

# Sniffing Out Static Error on a Gingery Shaper

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Lots of things move on a shaper. Anywhere there is wanted movement; there is the potential for unwanted movement. This article presents a means of finding these errors and knowing when you have reduced them.



The “magic” combination here is a beam torque wrench and a Dial Test Indicator.

The basic idea is to apply a known force and measure any deflection on the DTI. In all cases, I apply both a positive and negative torque. Total movement of the DTI is then recorded along with the applied + and – torque. I can then apply a possible fix, re-apply the torque, and see if the DTI’s total swing is reduced.

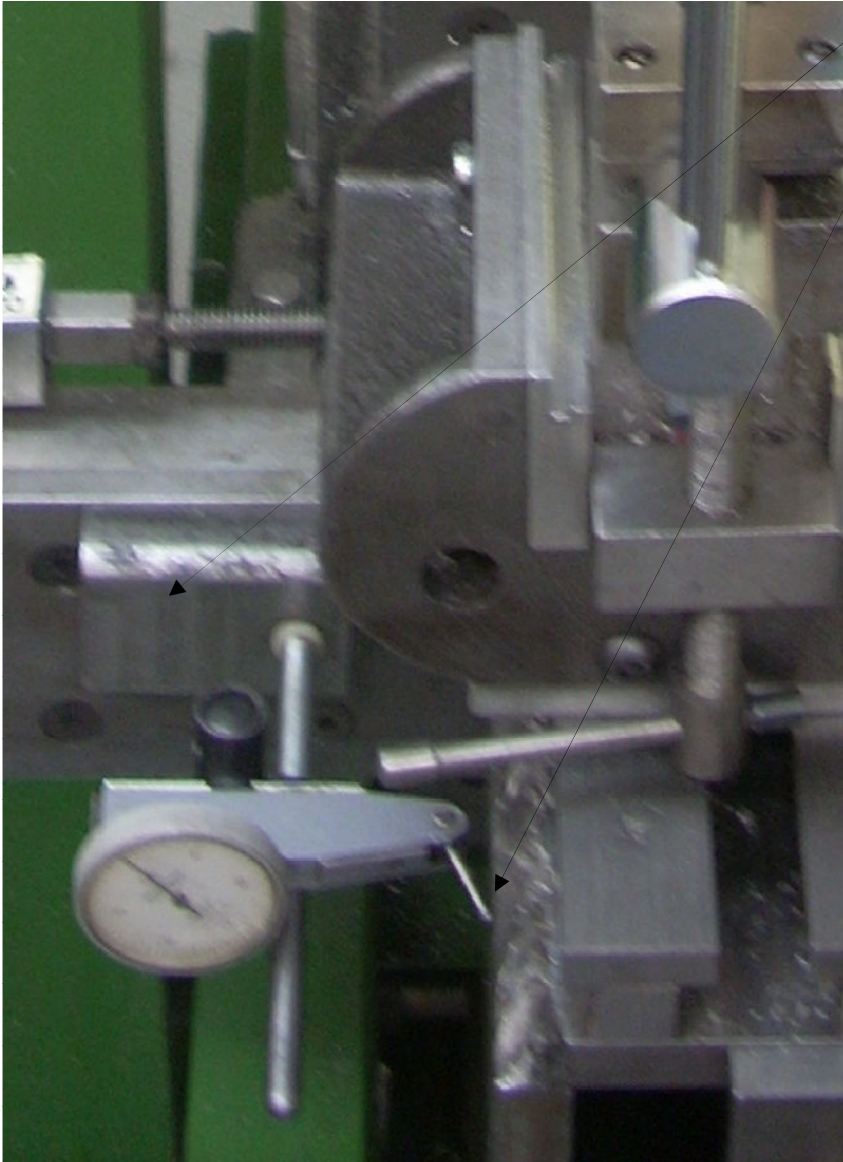
I have clamped the 3/8” square drive in a small vise which, in this case, has been clamped to my shaper vise.

Note that I am doing just static testing here. There is no point in doing dynamic testing if unacceptable static errors exist in the machine.

