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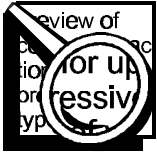
MAINTENANCE MECHANIC TRAINING

SKILL DEVELOPMENT GUIDE

Duty G: Conveyors

G-34: Replace Headpulley/Tailpulley (Belt)

Issued 01/01/99



Task Preview

Replace Headpulley/Tailpulley (Belt)

A Maintenance Mechanic replaces the headpulley when it loses its treads and no longer has gripping power. Replace the tailpulley when its curvature ribs no longer have the beveled edge and cause the belt not to run true. The Mechanic also replaces the pulley when the possibility of worn out bushing on the shaft and bad ends.

Performing this task incorrectly or incompletely, could:

- cause damages or destroy the conveyor or the belt
- prevent the belt from being trained
- cause the belt to fail early

A Maintenance Mechanic prepares the pulley for removal. The Mechanic removes and disassembles the pulley, and inspects the removed components for serviceability. The Mechanic assembles the new pulley with serviceable parts and prepares the pulley for installation. The Mechanic installs and adjusts the pulley to its optimal performance.

How your skills will be checked

The Skill Check will require you to replace a headpulley/tailpulley. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator when you are ready for the Skill Check.



Skill Objective

Given a repair ticket to replace a defective headpulley/tailpulley on a conveyor, replace the headpulley/tailpulley.

Task Standards

1. The power disconnect must be locked and tagged.
2. The shaft must show no signs of scoring, ridges, or wear.
3. The bearings must show no signs of breakage, wear, or scoring.
4. The taper-lock bushing must show no signs of scoring, ridges, wear, or cracks.
5. The Allen head screw must show no signs of wear, and must have good threads.
6. All required safe practices must be demonstrated.

What You Will Need

This section contains the safety information, tools, and resources you will need before replacing a headpulley/tailpulley.



- Follow all Caterpillar facility safety standards when performing this task.
- The conveyor drive motor must be locked and tagged when the defective headpulley/tailpulley is removed and during the installation of the new headpulley/tailpulley.
- Ensure that the conveyor is unloaded, with no possibility of material being dumped on it while the headpulley/tailpulley replacement procedure is in progress.
- Lock out other feed belts and equipment.
- If the conveyor is located in a dusty area, wear a protective mask, as necessary.
- If the conveyor is located overhead and a ladder, manlift, or scaffold is necessary, exercise caution when working aloft. Wear a harness, as necessary.
- Wear gloves to protect your hands. Conveyors and conveyor service equipment can present hazards such as pinch points, rotating and moving equipment.



- two belt clamps
- appropriate transport equipment
- air drive impact or air ratchet wrenches
- Mechanics hand tools
- Allen wrench set
- special air drive socket for adjusting the tailpulley

- clamps, come-a-longs, chains, cables, etc. as needed in difficult applications
- fork truck
- boom attachment (as needed)
- gear puller
- remote conveyor jog switch (optional)
- anti-seize compound
- Flexlo's
- belt cutter
- belt tape
- straight edge



- Repair Ticket (Service Order)
- machine parts list
- belt location map



Task Steps

Replace Headpulley/Tailpulley (Belt)

Note: This procedure is divided into two parts. The first part is the replacement of the headpulley. The second part is the replacement of the tailpulley.

Part A: Replace Headpulley

1. Prepare to remove the headpulley.

Note: You may need to split the belt, depending on the application.

- Ensure the availability of all the parts and tools needed to replace a headpulley.

Warning: As a safety precaution, you will need to communicate with production and all personal in the area that before you start working.

- Disconnect the power and lock and tag the lever. See the figure below.



- Place the switch to Hand on the Belt system panel.
- Remove any covers, guards, etc. as needed to perform this procedure.
- Install a belt clamp at the headpulley.
- Attach a second belt clamp on the opposite side of the belt. See the figure below.

