

FEEDS-in lathe milling

IN SETTING UP work for milling in the lathe, an important influence is the manner in which the feed will be applied. The lathe spindle runs in the normal direction when driving a milling cutter—that is, the top of the cutter rotates towards the operator; or looking from the headstock towards the tailstock, the cutter runs in a clockwise direction.

Drills and end-mills rotate in this manner; and although a saw or slotting cutter could be reversed it would mean running the lathe spindle the opposite way, with the possibility of the chuck or driving plate unscrewing.

With the work mounted on the vertical slide, feed can be applied either from the cross-slide or from the vertical slide with the longitudinal feed of the saddle on the bed employed for putting on cut or locating the work in relation to the cutter, though this arrangement may be modified according to circumstances.

Having regard to cutter rotation, and the way in which feed may be applied, the next point is the manner in which the cutter will contact the work. In ordinary milling, the feed forces the work on to the cutter, as at *A*, and the thrust of feed and cutter is always in opposition.

This means that if the cross-slide feed is used the work should be mounted above the cutter and a start made near the operator for the work to be traversed away from him. To maintain the same conditions with cross-slide feed the work could be mounted to run under the cutter and brought from the far side towards the operator. But in many instances the cross-slide feed is too limited for this.

On occasion, from some convenience there may be in setting up or because the hazards are overlooked, the conditions of operation may be reversed and the down-cut milling principle introduced, as at *B*, with the possibility of breaking the cutter or spoiling the work from chatter or digging-in.

This is because, as the cutter rotates, the tooth which is nearing the end of its cut has a tendency to carry the

work with it, taking up the slack away from the feedscrew. When this happens the next tooth to strike the work has a greatly augmented cut to contend with, and in a bad case the tooth may be chipped or the cutter broken in halves; while there is always the danger of the work being moved or the finish spoilt.

Even with the slide gibs tightened so that the feed is stiff the risk remains. Consequently, whenever possible the down-cut principle, as at *B*, should be avoided in milling in the lathe.

Using vertical-slide feed in a downwards direction, conditions are satisfactory when the work is on the far side of the lathe away from the operator, as at *C*. With the work mounted near to the operator the feed should be upwards, as at *D*, as when slotting a piece of material to make a fork. A slight tendency to

dig in may be noticed on commencing a cut if this is to be very deep. The remedy is to take a series of light cuts.

The principles apply in end milling when the cut is on the side of a bar, as at *E* (top), and in machining a slot or channel (bottom), the cut is balanced. Where a slot is to be widened the method at *F* should be adopted. Cutting on the top of the slot, cross-slide feed should be away from the operator; cutting on the bottom, it should be towards him. The same applies when milling a dovetail, as at *G*, where feed conditions should be as *F*.

A keyway for a Woodruff or "half-round" key is machined as at *H* (top) with a direct feed on to the cutter; usually downwards from the vertical slide. A long keyway bottom can be cut with cross-slide feed under conditions similar to *A*. □