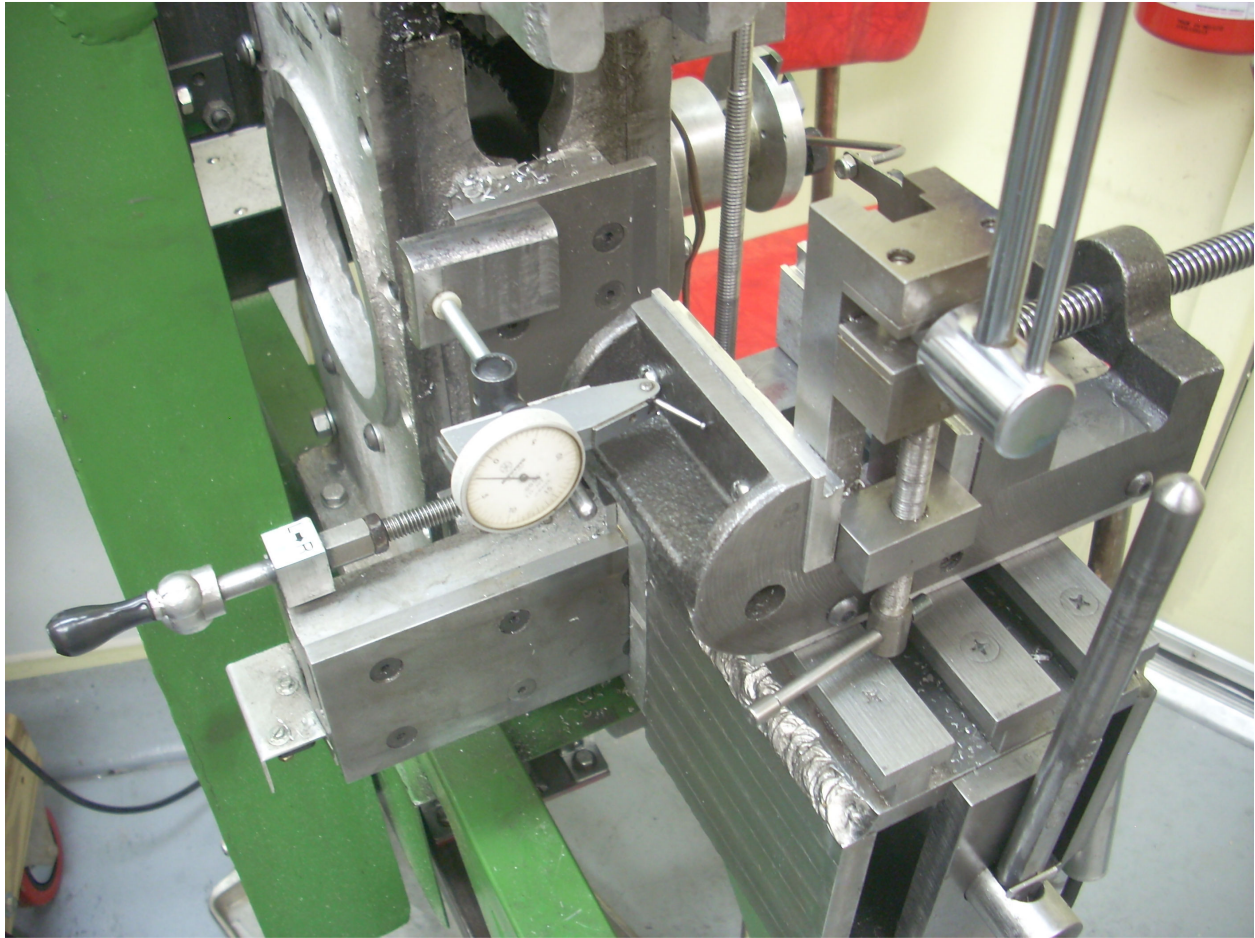
Once I am happy with the static error level, I will start doing dynamic testing by machining a test cube. That will be in another article.

