4.
HOW TO MAINTAIN AN EFFECTIVE PREVENTIVE MAINTENANCE PROGRAMME

DRIVEN BY POSSIBILITY™

Deciding when and how often to inspect or replace belt drives isn't always easy. Belt wear and service life depend on a variety of factors, including the original drive design, pulley alignment, installation tension, maintenance practices and environmental factors.

Experience with your own equipment will be the best guide to how often you need to inspect the belt drives. High speeds, heavy loads, frequent start/stop conditions, extreme temperatures and drives operating on critical equipment will require more frequent inspections.

WHEN TO SCHEDULE A COMPLETE SHUT-DOWN INSPECTION

- Drives fitted with standard V-belts require inspecting every 3 months (re-tension if necessary)
- Drives fitted with Gates synchronous belts and Gates Premium V-belts:
  - **Gates synchronous belts** require no maintenance during their service lifetime, provided they are installed as specified by Gates.
  - **Gates premium V-belts - Quad-Power® 4 & Predator®** are Service-Free and require no maintenance during their service lifetime provided they are installed as specified by Gates. An annual visual inspection is advised to check the overall drive condition.

When properly maintained and used under normal conditions, a well-designed industrial belt drive is capable of operating for several years. A good start to any preventive maintenance programme is to make periodic belt drive inspections a normal part of your regular maintenance rounds. The aim of these quick visual and listening inspections is to verify the general condition of the drive and identify any irregularities.

LOOK AND LISTEN

Look and listen for any unusual vibration or sound while observing the guarded drive in operation. A well-designed and maintained drive will operate smoothly and quietly.

GUARD INSPECTION

Inspect the guard for looseness or damage. Keep it free of debris and grime build-up. Any accumulation of material on the guard will act as insulation and could cause the drive to run hotter. Temperature is an important factor of belt performance and durability that may seriously reduce belt life. A rise in ambient temperature of approximately 20°C (68°F) above a belt's maximum operating temperature typically halves the life of the belt.

OIL AND GREASE

Also look for oil or grease dripping from the guard. This may indicate over-lubricated bearings. Oil and grease attack rubber compounds, causing them to swell and distort. This will lead to early belt failure.

ATTACHMENTS

Finally, check motor mounts for proper tightness. Check take-up slots or rails to see that they are clean and lightly lubricated.

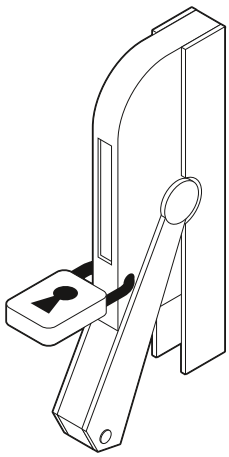
Thorough belt drive inspection should also be part of the greater preventive maintenance plan. A drive shutdown for a thorough inspection of belts, pulleys and related drive components is required to identify signs of impending failure, and replace components before they fail.

Here's a checklist for performing a safe and efficient shutdown inspection:

STEP 1 - SECURE DRIVE

Turn off power to the drive, isolate drive (Lock Out / Tag Out).

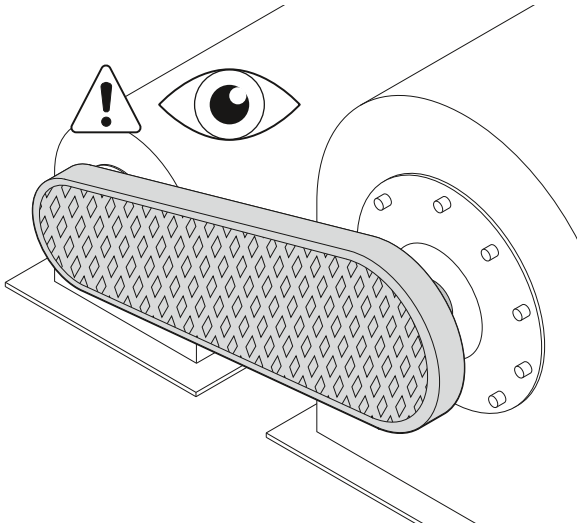
Place all machine components in a safe (neutral) position. Any other component that could inadvertently move during the procedure must also be secured in place to prevent this movement (e.g. fan blades to prevent freewheeling).



STEP 2 - GUARD INSPECTION

Remove and inspect the guard. Check it for signs of wear or rubbing against drive components. Clean the guard to prevent it from becoming insulated and closed to ventilation.

Clean off any grease or oil that may have been spilled onto the guard from over-lubricated bearings.



STEP 3 - BELT INSPECTION

Inspect the belt(s) for wear or damage. Mark a point on the belt, or one of the belts on a multiple V-belt drive. Work your way around the belt(s), checking for signs of unusual belt wear or damage to help you troubleshoot possible drive problems.

Check the belt for signs of excessive heat. Belts do warm up while operating, but temperatures must not exceed the belts' operating temperature range.