Install First Belt Clamp Here



Install Second Belt Clamp Here

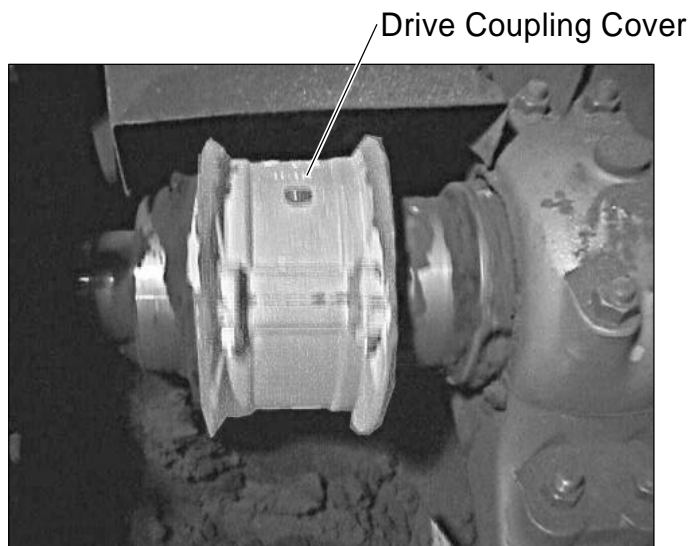
- Mark the position of the tailpulley bearing slides first, as a reference.
- Adjust the tailpulley bearing slides to relieve belt tension. See the figure below.



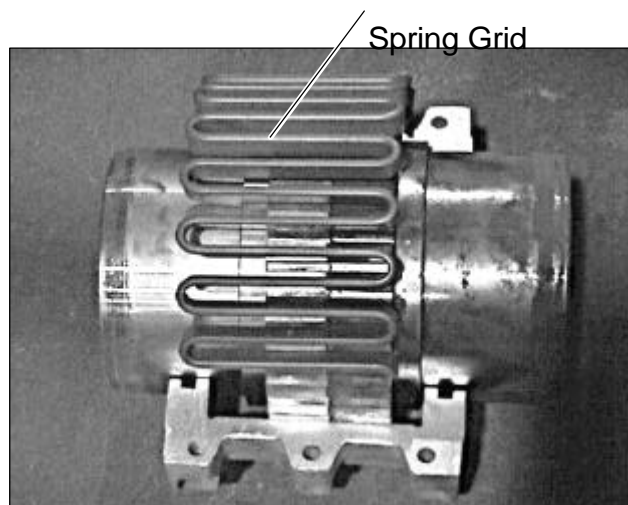
- Adjust both takeups in equal, small increments to avoid the misalignment of the tailpulley and stress on the tailpulley bearings.
- Attach a come-a-long to each side of both belt clamps.
- Pull towards the headpulley to pull the slack from the belt up to the headpulley for easier removal.

2. Remove the headpulley.

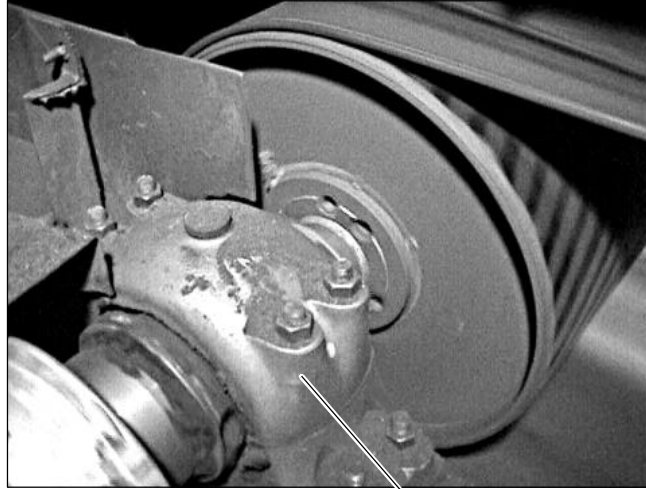
- Remove the drive coupling cover located between the headpulley and the motor. See the figure below.



- Remove the spring grid to disconnect the drive coupling from the headpulley's shaft. See the figure below.



- Unbolt the bearing assembly from the framework. Normally new bearings are installed with the new headpulley assembly. Do not discard the old bearings if the availability of the new is questionable. See the figure below.



