
2 PULLEY EDDY CURRENT SEPARATOR

MAINTENANCE AND OPERATING INSTRUCTIONS

U.S. Patent Nos. 5,626,233 and 5,655,664

Check immediately when the eddy current separator is received for possible shipping damage. Report damage to the delivering carrier.

Read this bulletin carefully before operating the separator. It is important that a strict maintenance plan for the magnetic rotor be followed (see page 6) to ensure a long life for the separator.

IMPORTANT SAFETY INFORMATION

CAUTION: STRONG MAGNET

Rare earth magnets in the magnetic rotor assembly are extremely powerful. They can project magnetism through a considerable distance and exert strong pulling force on magnetic metals. Use of iron or steel tools near the magnet could cause injury to personnel or damage to the separator. Strong magnetic field may have an affect on pacemakers and other electrical devices. Please contact the device manufacture for further information.

Wear eye protection, such as safety glasses, when adjusting the splitter or observing the operation of the separator.

Always stop the separator before cleaning any component.

Preventing damage to the separator:

When unloading the eddy current separator or moving it, do not place it near angle iron structures or truck floors or walls that are steel.

The separator should be handled gently when picking it up or setting it in position. Although it is ruggedly designed for heavy-duty operation, the magnets and shell are brittle and a sudden shock or blow could damage them.

Clean off any ferrous metal particles which may have accumulated on the magnetic rotor during shipment (see page 6).

The rotor is a high inertia load on the rotor motor, so special consideration must be taken during start-up.

The motor can be started no more than once in a 15 minute period. After shut down, allow the motor to rest for at least 15 minutes before restarting.

DESCRIPTION

The Dings eddy current system separates nonferrous metals such as aluminum, die-cast metal, and copper from non-metallic material.

WARNING: An eddy current separator is designed to remove nonferrous metals. It is NOT designed to be a source of magnetic ferrous separation.

Serious damage will occur if magnetic separators such as pulleys or drums are not used to remove the ferrous metal from the burden before it reaches the eddy current system. At least two stages of magnetic separation are recommended prior to the eddy current separator. Large pieces of steel or other ferrous can damage or crush the wear cover of the magnetic rotor. Small ferrous particles can accelerate wear on the rotor cover and the belt and ultimately cause failure.

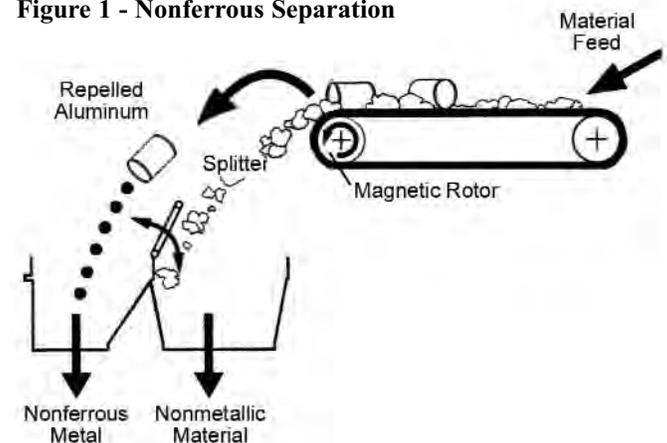
A strict maintenance plan to ensure the cleanliness of the magnetic rotor will extend the life of the shell (see page 6).

PRINCIPLES OF OPERATION

Material is fed onto the conveyor belt of the eddy current separator, which moves it across the magnetic rotor where separation occurs (Fig. 1). The two streams of material discharge into a housing. The housing has a splitter to divide the nonferrous metal from the nonmetallic material, such as paper, plastic, wood or fluff.

The key component of the eddy current separator is the magnetic rotor, which has a series of permanent rare earth magnets mounted on a support plate attached to a shaft.

