

Bearings without locating lugs



Fig. 1

Situation

Various manufacturers have switched over from manual engine assembly to semi or completely automated production lines. This has produced changes in the design of the main and connecting rod bearings. For some types of bearings the locating lugs of the bearing shells have been eliminated (Fig. 1).

Background

When the bearings are inserted in the housing bores mechanically, the locating lugs can be a hindrance rather than a help. The assembly robot is able to place the bearing shells in the bearing positions with exact precision. But the machine is not able to feel whether the lug is sitting correctly in the housing bore notch, as the assembly fitter can. To avoid problems with automatic insertions, various bearing shells are no longer equipped with locating lugs.

Common misconceptions and errors

It is often believed, incorrectly, that the lugs are there to protect the bearing shells from being rotated. It's

true that the bearing shells are held in place by the surface pressure in the housing bores when the bearing caps are being tightened. The surface pressure is achieved by the bearing crush height which is shown in Figure 2 in an extremely exaggerated form. In reality the crush height is only a few hundredths of a millimetre. The crush height produces surface pressure on the entire back of the shells, which holds the bearing shells securely in place after tightening. Therefore, when engine blocks or connecting rods are being overhauled, close attention must be given to ensure that the housing bores are within the dimensions specified by the manufacturer. If the housing bores are too large (as is the case after a seizure), the locating lugs are by no means able to hold the bearing shells in place or to prevent bearing spinning.

If the bearing has spun over in the housing bore due to bearing damage, it will always be the result of lack of lubricating oil or a faulty overhaul. A bearing will be seized when the friction inside the bearing is so great that the bearing material welds with the bearing pin. The heat and erosion of material will cause

the surface pressure to be removed from the bearing shells, which will cause them to turn in the housing bore. Under these circumstances the small locating lugs will not be able to counteract the torque of the camshaft. They will be bent back or cut off.

It is often assumed that the cracked separation areas on cracked connecting rods are what causes the removal of the locating lugs. But there is no correlation between the two. One reputable engine manufacturer still insists on the design with locating lugs, even when there are cracked connecting rods. So even in the case of cracked connecting rods, some manufacturers will prefer to use one design, and others will prefer the other.

Conclusion:

Locating lugs are irrelevant to the safe functioning of bearing shells. If bearing shells are supplied without lugs in the future for certain engines, they can also be used. The assembly will be carried out the same way. In this case the notches left in the housing bores for the lugs will remain unused. One must just be careful to ensure that the bearing shells are centred in the housing bore (axial alignment). Any mechanic will doubtlessly be able to do this manually just as well as a robot.



Fig. 2