MAINTENANCE INDEX

MAINTENANCE

Introduction

Every effort has been made in the design of the Fibreflow Drum to minimize maintenance problems. This section on preventative maintenance lists the steps necessary to keep the machine running smoothly and to provide the maintenance personnel with pertinent information so that if a problem does arise, it can be addressed.

Mechanical Operation

The rotating unit of the Fibreflow is a fabricated drum equipped with machined support rings (tires) that ride upon support roller assemblies. An axial guide roller assembly is also provided on the downhill side of the inlet end support ring to take the thrust load imposed by gravity forces resulting from the 1° slope of the drum. A girth gear is mounted on the outside of the drum and is driven by two(2) pinion gears through drive trains and two(2) electric motors to give rotational motion to the drum.

Feed stock and dilution water are supplied to the drum via the inlet chute. The rotation of the drum provides a tumbling action to the contents which kneads the feed material into pulp stock. The end of the drum is constructed of coarse screen plate. This section of the drum is enclosed in a bottom vat and hood assembly. The hood is equipped with a shower pipe that has spray holes to provide dilution to and through the screen plate. The sprayed dilution water keeps the screen plate clean and washes the stock into the bottom vat. Tramp material that entered the drum with the furnish is rejected out the tail end of the drum.

A. Inlet Chute and Inlet Seal Assembly

Description:

The inlet chute is located in front of the drum and is used to funnel feed material into the rotating drum. A dilution header with three nozzles is mounted on the inlet chute for use in adding dilution water to the drum.

A machined seal ring is bolted to the inlet chute to provide a smooth and true surface for the inlet seal to seat against. An exact duplicate seal ring is bolted to the rotating drum to provide the mating surface for the inlet seal to seat against. The inlet seal is a continuous single piece rope packing that is attached to one side of the inlet chute and is supported off the other side of the inlet chute by rollers. A counter weight is connected to the rope seal to provide constant tension. Refer to the "Inlet Seal Assembly" on drawing 1-01413-53, Sheet 3, Section 3, Drawings.

Maintenance:

A small amount of leakage is normal for any rope packing seal, but if the leakage becomes excessive the packing and seal ring surfaces should be inspected. Check the conditions of the inlet seal packing for deterioration and replace if necessary. The machined seal rings should be free of burrs, corrosion, and excessive wear which effect the seal ring capabilities and life of the inlet seal packing. Some tips to improve the seal and life of these pieces are:

- Do not wait for the inlet seal packing to break or completely wear out. Rotate the pieces of packing 180° to the mating surfaces so that a "fresh" surface is provided against the seal rings.

- Experiment with the amount of counterweight that is used with the inlet seal packing. The weight that is provided with the original installation may be changed. In general, only use as much weight as required to prevent the inlet seal from leaking or moving/slapping around. Extra weight on the seal packing will increase wear to the packing and seal rings.

- Periodically inspect the seal ring surfaces, especially after an extended shut-down. If there are any contaminants lodged between the seal rings; clean them. If there is surface corrosion or defects on the seal rings, it should be removed to prevent damaging the packing surface.

- The gap between the two seal rings is ¼" inch (nominal). If this dimension begins to widen from wear; a larger size of packing may help.

- Do not allow the drum to "walk" uphill (especially after support roller work). This will cause the two seal rings to contact each other. Metal to metal contact may damage the seal rings by creating metal burrs that can cut the seal rope packing.

Replacing Inlet Seal Components:

1. Lift and support the counterweight. Remove the rope clips from the end of the packing.

2. Inspect the surfaces of the seal rings. If they do not have excessive wear, they do not need to be replaced. Remove any burrs or surface corrosion that may be present. The new inlet seal packing can now be installed. The new piece of packing may be tied to the existing piece of packing to help pull it into position. The drip pan can be removed to help feed and adjust the new piece of inlet seal packing. Make sure the packing is not twisted, is properly positioned against the seal rings and is looped over both rollers. Install new rope clips and reattach the counterweight.

3. If a seal ring is severely worn and can no longer be considered a good seal surface, it will have to be replaced.

4. If it is necessary to replace the seal ring, it can be removed by removing the bolts and locating pins from the inlet chute flange (from the inlet side).

5. The seal ring on the drum is removed by entering into the drum and removing the socket head screws that hold the seal to the drum end plate. The drum seal

ring is fixed in position by four locator pins. These pins must be removed or drilled out to make it possible to slide the seal ring from its narrow space.

B. Drum Assembly

Description:

The drum assembly is a large fabricated piece of equipment with several internal components. The drum assembly is made up of three sections, the inlet section, the pulper section, and the screening section. The inlet section and the pulper section shell are constructed of solid plate. The screening section is constructed of screen plate. The inside if the drum contains "lifters", which provide a lifting surfaces for the feed material as the drum rotates, and "baffles", which limit the rate of material movement through drum. All three sections contain lifters and baffles.

