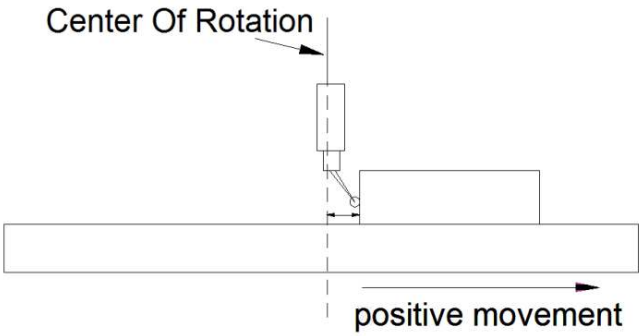
Finding the Center of Rotation of a Finger Dial Test Indicator, Version 1.1

By R. G. Sparber

A Finger Dial Test Indicator (fDTI) is an amazing instrument but also a very limited one. It is, at peak accuracy, determining when it has touched a surface at the same distance from its Center Of Rotation (COR) as it has before[2].



For example, I have a stack of gage blocks resting in a clamped piece of angle stock. The stock is held in a vise that is bolted to my mill table. The fDTI is touching the vertical face of the end block and I have zeroed it. Moving the X axis in a positive direction moves the fDTI into to the block and causes it to read a value greater than 0.

I can move the table so the block no longer touches the finger and then move it back. When the fDTI again reads zero, the block is back at its original position within the accuracy of the indicator. I trust this fDTI to +/- 1 tenth (that is +/- 0.0001 inches).

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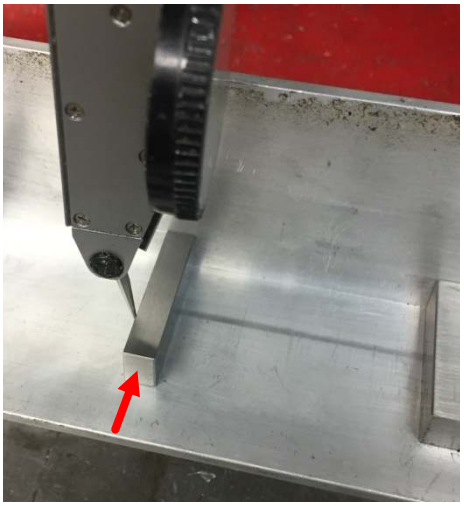
[2] For details, see http://rick.sparber.org/Articles/DTI/DTI.htm

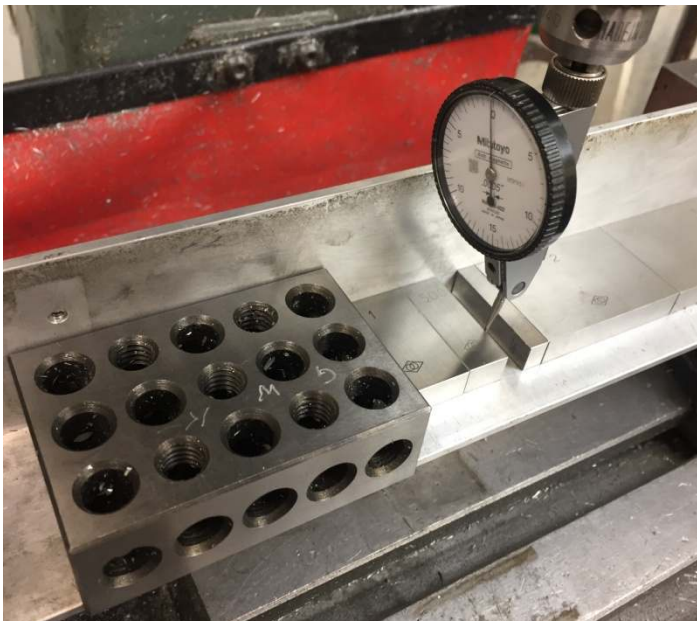
In most applications, this measurement is all that I need. But today I needed to know the distance from the point of contact of the finger to the COR of the fDTI. Since the finger is designed to be index around during set up, this distance is unknown.

It turns out that measuring this distance is not so difficult given my current set up.



