HempTrain™

HempAlta Maintenance Manual

Revision History

Rev.	Description	Date
1.0	First release	22/04/01

Contents

Safety

WARNING

Contact with moving equipment may result in injury or death

- Lock out equipment before maintaining
- Keep guards in place as much as is feasible
- Communicate clearly during testing
- Keep body parts away from all moving equipment

This document assumes that the user is fully competent in working safely in the industrial environment, particularly with regards to lockout during maintenance and clear communication during testing. It is the responsibility of the system operator to ensure that their staff (the users of this manual) are not only trained in industrial safety but are also supported by appropriate safety systems and management direction. Failure to follow appropriate safety practice may result in serious injury or death. Read procedures in full before performing them.

Introduction

This manual provides maintenance schedules and procedures for HempTrain™. The procedures are for competent, experienced industrial mechanics performing them for the first time or after a long absence. The procedures assume that the user will provide all necessary tool and have the knowledge and experience to use them.

Overview

This manual has two main sections, Maintenance Schedule, and Procedures. Where a procedure supports a specific maintenance item, the Schedule references the procedure. The Procedures are organized alphabetically by machine. In addition to the scheduled maintenance procedures, the Procedures include repair procedures.

Related documentation

The periodic maintenance tables are also available in a spreadsheet with additional columns for notes.

Maintenance Schedule

Pre-operation checks

	Right	Left
Bale opener feed belt – check tracking		
Bale opener regulating drum chain drive tensioner – check condition		
Bale opener fines conveyor belt – check tracking		
Crusher input belt – check tracking		
Transverse conveyor belt – check tracking		
Decorticator fiber input conveyor belt – check tracking		
Drum 1 grid bars – check height correct, locked & jack screw retracted		
Decorticator transfer conveyor belt – check tracking		
Drum 2 grid bars – check height correct, locked & jack screw retracted		
Decorticator hurd output conveyor belt – check tracking		
Decorticator fiber output conveyor belt – check tracking		
Cleaner input belt – check tracking		
Cleaner lobed rolls – check for hopping, remove hurd		
Cleaner shaker linkage plain bearings – lubricate		
Cleaner output conveyor belt – check tracking		
Baler air dropleg – drain		
Baler air water trap – drain		
Baler air oiler – check		
Baler stuffer shocks – check for resistance, replace if damaged	p.	14
Incline conveyor belt – check tracking, remove hurd from nip		
Primary separator GMF conveyor belt – check tracking		
Secondary separator screen – check for blinding		
Bypass conveyor belt – check tracking		

Weekly checks

The purpose of weekly checks of the conveyors is to detect damage to the belts and skirts before they take the machine down. This allows you to marshal parts, tools and people so you can efficiently replace the parts at a time of your choosing.

	ref.
Bale opener feed conveyor – check belt and skirt condition	-
Bale opener pre-opener feed – check belt and skirt condition	-
Bale opener fines conveyor – check belt and skirt condition	-
Bale opener bypass conveyor – check belt condition	-
Crusher input conveyor – check belt and skirt condition	-
Crusher crush roll bearings – blow out dust	
Crusher crush roll chain tensioners – check condition	
Decorticator fiber input conveyor – check belt and skirt condition	-
Decorticator hurd output conveyor – check belt and skirt condition	-
Decorticator Transfer conveyor belt and skirt – check condition	-
Decorticator fiber output conveyor – check belt and skirt condition	-
Cleaner input conveyor – check belt and skirt condition	-
Cleaner Tines – check	p. 15
Cleaner output conveyor – check belt and skirt condition	-
Baler hydraulic components – check for leaks	-
Transverse conveyor – check belt and skirt condition	-
Incline conveyor belt – check condition	-
Control panel – blow out	p. 16
Separator GMF conveyor – check belt and skirt condition	-
Primary Separator Screen drive – check backlash	p. 33
Hurd Processor Screen – check	-
Secondary Separator – check for missing/loose fasteners/hardware	-

Monthly maintenance

When checking drive trains, check for damage and misadjustment; note damage and marshal parts, tools and people so you can efficiently replace the parts at a time of your choosing.

	ref.
Bale opener feed belt chain drive – check and lubricate	-
Bale opener spiked apron chain drive – check and lubricate	-
Bale opener regulating drum chain drive – check and lubricate	-
Pre-opener feed primary chain drive – check and lubricate	p. 12
Pre-opener feed serpentine chain drive – check and lubricate	p. 12
Pre-opener swing arm chain – lube and check	p. 12
Bale opener fines conveyor belt chain drive – check and lubricate	-
Bale opener bypass conveyor chain drive – check and lubricate	-
Bale opener pre-opener V-belts – check	-
Crusher feed conveyor drive – check and lubricate	-
Crusher roll drive chains – check and lubricate	-
Crusher roll bearings – lubricate	-
Decorticator hurd output conveyor chain drive – check and lubricate	-
Decorticator drum 1 feed primary and serpentine chain – check and lubricate	-
Decorticator Drum 1 feed linear bearings – check	-
Decorticator Drum 1 feed chain tensioner – check	-
Decorticator drum 2 feed primary and serpentine chain – check and lubricate	-
Decorticator Drum 2 feed linear bearings – check	-
Decorticator Drum 2 feed chain tensioner – check	-
Decorticator drum 1 V-belts – check	-
Decorticator drum 2 V-belts – check	-
Decorticator fiber output conveyor chain drive – check and lubricate	-
Cleaner rolls and input chain drive – check and lubricate	-
Cleaner shaker V-belt – check	-
Cleaner output conveyor chain drive – check and lubricate	-
Cleaner Roll guide bushings – lubricate	-
Cleaner Shaker linkage – lube rod ends	-

Dust collector – check cartridges	p. 21
Transverse conveyor primary and serpentine chains – check and lubricate	p. 34
Incline conveyor drive chain – check and lubricate	-
Primary Separator GMF conveyor belt skirt – check condition	-
Primary separator GMF chain drive – check and lubricate	-
Primary separator connecting rod bearing – lubricate	-
Separator V-belt – check	-
Hurd processor V-belts – check	-
Screw conveyor drive chain – check and lubricate	-
Control Cable tray – all others – blow out dust	-