Figure 1 - Nonferrous Separation



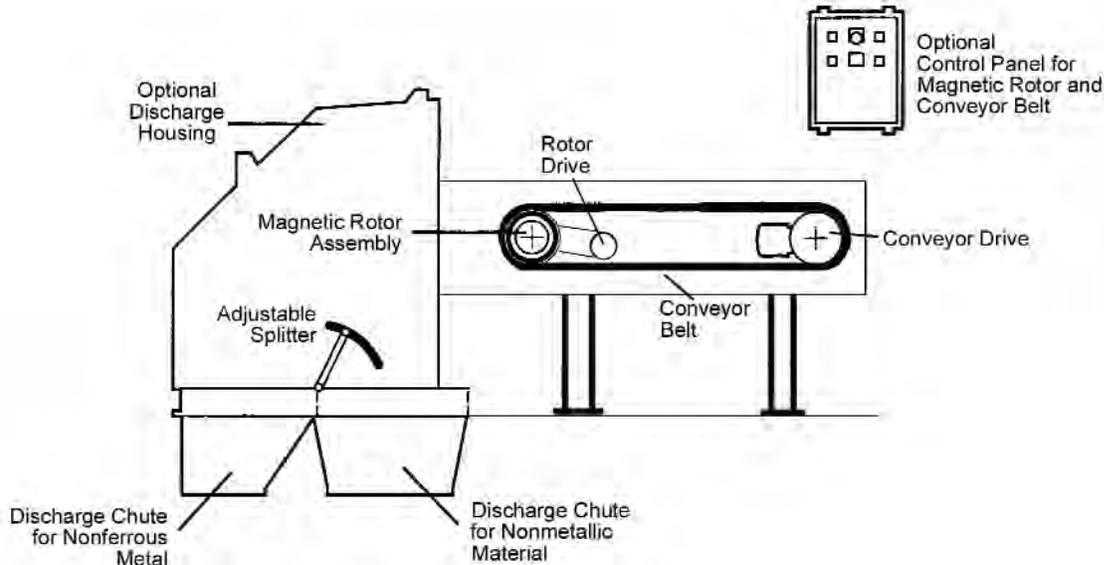
The magnetic rotor is surrounded by (but not attached to) a wear shell which supports the conveyor belt. This allows the rotor to spin independently and at a much higher speed than the wear shell and belt.

When a piece of nonferrous metal, such as aluminum, passes over the separator, the magnets inside the rotor rotate past the aluminum at high speed. This forms eddy currents

in the aluminum which in turn create a magnetic field around the piece of aluminum. The polarity of that magnetic field is the same as the rotating magnet, causing the aluminum to be repelled away from the magnet.

This repulsion makes the trajectory of the aluminum greater than that of the nonmetallics, allowing the two material streams to be separated.

Figure 2 - Major Components of the Dings Eddy Current Separator.



INSTALLATION

The eddy current separation system consists of the separator and the optional discharge housing. The height at which you place these two components depends on both the height of the feeder before the separator and the take-away conveyors or collection bins beneath the discharge housing.

LOCATION OF THE SEPARATOR

Magnetic performance may be affected by magnetic material in the field. This includes such items as I-beams, metal supports, hoppers, or splitters. These and other ferrous objects need to be kept out of the magnetic zone.

Place the eddy current separator at the discharge end of a conveyor or vibratory feeder. ("Feeding the Separator" on page 5 describes the use of a vibratory feeder to control surges in the burden.)

Mount the separator close enough to the feeder so that material does not fall between the two conveyors when the feeder is initially turned on or turned off.

The belt surface of the separator should be below the feeder conveyor, but not so low as to cause damage to the separator belt. The greater the gap between the separator and feeder, the harder the impact will be of sharp metal

pieces in the burden falling onto the belt. Use a 45° slide chute between the end of the feed conveyor and the eddy current belt. The slide chute will present the material to the belt without impact or bouncing.

LOCATION OF THE DISCHARGE HOUSING

The roof and walls of the discharge housing protect you and your machinery from flying metal when the eddy current separator is running. The housing also contains the adjustable splitter and two discharge chutes.

Place the discharge housing next to the discharge end of the eddy current separator as shown on the certified print. The base of the legs of the separator and the bottom of the channel frame of the discharge housing should be at the same height. Clearance must be allowed beneath the discharge chutes for the take-away conveyors or collection bins.

SETTING IN POSITION

Bolt both components securely to footings or framework that can support the weight of the separator and provide a stable foundation.

OPERATION

CAUTION: Do not operate the separator with the access doors open.

