WORKSHOP HINTS and TIPS

Methods of raising surfaces

By GEOMETER

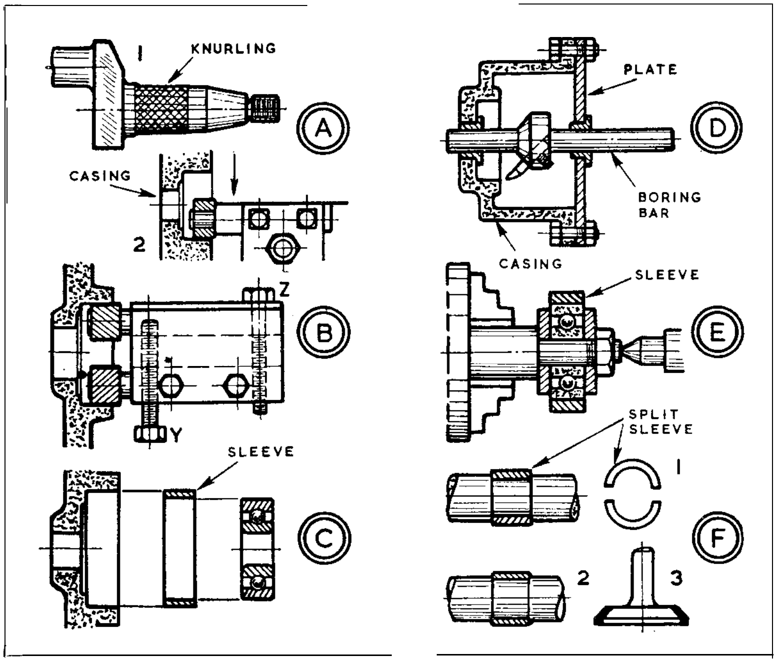
RUNNING clearances are essential for all working parts to move smoothly without seizing. As surfaces wear, clearances increase, and this leads to a variety of ill effects! depending on the type of mechanism. Thus, wear on valves and port faces of engines reduces efficiency through loss of compression in petrol engines, and loss of steam in steam units. Slackness in valve gear upsets timing. On lathes, slackness of spindle bearings and slides is likely to cause chatter, particularly when large diameters are turned.

If machining tolerances are not carefully maintained in making parts, slackness can occur where there should be no relative movement; and play is likely to develop between non-moving parts, if proper allowance is not made for heat in assemblies. The fitting of ball races provides examples of both these faults. They work loose on shafts if interference fits are too small; and they become free in heated light-alloy casings if allowance is not made for expansion.

Of course, allowance is often made for normal wear when engines and machines are designed. For example, car engines are-as a practice-rebored and fitted with oversize pistons, and crankshafts are reground to take sets of undersize bearings. Apart from such regular methods, there are plating processes for building up worn or damaged surfaces; and in general engineering, much is done by brazing and welding.

Regular methods of repair like these apply in all instances of normal wear which can be dealt with by servicing or reconditioning operations. For other jobs, recourse must be had to different methods which may be accepted, with or without reserve, according to circumstances.

As example is the seating for a ball bearing or a roller bearing on a crankshaft, the surface of which can be raised by knurling, as at Al. One end of the crankshaft can be held in the chuck, and the other end supported by the tailstock; the knurling tool is mounted on the topslide. Plating would be the alternative method of raising the surface and would be



followed by grinding to take the bearing with an interference fit.

When a ball bearing or roller bearing is loose in a light-alloy casing, it is sometimes possible to knurl the surface of the seating to an interference lit. To do the job in the lathe, hold the casing in the chuck or on the faceplate, and use a single knurling roller, as at A2, from the topslide. The holder for the knurling roller can be turned-down and casehardened square bar, lightly riveted at the end to prevent the roller from slipping off.

To knurl a bearing seating by hand, a tool as at ***B*** can be used. Two single knurling rollers are each mounted at the end of a square bar. One bar is threaded for screws Y Z, and the other is drilled. Side plates are bolted to one bar to guide the other. Screw Y expands the rollers; screw Z takes the reaction. The tool can be turned with an adjustable spanner.

Another way to rectify a worn seating in a casing is to fit a sleeve, as at C. With the job done carefully, no reservations need be made about it whereas, with knurling, heavy bearing loads may force down the crests that give the interference fit.

A casing that cannot be swung in the lathe can be bored for a sleeve as at ***D,*** with a boring bar in a pillar drill, and the feed lowered slowly. A bushed plate, bolted to the open side of the casing, and another bush temporarily fitted to the casing, will guide the bar.

The sleeve should be not less than about 1/16 in. thick. If it must be made from short material, it should be bored first and then pressed on the ball bearing, which can be mounted between washers on a mandrel, as at ***E,*** for turning the outside of the sleeve to size.

Sometimes a shaft for a pulley can be increased in size, as at Fl, with a split sleeve, which can be turned to size after it has been sweated with solder. Building up by brazing or welding, as at F2, is the alternative and requires more heat-as when hard metal is applied to the seating of a poppet valve (see