The lifters are fabricated from flat plates that are welded together to from a triangular cross-section with the drum. There are multiple lifters around the inside perimeter of the drum. The baffles are also constructed from flat plate and are cut and oriented in differing fashions inside the drum to assist in providing the proper retention required for the feed material. There are multiple baffles spaced along the length of the drum. A "scoop" baffle is positioned between the pulping and screening section of the drum. This baffle has a spoon-like arm on the pulping side of the baffle. The scoop baffle is used to help meter stock into the screening section.

The outside of the drum is fitted with two machined support rings (tires) to provide a running surface for the drum.

Maintenance:

The drum has been designed and fabricated to withstand normal operating conditions set for this type of application. Periodic inspections should be performed to check for structural integrity and signs of corrosion of the internal

components. Signs of incidental damage may be considered typical. However, steps should be taken to correct any damage that is found in order to prevent the problem from escalating or causing severe damage to the drum.

C. Support Rings, Support Rollers, and Axial Guide Roller

Description:

The support rings are the machined riding surfaces for the drum assembly. There are two support rings mounted on the drum. For each support ring there are two support roller assemblies. A support roller assembly consists of the support roller, the support roller shaft and two pillow block bearings. Refer to drawing 1-01413-53; Section 3, Drawings. The two support roller assemblies for a support ring are mounted on a common frame. The support rollers and rings take the entire load of the rotating drum and its contents.

An axial guide roller assembly (Item 36 of drawing 1-01413-53) is mounted on the downhill side of the inlet end support frame. This guide roller assembly prevents the drum from moving downhill from the load imparted by the 1° slope of the drum. Both axial roller and the support ring are machined with a bevel on the mating surfaces to provide the proper rolling surfaces. The support rollers and support rings are machined straight across; they are not crowned, dished, or tapered.

Maintenance:

The support rings are narrower than the support rollers so that wear will not put grooves into the support ring surface. There are no normal maintenance items associated with the support rings other than greasing. As a preventative step, the support rings should be inspected periodically for wear.

The rollers rotate at a much faster rate than the support rings and, therefore, require more attention. Also, the bearings for these rollers should be taken into consideration during inspections.

One important note that should be kept in mind. The support rings and rollers are constructed of ductile cast iron. The shafts for the rollers are constructed of heat treated alloy steel. Do not weld on these items. They are not readily weldable.

The following are maintenance tips for the rollers and support rings:

- Look for excessive wear on the support rollers. If shoulders are formed at the edges of the support rollers, they may begin to work at the edge of the support ring and cause flaking or de-lamination of the support ring corners. Grind off the support roller shoulders at the earliest convenience.

- Even coating of lubricant over the face of the support ring should be present. Refer to the lubrication section for additional information.

- Check that the drum runs smoothly. If there is indications of vibration or rumbling, inspect the rolling surfaces for wear, spalling of flaking. Also check the run outs of the support rollers. If imperfections or high run outs ore found, they should be ground or machined before they impart defects into the support ring faces. A maximum of 5/8" may be removed from the diameter of the support roller by machining or grinding. If it is found that the support ring needs grinding, Ahlstrom Machinery has developed a sanding shoe that can be used for this purpose. Conventional grinding of the support rings is not recommended.

- After support rings and support rollers are machined or sanded, it will be necessary to verify the elevations of the drum to insure that seal rings are aligned and that the drum is operating on a 1° slope.

Rebuilding a Support Roller Assembly:

1. Remove the support roller guard and the automatic lubrication lines.

2. Jack up the drum to take the weight off the support roller and to gain adequate clearance. Jack only on the thickened portion of the shell using a properly prepared block to prevent concentrated stress on the drum; do not jack on the

tire surface. Securely block the drum to keep it from rotating and dropping from the jack.

3. If the entire pillow block assembly is being removed with the support roller assembly, check that the inboard jacking screws are tight against the pillow block housing. This will help position the pillow block when it is reinstalled. Measuring the gap between the support roller and support ring also gives another reference point.

4. Loosen the outboard jacking screws and pull the jacking screw stop blocks from their socket. This will allow the bearings to slide out on the frame.

5. Unbolt the pillow blocks from the base and remove the support roller assembly.

6. Remove the bearings from the shaft. Use care not to damage the shaft. Extreme caution should be used if heat is required to remove the bearings.