Quarterly maintenance

	ref.
Bale opener Feed belt return dead space - remove dust	p. 12
Decorticator - dead space under hurd and fiber output belts - clean out	p. 20
Incline Conveyor brake housing - check, blow out/remove dust	p. 32

Semi-annual maintenance

	ref.
Bale opener feed belt bearings – lubricate	-
Bale opener spiked apron bearings – lubricate	-
Bale opener regulating drum bearings – lubricate	-
Bale opener pre-opener feed bearings – lubricate	-
Bale opener pre-opener drum bearings – lubricate	-
Bale opener fines conveyor bearings – lubricate	-
Bypass conveyor bearings – lubricate	-
Crusher input conveyor bearings – lubricate	-
Transverse conveyor bearings – lubricate	-
Transverse conveyor attrition roller and hinge bearings – lubricate	-
Incline conveyor bearings – lubricate	-
Separator screen drive external bearings - lubricate	-
Separator GMF conveyor bearings – lubricate	-
Screw conveyor screw bearings – lubricate	-
Decorticator fiber input conveyor bearings - lubricate	-
Decorticator transfer conveyor bearings - lubricate	-
Decorticator fiber output conveyor bearings - lubricate	-
Decorticator hurd output conveyor bearings - lubricate	-
Cleaner shaft bearings - rolls, shaker shafts - lubricate	-
Dust collector motor – lube	p. 21

Annual maintenance

	ref.
Bale opener feed conveyor gear box – change lube	-
Bale opener spiked apron gear box change – change lube	-
Bale opener regulating drum gear box – change lube	-
Bale opener pre–opener feed gear box – change lube	-
Bale opener fines conveyor belt gear box – change lube	-
Bypass conveyor gear box – change lube	-
Crusher input gear box – change lube	-
Crusher roll gear boxes – change lube	-
Transverse conveyor gear box – change lube	-
Incline conveyor gearbox – change lube	-
Separator screen drive gearbox – change lube	-
Separator GMF gear box – change lube	-
Screw conveyor Gear box – change lube	-
Decorticator Drum 1 feed gear box – change lube	-
Decorticator Drum 2 feed gear box – change lube	-
Decorticator fiber output conveyor gear box – change lube	-
Decorticator hurd output conveyor gear box – change lube	-
Cleaner shaker gear box – change lube	-
Cleaner output conveyor gear box – change lube	-
Baler hydraulic fluid filter – replace	-
Baler hydraulic fluid – replace	-

Procedures

Bale Opener

Bale Opener feed belt return dead space – remove dust

The panel under the belt is secured by 6 screws – four of which you can see, and two of which secure the panel to the base and are hidden on the inside of the machine. To remove the hidden screw, reach over the top of the panel with an extra long socket extension.

Bale opener spiked apron attachment chain – check and lubricate

- Keep the tines from touching the pre-opener feed belt – move the UHMW tensioner blocks as required.
- Check for excessive wear of the UHMW guides on the working side of the bed
- Check for creep of the hold-down angles and re-position if necessary

Pre-opener feed primary chain drive - check and lubricate

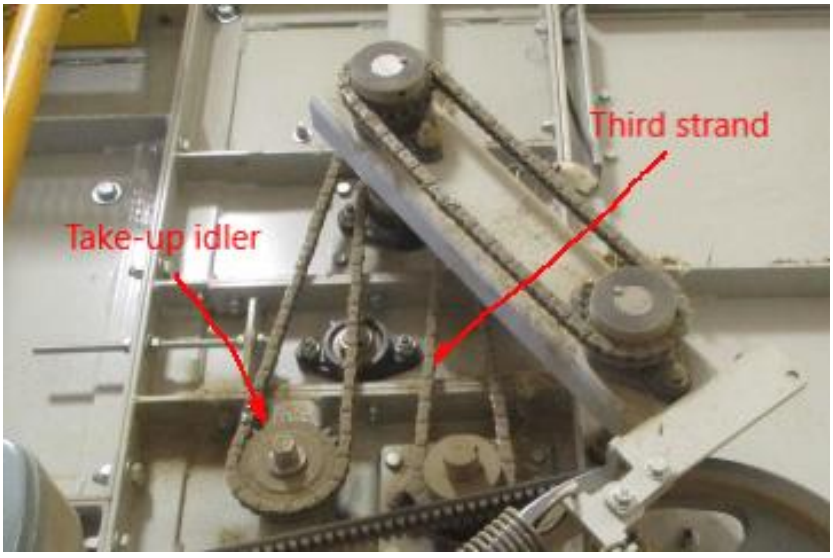
Because the pre-opener feed is sometimes driven by the material, the primary drive chain has to be kept tight. Watch the chain in operation for a few minutes – both strands should come almost completely tight. Failure to keep the chain tight can result in pre-opener drum jams and damage to the pre-opener feed driveline.

Bale opener pre-opener feed serpentine chain – check and lubricate

To check the tension of the serpentine chain

1. Empty the machine of product
2. Enter the Maintenance Mode of the HMI
3. Run the Pre-opener feed forward
4. Watch the 3rd strand of chain (see *Figure 1 - Bale Opener Serpentine Chain*). The slack in the strand will vary as the machine runs. The strand should almost but not quite come tight – you want to eliminate slack, but not at the expense of putting excess load on the chain.
5. Adjust the take-up idler as required.

Figure 1 - Bale Opener Serpentine Chain



Bale opener pre-opener swing-arm chain – check and lubricate

To check the tension of the swing-arm chain

1. Measure the slack in the center of the slack strand. This is the difference between when you pull the center of the strand away from the tight strand and when you push it toward the tight strand.
2. If this difference exceeds 1.5 inches, replace the chain.

