MYFORD SUPER 7 CROSS AND TOP SLIDE ADJUSTER UPGRADES

Introduction

I had a job for a customer that needed two M18 screws cut on either end of a 19mm silver steel shaft. I have never cut a thread that size before and it looked that with my aging muscle wastage, hand cutting was not an option. Fortunately, I have the Clough42 Automatic Leadscrew system fitted to my Myford Super 7 Big Bore lathe which hopefully was going to pay dividends.

I did some trial cuts using the Geo. Thomas 'Red Book' (ISBN 1-85761-000-8) top slide method of screw cutting but I found there was so much backlash on both the top slide and cross slide that I was struggling for consistency. In the end, on the actual job, I did a hybrid cut of 'nearly there' using the ALS using plunge cuts and then I finished with a nut die that was happy to 'start' on the part cut thread. This gave me a clean finish to the thread and I was relieved to get the job done. Note that my Myford Super 7 is a 'Metric' version but the leadscrew is Imperial so screw cutting using the ALS entails keeping the half nut engaged and reversing the drive.

With the client job completed my thoughts came round to giving the Super 7 some TLC to try to improve the backlash issues I had encountered.

Both the top slide and cross slides have their leadscrew held in place with a 26TPI threaded collar that has a single retaining grub screw. Damage by the grub screw impacting on the 26TPI thread is inhibited by a small disc of copper sandwiched between the two faces. The collar is normally tightened such as to reduce end shake of the leadscrew but inevitably the tighter this is made the more difficult it becomes to turn the adjuster handle. Usually this results in frustrating irregular stiff then slack handle rotations.

I found various discussion threads about overcoming this backlash problem through fitting thrust bearings to the cross slide and top slide but all referred to EBay thrust bearings that I failed to find the listings for. After some investigation I found Simply Bearings had two suitable items in stock. The NTA916-TRA916 is a 9/16" core diameter bearing and washers suitable for the cross slide and the NTA815-TRA815 is a 1/2" set for the top slide. I ordered two sets of each.

Top Slide (Compound) Modifications

In the process of reading the Geo. Thomas' 'Red Book' I browsed his Chapter 16 on top slide mods recommending adding a stop screw and also to add a pin to the gib strip to stop lateral movement. As I was about to strip the top slide, I thought it worthwhile to do these two mods.

His description of the work needed is clearly detailed and adding the pin to the gib and the stop screw did not take too long to do. After a thorough clean to remove cast iron dust and a re-lubricate, I then adjusted the gib strip without the leadscrew in place to ensure it moved freely and evenly by hand action. I opted for a simple cap head screw for the locking component as shown below.

Moving onto the thrust bearings sets (each being two washers and one needle bearing ring) these are fitted as one external to the casting which is sandwiched by the adjuster handle micrometer ring and one on the inside between the adjuster collar and the casting. The total thickness of the stack of the four washers and two bearings adds up to 7.5mm. This increase in 'thickness' means that the adjuster collar grub screw no longer engages with the 26TPI threaded section. Some means of accommodating this increased depth had to be found.

The possible solutions are varied and depend on your comfort in modifying the existing lathe structure components.

You could leave out the bearing washers completely and just fit the bearings. I tried this but it felt gritty as the surfaces of the casting, the collar and the end of the micrometer ring all have relatively rough surfaces to some degree or other. In particular the micrometer ring end face is made up of two coaxial surfaces and as a result this face at the very least has to have the washer fitted.

The locking collar ring can be reduced in thickness to bring the grub screw closer to the edge of the collar. This is a straightforward job to do but beware there is little metal to work with. It does help however but still leaves a need for more of a gain elsewhere.

(Clearly reducing the collar raises a chicken and egg situation. You need the lathe to reduce the collar but the collar forms part of the lathe that you want to use. Either you need a second lathe or make the skim in a milling machine or you make a new collar completely which means you need to be able to cut a 26TPI thread. My small Cowells ME lathe stepped up to the challenge).

The lead screw could have its external end face machined back but this impacts on the micrometer ring and the handle dimensions with both needing to be skimmed back to match. I didn't really want to go there.

