Connecting rod alignment

BEGINNER'S WORKSHOP

By GEOMETER

GIVEN alignment accuracy in the major components of an engine-crankshaft, main bearings, cylinder and piston-any fault must rest with the connecting rod; and this part more than the others may be subject to defects as a result of machining, dismantling or servicing.

In view of the comparatively slender proportions of a connecting rod, however much care is taken to ensure accuracy in machining it is possible for slight warping to occur due to release of stresses in the metal. In the case of a connecting rod having a clamped gudgeon pin, inappropriate handling when loosening or tightening the clamping screw can result in distortion. A badly-machined bush in a small-end will tip or twist the gudgeon bin-and the whole rod may be put out of alignment if a re-metalled big-end is machined in-accurately.

Anart from these possible defects it is-important on occasion, owing to big-end off-sets, to fit connecting rods the correct way round; and when new pistons or gudgeon-pin bushes have been fitted, side clearance at these points of the assemblies is important.

For checking connecting-rod alignment, the essentials are, first, two well-fitting parallel mandrels-one for the small-end, the other for the big-end, each about 3 in. long for small connecting rods and about 6 in. long for car sizes. The set-up can be on a lathe or surface plate and, where an indicator is not available for use on the slide rest or surface gauge, careful observation of a round-ended pointer will suffice.

The two mandrels, which can be machined in the lathe, should be parallel in both planes when fitted in the connecting rod, as at diagrams ***A*** and ***B.*** Vertically, the dimensions X and Xl should be the same; while horizontally, as on a surface plate, Y and Yl should be equal, as should Z and Zl Dimensions X and Xl can be easily measured-particularly on small connecting rods-but the horizontal check requires a lathe or surface plate, or a jig as may be used for car connecting rods.

In a lathe, with the big-end mandre held truly in the chuck or between centres, an indicator or pointer can be mounted on the slide rest, then the connecting rod turned for the small-end mandrel to be tested each end, moving the indicator or pointer by the saddle. For the cross-check, the connecting rod must be supported for the indicator or pointer to pass over or under the small-end mandrel, using the cross feed. If the lathe has a flat bed, the surface gauge can be used for both tests. On a surface plate, the big-end mandrel is levelled on blocks or placed in V-blocks for Y and Yl to check the same. Then Z and Zl should be equal.

In practice, exact equality in dimensions is not easily attained, and a reasonable degree of error must often be accepted. On the short mandrels, differences in dimensions should advisedly not exceed 0.002 in. to 0.003 in., and on the long mandrels 0.005 in. to 0.006 in.

A bent connecting rod, with an error in the dimensions at A., can be corrected as at C in a vice using three blocks; where the malalignment is twist, with an error in the dimensions at ***B,*** correction can be made as at ***D,*** holding one end of the connecting rod by the web between blocks, and using a bending bar at the other end. Care is necessary, and " spring-back " must be allowed for, particularIy in the latter operation-for which commercial alignment jigs often have screw adjustment.

Loosening or tightening a gudgeon-pin clamping screw may be done safely,. holding the gudgeon pm end-wise in the vice between suitable plugs as at ***E,*** whereas holding by the web may cause distortion. On car or multi-cylinder engines, observation should be made for big-end off-sets as at ***F*** and for small-end clearances during assembly, using a flashlight. ❑