7. The support roller is fitted on the shaft with an interference fit. Uniformly heat the roller to approximately 250°F degrees to remove the roller or it may be pressed off. Again, use caution when heating the roller. Do not make hot spots when heating. The support roller is heat treated and tempered to have a hard rolling surface. The hub of the support roller has four 1"-8UNC puller holes to aid the removal.

8. Clean and inspect the shaft.

9. Heat the replacement support roller to approximately 250°F degrees. Make sure that the mating surfaces are free of foreign material and machining burrs. Do not lubricate the mating surfaces. Install the support roller on the shaft until the roller contacts the shaft shoulder. Make sure that the machined relief in the bore of the support roller is the end that will contact the shaft shoulder when installing the support roller.

10. Install the bearing according to the manufacturers guidelines included in this manual, Section 10, Sub-Section 1, Bearings. Pack the bearings with the proper grease. See the lubrication section for suggested grease.

11. Thoroughly clean the pillow block housing. Assemble the support roller in the housings and fill the bearing cavity half full of the proper grease.

12. Mount the support roller assembly on the frame with the bearing pillow block against the inboard jacking screws. Fasten the hold down bolts and insert the outboard stop blocks and jacking screws. Tighten the jacking screws.

13. Slowly let the weight of the drum back onto the support roller.

14. Refer to the drum and drive alignment procedure included in this section of the manual.

15. When the alignment is complete, securely tighten all fastening hardware. Make sure that all of the jacking screws are contacting the pillow blocks and that the lock nuts are locked down. Failure to do so may allow the support roller to shift during operation.

16. Apply an even coat of grease to the face of the support roller.

17. Reinstall the support roller guard and all automatic lubrication lines.

18. Test run the drum and check alignment. Make any necessary adjustments.

Rebuilding the Axial Roller Assembly:

1. Remove the axial roller guard and automatic lubrication lines.

2. Unbolt the axial roller assembly from the support frame. Refer to drawing 1-01413-53; Sheet 6, Detail Item 36, Section 3, Drawings for illustration of the axial guide roller.

3. Disassemble the roller assembly by removing the bearing cover, bearing locknut, washer, and then the bearings. A press may be required to remove the bearings. Also remove the seal ring if it is worn or damaged. The seal ring is heat shrunk to the shaft.

4. If the shaft is damaged, remove the shaft from the support base. The shaft is heat shrunk into the base. A press and heat will be required for removing the shaft.

5. Clean and inspect the base, shaft, and bearing cover.

6. Heat shrink the axial roller shaft into the base plate.

7. Install a new sealing ring, along with bearings and the axial roller. Check that the bearings are properly oriented on the shaft.

8. Pack the bearings and cavity with the proper grease. See the lubrication section for suggested grease.

9. Install the lockwasher and locknut. To obtain the proper clearance, tighten the locknut until there is .003"-.005" of axial end play between the shaft and the axial roller to ensure proper tightening. Do not over-tighten.

10. Apply grease over the top of the bearings until the grease is level with the top of the axial roller.

11. Install the bearing cover with a new gasket.

12. Install the axial roller assembly on the support frame and insure that the bolts are properly torqued for bolting materials conforming ASTM A193 B7.

13. Apply an even coat of grease to the face of the axial roller.

14. Reinstall the guard and the automatic grease lines.

D. Drive Components

Description:

The drum is powered by two electric motors. The motors are attached via fluid couplings to gearboxes for speed reduction. The fluid coupling allows a high-torque soft start to the drum. The main speed reducers are in turn connected to jack shaft arrangements with pinion gears. This connection is made through gear type (rigid) couplings. The pinions then drive a girth gear, which is mounted around the perimeter of the drum.

In addition, each drum is provided with an auxiliary (pony) drive to turn the drum slowly for maintenance and inspection work. The pony drive consists of a pony speed reducer, and a manual disengagement coupling which attaches the pony speed reducer shaft to the auxiliary input shaft of one of the main speed reducers.

WARNING: Never operate the main drives while the auxiliary (pony) drive is connected. Lock out the main drives while utilizing the pony drive. Make sure that the disengagement coupling is disengaged after use so that power and speed of the main motor is not put into the pony speed reducer and other components. Neglecting to disengage the coupling will cause a catastrophic failure! A proximity switch has been provided to protect against this situation. A locking device is also required by the customer to lock the shifting lever in the disengaged mode to prevent accidental engagement of the coupling.

Maintenance:

Check the level of the lubricant in the main and pony speed reducers and make sure that the lubricant is not contaminated. Replace lubricant at manufacturer's recommended intervals using the proper grade.

Check that the cooling devices for the main speed reducers are in good working order.

The pinion shaft gear (rigid) couplings require greasing at installation and at specific intervals. See manufacturer's recommended lubrication intervals. Only use a grease that has been recommended by the manufacturer.