The decision I took was to skim the outer face of the casting boss. This will reduce the datum marker line but is of no real consequence in being able to set the micrometer dial alignment. I made a simple jig mounting plate from a piece of cast aluminium and bolted the casting to it (2 x M5). Mounting this plate in the mill, I skimmed the boss height back to 13.5mm overall from the boss top surface to the temporary mounting plate.

The combination of the boss skim and the collar skim delivers sufficient width gain to allow the six component parts of the thrust bearings to be accommodated while leaving the grub screw face fully able to engage with the lead screw thread.

With the above dual gain in thickness, the assembly is straightforward to put back together. I suggest doing this with the end casting still removed from the top slide body. Tighten the collar against the bearings and lock the grub screw (having made sure the copper disc is in place).

Having removed the end casting to skim it, it is important to not tighten the two locating screws down until the lead screw has been engaged with the slide and fully wound in to bring the slide up to the end of its travel.

The result of the cross-slide modification is a stiffening on the adjuster handle rotation but not sufficient to make it a difficult to move – let's call it tight but comfortably smooth. The end shake on the top slide had now totally disappeared.

Cross Slide

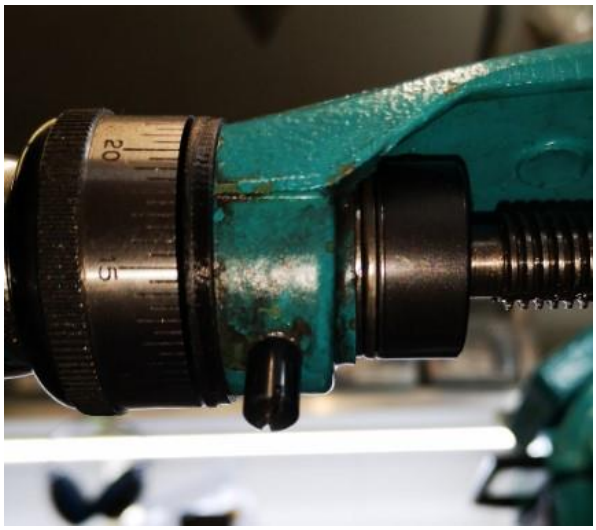
The cross-slide modification is much easier than the top slide because there is almost sufficient residual length on the lead screw 26TPI section to accommodate the increase in thickness that results from fitting the full bearing assemblies. A slight reduction skim of the locking collar width completes this. This ensures the grub screw is just fully engaged against the 26TPI threaded section. I would estimate that you need to reduce the gap between the grub screw hole side wall to the end of the collar by half. Note that I chose to skim the side face of the locking collar that had the slightly raised section.

The following additional notes apply.

My Super 7 has power cross feed. Once again reading Geo. Thomas' 'Red Book' he warns of the difficultly of re-fitting the cross-slide leadscrew on such a model (Chapter 26, P281). He does detail a step-by-step process should this become a problem. I was very careful not to move anything associated with the carriage when I removed the cross-slide lead screw. I was lucky to refit it without any issues. Once I had relocated it and before tightening the collar, I checked and adjusted the gib action for smoothness.

The cross-slide leadscrew 26TPI section is a slightly larger inner diameter (9/16") than the top slide equivalent (1/2"), hence the different thrust bearing part number. The outer diameter is 1" whereas the top slide version is 15/16". Even after the casting skim detailed above, the top slide diameter still nicely matches with the diameter of the adjuster knob and micrometer ring. The cross-slide bearing assembly is noticeably less in diameter than the adjuster knob micrometer ring and the adjacent casting diameter. This leaves a deep gap between the knob and the casting which is crying out to accumulate debris which could ultimately get into the bearing.

My solution was to 3D print a padding washer to fill this gap which was modelled using Fusion 360. This is a lose fit at 26mm ID, 36mm OD and 3mm thickness. While I 3D printed this packing washer it could clearly be a machined item.



Sadly, the same protection cannot be afforded to the newly fitted top slide bearing but this area is much further away from any cutting activity so it is less exposed to debris. Clearly this is a situation to be monitored and a potential additional maintenance activity to bear in mind.

As with the top slide, there is a noticeable improvement in 'slop' on the cross slide with this modification fitted. A dial gauge check suggests a movement of 1 or 2 thou.

