Reaming parallel and taper bores

By GEOMETER

REAMING has a wide range of applications for finishing bores. It provides a surface which is superior to that normally obtained by boring? is quicker than lapping and is suitable for hand work.

When bores are to be finished by parallel reaming, less time is required on them in the lathe than if they are to be finished outright by machining or lapping; and if they are machined slightly tapered, reaming will correct the error. Where sufficient metal surrounds bores, parallel reaming will pull two which are out of position into alignment, for location by a dowel, or so a shaft or spindle will turn freely.

Types of reamers

When bores are to be finished by taper reaming, as for flywheels, pulleys or gears to be mounted on shafts, they can be machined in the lathe to approximate taper, then sized and given the correct taper by reaming. When bores are merely holes, they can be drilled, then finished by hand reaming, or broaching-as when taper pins are used to locate or secure parts.

Typical reamers are as at A, the type for parallel bores 1, that for taper bores 2 (both with orthodox teeth, either spiral or straight) and the reamer or broach for taper pins 3, on which cutting edges are formed by the junction of flats. The normal reamer for parallel bores has a distance X of taper, with the end several thou smaller than nominal size. Thus, in machining on the lathe, the reamer may be used as a gauge, trying it in bores. However, it should be known -from a micrometer or caliper check and a spot of paint in a tooth-just where the taper joins full diameter, so that no more metal than necessary need be left for reaming.

In bores which are accurate and to be finished immediately, or which will not be compressed, as with thick-walled bushes, 0.001 in. to 0.002 in. is sufficient to leave. Bores in thin-walled bushes which compress on fitting should be opened approximately to the size of the reamer, otherwise when it comes to be used, it will encounter excessive metal.

When reaming in the lathe, the tap wrench or carrier can be rested on the slide, and the reamer supported and advanced by the tailstock centre, to which it should be held firmly back. The lathe should run slowly, or be pulled round by hand. Alternatively, for hand reaming a component, the chuck can be removed, plugged with rag from the rear, and held in the vice by its backplate. Conversely in hand reaming, a component can be turned along the reamer held by its shank in the vice. In all instances, advancing and withdrawing, rotation should be in the forward direction.

For finishing small taper bores, a reamer can be made in silver or cast steel with an included angle of 10 deg. At the same setting, a mandrel can be turned in mild steel for gauging and mounting parts-and the tapers for shafts can be picked up from it. If the reamer is small, the end of the blank can be necked down, as at **B,** then removed. Teeth can be formed from saw cuts by filing, with particular care at the finish where the backing off comes to diametral edges, which can be finally honed (after hardening and tempering) to reduce each "witness" to a cutting edge.

Reaming operations

For reaming small parallel bores in the lathe, a tool from silver steel rod (hardened and tempered) as at C, is effective. Its shank can be cleared from the front 0.001 in. per inch length, and the cutting edge formed grinding an arc Y-Y, and filing clearance to the leading edge. If required, a groove along the shank will clear swarf and allow for entering lubricant.

Typical reaming operations are as at **D** and **E.** Parts with misaligned holes should be firmly clamped for reaming the holes into line, casings with bushes should be bolted up, and a bush in a blind hole may be finished to the bottom with a tool as at C-but without clearance on the shank.

Recommended lubricants are-soluble oil for brass and bronzes, mild, silver, cast and stainless steels; soluble oil or paraffin for aluminium and duralumin; soluble oil and turpentine for copper; tallow and graphite for cast iron. ❑