SPOT and FACING CUTTERS

Beginner's Workshop

By GEOMETER

TO SEAT FIRMLY, without imposing bending strains, a bolt or nut requires a surface which is flat and at right angles to the axis of the hole. At times, of course, the essential flatness and alignment follow naturally when flanges or lugs are turned, milled or planed in the normal course of machining. But at other times when surfaces are tapered or in the " as cast " condition, it is essential to provide spot faced seatings.

In addition, even if machining of lugs or flanges is possible, there can be said for spot-faced seatings that the component is not weakened by their presence to the same extent as could occur with over-all machining.

Diagram A (top) shows what would be the effect of tightening a nut on to a sloping or untrue surface-bending of the shank of the bolt or stud, giving rise to severe strain and leading possibly to breakage. With a spot-faced seating, however-taken down just sufficiently to bring the surface true-the nut seats squarely (bottom).

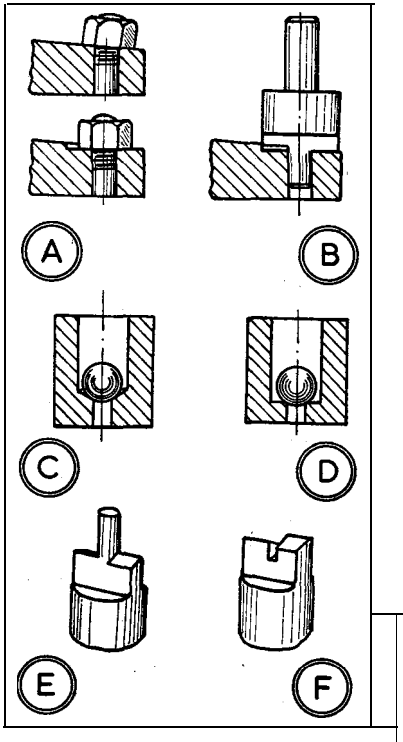
Where there are several lugs and their thickness varies spot-facing ensures uniformity, seatings in thick lugs being faced down to the level of those in thin ones. Following which, lengths of studs and projection through nuts are then everywhere the same.

The operation is performed as, *B,* using a cutter with a spigot to guide it in the hole. A hand-operated drilling machine, a bench drilling machine, or on occasion a lathe can be used. Speed of rotation should be slow and the feed light, or just sufficient pressure applied to ensure smooth cutting.

An operation of a similar kind is to face or square out the bottom of a hole which has been drilled to the angle of a normal twist drill; and it is particularly important this should be done if the seating is for a ball valve.

Depending on relative sizes of the ball and the hole it covers, a seating may occur partly up the conical surface left by the twist drill, C, in which case the valve will not be leak-proof. If, however, the seating is squared out, *D,* the ball can be lightly tapped to seal perfectly on the square edge.

Cutters for either operation can be made from silver steel rod to shapes



E and *F.* The spot-facing cutter requires a lathe to turn the spigot, to enter the hole comfortably. Near the spigot the rod is flattened each side by filing; then the tongue so produced is carefully backed off each side on the end to form cutting edges.

For the ball-seating tool no spigot is necessary, as it obtains its guide from the drilled hole. The end of the rod is flattened each side, then a hacksaw run centrally across the tongue and the faces backed off each side to form cutting edges. Both tools may also be backed off on the sides to clear themselves if used at a depth.

Inserted-blade cutters

For larger work, such as facing bosses, cutters with mild steel shanks and inserted blades can be used, the latter filed to shape, then hardened and tempered like complete tools.

For a single-blade cutter, G? the mild steel holder is turned wtth a spigot and a reduced shank for holding, leaving an enlarged boss into which the cutter is inserted at an angle and held by a grubscrew from the side.

To hold firmly, the grubscrew should seat on a filed flat or into a countersink. The end face of the cutter should be filed square-checking with a square from the spigot- or machined in the lathe with light cuts. Backing off to angle X, *H,* should be about 8 deg.

On a double-edged cutter; as can be used for facing piston bosses, *I,* the cutter goes right through and is provided with cutting edges each side. Preferably, when the grubscrew has been fitted, the same as the other, the holder should be run in the lathe and the tool faced each side for the cutting edges to spin in the same plane. Filing and backing off are as before

For'use, the cutter is inserted when the mandrel is through the bosses. Holding the piston, which can be a problem, can be as J, clamping a piece of hardwood top and bottom with bolts-but not if the piston is a split-skirt type.

B