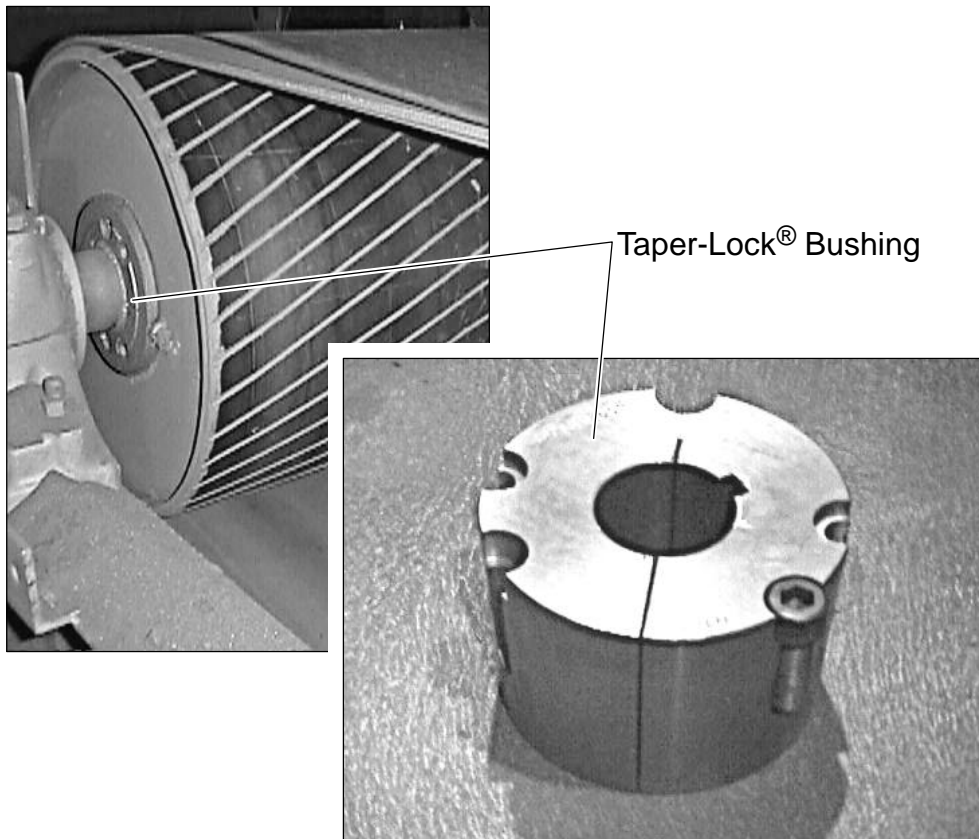
Bearing Assembly

Note: These bearings are located on both sides of the headpulley. Depending on the size of the headpulley, it may be necessary to remove the entire bearing housing.

- Rig a lifting device, as needed, to lift the headpulley assembly.
 - Slide the headpulley out from the top end of the conveyor if the belt needs to be broken.
 - Place the headpulley in the designated work area.
3. Disassemble the old headpulley assembly.
- Remove the coupling hub off the shaft.
 - Measure the distance from the inside of the bearing to the side of the headpulley, and record the results.
 - Measure the distance from the end of the shaft to the side of the headpulley, and record the results. Make sure the measurement is accurate.
 - Loosen the lock collars on the bearing assembly.
 - Slide the assembly off the shaft.

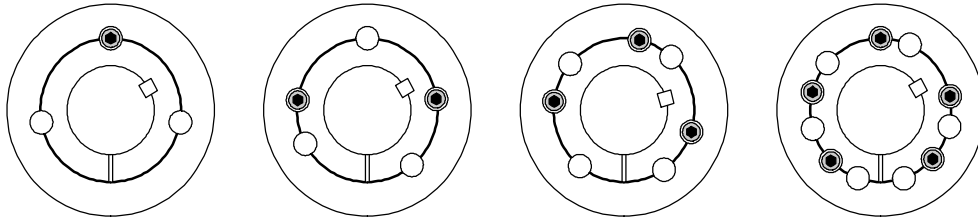
Note: The bearing assembly may not come off the shaft. If it does not, a welder may need to cut the bearing off the shaft. Make sure that the new bearings are available first.