Conclusion

The modifications as detailed are not complicated to implement. The main 'lump in the throat' is skimming the cross-slide casting but with care and a good jig this should not be a problem.

Having completed the work, I find the lathe is now much more responsive to settings and this is verified by the matching consistency of the DRO readouts.

I am more than happy that having undertaken this combination of modifications, it was time well spent.

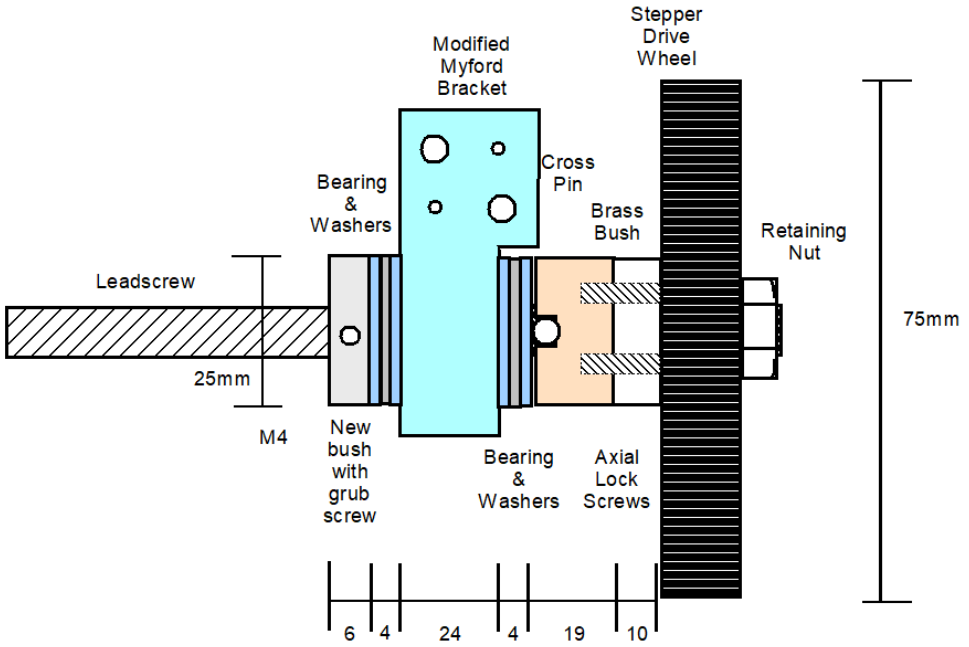
There now follows the later modifications I made to fit the thrust bearing modification on the Myford S7 leadscrew.

Phase 2 – Leadscrew Modification

Having modified the cross and top slides with thrust bearings, I kept pondering the leadscrew mounting and wondering how to fit thrust bearings. You can buy a kit from Hemmingway Kits to do this modification but my installation is complicated by my installation of the Clough42 Electronic Leadscrew. I chose to drive the leadscrew with a stepper motor mounted at the tailstock end. This involved making a brass driving bush that picked up on the cross pin in the leadscrew end section. The brass bush was then locked to the drive pulley with four screws. I really did not want to deviate too much from this arrangement.

The end result is not for the faint hearted. It involved shaving down the leadscrew mounting bracket to give me enough residual length to still use my brass drive bush arrangement.

Here is a sketch of the final structure.



