Improving the RF-30 Mill/Drill Y Axis Take Up Nut, Version 1.1

By R. G. Sparber

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A leadscrew and take up nut are used to move the table on my RF-30 Mill/Drill in and out. When new, this arrangement worked well. But over time I had to tighten the take up nut in order to keep backlash to a "reasonable" value.

The meaning of "reasonable" changed when I converted my mill/drill to Computer Numerical Control. It was at 0.038" when I ran manually. With CNC, I wanted to get it down to 0.002". This required modifying how the leadscrew is held and modifying the take up nut. This article deals only with the take up nut.

The screw at the top of the nut draws the partially separated section of the nut towards the majority of the threads. In this way, backlash due to wear in mostly the separated section is reduced.

Originally, the take up nut had a radial cut not even half way through. As I had to tighten the screw more and more, it became obvious that I needed to make this cut deeper. I went down to the bottom of the threaded bore.

Let's think about what is going on here.

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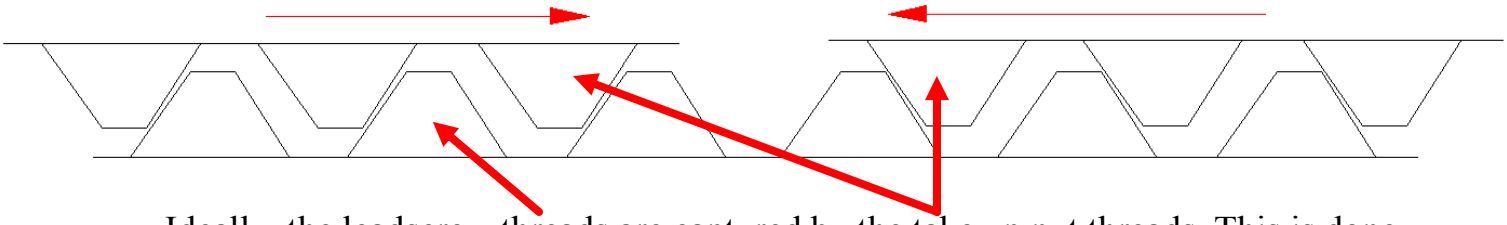
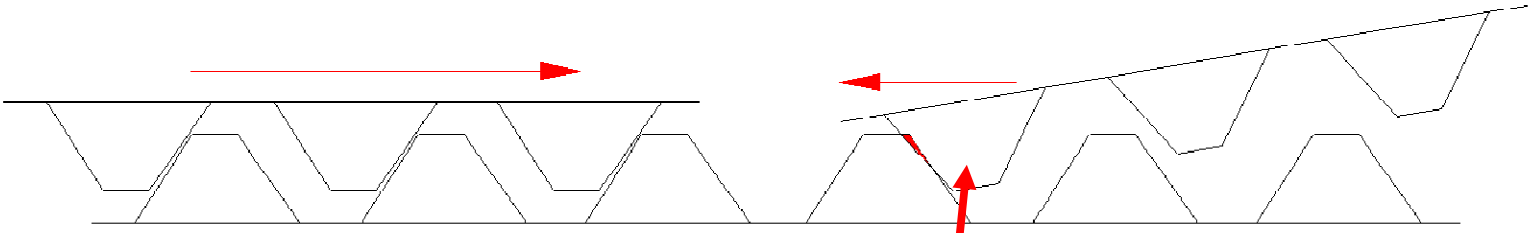
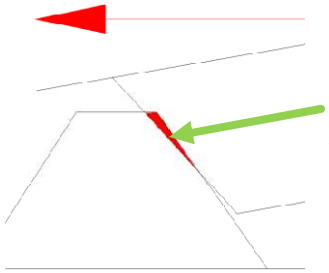


Ideally, the leadscrew threads are captured by the take up nut threads. This is done by adjusting the take up nut threads so they almost pinch the leadscrew threads. Given an ideal take up nut and leadscrew, this gap can be almost zero. In reality, variations in both the nut and leadscrew require a gap to prevent binding during movement.