- Inspect the bearing assembly for serviceability and replace as necessary.
- Remove the taper-lock bushings from the ends of the headpulley, using an Allen wrench. See the figure below.



- Remove all setscrews in the bushings.

- Insert bolts in the holes indicated by the black dots. See the figure below.



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- Loosen the bushing by alternately tightening the screws.

Note: A Welder may need to cut around the taper-lock bushing, in order to save the bushing.

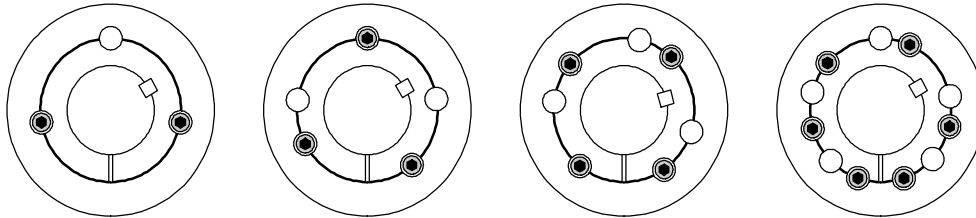
- Pull the shaft out of the headpulley.
- Clean and inspect the bushing for serviceability.
- Inspect the key and keyway in the shaft and bushing for serviceability and replace as necessary.

Note: If the inspection proves that the keyway is unserviceable, replace the shaft.

4. Assemble the new headpulley.

- Slide the shaft into the new headpulley and set the position according to the recorded data.
- Install both taper-lock bushings.
- Match the keys on the shaft with the keyways on the bushings.
- Ensure that each complete hole has threads only on one side.

- Insert the screws as indicated by the black dots. See the figure below.



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- Tighten the screws on the bushing according to the manufacturer's specifications.
- Use a hammer and brass punch to seat the taper-lock bushing in the headpulley.

Note: Set the taper-lock bushing at two or three places and retighten the bolts to the manufacturer's specification.

- Apply anti-seize compound to the shaft, to slide on the bearings.
- Ensure that the non-expansion bearing is on the drive side and the expansion bearing is on the opposite side.
- Install the bearing assembly on the shaft and position it at the distance previously recorded.
- Snug the lock collars to the shaft to keep the bearings from sliding on the shaft. Do not tighten the lock collars wrench-tight, the bearing position may need to be adjusted after the headpulley is installed.
- Apply anti-seize compound to the shaft to slide on the coupling hub.

Note: Be sure the cover seals are on the hub before sliding it on the shaft.

- Slide the coupling on the shaft.
 - Snug the coupling to the shaft.
5. Install the new headpulley assembly.
- Slide the new headpulley assembly into the same place where the old pulley was.

- Align the headpulley shaft with the reducer output shaft.
- Line up the bearings and bolt in place.
- Ensure that the pulley and shaft are aligned, and then tighten the bolts on the bearings.

Note: If the whole bearing assembly was removed, install the assembly.

- Align the coupling hub and lock it to the shaft.
- Install the spring grid and cover.

Note: Grease the spring grid and coupling.

- Remove the come-a-longs used to pull the slack in the belt. Let the belt slide towards the tailpulley.
- Remove the belt clamps.
- Grease all bearings on the headpulley and all rollers on the conveyor.
- Tighten the tailpulley. Ensure that the tightening process is accomplished evenly to prevent binding and damage to the bearings. Tighten to the original position or as close as possible.
- Reinstall any covers, guards, etc. that were removed.
- Remove all tools and equipment.
- Remove the lock and tag.
- Restore power.

- Adjust the belt using the procedure for adjusting and training the belt. See the figure below.



- Clean the area.

Note: Notify the appropriate personnel that the job is complete and you are clear of the belt.

Part B: Replace Tailpulley

1. Prepare to remove the tailpulley.

Note: You may need to split the belt, depending on the application.

- Ensure that all the parts and tools needed to replace a tailpulley are available.

Warning: As a safety precaution, you will need to communicate with production and all personal in the area that before you start working.

- ❑ Disconnect the power and lock and tag the lever. See the figure below.



