MACHINING DOMED AND HOLLOW SURFACES

By GEOMETER

DOMED and hollow surfaces present problems in machining when they are of considerable size-and, to avoid chatter, a generating principle must be employed in their production. The task is, of course, comparable to the process of normal turning with a single-point tool which is moved in an arc instead of along a straight line. At any give instant, there is only a short line of contact between the tool and the surface, as distinct from the long contact in the later stages of form-turning -which, from this aspect alone, the giving rise to chatter, is impracticable above a 'fairly modest size.

According to the numbers of components and the accuracy required, either free-hand turning, using top slide and cross-slide, or a controlled means of moving tools may be used for domed and hollow surfaces. Gauges from thin plate help in obtaining form in free-hand turning, while the finishing can be done on domed surfaces with files at fastish speeds, and on hollow surfaces with scrapers, running the lathe slowly. Polishing can be done at fast speeds with emery cloth.

Controlled movement

Greater accuracy than is given by these methods, and a faster rate of production if there are several components to do, call for controlled movement of the tool. Either it slides in contact with a form plate or it is swung in an arc from a radius turning fixture, for a series of cuts to be taken to remove metal, as in normal turning, to the final cut which produces the finished surface.

Taking cuts in free-hand turning usually needs practice to. bring about the co-ordination of hand and eye necessary to maintain an even depth of cut. Apart from this, a good eye for form is essential-to obviate, for example, machining a ball that is far from being a sphere. A guide Which indicates correct movement of the tool is a considerable help; and it can be arranged, as at ***A,,*** for a hollow surface.

For unobstructed working of the top slide handle, the tool is mounted in a holder similar to that used in boring large holes, but having the means for mounting a pointer whose end must be on a horizontal line with the tool point. Then, using top slide and cross-slide handles, you can move the point an arc X-Xl, the same as that of the surface which is being machined.

The arc can be a scribed radius on a piece of angle plate clamped to a pad centre with the tailstock fed up to apply the guide to each cut. For machining a domed surface in this way, the arc is scribed the opposite way on the angle plate.

Using a sliding tool

Domed surfaces, providing that they are not too greatly curved, can be machined with a sliding tool and a form plate bolted to the pad centre, as at ***B.*** Cuts are applied by feeding the tailstock and run through by retracting the cross slide. The tool can be silver steel rod, hardened and tempered, with' a flat for location by screws, and a thread at the end for a collar to take the pressure of the spring. The form plate is preferably machined to curvature, on an angle plate on the faceplate.

For machining hollow surfaces, it is often practicable to arrange a turning tixture as at C and ***D,*** using the tailstock to apply the cut, and a rack linked. to the cross-slide to carry it through by rotating the tool holder. Two small angle plates bolted to the pad centre form a fork in which the tool holder turns without shake on a pin. This is threaded through one plate for adjustment and locked by a nut.

Racks are obtainable commercially (camera size ones are suitable for small fixtures) and a tool holder can be planed with teeth to suit for about. one third of its circumference. Backing for the rack is furnished by the face of the pad centre. The teeth are kept free of swarf by brushing. ▣