The separator has two motor drives (Fig. 3):

(A) fixed high speed drive which rotates the magnetic rotor assembly;

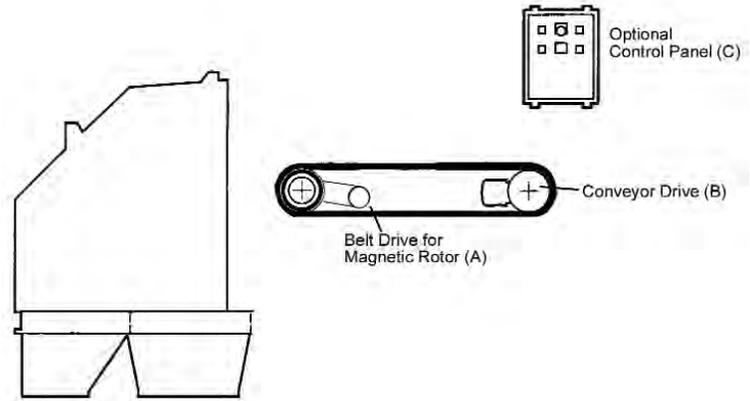
NOTE: The rotor is a high inertia load on the rotor motor, so special consideration must be taken during start-up.

The motor can be started no more than once in a 15 minute period. After shut down, allow the motor to rest for at least 15 minutes before restarting.

(B) fixed speed drive which runs the conveyor belt at about 400 fpm.

Optional motor controls are located in the control panel (C).

Figure 3 - Motor Drives and Controls.



- Conveyor belt
Nitrile belt with thermowelded PVC “T” cleats and PVC “C” sidewalls.
- Conveyor belt pulley
Pulley is crowned and there is lagging on the drive pulley.
- Gearmotor.

- Belt speed adjustment (if equipped)
See “Start-Up” on page 5 for more information about belt speed.
If equipped with a variable frequency drive:
The conveyor belt speed is preset to 400 fpm. The speed is adjustable at the drive from 198 to 440 fpm by pushing and holding one of the arrow keys on the drive until the desired speed is reached. The unit reads the speed of the belt directly in fpm. (Eg: 400/MIN = 400 fpm). For most applications, a belt speed of approximately 400 fpm will result in the best separation.
If equipped with a fixed-speed drive:
The belt speed is fixed at approximately 400 fpm.

Figure 4 - Conveyor Belt and Drive.

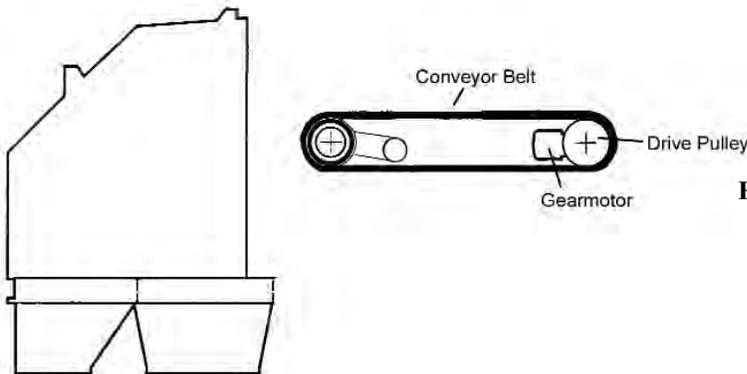
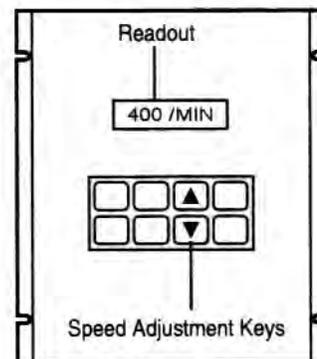


Figure 5 - Variable Frequency (VF) Drive for Conveyor Belt (Optional).



No keys other than speed adjustment need to be used, as the main control panel (Fig. 7) controls the VF drive. If other changes to the drive’s programming are needed, please refer to the VF manual or consult Dings. See wiring diagram for factory settings on the VF drive.

MAGNETIC ROTOR AND DRIVE COMPONENTS

(See Fig. 6)

CAUTION: Rare earth magnets in the magnetic rotor assembly are extremely powerful. Use of iron or steel tools near the magnet could cause injury to personnel or damage to the separator.

Magnetic rotor assembly

Contains highest grade of permanent rare earth magnetic material.

Stainless steel cover

Heavy-duty inner cover protects the magnetic rotor assembly from damage.