If any work has been performed on the drive, check the alignment of the coupling halves.

The maintenance of the remaining drive components will be discussed in detail below; specifically, the pinion/jack shaft arrangement and the girth gear.

Each jack shaft arrangement consists of a machined high alloy steel shaft, a pinion gear that is keyed to the shaft, and two pillow block bearing assemblies. The bearing on the speed reducer side is a "held" bearing while the other is a "free" bearing. The bearings are provided with an automatic lubrication system for greasing. The pinion gears have automatic spray lubrication systems. These components have long life expectancy when proper lubrication and proper alignment of the coupling and pinion gear are maintained. Refer to succeeding paragraphs of this section of the manual for drum and drive alignment.

The girth gear arrangement consists of the girth gear ring. The girth gear ring is a segmented gear consisting of 12 segments. The segments are fastened together using a combination of fitted shoulder bolts (the outer two bolts per connection) for aligning the gear segments, and regular fastening bolts (inner two bolts per connection). The girth gear should have a long life expectancy if proper gear alignment and backlash is kept between the girth gear and pinion gear. Refer to succeeding paragraphs of this section of the manual for drum and drive alignment.

CAUTION: The pinion gear and the girth gear are constructed of a heat treated, high grade, ductile cast iron and are not readily weldable. The pinion shaft is constructed of heat treated high alloy steel. Do not weld on these items!

Rebuilding a Pinion Jack Shaft Assembly:

1. Remove the required section of the girth gear guard and the automatic lubrication lines. It may also be necessary to remove the pony drive to gain adequate access.

2. Check that the inboard jacking screws are tight against the pillow block housing. This will help position the pillow block when it is reinstalled.

3. Loosen the outboard jacking screws and pull the jacking screw stop blocks from their socket. This will allow the bearings to be slid out on the frame.

4. Unbolt the pillow blocks from the frame and uncouple the jack shaft from the gearbox. Remove the jack shaft assembly from the frame.

5. If the pinion needs replacing, only the "free" end bearing will need to be removed. The coupling half will need to be removed if the "held" bearing is being replaced. Two pulling holes (1"-8UNC) are supplied in the coupling half.

6. Remove the bearings from the shaft. Use care not to damage the shaft. Extreme caution should be used if heat is required to remove the bearings.

7. The pinion gear is fitted on the shaft with an interference fit and also keyed to the shaft. Uniformly heat the gear to approximately 200°F to remove it or it may be simultaneously pressed and heated for removal. Again, use caution when heating the gear or pressing on the gear. Four pulling holes (M30 X 60) are supplied in the pinion.

8. Clean and inspect the shaft.

9. Note that the pinion gear is symmetric and can be "reversed" to use the "unused" sides of the teeth. Excessive wear on the "used" side of the teeth may make it difficult to measure gear backlash after installation.

Check before reuse. Heat the replacement pinion gear to approximately 200°F degrees. Make sure that the mating surfaces are free of foreign material and machining burrs. Do not lubricate the mating surfaces. Install the pinion gear on the shaft until the pinion contacts the shaft shoulder.

10. Install the bearings according to the manufacturer's guidelines included in this manual. Pack the bearings with the proper grease. See the lubrication section for suggested grease.

11. Thoroughly clean the pillow block housings. Assemble the pinion and shaft in the housings and fill the bearing cavity half full of the proper grease.

12. If the drive coupling half has been removed, re-install it at this time.

13. Mount the jack shaft assembly on the drive frame against the inboard jacking screws. Realign the jack shaft coupling halve with the speed reducer coupling halve and fasten the hold down bolts.

14. Insert the outboard stop blocks with jack screws into their sockets and tighten the jack screws

15. Refer to the girth and pinion gear manufacturer's instructions for aligning the girth and pinion gears. See Section 7, Sub-Section 5, for manufacturer's instructions.

16. When the alignment is completed, securely tighten all fastening hardware. Extra care should be taken to insure that the hardened washers are in place under the pillow block hold down bolts and that the bolts are properly torqued for bolting materials conforming ASTM A193 B7.

17. Make sure that all of the jacking screws are contacting the pillow blocks and that the lock nuts are locked down. Failure to do so may allow the jack shaft to shift during operation.

18. Apply an even coat of grease to the face to the pinion gear.

19. Reinstall the drive guard and all automatic lubrication lines.

20. Test run the drum and check for alignment. Make any necessary adjustments.

Servicing the Girth Gear:

The girth gear arrangement should be inspected twice a year. Items to look for are bolt torque and wear pattern of the gear teeth.

To replace a girth gear segment, follow the steps below. If a larger number of segments or the entire gear needs rework, refer to the section on girth gear mounting.