- ❑ Place the switch to Hand on the Belt system panel.
- ❑ Remove any covers, guards, etc. as needed to perform this procedure.
- ❑ Install a belt clamp at the tailpulley. See the figure below.



- ❑ Attach a second belt clamp on the opposite side of the belt.
- ❑ Mark the position of the tailpulley bearing slides first as a reference.

- ❑ Adjust the tailpulley bearing slides to relieve belt tension. See the figure below.



- ❑ Adjust both takeups in equal, small increments to avoid the misalignment of the tailpulley and stress on the tailpulley bearings.
- ❑ Attach a come-a-long to each side of both belt clamps.
- ❑ Pull towards the tailpulley to remove slack from the belt.

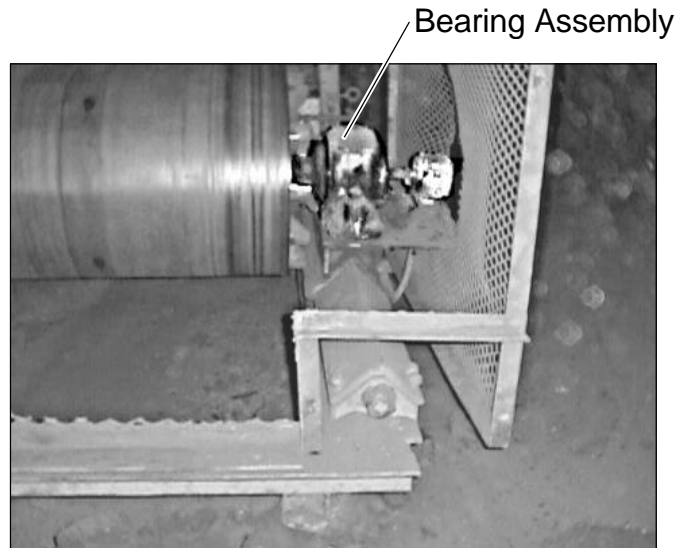
2. Remove the tailpulley.

- Remove the zero speed switch located on the outside of the bearing and lay it to the side. See the figure below.

Zero Speed Switch



- Remove the bearing assembly. See the figure below.

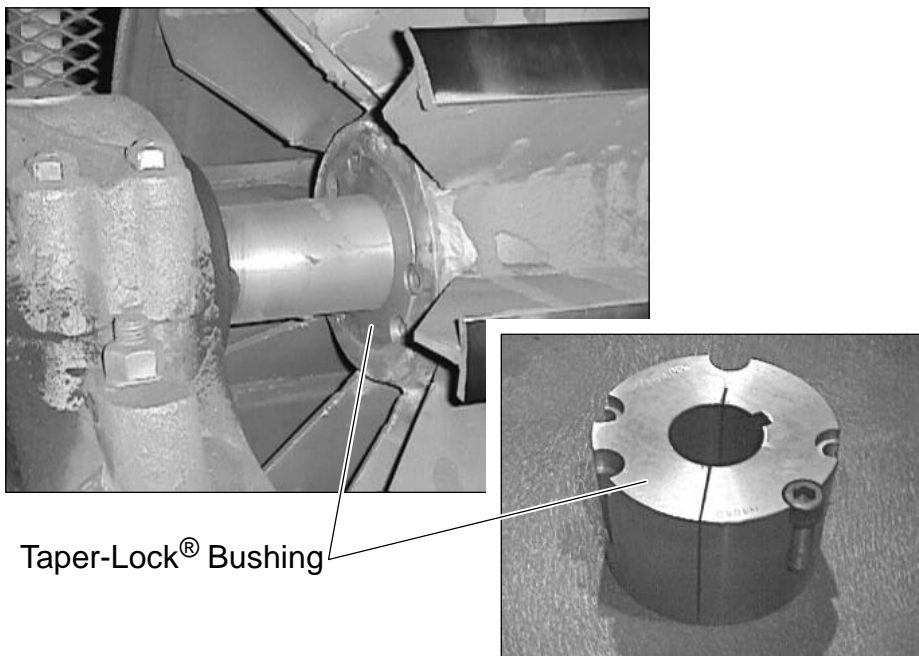


Note: These bearings are located on both sides of the tailpulley. Depending on the size of the tailpulley, it may be necessary to remove the entire bearing housing.