Bale opener pre-opener swing-arm chain – replacement

To replace the swing-arm chain

1. Remove tension from the pre-opener serpentine chain
2. Replace the swing-arm chain
3. Re-tension the pre-opener swing-arm (see *Bale opener pre-opener feed serpentine chain – check and lubricate* on page *12*.)

Baler

Baler stuffer linkage – check

Check that all set screws are tight. Check that shaft collars are tight against links.

Baler stuffer shocks – replace

- Top shock: McMaster-Carr 3742K21
- Bottom shock: McMaster-Carr 3742K19

Cleaner

Cleaner rolls and input belt chain tensioners - check

Check for loose or bent tensioner arms, bent mounting brackets, and loose or damaged sprockets.

Cleaner rolls and input belt chain tensioners – adjust

Tensioners must not exceed their rated deflection when the chain strand is tight. Check during installation.

Cleaner tines – check

Check for tines or crank arms shifting on the shafts. Tines should be parallel with each other. Check also for correct angle – rotate the drive by hand until the tines are as close to vertical as they will go. Use an inclinometer on the end of one tine from each shaft. The angle should be 87 +/- 1 degrees from the horizontal.

Compressed air

Best practices

HempTrain™ is equipped with low-pressure (30-40 psi) air outlets for cleaning.

- Use compressed air to clean only thing that are not practical to clean with a brush – the inside of the control cabinet, wiring, machine interiors etc.
- Do not use full pressure (90-125 psi) air for cleaning

Control system

Control system – blow out panel

1. Lock out system power
2. Blow out the condenser (the white box on the right-hand end of the panel).
3. Open the panel doors
4. Direct an air hose at the fan in the right-hand end of the panel
5. Direct an air hose at the fins in the right-hand end of the panel
6. Direct an air hose at the cooling vents of the VFDs (the row of boxes labelled “Teco” at the bottom of the panel
7. Blow the remaining dust out of the panel

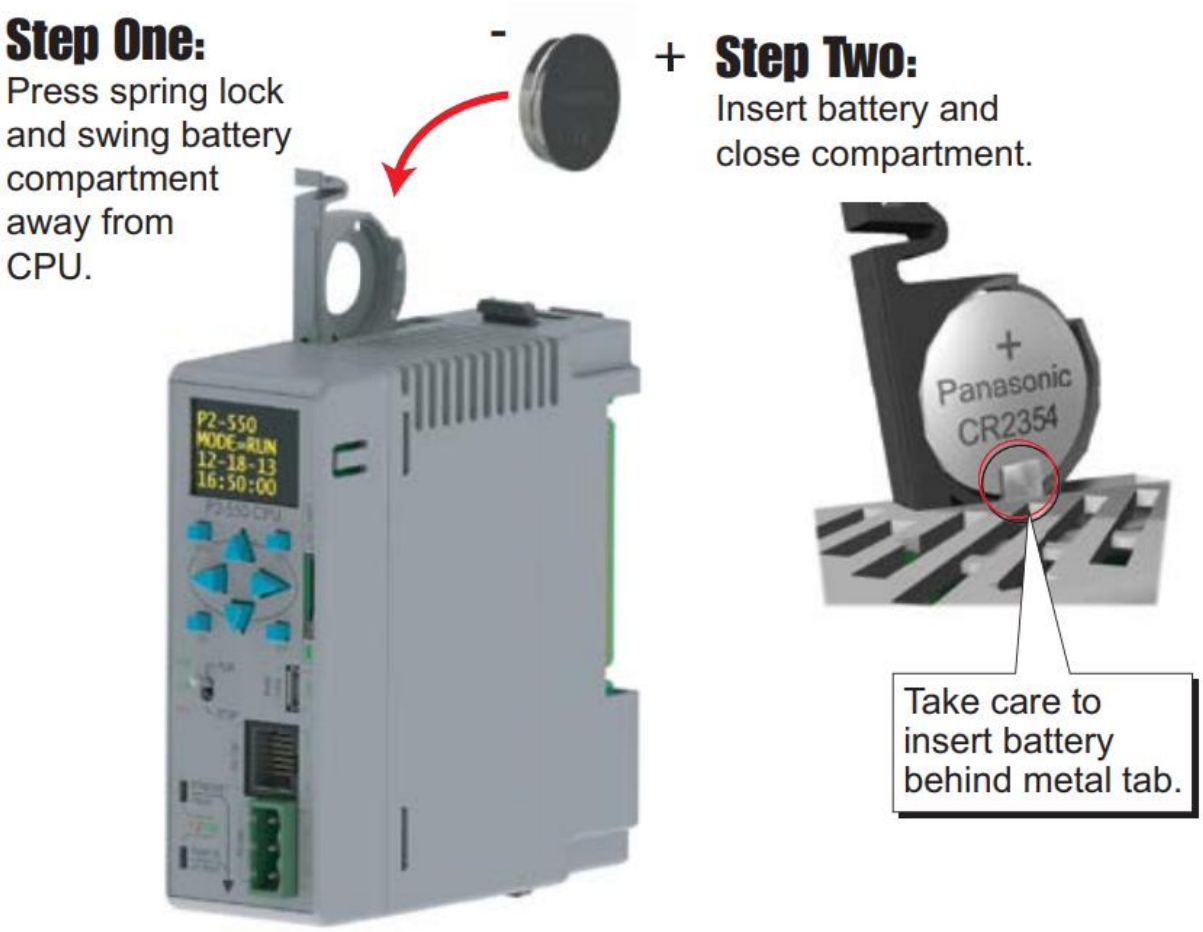
Control system – T-1 Panel Temperature High alarm

This alarm indicates that the panel is at risk of damage from overheating. Possible causes in clude:

- Panel needs to be blown out (see previous procedure)
- Air conditioner failed
- Air conditioner needs refrigerant recharge
- Ambient temperature above operating spec for system

Control system –Replace back-up battery

The back-up battery allows the CPU to retain the time and date as well as any tagname values that have been set as retentive. It is not needed for program backup.