Fiberglass wear shell

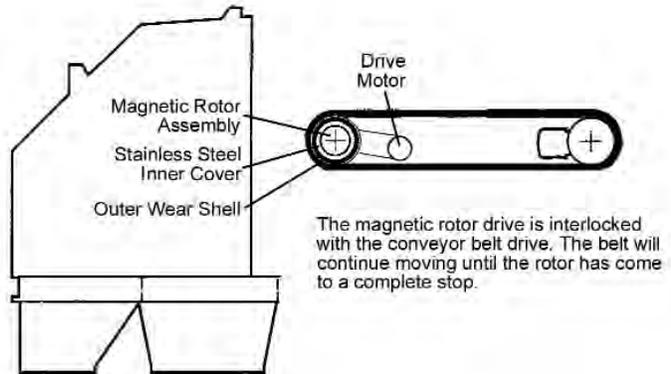
Wear-resistant ceramic tiles are bonded to the fiberglass shell. Wear shell supports the conveyor belt.

Motor

Drive motor is large and very powerful to rotate the magnetic rotor at high speed. Since the motor is set at the optimum speed, it does not require adjustment.

The motor shaft has a multiple belt sheave which drives the magnetic rotor pulley.

Figure 6 - Magnetic Rotor and Drive.

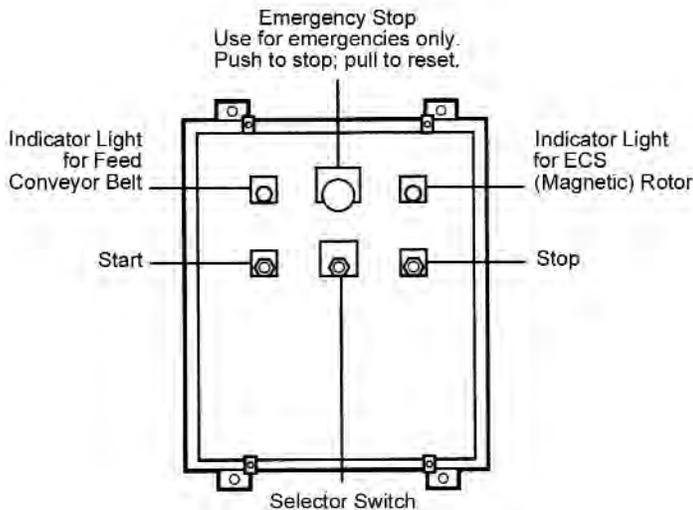


CONTROL PANEL (OPTIONAL)

The motor controls are described in Fig. 7.

When unit is shut off, a time delay switch allows the conveyor belt to continue to run after the magnetic rotor has been turned off. This function helps protect the shell and belt from being damaged and assures that all materials will have been removed from the belt.

Figure 7 - Control Panel (Optional).



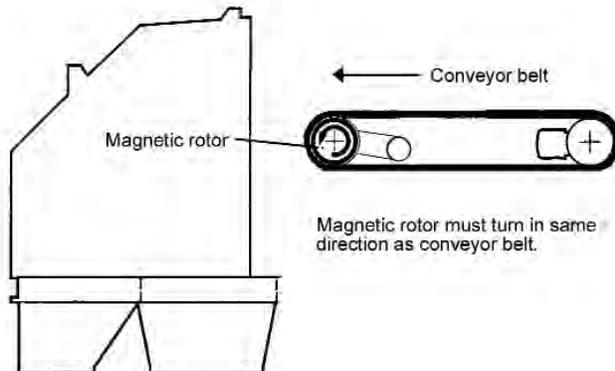
To run the conveyor only, turn switch to left and push the start button.
To run the conveyor *and* the magnetic rotor, turn to right and push the start button.
(The magnetic rotor cannot be run without the conveyor belt running.)

ELECTRIC CONNECTIONS

All wiring must conform to prevailing local and national electrical codes. See wiring diagram provided in control panel for your power requirements. Electrical power source supplying the eddy current separator must have a disconnect with lock out provisions.

IMPORTANT: Magnetic rotor must turn in the same direction as the conveyor belt (Fig. 8).

Figure 8 - Turning Direction of Rotor and Belt.



START-UP ADJUSTMENTS

BELT TRACKING AND TENSION

Belt tracking and tension should be checked at least every three hours for the first two days of operation. After that, check once a week.

