One of the leading causes of tool breakage, part finish issues, tolerance control, and machine registration issues is excessive spindle runout.

The simple definition of spindle radial runout is how much wobble a spindle produces at the nose. Axial runout is the measurement of how much play there is perpendicular to the axis of rotation. This reading is represented by Total Indicated Runout (TIR), which means the distance measured between the largest plus measurement and the lowest minus measurement for a total indicated amount.

A spindle can be measured either at speed (dynamically) or statically. The static measurement with a spindle runout test arbor is significantly cheaper and easier, yet somewhat less accurate than dynamic measurement which will take into account heat, vibration, and centrifugal forces.

Measuring spindle TIR is quite straight-forward with a spindle runout test arbor and dial test indicator with at least 0.0005 in. / 0.01 mm units (0.0001 in. / 0.001 mm is preferred).

Measuring Spindle Runout with a Dial Test Indicator

1. To start, load the spindle runout test arbor into the machine spindle. If you suspect tools are not loading properly, testing drawbar force with a ForceCheck Drawbar force test gauge is recommended.

2. Once you are certain the spindle runout test arbor is loaded properly and completely seated, position the tip of a dial test indicator as close as possible to the center line of the test arbor. We recommend testing at 3 points on the length of the arbor. Make a reading at about 1 inch / 25 mm from the flange, another point at about the halfway point, and the final one about 1 inch / 25 mm from the end of the bar. The final one will
give you the best indication of any wobble.

3. Position the the indicator stand on the machine table so that there is about 0.015 in. / 0.4 mm of pre-load indicated on the dial. We do not recommend the use of your machines "Jog" button since an accidental rapid movement that exceeds the range of the indicator may damage its internal mechanism.

4. Rotate the test arbor in the spindle until you see a reading of minimum deflection. Now rotate the dial face to "0" and align as closely as possible with the indicator needle. Exact positioning can be difficult so don’t spend time obsessing on it, just make a notation of the final setting. Rotate the test arbor and spindle slowly until you find the point of maximum deflection. Remember that your hand pressure may be an influence on the indicator so remove it when making readings.

5. All that remains to be done is to subtract the initial position reading from the reading for maximum position to get the TIR for this spindle.

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