Step One:
Press spring lock and swing battery compartment away from CPU.
-
+
Step Two:
Insert battery and close compartment.
P2-550
MODE=RUN
12-18-13
16:50:00
+
Panasonic
CR2354
Take care to insert battery behind metal tab.

Conveyor Belts

Check tracking

Belts should track in the middle of the pulleys. The edge of the belt must not rub on the side of the machine – the belt, the machine or both will be damaged. Belts should be only tight enough to continue moving under full load – excessive tension damages both belts and machines.

Crusher

Crush roll drive chain tensioners

Check condition.

Decorticator

Decorticator – clean out transfer belt

1. Measure the take-up distance on both sides and record it.
2. Release the belt tension
3. Vacuum the inside of the belt
4. Check for and remove fiber accumulation between the roll ends and the side of the machine
5. Center the belt
6. Re-tension the belt

Decorticator – dead space under hurd and fiber output belts – clean out

Access this space from the output end of the decorticator. Remove the access port cover and shovel out the dust you can reach. Get a buddy for potential rescue. Then climb inside with a vacuum cleaner. Your buddy must stay with you until you get out of the machine.

Decorticator – straighten Drum 1 baffle

1. Disconnect the dust collection pipe (remove the lower clamp)
2. Remove the cover – slide downstream (towards output) and leave it on top of the machine
3. Remove 4 button head bolts
4. Remove the baffle
5. Straighten the baffle in a vice or using clamps on a bench top
6. Re-install baffle
7. Re-install cover
8. Re-connect dust collection

Dust Collector

Dust Collector motor – lubricate

Use a ladder to access the motor. There are two grease fittings, one high and one low.

Dust Collector cartridges – check

Remove the cartridge from the dust collector and

- Check for and remove fibers stuck in the folds of the paper
- Check for signs of leakage (dusty areas on the seals)
- Check for damage (dents in the end pieces, missing or damaged seals, any bending or crumpling of the mesh on the inside of the cartridge
- Do not over-tighten

Hurd Processor

Hurd processor cover – open/close

Open

1. Remove the cover hold-down screw (see *Figure 2 - Hurd processor cover hardware*)
2. Remove the 2 input chute bottom screws closest to the separator (*Figure 2*)
3. Loosen the 2 input chute bottom screws to allow chute bottom to pivot
4. Loosen retaining link screws
5. Retract the separator screen by turning the separator drive sheave see *Figure 3 - Separator drive* and *Figure 4 - Screen observation position*.)
6. Tilt the cover back while pulling the chute bottom down to open