1. Remove the necessary sections of the girth gear guard.

2. Unbolt the girth gear segment from the rest of the gear and remove.

3. The gear segments are symmetric and are reversible. If the gear segment is going to be reversed, check that the wear is not excessive on the teeth which may make measuring gear back lash difficult

4. Install the replacement gear segment. Install the fitted shoulder bolts in the two outer holes per connection, then install the two inner regular bolts per connection. Also install the bolts that attach the segment to the mounting plates on the drum. Torque all bolts to manufactures specifications. See Section 7, Sub-Section 5, Drawing Y0020897 for torque values.

5. Apply grease on the teeth faces of the replaced gear segment.

6. It is recommended that drive alignment be checked at this time. Refer to the section in this manual regarding alignment.

7. Reinstall the guard segments and automatic grease lines.

8. The gear may make a different noise in the vicinity of the new segment during the break in period due to the difference in wear pattern from the other gear segments.

9. After a few weeks of operating, the girth gear connecting bolt torque should be rechecked.

Girth Gear Mounting:

If a major rebuild, reversal, or replacement of the girth gear is being performed the following procedure should be followed. After the rebuild is complete, drive alignment should be made.

1. The GIRTH GEAR is shipped in multiple sections. There are two (2) different types of fasteners and holes. The two (2) alignment holes use shoulder bolts to properly position the mating gear sections, and then two (2) other fasteners to assist in tightening the joint. See Girth Gear Drawing for Bolt Torque Data.

   NOTE: The segments will be match marked and must be assembled according to the markings.

2. Several segments can be bolted together prior to installation.

3. Lift the girth gear segment (or segments) into position and slip the segments between side plates that are welded to the drum. Insert bolts through the side plates and segments and install the nuts but do not fully tighten them.

4. Lift another section of gear segments into position and bolt these segments to the previously installed segments. Also insert bolts through the side plates and segments and install the nuts but do not fully tighten them.

5. Continue to install additional segments. If necessary, use a cable and tugger to rotate the drum so that the segments can be more easily lifted into place.

6. After all segments are installed, tighten the nuts on the side plate bolts to the manufacturer's specifications.

7. Rotate the drum and check the axial and radial run out using two dial indicators. Refer to manufacturer's instruction in Section 7, Sub-Section 5 of this manual. Make sure that the measuring surfaces are clean.

   The dial indicators should be mounted at convenient locations near the mesh point of the Pinion Gear and the Girth Gear. The machined "step" on the side of the Girth Gear should be used to obtain the required readings. Verify that the inlet end support ring remains tight against the axial roller during the complete revolution of the drum. Also be sure the mating surfaces of the support ring and axial guide roller are clean and free of paint, grease, etc. or, false indicator readings may result. The readings should be recorded in the table found in Figure 6-1 and 6-2.

   Record the run out measurements.

AXIAL RUNOUT
Readings in Inches/1000

Number of Gear Segments

Position	1	2	3	4	5	6	7	8	9	10	11	12	13
Indicator Reading													

Total Indicator Reading = _____ (Maximum Allowable .039")

NOTE: TOTAL INDICATOR READING IS THE DIFFERENCE BETWEEN THE MAXIMUM PLUS AND THE MAXIMUM MINUS.

FIGURE 6-1: AXIAL RUNOUT DATA RECORDING FORMAT

RADIAL RUNOUT
Readings in Inches/1000

Number of Gear Segments

Position	1	2	3	4	5	6	7	8	9	10	11	12	13
Indicator Reading													

Total Indicator Reading = _____ (Maximum Allowable is .039")

NOTE: TOTAL INDICATOR READING IS THE DIFFERENCE BETWEEN THE MAXIMUM PLUS AND THE MAXIMUM MINUS.

FIGURE 6-2: RADIAL RUNOUT DATA RECORDING FORMAT

E. Drum and Drive Alignment:

To ensure the smooth operation and even wear to the rolling drive components of the Fibreflow Drum, it is necessary to align the drum periodically or after rebuild work has been performed on the support rollers.

The drum needs to be aligned to account for wear in the support rollers or when a support roller is replaced with a new roller. Aligning the drum ensures that the support rings on the drum are running "true" to the support rollers. If this alignment was not performed, the rolling surfaces may wear unevenly, cause the drum to want to "walk" axially "uphill" or "downhill", or may cause the drum to run roughly due to excess friction build-up between the rolling surfaces. A drum operating in this manner will also cause unpredictable loading conditions on the drive components, as well as other drum components.

The drive needs to be aligned to ensure a good wear pattern on the gear teeth of the open gears. The girth gear is rigidly mounted to the drum and any time that the drum alignment is changed the pinion to girth gear alignment must be checked. The drive train (motor, speed reducer, and jack shaft) itself needs to be considered for aligning purposes as any standard drive train would. This section deals primarily with the girth and pinion gears.

