

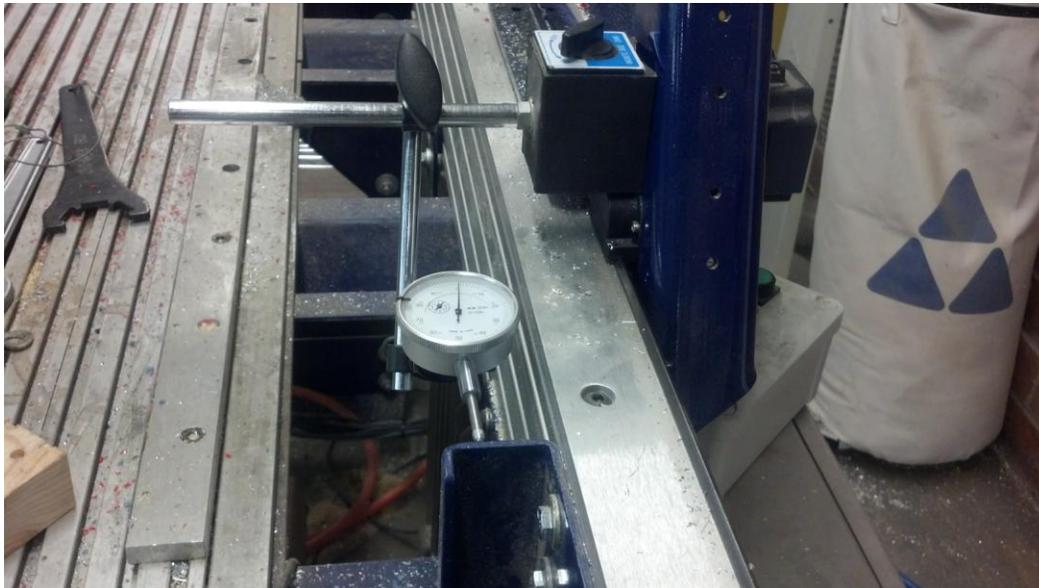


Using a Dial Indicator to Check Pinion Play

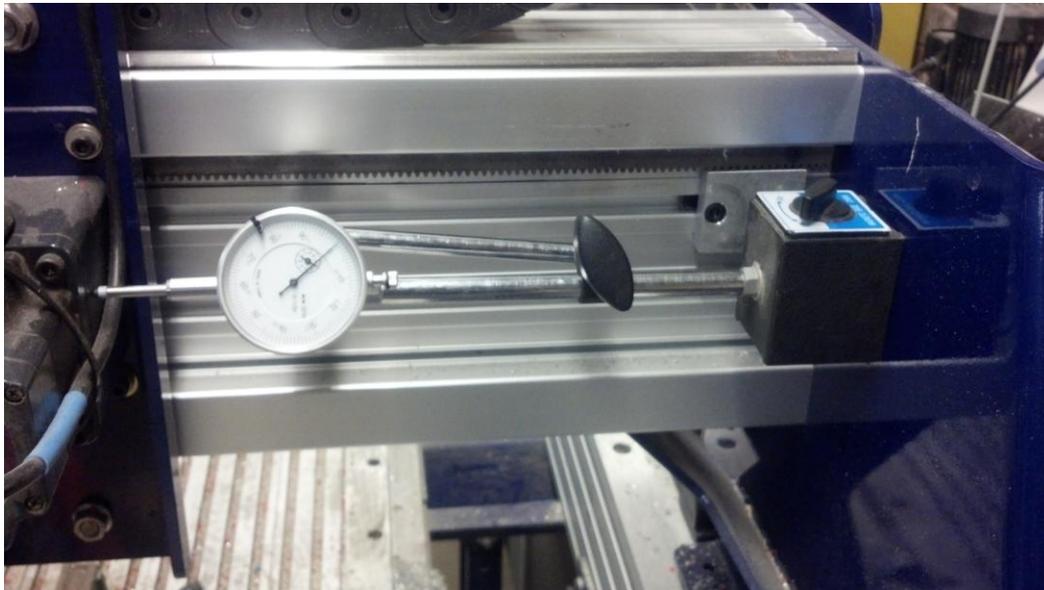
When the pinion to rack adjustment is not maintained on a regular basis the result is deflection of the bit off the cutting path. This may show up during a cut when density of the material changes, or most often during plunge, retract, start, stop or entering and exiting corners. Most users can use the "Push/Pull" test to check to see if their pinions are loose, but in many cases, the machine "feels tight", but the cuts are still unacceptable. In other cases the deflection may be just too small to feel.

In other cases the deflection can be caused by a loose bearing or a stack up of tolerances from multiple bearings and are virtually undetectable without use of a dial indicator. The following pictures show the setups I use to diagnose the "difficult ones". In many cases, play that is not noticeable by using "hand" methods will be more than visible when using a dial indicator.

Picture of the X axis setup showing magnetic base attached to PRS side plate with the dial indicator against a table leg. Push/Pull in the X direction on each side plate.



Picture of a Y axis setup with the indicator base attached to a side plate and the indicator against the Y motor. Push/Pull on the YZ car in the Y direction.



This setup is used to measure play in the Z axis in the vertical direction. The base is attached to the YZ car and the indicator touches the top of the Z extrusion. Grab the spindle or Z extrusion and Push/Pull in the Z (vertical) direction.



The following are two setups that have the base attached to a table leg and the indicator is touching an upside down 1/2" bit to measure deflection at the bit in the X and Y directions. Push/Pull on the bit or collet nut directly at and away from the indicator.



The first 3 setups are directly aimed at the pinion/rack adjustment. The last two, which will show lateral deflection at the bit, can show, depending on the direction, play in the lower YZ car bearings, play in the Z bearings or a loose spindle connections. To gain an accurate assesment at the bit, all play must be removed in the first 3 tests prior to setting up for the last 2.

In each case, you should put about 25 pounds of force in the appropriate direction, X, Y or Z. 25 lbs. is the equivalent weight of a 5 gallon bucket half full of water. You should make multiple tests with each setup and write down the results from each. This will be valuable in case you are not able to diagnose the problem yourself and wish seek help from another user or ShopBot Tech Support.