To align the belt:

- 1) Adjustments are made at the take-up assembly located at the opposite end from the eddy current rotor assembly.
- 2) Start the belt only, with the belt at a slow speed. Be ready to shut it off if the belt walks off severely to one side.
- 3) Using caution around moving belt, begin tracking the belt. Use an adjustable wrench to turn the take-up in the desired direction. Make adjustments 1/4 turn at a time. To move the belt to the left, tighten the take-up on the right. To move the belt to the right, tighten the take-up on the left.
- 4) Do not over-tighten the belt as the eddy current has a ceramic covered fiberglass shell that could be damaged by an over-tightened belt. The belt only needs to be tight enough so that the drive pulley does not slip and the belt stays tracked. Minimum belt sag should be 2 inches. This is measured at the bottom center of the belt.
- 5) Once the belt is tracked, increase speed to normal operating speed and readjust belt if necessary.

If the belt is difficult to track, see “Troubleshooting” tips on page 8.

FEEDING THE SEPARATOR

It is very important to load the belt as uniformly and as lightly as possible. If large surges occur, nonferrous metal will be under other material. This can weigh it down and cause a decrease in its trajectory, which may result in the piece not making it over the splitter and not being recovered.

In most applications, you will get the best separation at 400 fpm. If you change the belt speed after you’ve adjusted the splitter, you may need to move the splitter again.

A vibratory feeder can be used to level out surges and provide a uniform feed to the eddy current separator. Use a 45° slide chute between the end of the feed conveyor and the eddy current belt. The slide chute will present the material to the belt without impact or bouncing.

Special care must be taken when broken glass is present in the material. The slide chute should be equipped with sides that direct the material on to the belt without pushing broken glass under the belt seals. If glass gets caught under the belt seal, it may cause the belt to be cut.

ADJUSTING THE SPLITTER

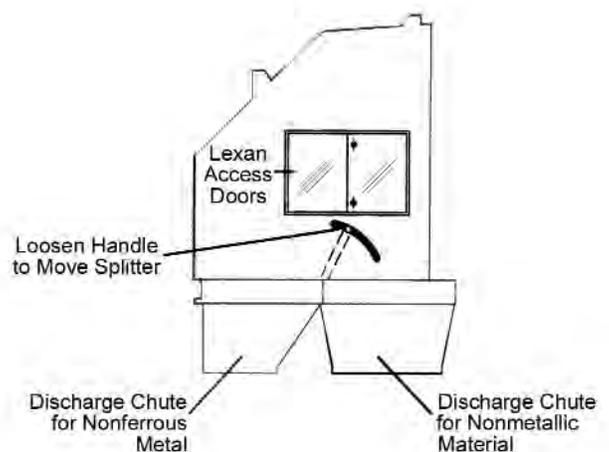
The splitter location determines what will be recovered as nonferrous metal or nonmetallics.

To adjust the splitter (Fig. 9):

- 1) The conveyor belt should be running and the magnetic rotor turned off. Use the selector switch on the control panel.
- 2) To move the splitter, loosen the threaded handle on the outside of the discharge housing.
- 3) Use the clear Lexan access doors to view your adjustments. Move the splitter until the trajectory of the burden at normal belt speed is about 1” short of the splitter. This should result in the nonmetallics being discharged into the proper chute.
- Since the magnetic rotor was not turned on, no separation took place. The material which dropped through the discharge chute while adjusting the splitter may include nonferrous metal and will need to be run over the eddy current separator again.
- 4) Turn on the magnetic rotor. Nonferrous metals should now be repelled over the splitter into the proper chute.

Note: If you increase or decrease the eddy current belt speed, you will need to adjust the splitter again because the trajectory path will have changed.

Figure 9 - Adjusting the Splitter.



MAINTENANCE

CAUTION: Rare earth magnets in the magnetic rotor assembly are extremely powerful. They can project magnetism through a considerable distance and exert strong pulling force on magnetic metals. Use of iron or steel tools near the magnet could cause injury to personnel or damage to the separator.

IMPORTANT DAILY MAINTENANCE

The magnetic rotor should be inspected routinely to ensure that no iron or ferrous metal is attached to the shell of the rotor beneath the conveyor belt. This metal may wear a groove in the surface of the outer shell and cause it to fail prematurely. Daily inspection is recommended, although it depends on your application and conditions.

The ceramic tile used by Dings on the outside of the fiberglass shell is the most wear-resistant surface available, but you will still need to inspect the shell daily and remove any iron particles in order to ensure a long life for the separator.