At installation, special attention was taken to check the alignments of the rollers and open gears. Over a period of years, the support rollers and gears will begin to generate wear. By giving consistent monitoring to the wear, alignment, and gear settings, it will be easy to determine what and how much realignment work needs to be performed. Waiting until there is problem will make the task much more difficult.

Wear in the support rollers can be detected from the formation of wear shoulders on the edges of the support rollers. The height of the shoulders indicate the amount of wear on the rollers but does not indicate the amount of wear on the support ring. It should be realized that all of the wear is allowing the drum to be lower, and in turn is closing up the backlash in the open gears. The gears themselves will begin to give indications of wear.

The following is the typical procedure for aligning the drum and drive:

1. The drum should be run empty of all contents prior to starting the alignment.

2. Check that the seal ring on the drum matches the seal ring on the inlet chute. This may be done by holding a piece of keystock against the outside diameter of one of the seal rings in four equal locations around the perimeter and determining how much and where to adjust the drum.

3. Remove the necessary support roller guards and jack up the inlet end of the drum. Do not jack on the tire. Jack only on the thickened portion of the shell using a properly prepared block to prevent concentrated stress on the drum. Securely block the drum to keep it from rotating and dropping from the jack.

4. Loosen the inlet support roller bearing hold-down bolts and the jacking screws. Push the support rollers in or out so that the seal ring on the drum matches the seal ring on the inlet chute. Make sure that the support rollers have full surface contact to the support rings. Keep the center line of the drum as close as possible to a vertical plane that passes through the centerline of the inlet and outlet support roller frames

5. Tighten all of the hold-down bolts, adjusting screws, and locknuts for the pillow blocks. Remove any blocking and slowly let the weight of the drum back on the support rollers.

6. Check the 1° slope of the drum using a mechanics level and the slope gauge. Adjust the discharge end rollers in the same manner as the inlet end rollers to achieve the 1° slope value. Insure that the drum does not make contact on either end of the vat or drum.

7. Check the support each support roller squareness with the support rings. This can be accomplished by laying a machinist's long straightedge along the sides of the support roller and checking the parallelism of the straightedge with the flat side of the support ring. Perform this check on

all support rollers and adjust the support rollers as necessary to meet the tolerances shown on drawing 2-26009-03. Section 3, Drawings

8. The gear position and backlash now needs to be checked. Measure the backlash on both sides of the gear at both pinion positions. This can be performed by using feeler gauges. Slide the feeler gauges between the teeth of the girth gear and the tooth of the pinion gear that are in closest position to one another. You will need to check on both the top and the bottom of the tooth. Add the readings together to give total backlash. Do this for both sides of the pinion. Record the backlash measurements in the chart of Figure 6-3.

Backlash Readings in Inches/1000

Position	Left Side		Right Side	
	Contact Side of Tooth	Backlash Side of Tooth	Contact Side of Tooth	Backlash Side of Tooth
1				
2				
3				
4				

Teeth Face Parallelism: Maximum Allowable is 0.001 inch

Figure 6-3: Backlash Recording Format

9. As a reference, also check the spacing "E" of the girth to the pinion gear. A machined shoulder has been provided in the girth gear just below the root of the teeth. A machined V-groove has been provided in the pinion gear just below the root of the teeth. As if measuring through the centerline of the gears, the spacing measurement between the girth gear shoulder and pinion V-groove should be greater than 4.72" (120mm).

10. Rotate the drum and check the backlash and gear spacing in at least four different equally spaced spots. Refer to the acceptable limits for backlash and gear spacing given in this manual. Also, check the straightness of the tooth contact with machinist dye. The contact should be 80% minimum of the tooth width and 40-50% of the tooth height.

11. The gear setting may be adjusted by sliding the drive base frame on the support rails. Continue to make subtle adjustments until the gear alignment is within specification.

12. Recheck the elevation, drum slope and the support ring to support roller contact to make sure that nothing has moved during the adjustment procedure. Also check for clearance between the drum and the hood & vat.

13. Contact between the inlet support ring and the axial guide roller needs to be checked. The drum should contact the thrust roller within a few revolutions of the drum. If the support rollers are not running true to the drum and the gear is not properly aligned, it will have a tendency to push the drum either uphill toward the inlet or downhill toward the discharge. Lack of contact between the axial roller and the support ring indicates that the drum needs to move downhill. If the axial roller assembly bearings run hot (over 70° C/ 168° F degrees), it indicates that the drum is tending to move to strongly downhill

14. If the drum needs to be moved uphill or downhill, follow the procedure as shown on drawing 2-26009-03 in section 3 drawings. This procedure will correct minor imperfections in the drum and drive alignment.