Figure 2 - Hurd processor cover hardware

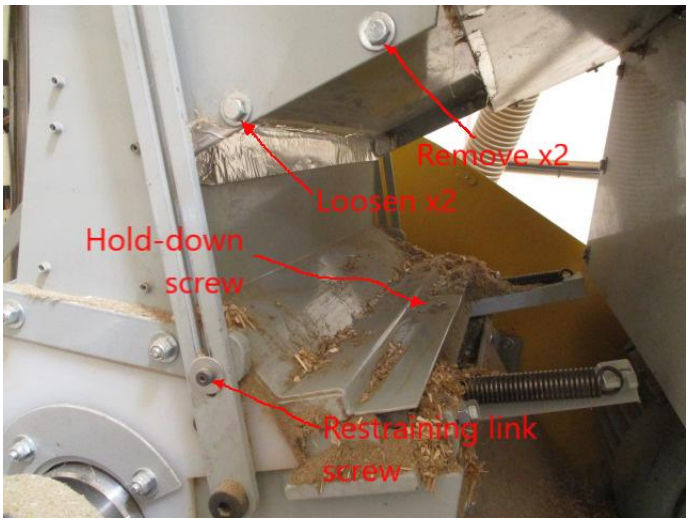


Figure 3 - Separator drive

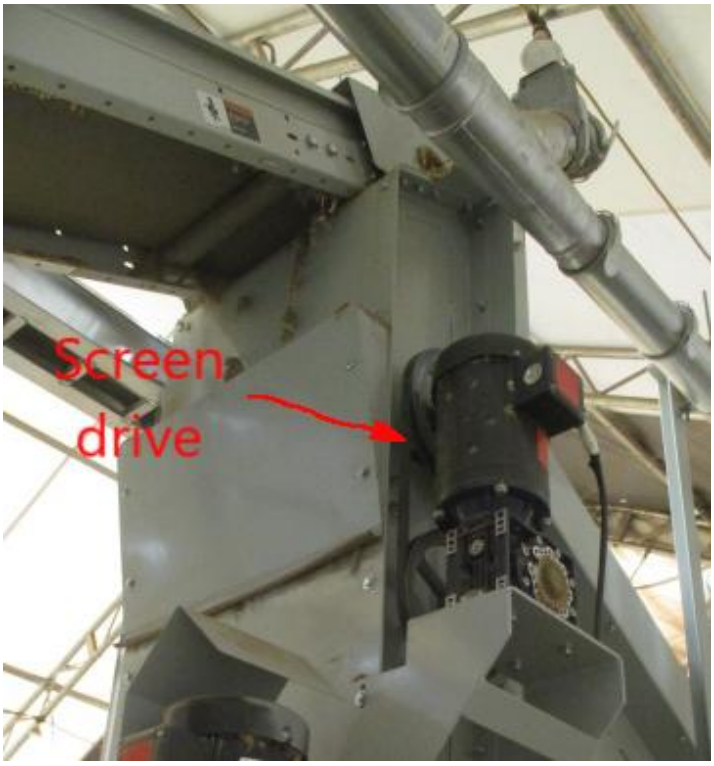


Figure 4 - Screen observation position

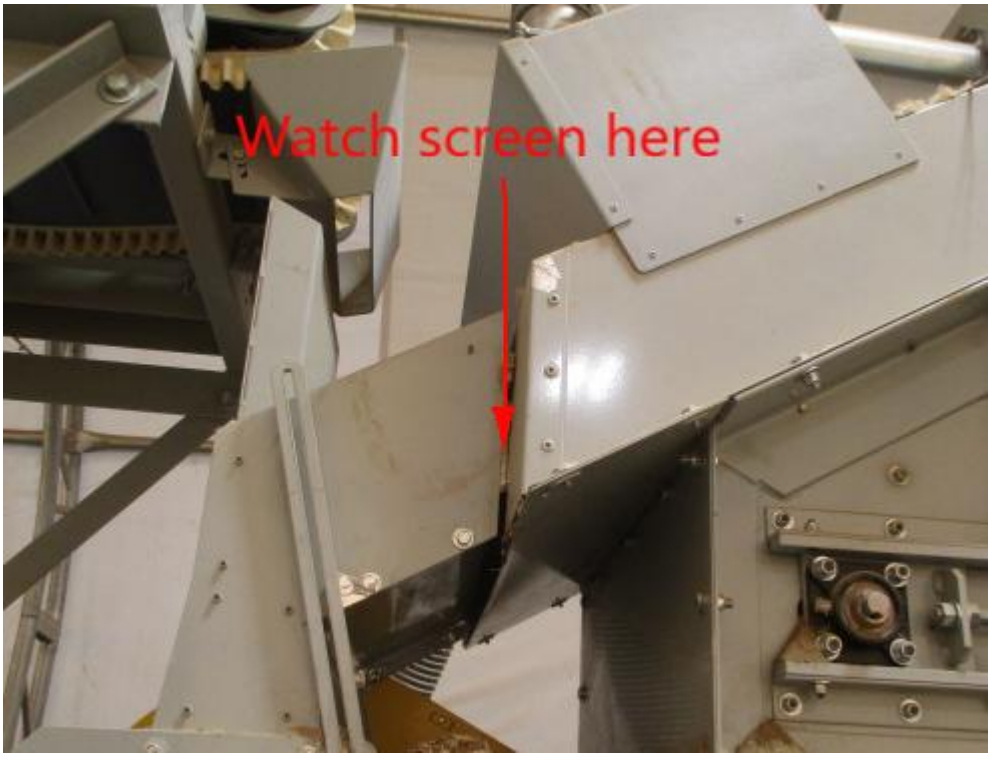


Figure 5 - Opening the processor cover

Close

1. Clean all material from the cover seating area
2. Retract the separator screen by turning the separator drive sheave (if not already retracted)
3. Tilt the cover forward while lifting the chute bottom under the separator screen (*Figure 6 - Closing the processor cover*).
4. Install the cover hold down screw
5. Swing the input chute bottom into position and install 2 screws
6. Snug all 4 chute bottom screws
7. Tighten the retaining link screws