To inspect the wear shell:

- 1) Turn off the magnetic rotor and the conveyor belt and lock out power. Allow them both to come to a complete stop. The conveyor belt will continue to run for several minutes after the switch has been turned off. Lock out power.

CAUTION: You should wear safety glasses, a face shield, or some other type of eye protection before proceeding with the inspection.

- 2) Open the access doors (Fig. 10) and inspect the belt and the wear shell. There should not be any holes in the belt, nor any grooves in the wear shell of the rotor.
- 3) Rotate the shell slowly by hand and remove any iron particles which may be attached to it.

- 4) Continue to rotate the pulley slowly and remove any pieces of steel or iron sticking in the belt. Inspect the belt for any signs of holes or wear which may allow particles or iron to go through the belt and onto the surface of the wear shell. If the belt shows much wear or any holes, it should be replaced with a new belt.
- 5) Inspect the belt position on the pulley to see if it is tracking properly or if it needs to be adjusted. Do not over-tighten when adjusting or damage will occur to the wear shell.
- 6) Inspect the belt slider bed through the access doors. If the slider bed shows signs of excessive wear, it should be replaced.

Cleaning the Splitter

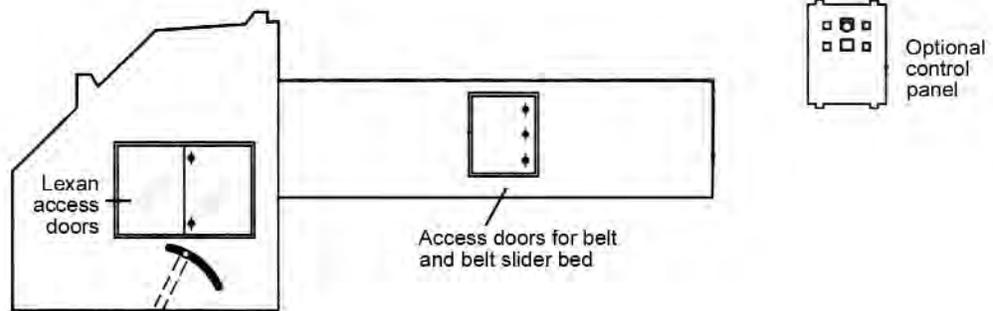
CAUTION: Stop the separator before cleaning the splitter. It is dangerous to clean it when the unit is running as the cleats on the belt may cause injury. Lock out power.

It is very important to keep paper, rags, wire, plastic bags, etc. from collecting on the splitter. This build-up of debris can block the nonferrous metal, causing it to fall into the nonmetallic discharge chute. To clean the splitter:

- 1) Turn off the magnetic rotor and the conveyor belt. Allow them both to come to a complete stop. The belt of the conveyor will continue to run for several minutes after the switch has been turned off. Lock out power.
- 2) Open the two Lexan access doors on the side of the discharge housing.
- 3) Use a wooden stick or dowel to clean off the splitter.

CAUTION: Do not use a metal rod or any piece of steel or iron as it will be attracted to the magnetic rotor.

Figure 10 - Access Doors for Inspection and Cleaning of Components.



General Maintenance

Lubrication

CAUTION: Do not grease the machine while in operation. Lock out power.

Follow standard bearing maintenance. Lubricate the bearings in your normal lubrication schedule, with a lithium-based grease conforming to NLGI Grade 2. However, if conditions are very dirty, lubricate every two weeks.

CAUTION: Do not over-grease the bearings on the wear shell of the rotor.

Motors and Drive Components

Standard motor maintenance applies. Inspect motors at regular intervals. Keep the motors clean and the ventilation openings clear of dust or other debris. Check gear reducer oil level and fill as required with proper lubricant.

Inspect V-belts and sheaves on the magnetic rotor drive at least once a month and replace when necessary. Periodically check and maintain proper V-belt tension.

All pulley hubs and bearings are tightened at the factory. Shortly after application of full load at installation, the hub bolts and set screws on bearings may need to be tightened. Repeat this every 2-6 months, or as needed.

Belt Tracking and Tension

Conveyor belt tracking and tension should be checked once a week. Follow procedures for tracking on page 5.