- Rig a lifting device, as needed, to lift the tailpulley assembly.
 - Measure the distance from the inside of the bearing to the side of the tailpulley, and record the results.
 - Measure the distance from the end of the shaft to the side of the headpulley, and record the results. Make sure the measurement is accurate.
 - Slide the tailpulley out from the bottom end of the conveyor if the belt needs to be broken.
 - Place the tailpulley on the designated work area.
3. Disassemble the old tailpulley assembly
- Loosen the lock collars on the bearing assembly.
 - Slide the assembly off the shaft.

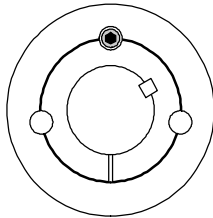
Note: The bearing assembly may not come off the shaft. If it does not, a Welder may need to cut the bearing off the shaft. Make sure that the new bearings are available first.

- Inspect the bearing assembly for serviceability and replace as necessary.
- Remove the taper-lock bushing from the ends of the tailpulley, using an Allen wrench.

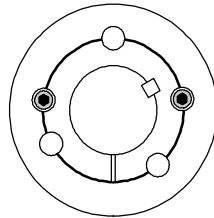


- Remove all setscrews.

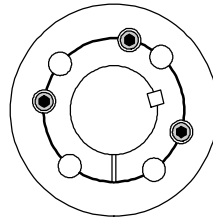
- Insert screws in the holes indicated by the black dots. See the figure below.



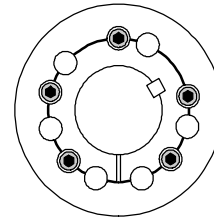
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- Loosen the bushing by alternately tightening the screws.

Note: A Welder may need to cut the taper-lock bushing from the tailpulley, to save the bushing.

- Pull the shaft out of the tailpulley.
- Clean and inspect the bushing for serviceability.
- Inspect the key and keyway in the shaft and bushings for serviceability and replace as necessary.

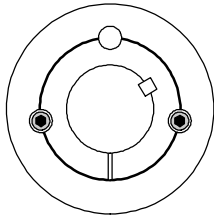
Note: If the inspection proves that the keyway is unserviceable, replace the shaft.

4. Assemble the new tailpulley.

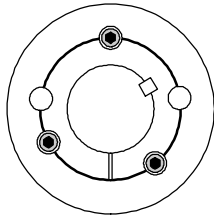
- Slide the shaft into the new tailpulley and set the position according to the recorded data.
- Install both taper-lock bushings.
- Match the keys on the shaft with the keyways on the bushings.
- Ensure that each complete hole has threads only on one side.

- Insert the screws as indicated by the black dots. See the figure below.

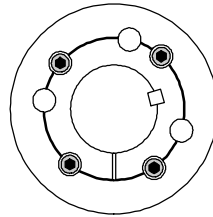
Insert Set Screws as Shown to Install



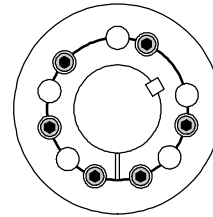
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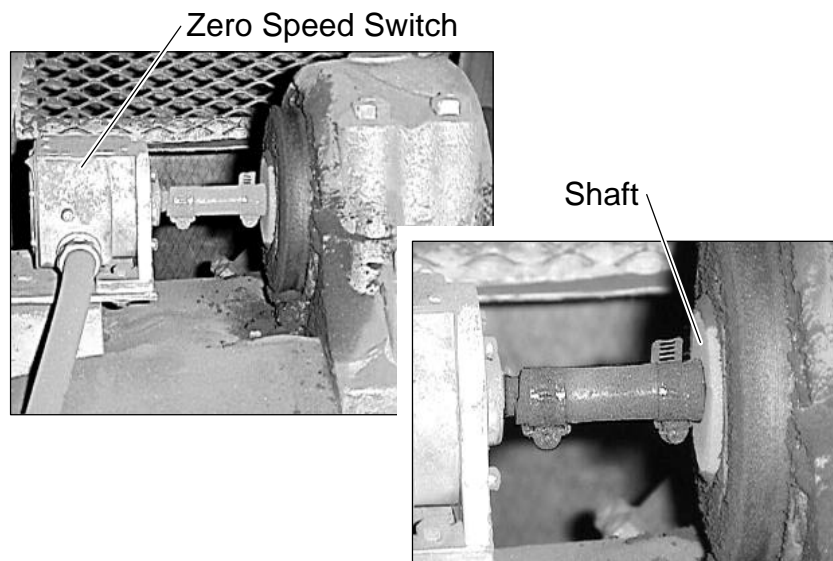
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- Tighten the screws on the bushings according to manufacturer's specifications.
- Use a hammer and brass punch to seat the taper-lock bushing in the tailpulley.