Figure 6 - Closing the processor cover

Hurd processor screen – remove/install/check for interference

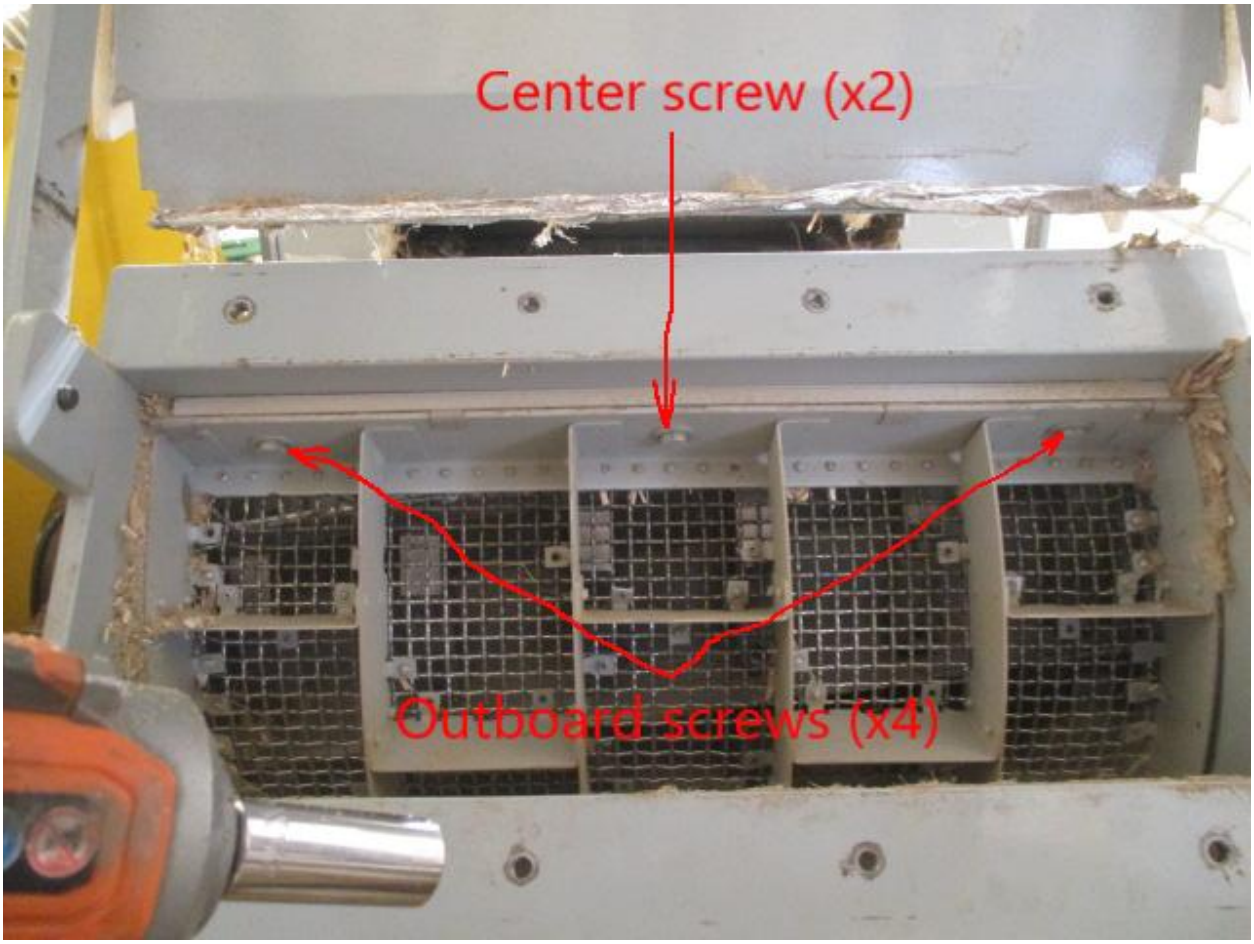
Remove

1. Lock out system power
2. Remove MicroHurd bag
3. Sweep floor under and around machine
4. Remove front and back covers (see *Figure 7* and *Figure 8*)
5. Slide the Secondary separator out of the way – this may require two people, an air hose for cleaning the slides, and multiple attempts as you progressively blow out dust in the slides.
6. Remove the outboard mounting screws – leave center screw in place but only finger-tight (see *Figure 9 - Screen mounting screws*)
7. Reach under the machine to support the screen and remove the center screws.
8. Lower the screen and shim packs. If the machine has run for a few days, this may take some effort as hurd packs in against the side of the screen frame and holds it in place. Take note of which shims are on the front of the machine and which are on the back – they are different. The screen may also be shimmed from side to side with small pieces of sheet metal – make sure to record where they go.

Figure 7 - Processor front cover

Figure 8 - Processor back cover

Figure 9 - Screen mounting screws



Install

1. Make sure all hurd has been removed from the processor – pieces of hurd can cause noises that interfere with checking the screen installation.
2. Determine whether to use the existing shims or change them to accommodate new fly knives. If you have installed a new set of fly knives, use the full stack of shims to provide blade-to-screen clearance.
3. Get a buddy to help you.
4. Have your buddy hold the screen under the processor while you stack the screen shield and the shims on the screen frame rails. The screen shield goes on the front, right against the screen frame (*Figure 10 - Screen shield*) – note the orientation. The shield protects the edge of the screen from hard objects carried by the rotor.
5. Have your buddy lift the screen into place while you insert the center screws. Leave them a bit less than finger tight so you can adjust the shims
6. Insert the rest of the screws and tighten.
7. CAUTION: Always check for interference (see following procedure)

Figure 10 - Screen shield

Check for interference

1. Arrange for the shop to be as quiet as possible – turn off fans and other sources of noise
2. Rotate the rotor backwards by hand

- You may hear the fixed knife contacting the rotor blade. You will hear the blades slide across each other. This is OK
- You may hear the blades contact a rivet or the screen. A rivet will make a short sound; the screen will make a longer sound. In both cases you will hear the screen frame vibrate. This must be corrected.
- You may hear the blades contact a piece of hurd; this will be a short sound that is distinct from a rivet. If you are not sure what kind of sound you are hearing, use a metal tool to tap the screen frame then and drag across the screen itself. These are the sounds of contact. Hurd sounds "softer", like the difference between hitting something with a steel hammer and hitting it with a rubber mallet.
- If there is contact on a new screen, touch the screen as your buddy rotates the rotor. You will feel where the contact is occurring – mark the contact areas with a crayon or dry-erase marker, remove the screen and adjust with a hammer. Take it easy with the hammer – you only want to bend it enough to clear the blades – anything more can interfere with processing efficiency.
- If there is no contact with a new screen, you may want to remove shim(s) to get the screen closer to the blades – the smaller the distance, the higher the throughput.

3. Once you have set the screen so that there is no contact when rotating backwards, try rotating forwards. If there is contact, eliminate it.
4. CAUTION: Remove all material and tools from the top of the rotor.
5. Use Maintenance Mode to spin the rotor **backwards** at 300 rpm (indicated). Listen carefully for contact. If there is contact, eliminate it.

6. Use Maintenance Mode to spin the rotor **forward** at 300 rpm under power. Listen carefully for contact. If there is contact, eliminate it.
7. Repeat steps *5* and *6* at 600 rpm.
8. Repeat steps *5* and *6* at 1000 rpm.
9. Close up the processor and return the unit to service.

Hurd processor knives – backlap

1. Open the cover (see *Open* on page *22*)
2. Remove the screen (see *Remove* on page *25*)
3. Adjust the fixed knife until there is firm, not light contact (see *Adjust* on page 29). You should still be able to (barely) move the rotor by hand.
4. Turn the keyswitch to Backlap
5. Hold the brush in your right hand and load it with compound
6. CAUTION: avoid contact with the rotor. Push the run button with your left and apply compound
7. After about 10 minutes, check for a burr on the fly knives. If there is no burr, check for firm contact between the fixed knife and the rotor – advance the fixed knife if necessary. Then continue back lapping.
8. Once a burr has formed on the rotor knives, remove the burr with a piece of a diamond file.
9. Clean the lapping compound off of the machine. Any compound remaining on the machine can cause premature wear of the blades.
10. Adjust the fixed knife as in section Hurd processor – fixed knife adjust/replace.
11. Reinstall the screen (*Install* on page *27*)
12. Close the cover (*Close* on page *24*)
13. To thoroughly clean the lapping compound off of the machine in order to prevent product contamination, run some material that can be thrown away.