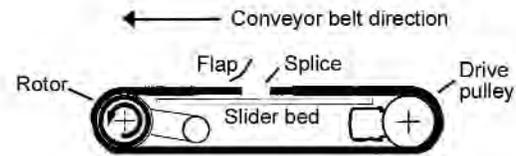
Replacing the Conveyor Belt

The new belt should be of the same type and size as the old belt, with similar cleats and side walls. A stainless splice should be used, with a top cover flap glued over the splice once the belt is installed. Ends of the belt must be cut square to the edges of the belt. If not, belt tracking may be difficult or impossible.

To replace the belt:

- 1) Lock out power and use caution around the magnetic rotor as it is very powerful.
- 2) Loosen the take-ups located at the opposite end from the magnetic rotor.
- 3) Remove old belt by cutting it off.
- 4) Inspect and clean pulleys. Make sure all bolts holding the bearings are tight.
- 5) Feed the new belt onto the unit so that the splice is on top, on the slider bed (see Fig. 11). The flap should be on the belt end that is closest to the magnetic rotor.

Figure 11 - Belt Replacement.



- 6) Attach the ends of the belt following the manufacturer's instructions.
- 7) Glue flap down over splice according to the manufacturer's instructions. Be sure the flap is flat and wrinkle-free.
- 8) Tighten the take-ups evenly until the belt has a small amount of tension on it. Make sure the belt is centered on all the pulleys.
- 9) Track the belt following instructions on page 5.
- 10) Stop the belt with the splice on top. Turn off the unit and lock out the power.
- 11) Adjust the rubber cowling seals if required so that there is about 1/16" of clearance between the seals and the thickest part of the belt (splice area). If the seals touch the belt, they may wear a groove in the belt.

Replacing the Wear Shell

Return the magnetic rotor pulley assembly to Dings Co. for replacement of the wear shell.

CAUTION: Use extreme care as pulley assembly is magnetically very strong and can be drawn to ferrous metal with very high force.

If the magnetic rotor is removed from the separator, it should never be allowed to rest on the shell surface; it should be suspended on the shaft. Although the separator is designed for heavy-duty operation, the shell is brittle and a sudden shock or blow could damage it. Place the magnetic rotor in a wooden crate to protect it when not installed in the separator.

TROUBLESHOOTING

Recommendations to improve the performance of the eddy current separator:

- 1) On most units a belt speed of 400 feet per minute will give optimum separation.
- 2) If equipped with a variable speed drive and the belt is set too fast, the material may not be in the magnetic field long enough over the magnetic rotor to be affected by the repulsion force. If the belt is set too slow, the difference in trajectory of the non-ferrous and non-metallic material will not be great enough to properly split the two material streams.
- 3) Install a longer vibratory feeder. Burdens which have a high volume of material but little weight are more difficult to separate. Material such as auto fluff is very light - normally about 10 pounds per cubic foot in density. It's important to provide enough travel distance on the vibratory feeder to level out the surges and reduce the overall depth of the fluff before it reaches the eddy current separator.
- 4) Determine whether the nonferrous metal being missed is truly "recoverable." The size, type, and configuration of the nonferrous affects its ability to be separated:
 - Nonferrous metal entrapped in nonmetallic material may be impossible to separate. Small scraps of aluminum that are embedded or entrapped in fabric, foam or plastic usually are not recoverable. And although aluminum cans are very easy to separate, a full soda can is not recoverable - the weight of the soda or nonmetallic material is much greater than the repelling force affecting the aluminum.

- Although aluminum, copper, and die-cast metal are recoverable with an eddy current separator, there are other nonferrous metals which are very difficult or impossible to separate. For example, although they are nonferrous metals, stainless steel 302 and 304 are very difficult to separate. Their high resistance to current flow usually prevents any significant repelling force from being developed.

Belt Tracking

If the belt is difficult to track after following procedures on page 5, check the following:

- Are all bearings bolted down tightly to the frame? Have they moved or shifted?
- Are the eddy current pulley and drive pulley at right angles to the frame?
- Is the eddy current frame twisted or bent in any way?
- Has the belt been stretched so that one side is longer than the other?
- If the belt has been replaced, have the ends been cut square to the edges of the belt prior to the splice being installed?
- Are all the bearings in proper operating condition?

ORDERING PARTS

Replacement belts or other parts can be purchased from the Dings Co. in Milwaukee. Call **414-672-7830**. Please have nameplate information ready to supply while on the phone. The nameplate is located on the frame.