Fitting and turning…

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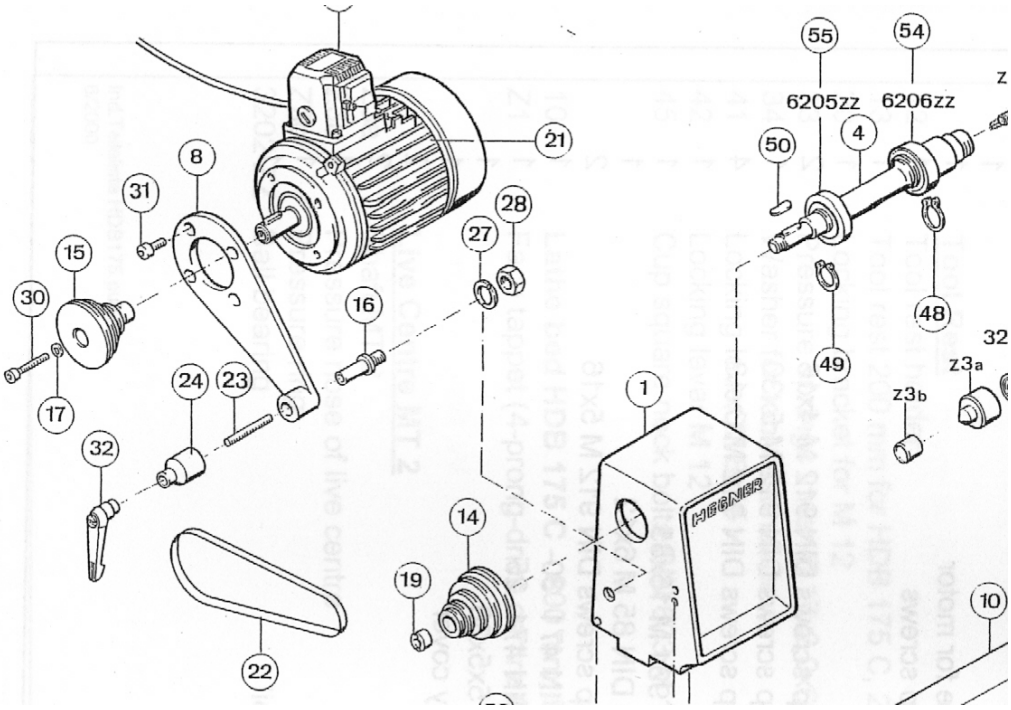
I own a Hegner HDB175 wood lathe that was made in 1992 – the picture shows a short bed version – mine has a 1m bed. I bought it second hand in 1999 through the late Scott Myles. These were imported by Hardware Centre, but apparently only five were sold locally, so you won't find many around. A similar model, the HDB200 is still made by Hegner. Roy Gibbs has an example.

Recently, my Hegner developed an annoying rattle from the headstock when it ran, particularly at higher speeds.
The exploded parts diagram shows the construction of the headstock. This particular model has a five step pair of Poly-Vee pulleys (14) and (15) to reduce or increase the speed of the 500W single phase motor (21).

I upgraded the original HDB175 with a new spindle (4) from the factory in 2004. The new spindle provided the capability of a 2 Morse Taper socket on the headstock and a through hole for boring through or for a knock-out bar. When I installed the upgrade, there was a small amount of radial play between the driven pulley (14) and the headstock shaft (4). I fitted a shim to take this up. The shim was fitted on the side of the keyway (50) for the pulley.



Now, many years later, when the unit was running with a work piece of any significant mass spinning, it began to make a loud rattle. If the lathe was heavily loaded with a deep cut, the rattle diminished. A small amount of radial play could be felt between the Poly Vee pulley (14) and the spindle shaft (4) and this was determined to be the problem.
The lathe has the original 500W single-phase 4 pole (1440 rpm) motor, which may not have a smooth speed characteristic, compared with a three-phase motor. During each revolution, the motor is slightly speeding up and slowing down, and this is evident now that play has developed. This is inherent in single phase motors. Three phase motors are smoother than single phase motors. The motor does not seem to be faulty, as it starts normally and develops

the usual torque at speed. The motor has a capacitor excited run winding, and no start winding. If the capacitor is not closely matched to the run winding, then the torque generated by the two windings will not be exactly the same and there will be a cyclic torque variation over each revolution. This will attempt to speed up and slow down the motor slightly, enough to show up any play as a rattle.

I dismantled the Poly-Vee pulley (14) from the spindle shaft, which required a puller to do so, as there was a small amount of fretting on the shaft and material transfer from the pulley. There was also fretting evident on the key (50) at the interface to the steel spindle (4). There was no fretting on the key on the interface between the key and the pulley, but this is not surprising as the softer aluminium alloy of the pulley was wearing. There was a small gap evident between the key and the keyway on the pulley.
There were several possible remedies that I considered:

1. Make and fit an oversize key, to eliminate any play in the radial direction.
2. Simply replace the existing key and use Loctite to glue the pulley onto the shaft. This may cause problems with disassembly in future, as heat may be required to release the Loctite, which may spoil the lubrication in the bearings.
3. Replace the spindle pulley.
4. Fit a three phase motor.

I suspected that with options 1 and 3, the problem will then re-occur again in the future, unless I implement 4 as well. Option 2 may assist.
I decided to make a new, oversize key and then I used Loctite when I assembled the pulley onto the shaft. The key is about 5mm square, so I purchased some 6mm key steel and filed it down fit. Key steel is a medium carbon steel that is hardenable, if required. Using a micrometer to measure the existing key, I filed the 6mm square stock to just over the required size – about 5 x 5 mm. I then carefully filed the new key down until it was a close fit, both in the aluminium pulley and the steel shaft. The new key was about 0.05mm wider than the old one for the pulley slot and about 0.03mm wider for the slot in the shaft. This is not much, but it was enough cause the rattle.
The pulley was assembled onto the shaft with the new key and using Loctite. When the lathe was run, the rattle was gone. After a few hours of use, including turning a heavy lump of oak, the rattle has not returned. It may still yet, but I’m holding thumbs.

In the longer term, I would like to fit a more powerful three phase motor with a Variable Speed Drive, perhaps a 1.1 kW unit. However a new drive pulley may be required, because the larger motor has a larger shaft. I don’t think there is enough much material on the driving pulley if I have to bore it out for the larger shaft. I may have to make another pulley and new mounting flange (8), but that is another project for the future.