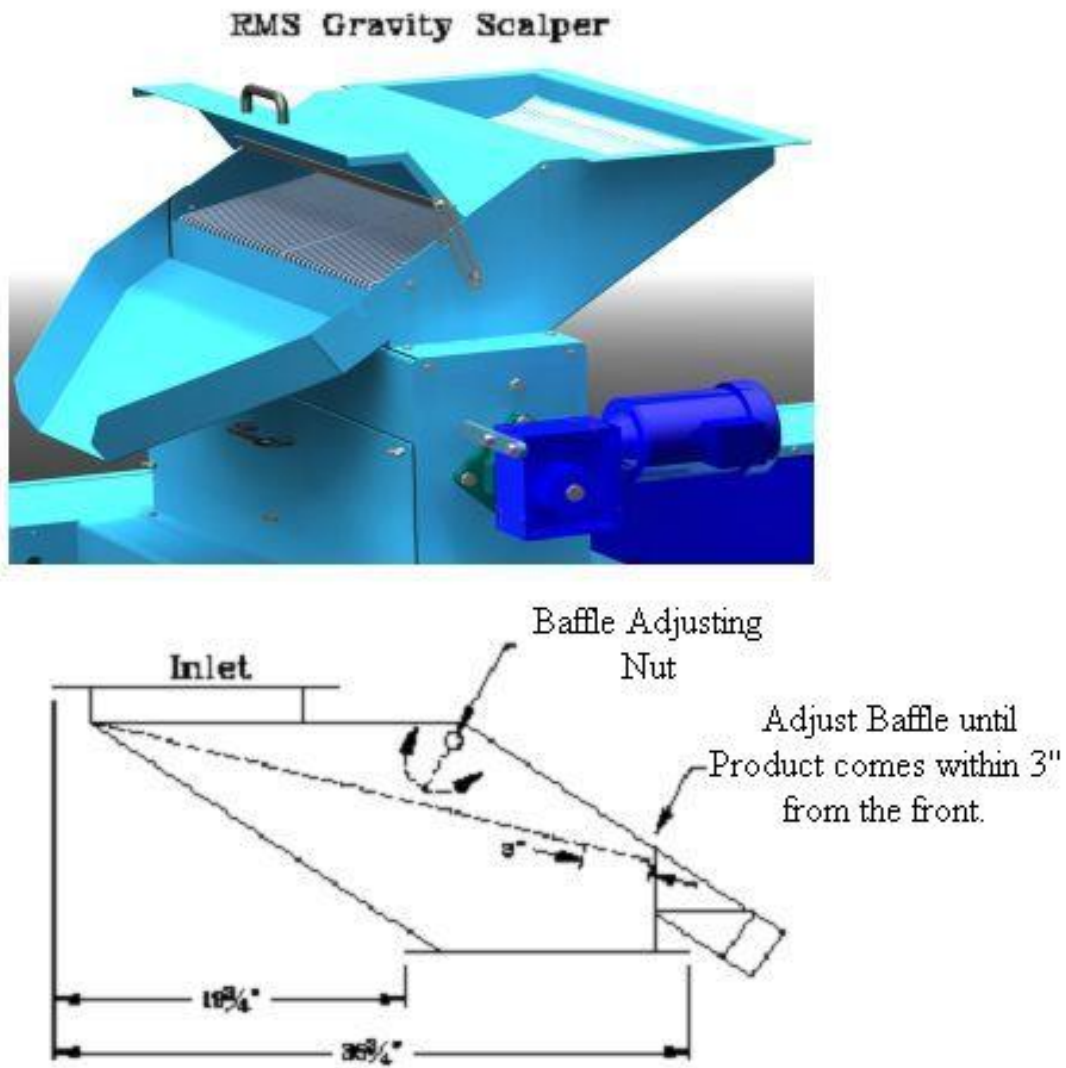


Adjusting the Scalper:

A properly adjusted scalper is important for maintaining grind efficiency and mill safety. You adjust your scalper by varying the angle of the baffle (a rod with a steel flap attached). The baffle is used to constrict the amount of grain flowing over the scalper grate, which consists of long, thin metal rods that sift foreign materials from your pre-grind product.

Adjust the baffle until product comes within 3" of the scalper discharge, as shown in Figure 14. This sifts out the maximum amount of foreign material while ensuring minimal product waste.

Figure 14. How to adjust an RMS Gravity Scalper.



Installation:

Installing a machine on a stand:

If the machine is installed on a stand it is critical that this stand is built to handle the overall weight of the machine and product that will be in the machine. As a general rule of thumb the stand should be built with a 1.5 to 1 safety factor.

Bolting machine to the ground:

Concrete anchor bolts must be used when the machine is being installed on concrete. If the machine is being installed on a steel platform grade 5 bolts or better should be used. **Machines should be checked for level, no matter where they are installed, before being secured.**

To prevent dust leaks:

After the machine is in place and bolted, the seams between each flange should be sealed with silicone caulk, to ensure it stays dust tight.