15. Always check that the proximity switches for drum alignment are properly set and in working order. The maximum allowable movement is 3/16" uphill and 3/16" downhill. The drum can only move downhill if the bearings fail in axial guide roller bearings. A drum Stop limits the maximum travel uphill. If the inlet support roller ever contacts the drum stop, there will be a noticeable metal to metal scraping sound.

16. Observe the drum closely during start-up to ensure that there are no problems.

F. Bottom Vat and Hood Assemblies:

Description:

The bottom vat is located beneath the screen section of the drum to accept diluted pulp stock from the pulper. Two agitators are used to circulate stock inside the vat. There is also a pump suction used to pump stock from the vat to the rest of the system. An overflow pipe is included to route stock away from the vat if the level becomes too high, and a drain to empty the vat. Flushing water nozzles are provided at the low points of the labyrinths on both ends of the vat for flushing splashed stock back into the vat.

The hood covers the top area of the drum screen section. A shower pipe with internal valving is included so that dilution water can dilute the stock and wash it into the vat as well as to back wash the screen plate to keep it clean. Inspection hatches are included in the hood to check for plugged screens and to monitor the shower system.

Maintenance:

The maintenance requirements for the pump and agitators is provided in the manufacturer's bulletins or manuals. The bottom vat requires no special maintenance. It should be periodically cleaned and inspected inside. The hood also requires no special maintenance items. The shower pipe may need to be flushed or cleaned occasionally if contaminants collect inside. The flange joint seal between the vat and the hood should be checked for leakage. If the joint seal is leaking, tighten the connection or replace the seal as necessary.

G. Lubrication

Proper lubrication is essential to success and long life of any piece of equipment. The type of lubricant, interval of checking and changing, cleanliness, and making sure the proper amount is used are all vital factors. Refer to the manufacturer's bulletins for lubrication of the following items:

- Main speed reducers
- Pony speed reducer
- Gear Couplings on Main & Pony Drives
- Agitators in Bottom Vat
- Pump at Bottom Vat

The support roller, pinion jack shaft, and axial guide roller bearings are greased by an automatic lubrication system. The system should be checked weekly to ensure that it is operating correctly and that all of the bearings are actually receiving the grease. The check can be made by manually operating the lubrication system and monitoring the dosing module stem movement. A lithium based, multi-service extreme pressure grease such as EP 0, 1, or 2 should be used to recharge the bearings. When installing new bearings, the housings should be half filled with grease. The axial guide roller housing should be nearly filled with grease. Since contamination is more of a concern and purging the bearing is considered important to combat contamination, it is more practical to give smaller and more frequent recharges. An analysis of the greasing quantities and lubrication intervals is provided in the lube system section of this manual. The bearings run slow enough where over greasing and over heating the bearings is not a concern. However, approximately once a year, the caps of the pillow blocks should be removed and excess grease removed from the housing.

The girth & pinion gears and the support rings & rollers also are lubricated through an automated system. This system should also be checked daily to ensure that it is operating correctly and that all of the surfaces are receiving lubrication. The required lubricant for the gears and the rollers of the Fibreflow Drum is an open gear grease which has molybdenum disulfide and / or graphite as an additive. The penetration of lubrication grease will be

selected; depending on environmental conditions, from hardness classes NLGI 0...NLGI 2. The viscosity of basic oil should be bigger than 460 cSt @40 degrees Celsius. Before initial start-up or after major work has been performed on these items the surfaces should be manually coated with an even amount of grease. The lubrication schedule for the gears, axial roller and support rings are provided in the lube system section of this manual. An even amount of grease should be kept on the faces of these items. Adjust the dosage as needed to maintain an even layer. Over lubricating will only waste grease and cause housekeeping issues.

Operation and maintenance literature for the automatic lubrication systems can be found in lube system section of the manual. The barrels should be kept covered to avoid contamination of the grease.

H. Routine Scheduled Checks

Below is a list of common items to check and the time frequency that they should be made. This list is not intended to be all-inclusive, but rather a guide for assisting mill personnel. Follow manufacturer's recommendations for checking components such as vat agitators and pumps, speed reducers, and couplings. This information is listed in later sections of the manual.

Once per Shift:

- Walk around the pulper and perform a visual inspection. Pay close attention to the inlet packing seal, drive components and how smooth the drum is running.

- Check the working order of the automatic spray lubrication system and that none of the components or grease lines are damaged. Check the amount of grease in the barrels.

- Look at the coating of grease on the support rings for even distribution.