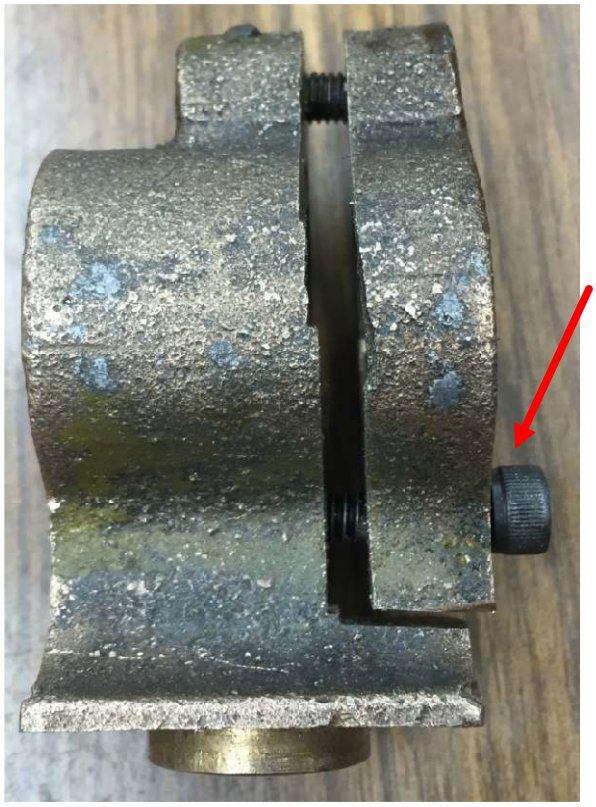
As the take up nut is tightened, the threads in the smaller section tilt. Backlash is still taken up but the wear pattern on the take up nut becomes less and less ideal.



The thread on the take up nut has a groove worn into it . So rather than evenly wearing along the entire face of the thread, it is all concentrated in one place.

Furthermore, I have seen that this concentration of wear causes backlash to change as I move along the leadscrew. That is particularly bad in CNC where the software can only compensate for a single value.

The solution is *technically* simple but may cause excessive emotional stress. Mess up this modification and you may have ruined your take up nut. Buying a new take up nut is likely not an option. I thought long and hard about this modification before taking the plunge.



Here is the finished modified take up nut. The smaller threaded section has been sawed free of the rest of the nut.

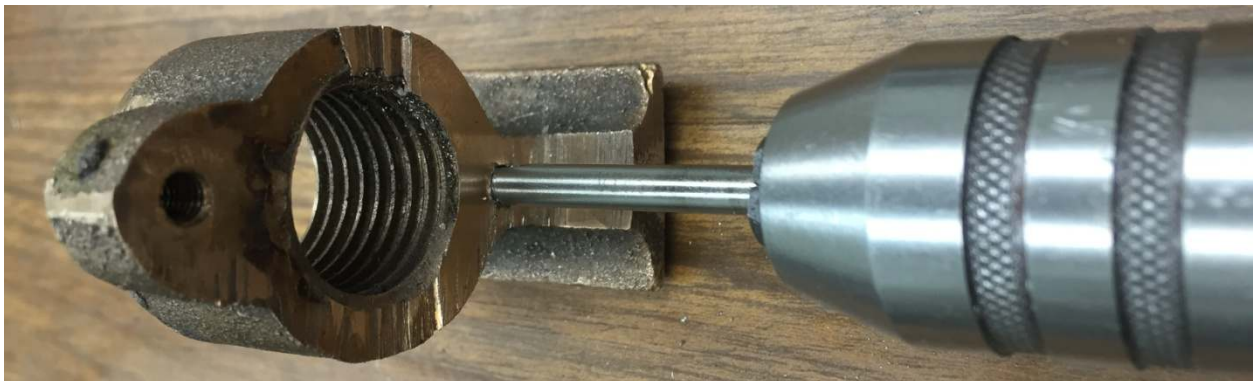
A second screw has been added to anchor the bottom.

This arrangement permits me to adjust the backlash while keeping the movable part of the nut aligned with the leadscrew.

I first drilled a 10-24 tap hole all the way through the casting. This was done on my drill press to insure that the hole was parallel to the nut's major axis.

Then, ***gasp***, I sawed out the movable section. No turning back now!

The movable part was drilled to a close through hole.



The body of the nut's hole was tapped 10-24.

The roughly assembled take up nut is now ready to be trial fitted to the leadscrew. This is best done with the leadscrew removed from the mill. It is difficult to reach the lower screw.

Loctite™ was used to secure both screws and final adjustment was made on the machine.

Shop Performance

I see variation in backlash due to movement along the leadscrew and also from rotation of the leadscrew. The leadscrew has previously be adjusted to be parallel to the Y axis within 0.0005" over 15 inches. How I did that will be covered in a future article.

The original take up nut with the gap crunched all the way down gave me a change in backlash along the leadscrew of 0.0035 inches over a distance of 3 inches. I could get a backlash of 0.0014 inches at the start of the run but it would bind up.

The modified take up nut run over the same section of leadscrew showed a worst change in backlash of 0.0008 inches. Typically it was less than 0.0005 inches. My backlash was set to 0.0015 inches and it did not bind up as I moved over the full range.

Variation in backlash due to leadscrew rotation was 0.0002 inches worst case. This is down from 0.0005 inches.

I plan to modify my X axis take up nut in the same way.

Acknowledgments

Thanks to John Herrmann for collaborating with me on this adventure.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

Rick Sparber
Rgsparber.ha@gmail.com
Rick.Sparber.org