V-belt troubleshooting -page 50

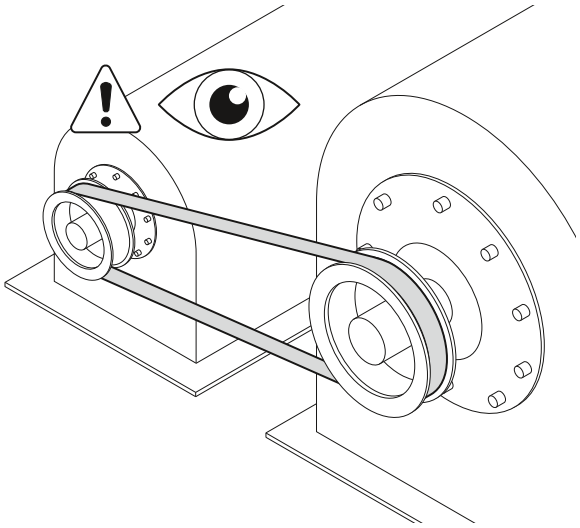
Synchronous belt troubleshooting -page 53

Use a wrench to turn the pulley when you are rotating drives manually (to ensure correct tracking of the belt). This protects fingers from getting trapped between the belt and pulley. Rotation of large synchronous drives by pulling on the belt is particularly hazardous where entrapment of fingers between pulley flanges and the belt can result in immediate amputation of the finger(s). The drive should be rotated by turning the larger pulley, while continually practicing dynamic risk assessment.

Belts should be replaced if they show obvious signs of cracking, fraying, unusual wear or loss of teeth in a synchronous belt.

V-belt replacement - page 27

Synchronous belt replacement - page 29



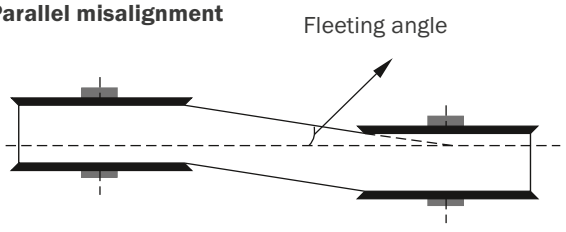
STEP 4 - PULLEY INSPECTION

When belts have been removed from the drive, check pulleys for unusual wear or obvious signs of damage. Wear is not always obvious. Use Gates sheave gauges to check V-grooves.

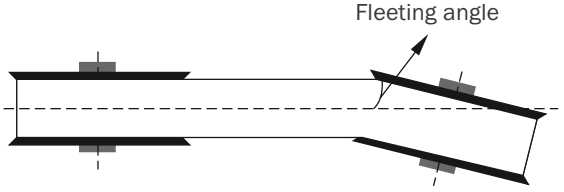
Always check pulleys for proper alignment and mounting. Misalignment reduces belt drive performance and service life. The main causes of misalignment are:

- pulleys are improperly located on the shafts;
- motor shafts and driven machine shafts are not parallel;
- pulleys are tilted due to improper mounting.

Parallel misalignment

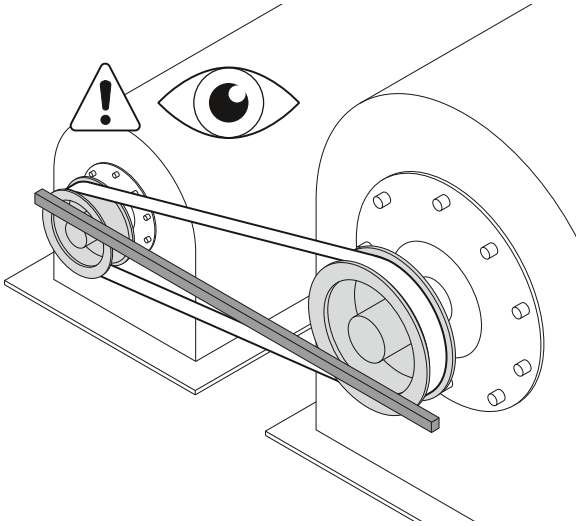


Angular misalignment



STEP 5 - CHECK PULLEY ALIGNMENT

To check alignment, you will need a straight edge or, for long centre distance drives, heavy string. Line the straight edge or string along a machined face of both pulleys as shown on the picture below. Misalignment will show up as a gap between the face of the pulley and the straight edge or string. When using this method, make sure the distance between the groove edge and the outer rim of both pulleys is identical. Pulleys can also be checked for tilting with a spirit level.



Correcting misalignment is not always easy, so laser tools such as the LASER AT-1 laser alignment device can be very helpful. The LASER AT-1 identifies parallel as well as angular misalignment between the pulleys and is suitable for pulley diameters of 60 mm and larger. Mounted in a few seconds, the laser line projected on the targets allows you to quickly ascertain and correct misalignment. It can be used on both horizontally and vertically mounted machines. For more information please see leaflet E2/20121.

LASER AT-1 laser alignment device - page 87

STEP 6 - CHECK ALIGNMENT TOLERANCES

As a general rule, the deviation on pulley alignment on V-belt drives should not exceed 1/2° or 5 mm per 500 mm of drive centre distance. Alignment for synchronous, Polyflex® and Micro-V® belts should be controlled within 1/4° or 2.5 mm per 500 mm of drive centre distance. If a pulley shows obvious signs of wear or damage, it will need to be replaced.

Pulley alignment - page 37

STEP 7 - CHECK OTHER DRIVE COMPONENTS

Always examine bearings for proper alignment and lubrication. Also check motor mounts for correct tightness. Be sure take-up rails are free of debris, obstructions, dirt or rust.

STEP 8 - CHECK EARTHING SYSTEM

Inspect static conductive earthing system (if used) and replace components as needed.

STEP 9 - RECHECK PULLEY ALIGNMENT

It is necessary to recheck the position and alignment of the pulleys because they may have been moved during the maintenance work.

STEP 10 - CHECK BELT TENSION

The final step is to check belt tension, and, if necessary, retension the belt. If too little tension is applied, V-belts may slip or synchronous belts may jump teeth. The correct tension is the lowest tension at which the belts will transmit the maximum load specified for the drive.

Belt tension - page 31

STEP 11 - REINSTALL BELT GUARD

STEP 12 - RESTART DRIVE

Turn power on and restart drive. Look and listen for anything unusual.