

Spindle and wear adjustments

By Geometer

BEARINGS with a slit along the side closed by a clamping screw, or the type with a removable shimmed cap, may be employed for spindles on the smaller and simpler machine tools as mentioned in the previous article. But for many purposes these easy methods are not considered entirely satisfactory? particularly when accurate alignment and all-round support are required for spindles.

On a machine tool such as a lathe, in closing a normal split plain bearing, two effects occur; the spindle alignment is altered slightly in relation to the bed (spindle drop); and the bearing is no longer quite circular but grips and supports mainly on the diameter on the line of adjustment. Employing, however, conical bearings or bearings with conical adjustment, both alignment and all-round support are maintained.

A simple arrangement of conical bearings is as A, the two cones rotating with the spindle. That at the chuck end is fixed, while the other, which may be keyed, can slide when adjustment is made by the nuts. The bearings with tapers corresponding to the cones, are in parallel holes in the casting or headstock and have small external flanges preventing end movement.

To obviate the front bearing running tight or seizing under cutting loads, either a single ball or ring with separate adjustment is fitted at the left or rear of the spindle (not shown) to take thrust. This adjustment should be slackened before adjusting the bearings,

Adjusting conical bearings

Conical adjustment on bearings for a parallel spindle is arranged as B. The casting or headstock has taper holes containing split bushes, each adjusted by two nuts. To close the bearing, nut 1 is slackened and nut 2 tightened, at the finish both nuts being tight. A ball ring thrust and end-play on the spindle are regulated by nuts on the spindle. This adjustment, too, should be slackened for adjusting the bearings. On small and medium-sized lathes, taper roller bearings may be employed as C.

For heavy duty machines, the arrangement lacks rigidity with the bearings widely separated and the casting subject to deflection and "give." As a result, two bearings in opposition, C, may be used in a short housing at the chuck end, and a plain parallel roller at the rear. Two opposed bearings may also be used at the rear if they are in a sliding housing in the casting, for spindle location to be solely on the chuck end bearing.

On some machines, a back-to-back arrangement of taper roller bearings is employed, D. The centre members and spindle are held by a nut on the spindle, while the outer members are held by a plate bolted up to the casting. Adjustment is made by shims between the outer members. This permits preload of the bearings to be regulated before they are fitted.

As much as a faulty spindle, tailstock misalignment may result in difficulties or indifferent work. A common fault on flat-topped beds is wear of the

tailstock tongue in the central guide-way, E, which permits lateral movement as the tailstock is tightened.

Machining the tongue where it fits in the bed and fitting a packing strip each side is one solution though it may involve outside assistance. A method which does not is to employ a block at each end of the tailstock, F, holding it with a stud through a clearance hole for the tailstock to be true before the nut is tightened.

Alternatively, drilled holes opened out with a facing cutter can be provided each end of the tongue to contain plugs with shims, which can be moved side to side to true the tailstock, G.

A jerky action on a feedscrew may be due to an inclined face on the locating boss and wobbling nuts on the screw? giving rise on leadscrews to screwcutting difficulties. For this reason, some lathes have a self-aligning thrust, the principle of which can be employed as H by means of a hollow washer and rounded nut.