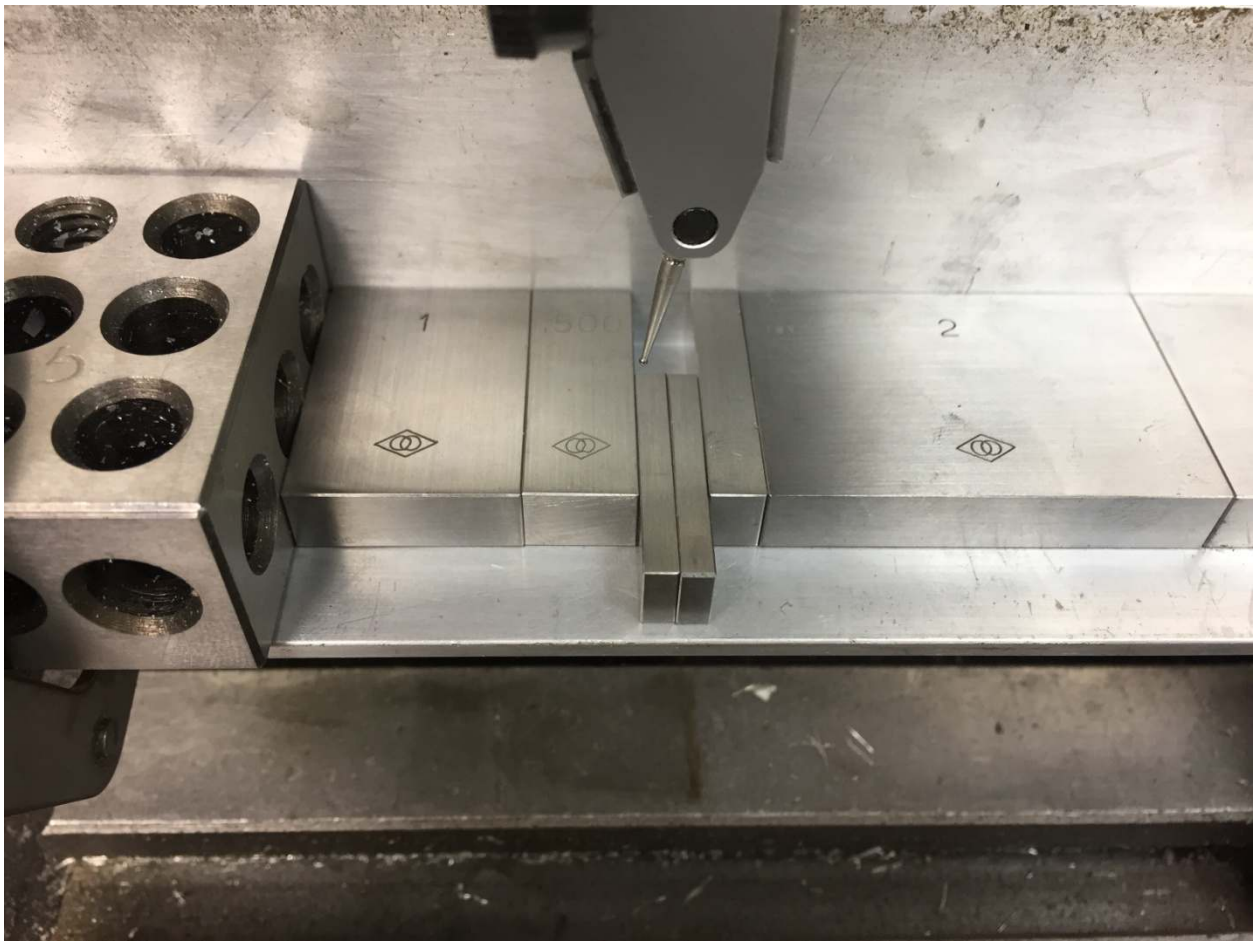
After zeroing my fDTI, I pushed on the end of that small block (red arrow) and removed the larger block to its right. Then I carefully slid the small block to the right. The goal was to not bump the finger.

I then had room to rotate my fDTI by turning the spindle almost exactly 180°.



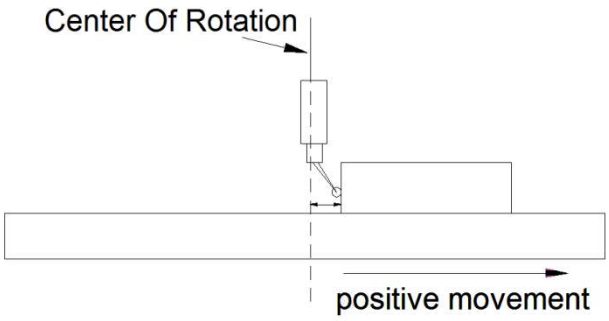
With the finger out of the way, I put back the large and small block on the right side of the picture.

Next I slid a few blocks into the fDTI backed up by a 123 block from the left. I stopped when the fDTI again read zero. Then I clamped the 123 block.



With the gap solidly clamped, I was able to use my gage blocks to measure it. A stack 0.295 inches thick just fit. 0.296 did not fit. This means that the COR is $\frac{0.295\ inches}{2} = 0.148\ inches$ from the contact point of the finger. I am only entitled to 3 place accuracy and since the gap is between 0.295 and 0.296 inches wide, I rounded up.

Until I am done with this measurement, it is absolutely essential that I do not bump the finger of the fDTI. That can cause it to snap to a new position and invalidate the calibration.



With the finger's contact point to COR known, I can go back to my original application. When the fDTI reads 0 and is contacting the block, the COR is 0.148 inches more negative.

If I raise the fDTI so the finger clears the block, I can move the COR to the right by 0.148 inches. This will put the COR at the face of the block. If desired, I can then zero my Digital Read Out.

Acknowledgment

Thanks to Dave Kellogg for pointing out that the last figure would be useful at the top of the article.

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.

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