Working from left to right and with all diameters roughly 25mm : -

1 A new 6mm wide bush was made to fit the leadscrew and with minimal thickness to allow a M4 grub screw.

2 The bought in thrust bearing and its two facing washers.

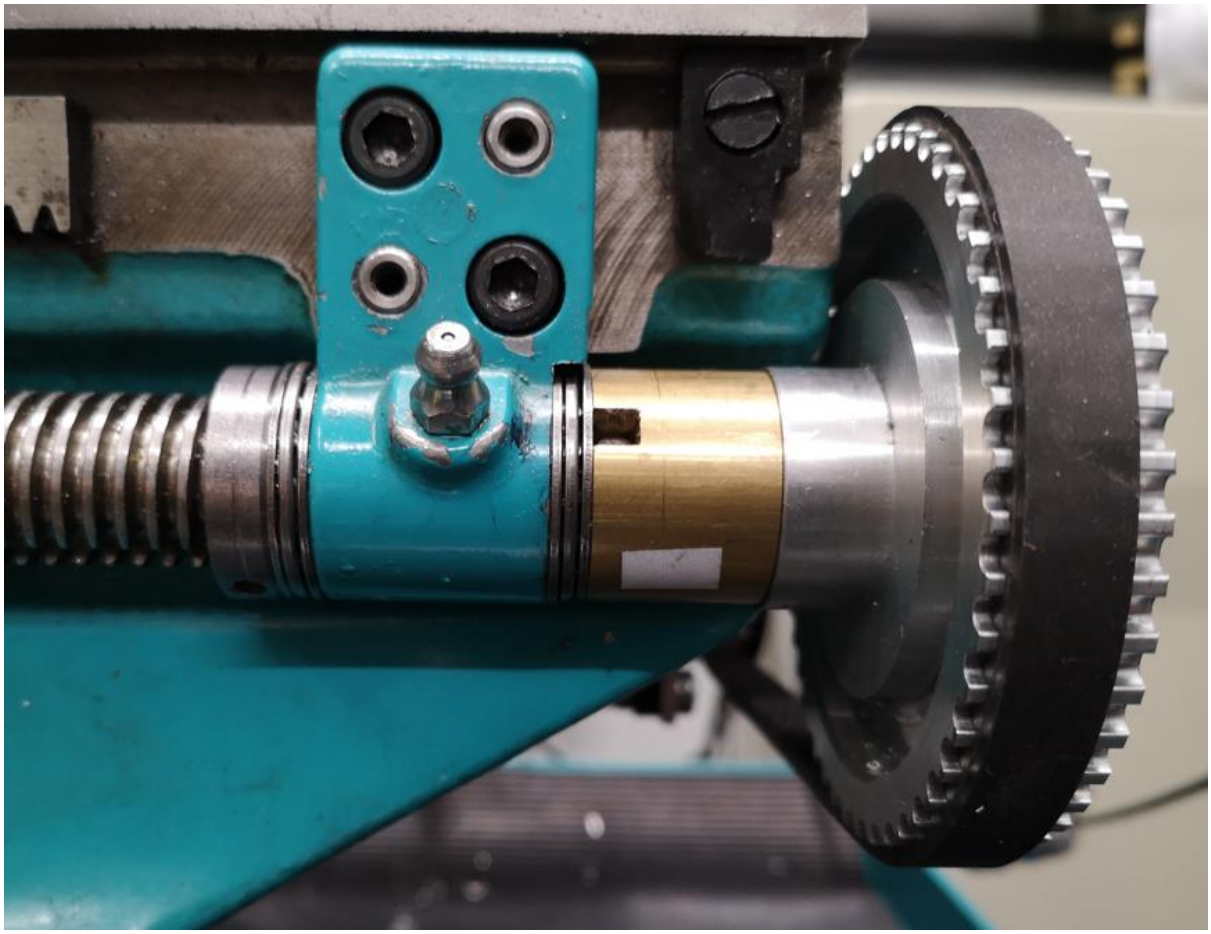
3 The modified Myford leadscrew bracket. Note that I kept the original bronze bearing bushes in place and milled the right-hand side bush down while skimming back the bracket body. Care is needed to ensure the two faces of the bracket are parallel so some careful jigging is needed.

4 The second bought in bearing combination.

5 The brass bush that tightly matches the fit over the original cross pin in the leadscrew. The end face of the brass bush has four radial holes that match similar holes in the face of the stepper drive wheel. This locks the drive wheel to the brass bush which in turn is locked to the leadscrew by the cross pin.

6 The drive wheel for the stepper which is much modified on its outer face to get sufficient leadscrew thread to be held by the outer nut. I was struggling to get a major protrusion of the threaded end so in the end I used a Nyloc nut fitted the reverse way round on the leadscrew end. There is more metal available that could be removed from the drive pulley to accommodate the nut but I opted to leave well alone as it worked fine.

Here is a picture of the complete assembly.



Once more I would emphasise that this modification also requires irreversible modifications to the Myford fittings. This time to the leadscrew mounting bracket. The modification is not to be undertaken lightly !