

The Dial Indicator

by R. Bruce Hoadley

An indispensable tool in our shop is a dial indicator with a magnetic base. Although this tool is usually associated with metalworking, we routinely use it for a host of jobs, from aligning equipment and setting up cutterheads to precise measuring of wood samples and deflection in joints.

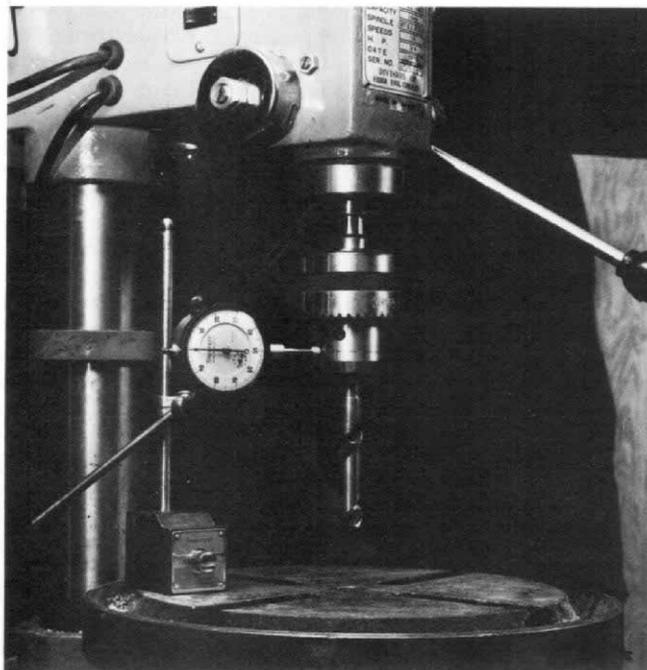
The dial indicator works by coupling a plunger-type spindle through internal gearing to a sweep hand. When the instrument is held firmly in position, any slight in-and-out movement of the spindle results in greatly magnified movement of the hand around the dial. The spindle is lightly spring-loaded so its tip will follow variations in the surface it contacts, and it can be fitted with a variety of contact points for special situations. Our instrument has a full inch of spindle travel, and its dial is graduated in units of 0.001 in. Indicators are made with greater accuracy, but the trade-off is a smaller measuring range.

The indicator comes with a universal-jointed arm that holds it in virtually any position relative to its magnetic base, which can be demagnetized by the push of a button. When the button is "off," the base retains only a whisper of magnetism, just enough so it will rest snugly against a steel surface. Once in position, the magnet is turned "on," whereupon it locks with about 50 lb. of force.

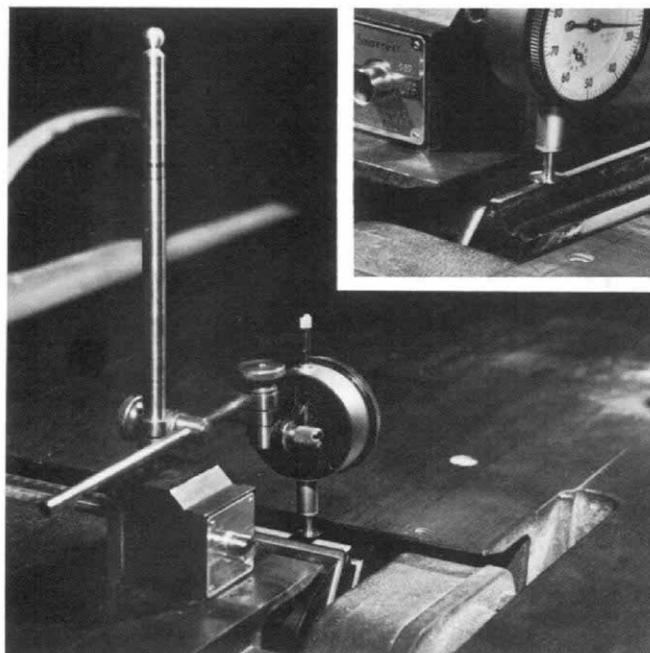
When the base is locked to a drill-press table and the indicator positioned perpendicular to the quill, the trueness of quill rotation can be measured. Similarly, measuring against the shank of a drill will reveal whether the chuck is centered. Out-of-round, out-of-center and bent shafts and mandrels of all kinds can be checked this way. By setting the base on the outfeed table of a jointer, the height of each knife can be gauged, and measuring across to the infeed table will tell whether the two tables are parallel. A hand-plane iron could be set in the same way. The indicator is invaluable in setting the bedrolls, outfeed roll and pressure bar of a thickness planer. On a table saw, the indicator will measure tooth height as well as set. Of course, the machinery must be electrically disconnected and revolved by hand. Never attempt to gauge cutting edges at operating speeds.

By setting up on a flat surface such as a saw or jointer table, the indicator becomes a comparator-type of measuring device. It will check the diameters and roundness of dowel pins, or the thickness of veneers. The magnetic base also has angled surfaces which will lock against a cylindrical shaft, and because of its weight the base will set firmly against a flat wooden surface as well. By laying an accurate metal bar across a large flat surface, the surface can be "scanned" to gauge overall flatness and locate irregularities. The base holder by itself also has many uses around the shop. Locked to the saw table, it makes a convenient end-stop for crosscutting multiple pieces. I often use it to position an air hose or to hold excess electric cord out of the way.

Dial indicators are quite similar among reliable brands, although a variety of backs are available for mounting to different holding devices. A good indicator costs between \$40 and \$80, and a magnetic base is about \$40. □



The dial indicator easily measures minute variations—here, it is set up for checking chuck concentricity on a drill press. With the dial's spindle bearing against the quill, it will measure bearing runout. Setting it against the shank of a bit will tell whether the bit is centered or bent.



The dial indicator can also gauge surface flatness—here, it checks the height of a jointer knife. Revolving the cutterhead by hand will tell whether all the knives are cutting the same circle. Moving the indicator across a knife will show whether it is parallel from end to end. The spindle can also be extended to the infeed table to check if infeed table and outfeed table are parallel.