Belt Failure Modes and Solutions
by

Rev 1.2; 3/26/2003

Belt Failure modes, and how to "read" them…

The belting used by ScootWorks is the most modern Kevlar based belting stock on the planet. These belts are VERY strong, and if adjusted correctly, will last for many tens of thousands of miles. Occasionally, as with any drive system, a belt will fail. The following are typical failure modes, and a description of how to correct for the failure.

Failure modes A, B, or D can be caused by a loosened front pulley assembly. Be **_SURE_** to read our technical bulletin in the [Information Resource Center] named: "Unwanted Loosening of the Vulcan 400/800 Front Sprocket/Pulley assy" if you experience this type of failure. This is most common on the Vulcan 400/800, and is explained in the technical bulletin mentioned above.

Here is a short description of failure modes and their appearance:

a- A smooth break straight across the width of the belt is caused by micro-oscillations in the return path (bottom) of the belt stock, due to under tensioning. These oscillations can also be caused by a loosened front or rear pulley.

b- A jagged and/or splintered break is most often caused by Kevlar becoming fractured by a sudden increase in belt tension. This is usually caused by a foreign object finding it's way between the belt and pulley (large rock, tree limb, key chain, etc). While not impossible, it is certainly rare. It can also be caused by an over tensioned belt, or by a mechanical transients generated by a loosened front pulley assembly.

c- A jagged and/or splintered break with teeth sheared from the belt is caused by Kevlar becoming fractured by a sudden increase in applied power. This can be caused by "popping" the clutch, rear wheel spinning then "grabbing traction", application of NOS systems while in the lower gears, etc.

d- Teeth sheared from the belt, but no belt breakage can be caused by a sudden load change from "popping" the clutch, by the rear wheel spinning freely on ice or sand, oil…then "grabbing traction", application of NOS systems while in the lower gears, etc. This is more common than "c" above. While uncommon, it can also be caused by operating at load while **under tensioned**, or by mechanical transients generated by a loosened front pulley assembly.

e- Heavy wear _between_ the teeth on the belt. This would be caused by over tensioning, though we've never seen this on any of our belt drive systems to date.

f- A repetitive damage/chip in belt teeth (every so often along the belt's length). This is caused by a stone or other debris becoming wedged in between two teeth in one of the pulleys. Examine both pulleys closely for this possibility.

A few additional things to check, if a belt should fail:

Check the torque/tightness of the securing nut on the front pulley, and the securing nuts on the rear pulley. A loose pulley can cause belt slippage/stripping, and belt failure as a result of mechanical transients being transmitted along the length of the belt. It can also lead to damage to the splines of the output shaft.

If you own a Kawasaki Vulcan belt drive, did you get a version that required you to swap the old spacer behind the front pulley, with a new spacer? If so, is the beveled end of the spacer turned towards the engine (passing it through the seal)? If you have a version that requires the spacer to be swapped during installation, and the bevel is turned the wrong way, an internal o-ring will fail and cause clearance to creep in and loosen the pulley (without loosening the nut!).

We've have seen once, immediately after a customer's install, where the belt wasn't engaged into the teeth of the pulley, but rather it was riding on the tops of the teeth (180 degrees out of position). It made the tension test come out correct in force vs. deflection (1/8" @ 10lbs), but once the bike's rear wheel rolled a few turns, the belt seated itself and was destructively loose. Undertensioning creates an oscillation in the belt along the bottom path, causing the Kevlar to fail at the crimp, and it'll break almost as clean as it were cut. This is THE leading failure mode in belts.

Make sure the rear pulley was installed in the correct direction….sounds crazy, but it does happen. The alignments, as specified in ScootWorks' designs, are very important for long belt life.