Resetting part-machined components

Accuracy in important features-concentricity of diameters and right-angle alignment of faces-is promoted in lathe work by machining operations at one set-up, though the principle is applicable, for outright production, only to small and simple components which, in the main, are machined from bar-stock. For others, resetting in the part-machined state is necessary; and if overall accuracy is to result from the follow-on operations, resetting must be suitably performed from some already-finished feature.

For centred components, like spindles and shafts, end-for-end changing permits overall machining, and simple precautions ensure truth. First, centres in the ends of components must be produced with a centre drill giving clearance at the tips of the lathe centres; and on these centres and those in the components, the coned surfaces must be smooth and true. Then, it must be observed that the live centre in the headstock spindle runs truly; for if not, eccentricity will be apparent when components are changed.

This centre is advisedly ground fitted in the lathe spindle, and a mark made on the shank to come to one on the spindle-for correct refitting. There is no movement of work on this centre, however, so one of mild steel or unhardened cast steel can be used, turned at 60 deg. included angle with a tool from the topslide. The tailstock centre must, of course, be hard, kept in good adjustment to the work, and supplied with lubricant -oil, grease, or one of the special types now available which obviate scuffing. Brass or aluminium strips where carriers are fitted save components from indentations.

As centred spindles, which can be set-up and removed as required, steel mandrels provide for a variety of follow-on operations, locating components from bores already machined. By such resetting, bushes can be turned on the outside, cylinders faced at the ends, flywheels skimmed true in this last instance taking light cuts, and with the mandrel adjusted rather tightly from the tailstock to eliminate chatter.

A mandrel for resetting a bush or cylinder is as at ***A,*** **the** locating diameter having been turned some 0.0014 in. to 0.001 in. above size-from which size it is eased down at the fitting end and as far along as necessary with a Swiss file and fine emerycloth. The lathe should run rather fast, and the file can be cleaned pushing a chisel-edge piece of brass or aluminium through its teeth. When it comes to testing bush or cylinder on the mandrel, there should be a smear of lubricant between them. Slip must not be allowed in cutting; a tighter fit should be made up on the mandrel, and the depth of cut reduced.

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For resetting a flywheel by a tapered bore, a mandrel can be as at ***B,*** machined with the corresponding taper, and threaded for a holding nut. There is no slip with this fitting; and to avoid chatter tight adjustment, slow speed and light cuts are advisable.

Resetting of various components is possible on stub mandrels machined from material held in the chuck, locating from a plain diameter, push fit, as at C, left (a set-up for turning connecting rod bosses), or from a thread and a face, as for final work on a threaded fitting, right.

If such mandrels are to be removed from the chuck and later replaced, they should be lengthy for a substantial hold by the jaws, and dot-marked to No 1 jaw. Then a mandrel of that type can be used for resetting a small piston, as at ***D.*** It should be drilled right through for an eyed holding bolt, a register turned for inside the piston, and a reference diameter for verifying truth when-the mandrel is replaced with the piston fitted.

With an outside hold in resetting components, the function performed is that of collet chucks. The material can be appropriately drilled and reamed or bored, then cut lengthwise for clamping. When components fit in a shallow recess, a cross bolt as at ***E,*** left, suffices; otherwise an orthodox clamp, right, is needed.

A stub mandrel faceplate with clamps as at F, permits of setting and resetting components by faces, and can be helpful for machinists in small dimensions-where a watchmaker's lathe might be more suitable. ❑