

Holding and resetting

WITHIN the range of standard chucks, there are many ways of holding work for first operations and of resetting it for those which follow.

The three-jaw chuck is used for holding round and hexagon bars from which many small parts are machined. Some may be finished and parted off at a single setting, which ensures concentricity—except with a drill running. Others must be machined as far as possible at the first setting and then parted off and reset for further operations. Naturally, the later machining must be true with that already performed; and the usual method of ensuring the essential accuracy is to machine a mandrel in the chuck and mount the parts on it. At times this applies to components made from castings, such as covers, endplates, pulleys and flywheels.

With the four-jaw chuck, the range of holding and resetting methods is extended through its reversible and independently-adjustable jaws. The chuck can be used in the same way as the three-jaw for mounting bar stock and second-operation mandrels, with the additional advantage that adjustments are easily made to eliminate eccentricity.

Accuracy—which includes freedom from eccentricity—is the most important feature of a second-operation mandrel. If the mandrel is machined in the chuck and used once, the result is not in doubt. But it is if the mandrel is removed and kept for further use—unless precautions are taken. This may be seen from diagram A, where a double-ended union is set up in a short mandrel (left) and a long mandrel (right).

The short mandrel can be made from a scrap of material, faced with a turning tool and centred, drilled and tapped from the tailstock. The union will screw in and spin truly. But when the mandrel has been removed, it is unlikely to reChuck truly again, because of its short length (V) and the fact that it is gripped only at the outer ends of the jaws. To be reasonably certain that a mandrel of this sort will reChuck truly, you must extend it well into the chuck jaws (W);

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and if it is turned in the three-jaw chuck, you should make a reference mark with a centre punch opposite No 1 jaw.

Sometimes a faulty part can be trued on a mandrel, when light cuts will suffice to correct it. As an example, a cylinder cover in which the piston rod binds, or which affects the smooth working of the cross head, can be mounted on a mandrel, as at B1, for skimming each side of its flange.

The setting up of castings is often facilitated through cast-on pieces which can be gripped in the chuck. These may allow all-over machining at one setting—and so avoid the use of a second-operation mandrel; or they may provide alternative, simpler mountings for components which would normally be set up by other methods. An example is a cover, as at B2, with a chucking piece which serves for holding it, and from which it is finally separated with a parting tool.

A piston of commercial size may be set up for machining the outside, as at C. The jig is bolted to a faceplate (or driving plate) and machined with a short spigot which fits inside the skirt of the piston. A drawbolt pulls on a pin in the gudgeon pin bosses; and support is provided by the tailstock to a short extension piece (X) which is finally machined off.

In model size, a piston can be set up in the same way, as at D1, or if a chucking piece has been provided on the casting, D2, it can be held by that in the chuck.

Many other components can be set up through chucking pieces, a method which on occasion is unorthodox but effective. As an instance, each half of a small crankcase, split on the vertical centre line, can be provided with a half-round chucking piece. Facing of each half is done as at E, and a line (Y-Z) is scribed. With the halves bolted up, centres are made at the ends. The chucking piece is machined between centres. Holding by it, as at F, you can machine the face for the cylinder.