Clearances around the machine:

It is important to take into consideration the room you will require for roll changes and routine maintenance work when deciding where to place your machine. Call RMS for recommended clearances.

Frequently Asked Questions:

What if my main motor breaker trips?

Is the breaker sized correctly for the motor being used?

- Look at the nameplate on the motor and find the correct breaker size.
- Verify that the breaker is sized correctly for peak motor start-up. It needs to handle the maximum voltage pull from the motors.

Is there grain in the rolls?

- Rolls should turn freely by hand. If not, first turn off all power supply to the mill. Then open the front cover and clean out any product from between the rolls.

Is there a foreign object in the rolls?

- Rolls should turn freely by hand. If not, first turn off all power supply to the mill. Then open the front cover and clean out any product from between the rolls.

Is the motor being over-worked?

- Open the roll gap on the set of rolls that the over-worked motor drives. This will allow grinding work to move to another set of rolls, distributing the work between motors.

What if my feed roll won't start?

Is there a foreign object in the feed roll?

- The feed roll should turn freely by hand. If not, first turn off all power supply to the mill. Then open the front cover and clean out any product from between the rolls.

Are temperatures very cold?

- Warm up the gearbox and replace oil with SYN Lube 220 L0975-057.

What if I can't get my desired grind capacity?

Are the rolls getting dull?

- Call RMS to schedule a stop-and-check or a roll exchange.

Does the motor amperage-pull fluctuate?

- Motors should pull roughly the same amperage, within 5.00 amps of each other. If your motors are fluctuating more, note the fluctuation and call RMS to schedule a roll exchange.



Is the top set of rolls not pulling any amps?

- Check the roll gap. If the top rolls aren't pulling any amps, they probably aren't grinding.

Is your roll wear sensor giving an alarm?

- Call RMS to schedule a stop-and-check or a roll exchange.

Are the roll gaps set to give maximum output?

- Adjust roll gaps as necessary.

What if I'm getting whole pieces of grain after grinding?

Are the rolls getting dull?

- Call RMS for a roll exchange.

Are the top adjustable slopes and intermediate slopes set correctly?

- Turn off all power to the mill and verify that the slopes are set correctly.

Are the V-blocks set correctly?

- Turn off all power to the mill and verify that the v-blocks are set correctly.

What if my bearings are running above normal operating temperature?

Have the bearings been greased?

- If not, grease the bearings. Refer to the lubrication section of this manual for a greasing schedule and recommended grease types.

Is the bearing still running abnormally hot after greasing?

- Give RMS a call at 605-368-9007. Your bearing may be going bad.

What if my bearing is also making a whistling noise?

- Give RMS a call at 605-368-9007. Your bearing may be going bad.

What if my belts are squealing?

Verify the following:

- Belts are correctly tensioned
- Pulleys are aligned
- Belts are in good condition
- Pulleys are in good condition

Parts and Service:

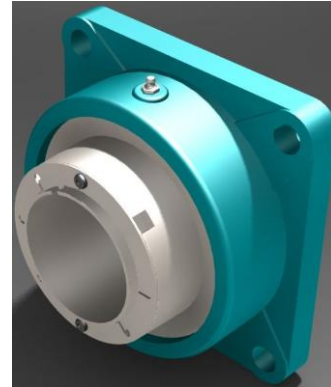
Recommended Optional Parts:

Bearings

RMS Roller Grinder encourages customers to keep an extra set of bearings on hand. If a foreign object enters your rolls it can cause a bearing to fail and the excess vibration on the roll may cause the other bearing to fail as well. It is to your advantage to keep an extra set of bearings on hand.

(12) 4-Bolt Flange 2 7/16 SXR Ball Bearings

(1) 4-Bolt Flange 2 7/16 SC Ball Bearing



Motor

(3) 10HP 1800 RPM 3-Phase TEFC or XP motor

RMS uses WEG motors and can help determine if there is a warranty issue if the motor should fail.

Grease Lines

Can be ordered from RMS

**RMS carries all replacement parts and can bill and ship to you directly.
Call our service department at 605-368-9007 to order parts or inquire on warranties.**



Additional Services:

Roll Exchange Program:

- We can provide appropriately sized rolls for you as long as you own your mill.
- We can provide roll sharpening and replacement when needed.
- We can come to your facility and change out the rolls if needed, or if you prefer to change out your own rolls we also have the ability to deliver sharp rolls to your facility.
- Our service technicians will work around your production schedule.
- We can group you in with other customers in the area, to help reduce your costs.

Machining Services:

- We can supply replacement rolls that are ISO 9007:2000 certified and dynamically balanced.
- RMS can recommend roll corrugation to meet the needs of your operation.
- We also offer a fully equipped test lab, with the ability to test your product to ensure you are maintaining your target particle size.
- We can provide roll balancing.
- RMS can assist with shaft repair and replacement.

RMS Also Offers On-Site Training and Consulting on the Following:

- Safety
- How to operate your machine at maximum efficiency
- Machine maintenance
- Custom training also offered. Let us know what you need to learn and we will be more than happy to assist you with your operational needs.

Emergency Contact Information

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