WORKSHOP HINTS and TIPS

Machining HEXAGONS and SQUARES

WHILE hexagon bar material can be used to produce standard bolts and nuts, unions, and cap fittings, there are many occasions when its shortcomings are apparent. It runs in stock sizes, and none may be right for scale dimensions-or even for satisfactory appearance in free-lance work.

In addition, there are a number of fittings-such as caps and flanged nuts -with diameters larger than their hexagons, which means that they must first be turned as blanks from round material, the hexagons then being produced by filing or milling. Tap bodies, too, often incorporate machined hexagons, and such features may be included on tools. The same is largely true of squares, which are sometimes employed as alternatives to hexagons.

Besides all this. our need of standard hexagon material may sometimes be foreseen as very modest, compared

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with our need of round material; and accepting that the round can be used for the occasional job, outlay and stock in hand can be reduced.

In producing hexagons or squares, corner and flat dimensions may be known, or there may be a good pattern from which to take them. Then, with the blanks turned to size, the flats come automatically by turning or milling at an appropriate stage in the total operations. A programme helps-and it must include the operation of dividing, which follows that of turning when the flats are to be tiled.

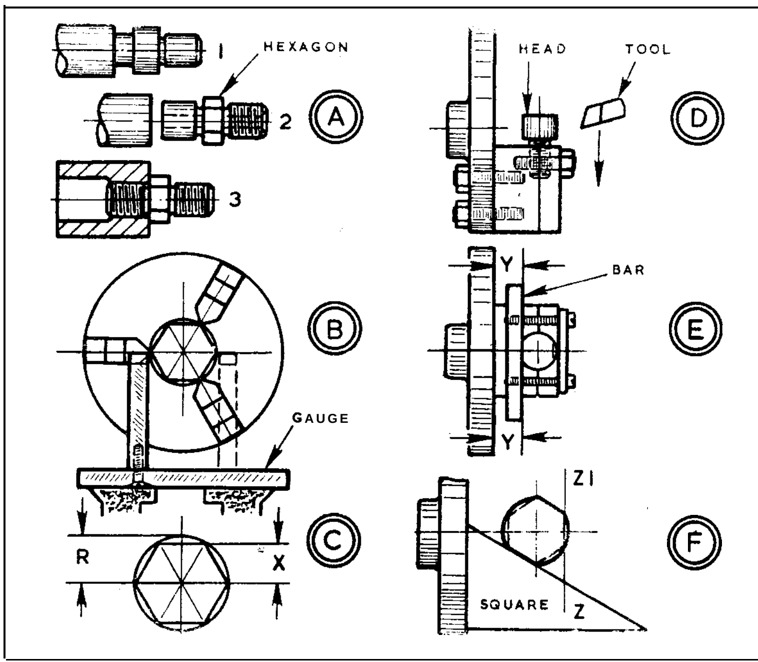
An example is a double-ended union fitting, ***A,*** produced in three stages on the lathe. In stage 1, the bar (dot-marked for refitting) is faced, drilled and countersunk at the end. Diameters are turned for the hexagon and the thread, which is chamfered and undercut. Behind the blank for the hexagon, the bar is relieved, and then the blank is divided into six; and with the bar held in the vice, the hexagon is carefully filed.

In stage 2, the thread is die-cut, and the opposite thread blank turned and undercut, then the piece parted or sawn off. In stage 3, the union is screwed into a threaded holder in the chuck, for the end to be faced, chamfered and countersunk, and the second thread die-cut.

Without means of dividing on the lathe, the corners of squares can be scribed, bringing each jaw of a four-jaw chuck to a stop on the bed, and using a pointed tool sideways from the slide. But to mark a hexagon requires a gauge, ***B***, and the three-jaw chuck. The two pieces of flat material are joined by countersunk screws, one bridging the bed, the other standing vertically to centre height. The vertical piece is faced in the independent chuck; and with an off-set, a step is turned to a depth of half the thickness of the jaws of the three-jaw chuck. One jaw is brought down to the step for setting, and the gauge is used each side of the blank with a hand scriber.

According to requirements, sizes of hexagons and squares can be obtainedfromcornerorflat dimensions through simple multiplication and measuring by micrometers. When we know the distance over the flats of a hexagon, the corner dimension follows; we multiply by 1.155. Given the corner dimension, multiplying by 0.866 provides the distance over the flats. For checking one flat from blank diameter, the radius must be used, C. Multiplying ***R*** by 0.866, distance X is obtained; and is added to ***R*** for a micrometer test.

From the dimension for the flats of a square, we multiply by 1.414 to get the blank diameter. To obtain



flats from blank diameter, we multiply by 0.707; and the distance of one flat from the centre is found by multiplying the radius, ***R,*** by 0.707.

To mill hexagons or squares, bars can be mounted on the vertical slide; or when threads are finished, a hold can be obtained in split blocks on the slide. Certain hexagons can also be machined in such blocks on the faceplate, ***D.*** With one flat finished, the part is turned, ***E,*** a bar clamped to it, and gap Y brought equal. Resetting for other flats is done with a 60 deg. square, ***F,*** to machine along line El