

# MILLING on ANGLE PLATES

**WORKSHOP  
HINTS  
and TIPS**

**W**ITH an angle plate mounted on the cross-slide (as described in my last article), the effective capacity of the lathe is extended over a wide range of milling and boring operations. The outcome is that one can undertake machining of certain items of equipment, or parts of models, which were previously beyond one's scope from sheer inability to swing them or otherwise set them up.

Many operations on smaller components are also facilitated when the slide-mounted angle plate is the only alternative to the top slide for setting up—the lathe having neither a vertical slide nor a cross-slide with slotted face. Small components which can be set up by straightforward clamping can, like large ones, be mounted direct to the face of the angle plate. For others with right-angle faces, it is advantageous if the angle plate is supplemented by a smaller one? or by right-angle blocks, providing either a

horizontal platform or faces to which components can be attached.

For many operations, especially on large components, it is necessary to set up to horizontal and vertical centre lines—which are first marked on components in normal ways. For the horizontal centre line to the lathe axis, the surface gauge can be used from the lathe bed, aligning its point to the centre line at each end of the component. The height of the point is set from a horizontal line on a piece of material in the independent chuck. This line is itself set to centre height by adjusting the chuck jaws and testing at 180 degrees. Then the scriber transfers the setting to the component.

For the vertical centre line, a flat face is needed at the lathe axis extending from the chuck. It may be the face of a half-round bar, or a piece of rectangular bar off-set in the independent chuck. With the face at the axis, a small straight-edge can be held or clamped to it, and set vertically by turning the chuck. Then the vertical line on the component can be adjusted,

by slide feed, across to the straight-edge; and for a boring operation, the slide is clamped.

The cast bed of a horizontal steam engine is a fairly common example of outside work. From inability to machine it, the underside may have to be filed true, the casting being screwed to a block of hardwood in the vice. Flatness can be tested on the surface plate.

For milling the crosshead face, a set-up can be made on the angle plate. A. Ordinary clamps may be used instead of lugs, or bolts may be

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passed through the bed. Alternatively, a strap bolt may be used on the cylinder mounting face; it consists of a stud brazed or welded to flat material.

After milling the crosshead face, turn the angle plate 90 deg. to deal with the cylinder mounting face. For this, to get to the lathe axis, the engine bed is mounted with the crosshead face to the angle plate, with packing if necessary, B.

Machining outside the flange, and boring for the spigot on the cylinder cover, should precede the facing operation, while the centre line remains to give the setting for clamping the slide. These operations are performed with an outside tool and a boring tool, C1 and 2.

Ordinary facing and outside flange-machining operations, of which these are examples, can be performed with tools in blocks, adjusting the chuck jaws for swing and radius. Boring operations require short stiff tools, similarly set to radius by the chuck jaws. For narrow slots, such as ports and keyways, endmills are advisable; though on occasion some extra width is possible by wobbling slightly in the chuck.

For operations like these, the second angle plate mentioned (mounted on the main one) facilitates setting up, though by the use of clamping plates and blocks, set-ups can be made without it, D.

The engine cylinder, for example, can be bolted between two plates W-X which are fitted by studs to blocks Y-Z, also tapped for studs to hold them to the angle plate. The crankshaft can be set up in split blocks, one of which is drilled and tapped for studs. □