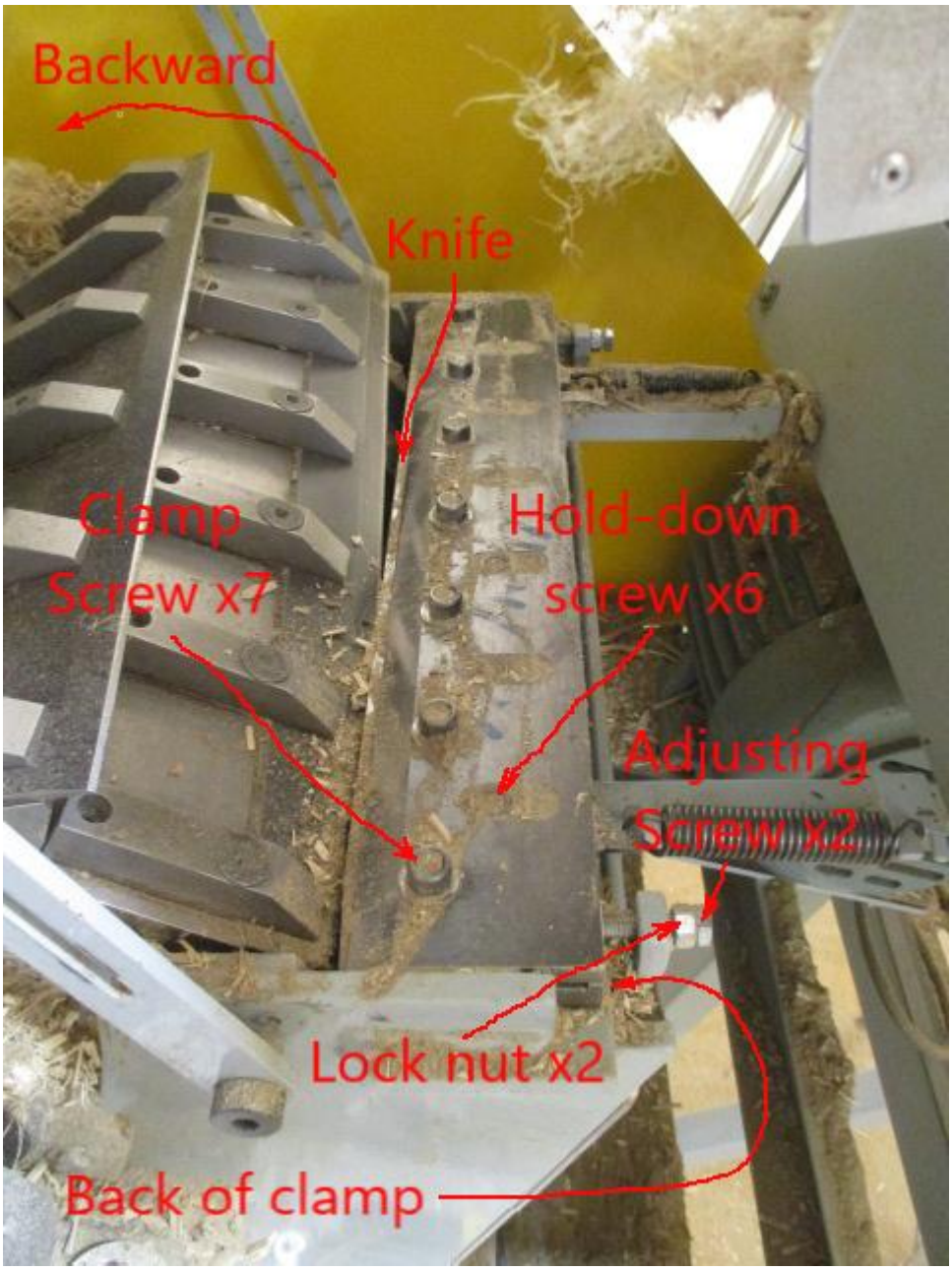
Hurd processor – fixed knife adjust/replace

Adjust

1. Open the cover (see *Open* on page *22*)
2. Remove the screen (see *Remove* on page *25*)
3. Loosen the jam nuts and back out the adjustment screws a couple of turns (see *Figure 11 - Fixed knife mounting and adjustment hardware*)
4. Pick and blow all hurd out of the knife hold-down screw sockets (those are the screws in the slots)
5. CAUTION: cut hazard; cut-resistant gloves are recommended. Rotate the rotor so that the fly knives and the fixed knife do NOT line up – this will create space to re-install the knife assembly
6. Back out the knife hold-down screws so they are just less than finger tight
7. Rotate the rotor backwards – the rotor will push the knife into rough position Finger-tighten the outer down screws – leave the center four screws loose.
8. Rotate the rotor backwards and check for even and light or very light contact across the width of the machine. Advance the screws while rotating the rotor. The adjustment is very sensitive; move the screws only the smallest amount you can. If you overshoot, adjust looser with a brass drift and hammer – light hits only, you don't want to mar or damage the assembly. If the assembly won't move, loosen the screws and try again.
9. Finger-tighten the hold-down screw.

10. Torque the hold-down screws to **30** ft-lb
11. Rotate the rotor backwards and again check. Generally, contact will now be heavier; as long as you can easily turn the rotor by hand, this is OK.

Figure 11 - Fixed knife mounting and adjustment hardware



Replace

1. Open the cover (see *Open* on page *22*)
2. Remove the screen (see *Remove* on page *25*)
3. Loosen the jam nuts and back out the adjustment screws a couple of turns
4. Pick and blow all hurd out of the knife hold-down screw sockets (those are the screws in the slots)