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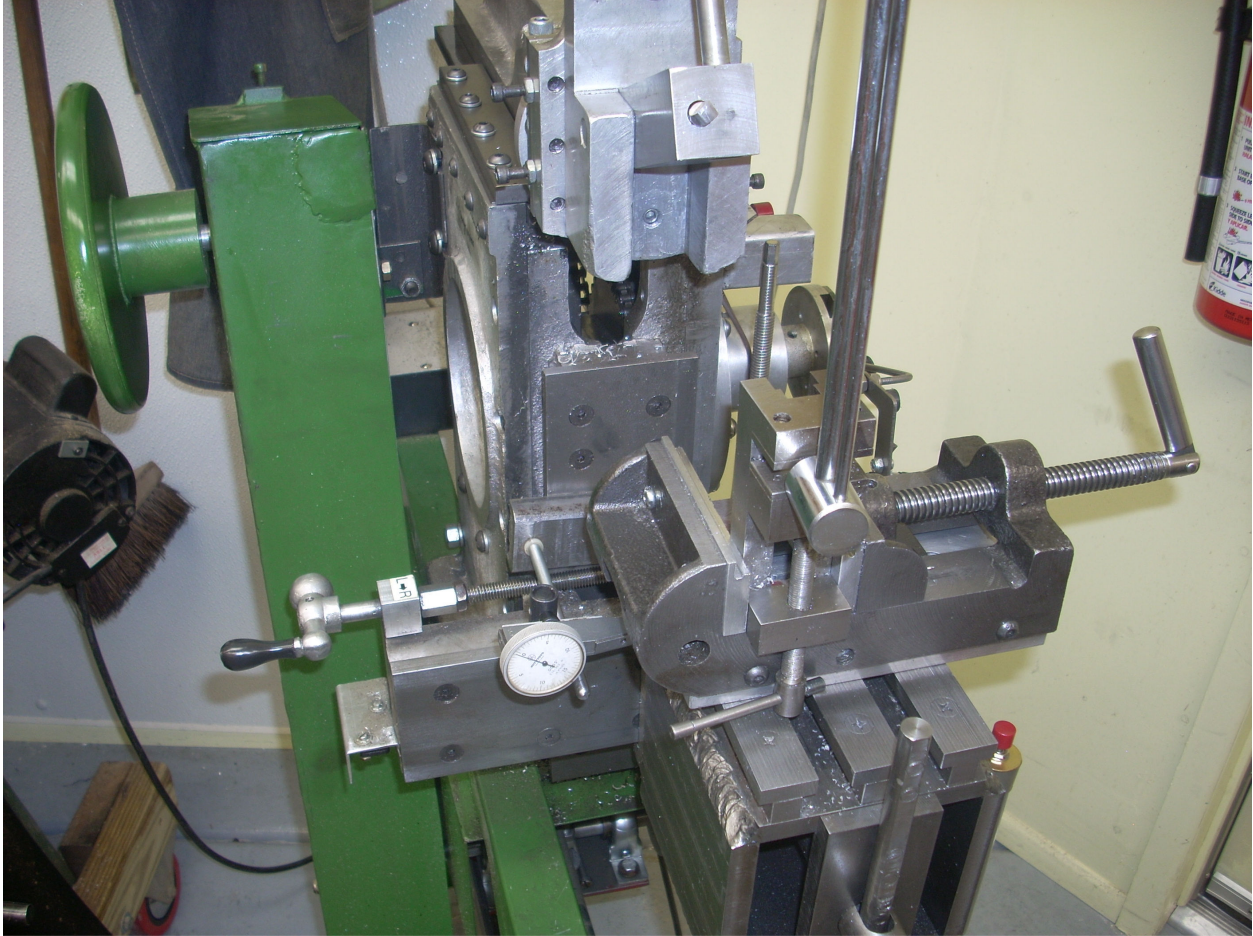
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The base of my DTI is magnetic and attached to the cross slide ways. The DTI's finger is touching the side of the table. The exact location is not that critical but do record it so you can reproduce the test later. You do not want to put the DTI in a location that is centered across a ways since it might not pick up any movement. As I apply + and - 200 inch pounds of torque to my table, I can see the DTI move less than 0.0005". This tells me that my cross ways are snug. Yet I can still crank the table from side to side so all is well here.