- Check to see that the axial guide roller is turning. This indicates that the drum is not tracking uphill.

- Check the working order of the cooling water systems (or air cooler) for the main speed reducers.

- Look at the rejects from the drum to obtain an indication of what has passed through. If heavy tramp material is present, locate the source and eliminate it to prevent future damage to the drum.

Every Week:

- Check the inlet chute through the inspection door to insure that feed stock is not sticking to the walls of the chute.

- Check to see that the grease lubrication system for bearings is functioning properly

- Check the hood shower header to verify that the shower nozzles (holes) are not plugged. If showers are plugged, they should be cleaned to insure that the drum screen section functions properly.

Every Three Months:

- Enter the drum and perform a visual inspection of the internals.

- Visually inspect the rolling surfaces of the rings and rollers.

- Visually inspect the inlet seal packing and seal rings.

- Check condition and setting of proximity switches.

- Open the manway to the bottom vat. Clean out and visually inspect the vat internals. Clean out the drain openings in the labyrinth seals at each end of the vat.

- Check under and around the guard assemblies for grease build-up. Clean as needed. There are grease catch pans under each pinion. Pull these pans and clean out the grease.

Every Six Months:

- Perform runout measurements on the outside diameter of the support rollers and also visually inspect.

- Check the gear setting measurement and backlash and check for wear.

Every Year:

- Open the caps of the pillow block bearings and visually inspect. Remove excess grease.

I. Troubleshooting Chart

Trouble	Possible Cause	Action
Noise or Vibration.	Girth and pinion gear misalignment.	Check backlash on gears; Check for crossover of pitch circles. Realign gears.
	Spray lube system not working.	Repair Spray lube system. Check for correct grease.
	Support rings on drum are wearing unevenly.	Check support roller alignment. Check grease spray nozzles.
	Large object inside of drum.	Check for dents on drum surface. Check for wire ball in drum discharge. Remove the object.
	Drum has moved uphill and contacting Drum Stop.	Realign support rollers.
	Defective bearing.	Check bearing temperature & vibration. Replace bearing as necessary.
	Low oil in speed reducers.	Add oil.
Inlet seal rope wears quickly.	Sharp metal object is lodged in the seal gap.	Clean metal from the seal gap.
	Drum has moved uphill and seal rings are contacting each other.	Realign support rollers.
Excessive seal leakage.	Seal rope is worn out.	Replace seal rope.
	Seal rope is not looped over all pulleys.	Place rope over all pulleys.
	Weight is stuck in guard.	Remove debris to free up the weight.
	Insufficient weight.	Add more weight.

Trouble	Possible Cause	Action
Noise in girth and pinion gear.	Gear misalignment.	Realign the gears.
	Loose bolts in gear segment flanges or side plates.	Tighten and retorque bolts.
	Defective or broken tooth.	Inspect gear teeth and replace girth gear segment or pinion if necessary.
Excessive wear on girth gear.	Insufficient amount of grease spray.	Check out grease system and repair.
	Grease barrel empty.	Fill grease barrel.
	Low air pressure.	Increase air pressure to spray nozzles.
	Spray nozzles plugged.	Clean grease lines and spray nozzles.
	Defective dosing module.	Check operation of dosing module and repair/replace as necessary.
	Incorrect gear alignment.	Realign girth and pinion gears.
	Improper grade of grease.	Use correct quality of grease.
High temperature on main speed reducer. (alarms at 190 F)	Oil pump not running or water cooler is shut off.	Repair oil pump or start cooling water.
	Low oil level.	Increase to proper oil level.
	Improper grade of oil.	Fill with correct quality of oil.
Pulp spills from vat labyrinth seals.	Drain hole is plugged in the lower portion of the labyrinth.	Check to see that spray nozzles are working to keep the hole clean.
		Clean out labyrinth seal on next shutdown.

Trouble	Possible Cause	Action
Drum trips out while running.	Drum has moved uphill and tripped the proximity switch.	Realign support rollers.
	Axial support roller has failed and drum has moved down hill and tripped proximity switch.	Repair axial support roller and readjust the alignment of the drum support rollers.
Drum will not start.	Axial movement proximity switch is tripped.	Check for problem and reset.
	No oil circulation in the speed reducer cooling system.	Take corrective action to start the oil circulation systems for the speed reducers
Large amounts of fiber in the rejects.	Shower Header spray holes are plugged.	Clean shower spray holes.
	Not enough dilution water.	Increase dillution water.
	Not enough water to the front end of the screening section.	Readjust spray header valves to use more water on the front end of the screening section.
Too many flakes in the Pulp.	To much dilution water added to the front end of the pulping section.	Readjust the water distribution between the screening and pulping section to have less at the pulping section.