Note: Set the taper-lock bushing at two or three places and retighten the bolts to the manufacturer's specification.

- Apply anti-seize compound to the shaft, to slide on the bearings.
- Install the bearing assembly on the shaft and position it at the distance previously recorded.
- Snug the lock collars to the shaft to keep the bearings from sliding on the shaft. Do not tighten the lock collars wrench-tight, the bearing position may need to be adjusted after the headpulley is installed.

Note: If installing a new shaft, drill a 1/2 inch hole and tap it to 13 threads per inch in the end of the shaft to accommodate the zero speed switch.



5. Install the new tailpulley assembly.
 - Slide the new tailpulley assembly into the same place where the old pulley was.
 - Bolt the bearings on, align, and lock down collars.
 - Install the zero speed switch.
 - Remove the come-a-longs used to pull the slack in the belt. Let the belt slide towards the tailpulley.
 - Remove the belt clamps.
 - Grease all bearings on the tailpulley and all rollers on the conveyor.
 - Tighten the tailpulley. Ensure that the tightening process is accomplished evenly to prevent binding and damage to the bearings. Tighten to the original position or as close as possible.
 - Reinstall any covers, guards, etc. that were removed.
 - Remove all tools and equipment.

- Remove the lock and tag and restore power.
- Adjust the belt using the procedure for adjusting and training the belt.



Clean the area.

Note: Notify the appropriate personnel that the job is complete and you are clear of the belt.



Concept Check

Replace Headpulley/Tailpulley (Belt)

Answer the following questions to check your understanding of replacing a headpulley/tailpulley. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. When installing the taper-lock bushings on the headpulley:
 - a. ensure the bushings are flush with the ends of the headpulley.
 - b. match the hole pattern.
 - c. match the threaded holes.
2. To relieve tension in the belt:
 - a. pull the belt with a come-a-long.
 - b. adjust the tailpulley bearing sides.
 - c. adjust the takeups in equal, small, increments.
 - d. loosen the nuts and let gravity pull out the tension.
3. If a new shaft is required for the tailpulley, make sure that:
 - a. the keyways are cut into the new shaft.
 - b. the shaft is the same length as the one being replaced.
 - c. the end of the shaft is drilled and tapped for the zero speed switch.
 - d. anti-seize is applied so the shaft will slide through the tailpulley smoothly.

Answers: (1. b 2. c 3. c)

Next Step

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check. However, if you need to practice some of the steps first, continue to the next section.



Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

Practice

Your Trainer will designate a conveyor for replacing the headpulley or tailpulley. During the practice you will:

- Prepare to remove the headpulley or tailpulley assembly.
- Remove the headpulley or tailpulley assembly.
- Disassemble the old headpulley or tailpulley assembly.
- Assemble the new headpulley or tailpulley.
- Install the new headpulley or tailpulley assembly.

Your Trainer will observe you as you remove, disassemble, reassemble, and install the headpulley or tailpulley to ensure that the replacement task is preformed properly. You are required to follow all the recommended safe practices.

Practice Objective

The major components will be inspected for serviceably, showing no signs of wear, scoring, cracks, ridges or breakage. The headpulley or tailpulley must be reassembled before being install on the conveyor. The headpulley or tailpulley must be installed in the same position as the defective one. All safe practices must be demonstrated.

Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.

