Using a test indicator (I)

By GEOMETER

EVERY production engineer uses a test indicator, for there are few, if any, instruments with wider applications in practical engineering. This may account for the variety of names it goes by-dial indicator, clock indicator, clock gauge, and so forth. Some engineers call it a comparator, for that is what it is-the common workshop comparator, used by turners, millers, grinders, inspectors.

In specific applications, its function is to compare the shape and alignment of faces, the location of faces on components, the alignment of slides, and work on machine tools. You see these best by examples.

When you test the running truth of round stock in the independent chuck by bringing a tool near to it, you compare parts of the surface. If the stock wobbles, there is a high point and a low pomt. You see the gap at the tool. When a test indicator is applied to the stock, the error is shown in thousandths of an inch.

By this principle, you can test diameters for circularity and concentricity; and in resetting part-machined components, you can ensure that the surfaces which have still to be machined will be true with those that are already completed.

When you mark off work on the surface plate, you make sighting lines to which the surfaces are to be machined. You test the surfaces afterwards with scribing block or surface gauge, looking carefully for variations. But you make a far more accurate check with a test indicator on the surface gauge, its sensitive plunger resting on the surfaces.

When you set up a vertical slide by graduations, you chance whether the machining will be really accurate. And so you may mount a fixed point and traverse the slide past it, again looking carefully for variations-and, of course, correcting them. Here, too, you can mount a test indicator, and adjust the slide so that its face is exactly parallel to the line of movement.

One job which every turner must do from time to time is to true the tailstock for parallel turning between centres. On some lathes, the tailstock can be adjusted. On others, an adjustable centre is employed. When a lathe is in good condition, the basic setting can be made quickly, with a mandrel and a test indicator, as at ***A***. The mandrel is turned in mild steel, brass or aluminium-alloy, to choice, with its two diameters made the same size. On a worn lathe, the tailstock should not be moved after the setting has been made. The test indicator is mounted on the topslide.

Another job on which accuracy is essential is the turning of a taper. Only great good luck would give a true setting from topslide graduations. To get precision you use a test indicator with its plunger at centre height and set at right-angles to parallel work when the topslide is adjusted to angle. You need a variation in reading, in thousandths, on the test indicator, when the topslide is moved 1 in. by its feedscrew. The variation is the sine of the half-angle of the taper. You can take it from trigonometry tables. These are what you need for common angles: 1 deg. O.O174in., 2 deg. 0.0348 in., 3 deg. 0.0523 in., 4 deg. 0.0697 in., 5 deg. 0.0871. Diagram B shows the setting.

Sometimes there is need to set up work to a centre punch indentation. You have marked the work on the surface plate and punched at intersections of lines. You make a set-up on the faceplate, on the angle plate, or in the independent chuck, as at C. To true the centre punch dot, use a centre finder-the subject of a correspondence in Postbag. It is a true piece of rod, pointed at one end and centred at the other. The test indicator must maintain a steady reading as the work is rotated.

To check settings of a vertical slide, at right-angles to the lathe axis and parallel to this axis, you mount the test indicator as at ***D*** and ***E***, and then traverse the slide along its plunger.

You can use a test indicator as the basis of a master square by mounting it, as at F, on a straight-edged, footed base. The test cylinder you machine parallel in the lathe. ❑