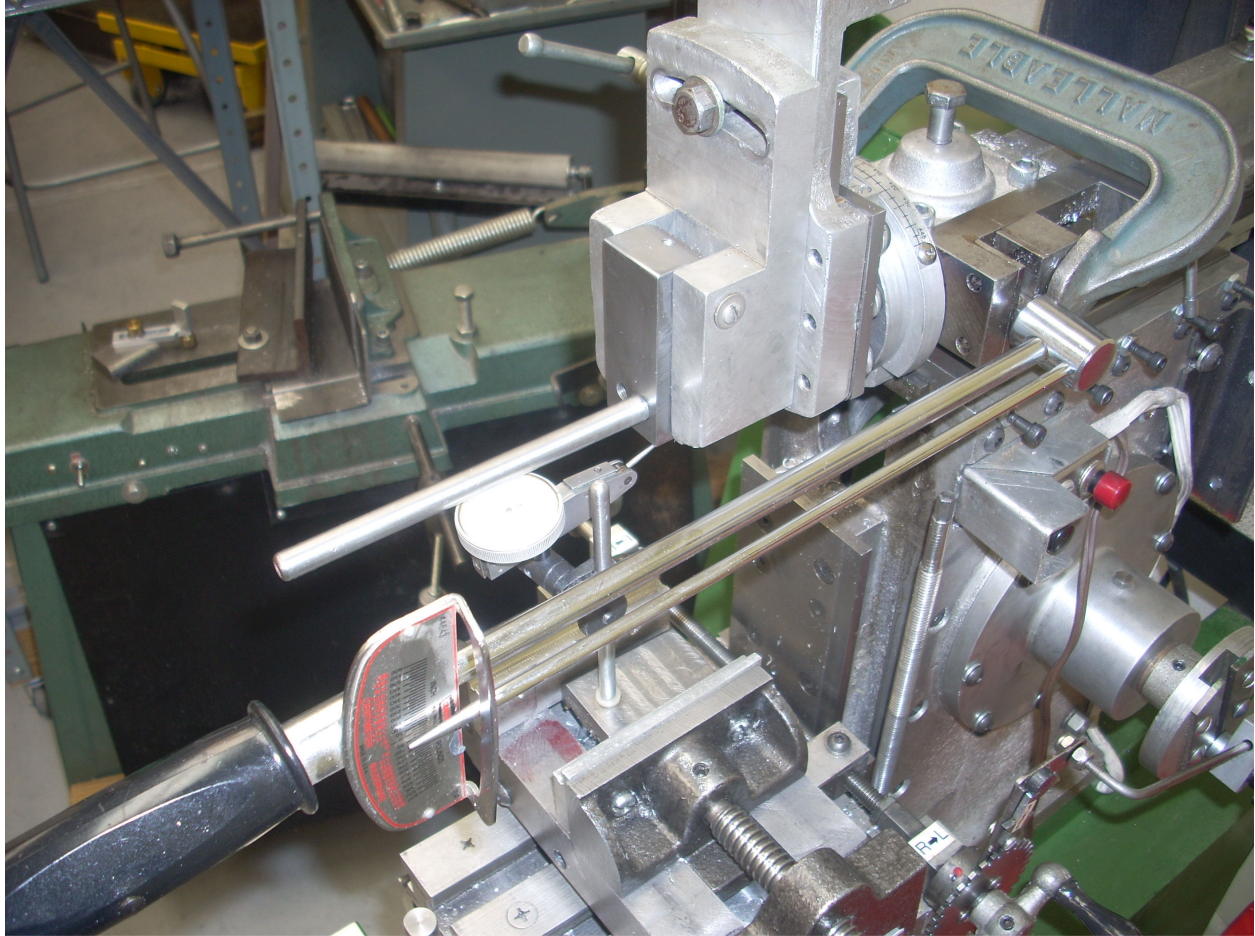


My next test includes the vertical and horizontal ways. I have already determined that the horizontal ways are snug so I am mostly looking at the vertical ways. I applied + and - 150 inch pounds and saw 0.0135" of movement. Clearly something is loose here. I tightened the vertical ways until they locked yet still saw the same flexure. OK, then what else could it be? I've never liked this cheap cast iron vise. Maybe it is the problem.

