Setting-up for second operations

THE solution to many problems of setting up for second operations is to use mandrels which can be machined in the chuck or run between centres with the components mounted on them. Concentricity and squareness are thus ensured for components which have been partly machined and then have had to be removed from the chuck for the reverse sides to be finished.

If a component is machined with a smooth bore in the first operation, you can mount it by this bore on a mandrel for subsequent operations. At the finish, you will be certain that all the diameters are concentric and all the faces square. There will be no eccentricity or sideways wobble to cause trouble when the component is assembled with others.

By GEOMETER

With light cuts from a sharp tool which is set exactly at centre height, you will find that friction drive is sufficient for a small, smooth-bored component which is forced firmly on a mandrel. In making, the mandrel should be turned smoothly almost to size. Then you can reduce it carefully with a file and emerycloth until the component can be twisted on firmly. On occasion, a component can be smeared with oil in the bore (to prevent scoring) and still hold.

An off-cut, or the short remaining piece of a used-up bar of mild steel, is suitable for a stub mandrel for the three-jaw chuck. The scrapbox in most workshops contains a variety of such pieces. Select one which is long enough to go well into the jaws of the chuck. Then the set-up will be as shown at A. If you are likely to use the mandrel on future occasions, you should mark it lightly with a centre punch in line with No 1 jaw.

When a component has a threaded bore, which has been tapped or screwcut at the first set-up, you can mount it by the bore on the second occasion, using a threaded mandrel. An example of this type of mandrel is illustrated at Bl. When you have chucked the material, turn it to size, undercut it, and then thread it, by screwcutting, or with a die in the tailstock dieholder. I do not advise a hand holder, unless you use it very carefully with support from a pad centre in the tailstock, for a cranked or wobbling thread may not provide an accurate mounting, even if you force the component up to a true shoulder on the mandrel.

A component with a thread on an outside diameter must be mounted by a mandrel which has an accurate internal thread. Diagram B2 shows the set-up. Face the material for this mandrel, centre with a. centre drill from the tailstock, and drill to size for tapping. You can perfom this last operation with the tap supported by the tailstock centre, which must be pointed or hollow, depending on whether the shank of the tap has a countersink or a point at its end. Take care to keep the tap supported all the time that it is cutting; apply oil to it, and turn it carefully back to clear swarf if it sticks.

Extra grip to drive a component on a stub mandrel can be provided through a nut at the end, as illustrated at C. This is advisable for machining a component of substantial diameter, otherwise you may find that a dig-in by the tool stops the component with the mandrel spinning in its bore.

If you have to turn the outside of a large spoked wheel, I suggest that you employ the type of mandrel which I have shown at *D.* As it must project some distance from the chuck, you should centre-drill the end for support by the tailstock. Drill and tap two holes in the larger diameter near the chuck to attach the driving bar and packing by setscrews.

To set up a taper-bored component, as at *E,* a mandrel must be turned with a corresponding taper and provided with a nut. Fit the two tapers by carefully filing the mandrel, using a smooth file, or preferably a Swiss. You can see where to file from marks left on the mandrel by trying the component. Centre-drill this mandrel, too, for support by the tailstock.

Points in centre drilling are illustrated at *F.* As a centre forms a bearing, the conical part should be fairly deep. The tailstock centre must clear, and so if your centre drill is stumpy follow it with an ordinary drill.