# Pulley Alignment Tension

Today's belt performs a specific job: transferring power from the crank pulley to all accessories in the Automatic Belt Drive System (ABDS). On average, a serpentine belt has to cycle over 350 million crank shaft revolutions in 100,000 miles which translates to nearly one hundred million belt revolutions depending on the length of the belt. Power-hungry alternators, air conditioners, power steering pumps and water pumps all try to rob the belt and keep it from transferring this power. To say the least, it's no small task to keep all these parts functioning properly, especially under extreme temperatures.

If regular preventive maintenance and inspection has been overlooked throughout the years, or at some point an incorrect part has been installed, then the system may suffer. The customer who just purchased a new Gates belt expecting a long, worry-free motoring experience, may see a failure soon after they replaced their belts because their ABDS system was not properly inspected and cleaned before installation.

**Three conditions must exist for a belt to run correctly:**

1. *Pulleys in good operating order—free and clear of dirt, grease and grime or wear.*
2. *Proper alignment—any misalignment must be repaired before installation of the new belt.*
3. *Proper tension—if the belt does not have proper tension, it will begin to slip, causing heat which will result in premature failure and noise.*

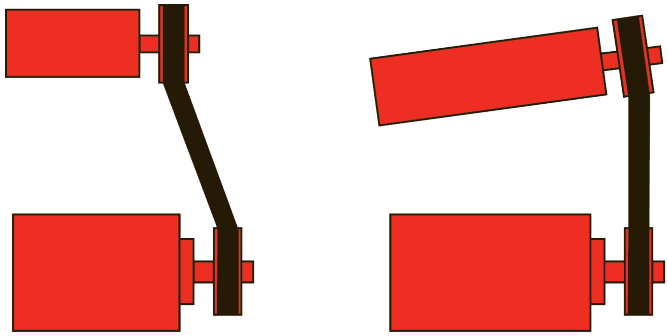
## Pulleys

Belt drives are exposed to grit, rocks, salt and water. Over time, these contaminants along with slippage result in wear of the belt rib and pulley. Just like V-belt pulleys, micro-ribbed pulleys should be inspected and cleaned before a new belt installation. Any buildup of road dirt or oil residue in the pulleys' grooves should first be removed with alcohol-based brake cleaner and a soft bristled brush. In fact, if there is oil on any of the pulleys, and it has not been removed, then as soon as the key is turned the new belt will be coated and the failure starts all over again.

Pulley wear can be continual as the offending belt slips on the ABDS especially on systems with higher amperage alternators.

## Alignment

**There are two types of misalignment: parallel and angular.**



Parallel misalignment  Angular misalignment

1. *Parallel misalignment refers to pulleys that are outside the plane of other pulleys in the drive system whose shafts remain parallel with the other components. Proper positioning of a pulley on a shaft will help ensure all pulleys are in a common plane.*
2. *Angular misalignment refers to pulleys which are within the drive system plane but are tilted because their shafts are not parallel.*

Both misalignment conditions can create belt tracking problems, excessive wear, chirp noise and belt stability problems. Just a few degrees of misalignment can increase belt operating temperature by 30°F, reducing belt life by as much as 50 percent.

Misalignment noise occurs most frequently on the shortest spans in a drive, which often arise between a backside pulley and an adjacent grooved accessory pulley. Proper pulley alignment is particularly critical in these locations. Side damage on the belts is a key indicator that there is misalignment present in the system and normally points to a failing tensioner.

***Use Gates DriveAlign® Laser Alignment Tool (Part #91006) to quickly identify pulley misalignment.***

Another tip for identifying misalignment or slip is to spray water on a noisy belt. If the noise gets louder, then the belt is slipping due to loss of tension; if the water causes the noise to fade or go away completely, then there is misalignment in the ABDS.

## *Tension*

A belt is just like a tire running on the highway; without proper tension it will slip and lose material. This changes the belt profile losing the friction it needs to transfer power to all the other accessories. Over time, the sidewalls will wear smooth and the belt will eventually harden through "heat-aging," a process referred to as glazing. The more glazed the belt surface is, the more likely it is to be noisy and lack sufficient ability to transmit power.

Why is this important? A persistent check engine light, reduced engine cooling, inconsistent power steering performance or poor A/C system performance, are all signs of belt slip due to loss of tension. Belt slip from a worn belt that has stretched in length can cause the belt tensioner to bottom out resulting in significant system tension reduction and catastrophic tensioner failure. Therefore, it is critical to check the tension or the performance of the automatic belt tensioner anytime the serpentine belt is checked for wear or replaced.

The best practice is to begin checking belts at 50,000 miles to ensure that the belt rib is uncompromised and not showing wear. As little as 5% rib material loss in belt, pulley or both can create tension issues for your customer.

**Other areas that can create tension related issues are:**

- *Insufficient spring tension or failing tensioner*
- *Belt sidewall wears from slipping or misalignment in the system*
- *Pulley grooves wear from slipping or misalignment in the system*
- *No run in and re-tension when the belt is new (manually tensioned drives)*
- *Belt elongation from old age and material loss*
- *Incorrect belt length installed during installation*
- *Change in drive center distance*

The cause of belt noise is often referred to as belt "stretch." However, the use of the term "stretch" is actually an inaccurate identification for what it is, in fact, a loss of tension caused by one of the factors listed above. Belt deformation is usually not a sufficient reason for loss of tension.

Belts tensioned too high may not cause noise, but can shorten pulley bearing life from excessive hub loads. Too much tension can also result in excessive belt wear, increased belt temperatures and premature belt failure.

Use Gates DriveAlign belt tensioners for OE fit, form and function. Gates recommends replacing tensioners and idler pulleys with every belt change.

For more information contact your local Gates representative, visit www.gates.com or send us an e-mail at aftermarkettraining@gates.com

A Tomkins Company

**Gates Corporation**