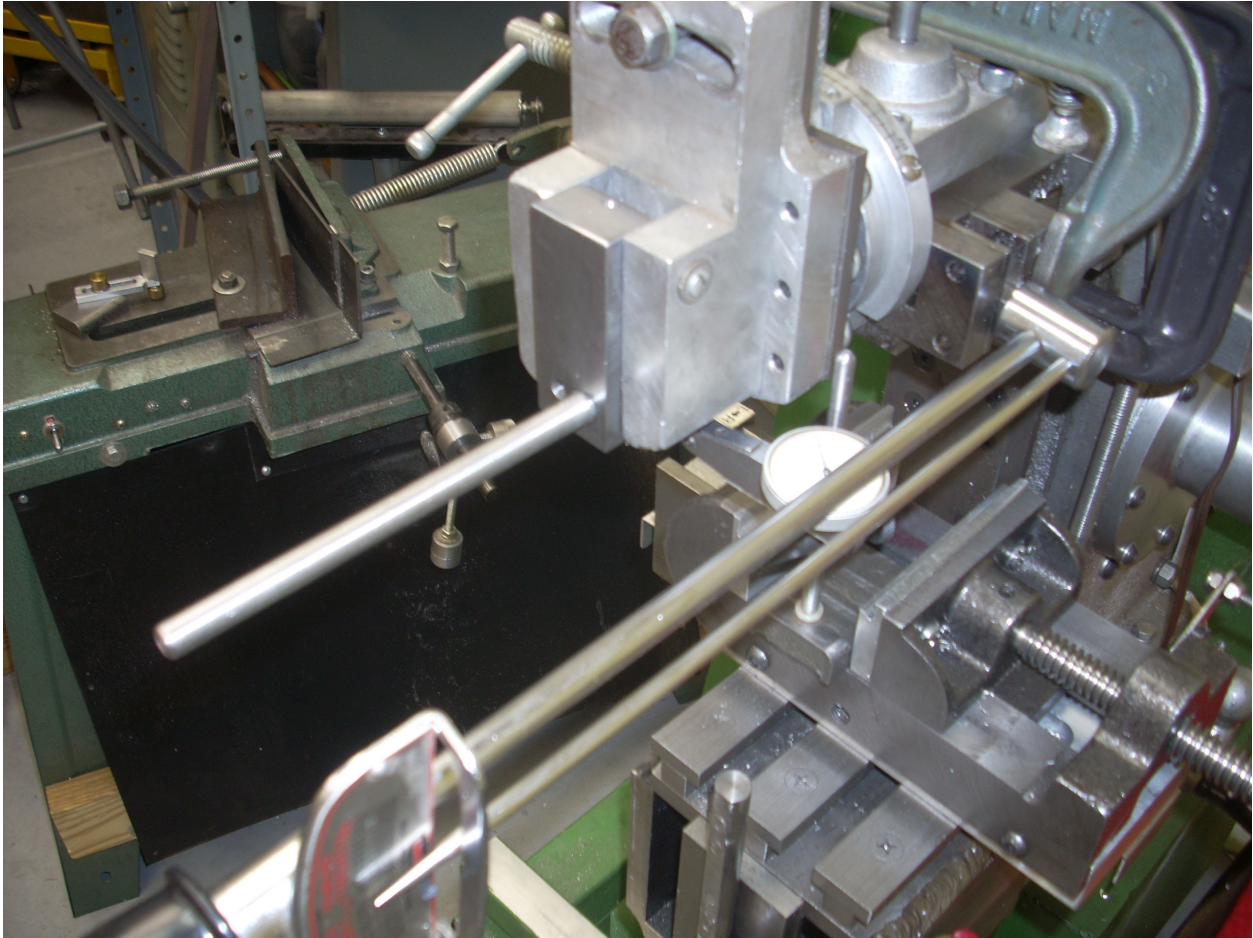


I moved the DTI down so it is touching the aluminum block that supports the vise. Now I see a total movement of around 0.001" as I apply the same torque.

So my dislike of this vise has been justified. The fixed jaw was bending about 0.012" due to the torque. Time to look for a better vise!



I will now test the ram with respect to the vise ways. There will be no stress on the vise ways so this is really a test of the ram's head with respect to the body of the shaper. I applied + and - 150 inch pounds of torque and see 0.001" of movement. Interestingly, when I lift up on the torque wrench handle, the DTI does not move at all. Only when I push down do I see that 0.001" deflection. Since the cutting force tends to push the head up, this is good news.



Next, I extended the ram out as much as possible. When I lifted up on the torque wrench handle and applied 250 inch pounds, the DTI needle did not move. Lifting up gave me a deflection of 0.001”.

You may wonder how I decide how much torque to apply. I just apply torque until I don't see any more DTI movement or until I see enough to realize something is very wrong. The key is to be consistent.

The next step is to buy a new vise. Then I can start cutting my test cube.

I welcome your comments and questions.

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