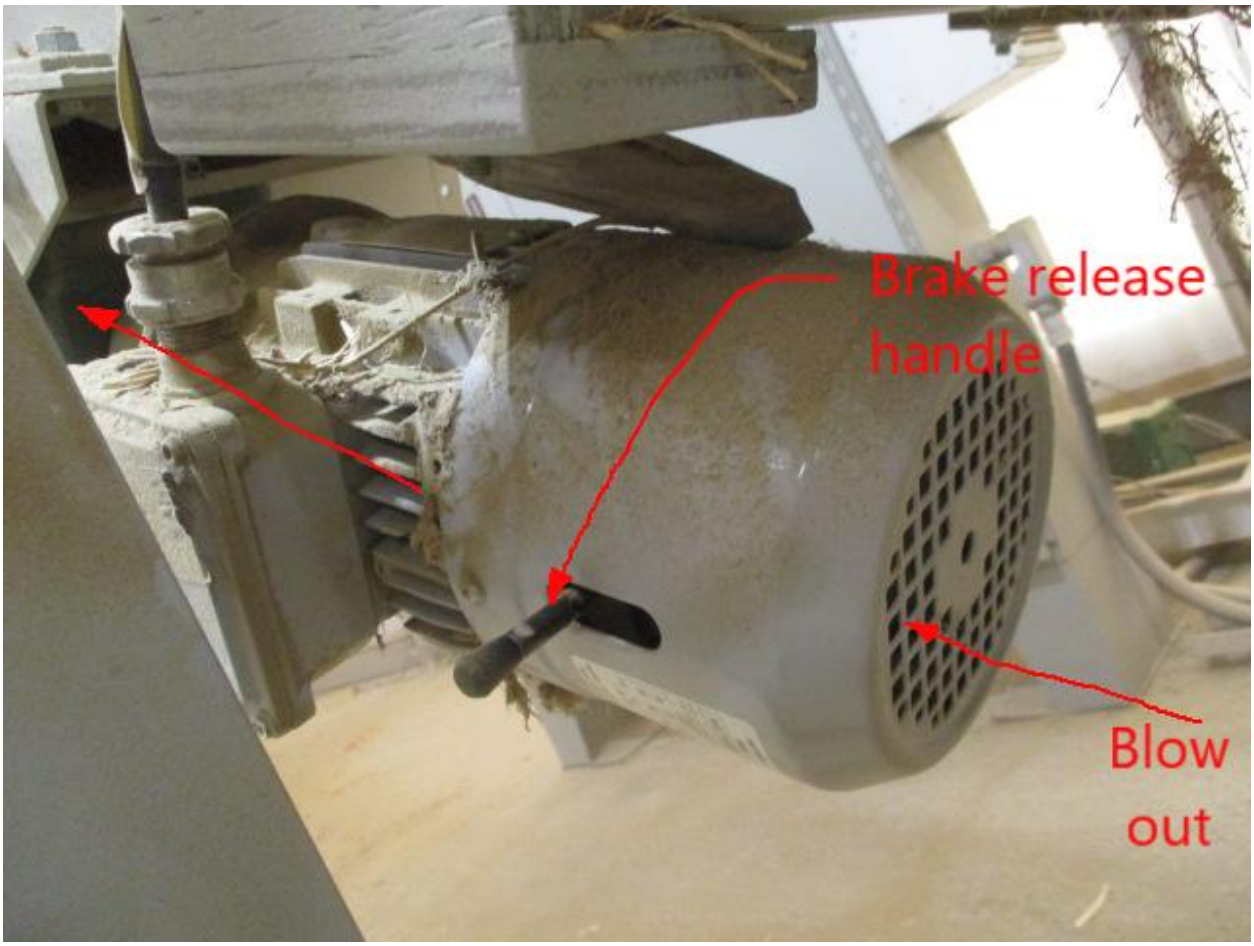
5. CAUTION: cut hazard; cut-resistant gloves are recommended. Rotate the rotor so that the fly knives and the fixed knife do NOT line up – this will create space to re-install the knife assembly.
6. Back out the knife hold-down screws completely out but do NOT remove them.
7. Lift the knife assembly out of the machine and take it to a work bench.
8. Clamp the assembly to the bench top and remove the clamp screws (see *Figure 11 - Fixed knife mounting and adjustment hardware)*
9. Remove the old knife and clean both halves of the clamp
10. Use a file to dress off any burs on the clamp
11. Place the new knife in the clamp. The edge should be up and the knife centered in the clamp.
12. Set the knife so the straight part of the edge protrudes 1/8” past the lower clamp jaw
13. Put the washers on top of the slots, put the top clamp jaw on the bottom clamp jaw, and put the hold-down screws through the washers.
14. Insert but do not tighten the clamp screws
15. Line up the back sides of the top and bottom of the clamp (*Figure 11 - Fixed knife mounting and adjustment hardware*)
16. Check that the knife is still properly located in the clamp
17. Tighten the clamp screws to 30 ft-lb
18. Place the fixed knife assembly back in the machine
19. Adjust the fixed knife as in *Adjust* on page 29

Incline conveyor

Incline conveyor brake housing – check, blow out dust

Start with an air hose – see *Figure 12 - Incline conveyor brake housing*. If air does not pass freely through the housing, lock out system power and remove cover (the brake release handle screws into the brake). Clean out all the dust and fiber and re-assemble.

Figure 12 - Incline conveyor brake housing



Primary separator

Primary separator screen drive – check backlash

1. Get a ladder
2. On the ladder, grab the drive sheave (the one on the gearbox) and rotate it gently in the forward and reverse directions. When changing directions, you will feel slight backlash in the gear drive. Observe:
   - Does the shaft rotate with the sheave, or is there some slop?
   - Does the inner ring of the gearbox bearing rotate with the shaft, or is there some slop?
   - If there is slop in either of these connections, correct immediately. Note the relative amount of backlash in the gears. If it is noticeably increasing from one inspection to the next, replace the gearbox.
3. Grab the driven sheave and jerk it in the forward and reverse directions. You will be able to feel the gearbox backlash, attenuated by the belt, but you will also be able to feel if there is backlash between the sheave and the screen. Observe: Does the shaft rotate with the sheave, or is there some slop? If there is any slop, correct immediately.
4. If there appears to be backlash between the shaft and the screen, remove the cover (see *Figure 13 - Location of Primary separator access cover*) and grab the connecting rod bearing and shake parallel to the machine. If there is slop, replace the bearing at the next scheduled major maintenance.
5. If there is no slop in the connecting rod bearing, grab the screen by its sides and shake it forwards and back. If there is slop, the rod end bearing should be replaced at the next scheduled major maintenance.
6. Check the belt tension. A loose belt will create backlash.

Figure 13 - Location of Primary separator access cover

Transverse conveyor

Transverse conveyor primary and serpentine chains – check and lubricate

To check the tension of the serpentine chain

1. Enter the Maintenance Mode of the HMI
2. Run the Transverse Conveyor
3. Watch the 3rd strand of chain (see *Figure 14 - Transverse conveyor serpentine chain*). The slack in the strand will vary as the machine runs. The strand should almost but not quite come tight – you want to eliminate slack, but not at the expense of putting excess load on the chain.
4. Adjust as required.

Figure 14 - Transverse conveyor serpentine chain