Methods of gauging

By GEOMETER

MANY standard articles in the workshop can be used at times as gauges, or as reference pieces from which to take sizes. They include silver steel rod, hard steel balls, lathe tools, bolts and screws.

Sometimes bolts and screws will serve as pitch gauges for other threaded parts: in addition, their threads are usually sufficiently accurate in profile for them to be used as form gauges to which to grind screw-cutting tools; as threads are cut, they can be checked for depth.

To use a bolt or screw in this way, half the thread diameter should be removed for a little way. Small bolts or screws may be filed; but some of the surplus material should be removed by hacksaw from the large ones to reduce the amount of filing. A micrometer or callipers can be used to check the result.

At the centre-line, the thread on the bolt or screw is of full profile, and should fit completely into the thread on the work, as at ***Al.*** At times, plug taps may be used like this; and with fine-pitch threads, a magnifying glass may be used to reveal form and fit.

Thread measurement

For checking threads in the profile, a micrometer can be used with three wires or small diameter rods, as at A2. In some instances, the spindle of the micrometer must be fitted with a thimble to bridge two of the wires properly, and allowance must be made in the reading. The base dimension for the micrometer is taken in conjunction with the wires from a good bolt or screw; this serves for work of the same size, or of a different size, providing that the thread is the same pitch and profile. Thus, if the bolt for the base dimension is 3/8 in. outside diameter, and the work is 5/8 in. outside diameter, it will be necessary to add 1/4 in. to the base dimension.

A piece of rod or a hard ball can be used with a micrometer to measure a curved surface like tubing, as at A3. Plasticine or putty will stick a ball to the anvil while it is gripped to it by the spindle. With care in measuring, the ball is not displaced. A small rubber sleeve is an alternative means of holding it.

A piece of rod may be used to verify the depth of a groove in work, using a straight-edge on the surface, as at ***B.*** With ring grooves in a piston, one of the rings can be rolled in each, to be certain that they will all be just beneath the surface when they are fitted. Grooves and undercuts can sometimes be machined in work from an outside diameter, their depth being taken from the micrometer collar on the cross slide screw.

There are many uses for a small angle gauge or die-maker's square, as at C, for marking material with equal angles, and checking angles on work, lathe tools and drills. With a grooved pulley, the gauge can be applied to one face and then the other, to verify that both inclines are the same. Used from the bottom face of a lathe tool, the gauge checks the front rake angle. When a twist drill is laid in the stock, a test can be made of the angles of both cutting lips. They should be the same.

The stock is made from two pieces of flat material riveted together with spacers, so that the blade will slide between them. The blade is set from a standard protractor and is held by a screw through the stock.

A simple, easily-made depth gauge, as at ***D,*** can be used for many purposes, checking a shoulder ***(Y)*** and a recess (Z), with standard dimensions taken from items in the workshop. Thus, the stock can be placed on two drills, balls, or lathe tools on the surface plate, and the pin or depthing rod can be pushed down and clamped.

The groove in the stock can be formed by drilling with another piece clamped up; or solid material can be drilled and then soldered to a plate for facing in the chuck, as at ***E.*** Another way is to mill the groove with a twist drill, as at *F.* For this, the stock is clamped to angle on the slide,. and the twist drill, with rounded lips, is run in a sleeve in the chuck. ❑