

# SIMPLE TOOL GRINDING

By GEOMETER

**I**N all kinds of machining—turning, milling, planing, shaping—consistent acceptable results depend on keen tools ground to reasonably appropriate rake and clearance angles. Of course, for ordinary work, unless there is a special reason to the contrary, acceptable results will not arrive only from the use of particular angles. A normal turning tool with a keen edge, for example, may do quite well on mild steel, brass and aluminium. It may be ground free-hand, honed up, and set by eye on the lathe according to the machinist's judgement and skill.

That is normal practice and as

long as it works all is well. Yet inevitably variations occur. Angles are rarely duplicated and when they need to be accurate and consistent, the method of relying on eye and judgement is less reliable than the scientific method of proceeding on ordered lines.

In the case of small tools such as screwcutting tools, external and internal, free-hand grinding and setting by eye are possible. If the tools are large enough, setting can be to thread gauges, when it is necessary to depend on the attitude of the tips in the gauges—for the Vs may not be at fixed angles to the tool shanks. However, the use of a setting gauge is a step in the right direction. Further

progress can be made by grinding not only the tool angles as accurately as possible, but also by arranging them in a definite relationship to the shanks, so that these can be referred to in setting up in the case of very small tools and tips.

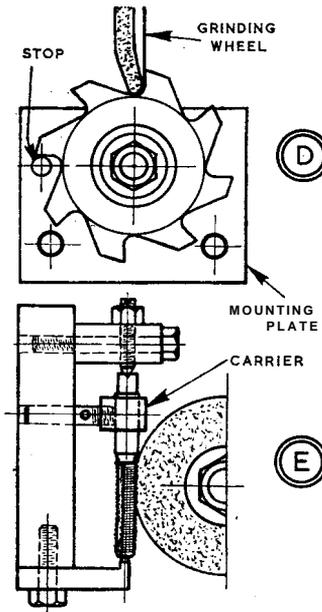
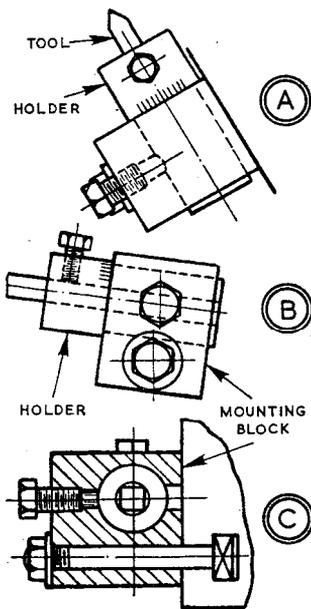
Preparing tools in this way requires the use of suitable jigs and a tool grinder or a lathe with vertical slide, and grinding wheels of straight and cup types, running as fast as possible on mandrels in the chuck. For the usual straight tool bits and boring tools or internal screwcutting tools with similar shanks, a jig as at **A**, **B** and **C** meets most requirements.

The mounting block to bolt up to the face of the vertical slide can be in any common material, though aluminium or duralumin would be easiest to work. A hole can be drilled and bored in the independent chuck to take the toolholder, then two cross-holes drilled. One is for a holding bolt, the other for a short plunger and, at the outer end when tapped, the locking screw. The toolholder can have a round central hole even if the bits are square, and a tapped hole for the toolholding screw. It may also be graduated to set in the block, which can be twisted on the slide which itself can be angled on the cross slide. Hence, all angles can be pre-set and duplicated. If desired an angle-graduated plate with a tongue or stud in the T-slot, may be used between the slide and mounting block to facilitate setting.

For dealing with milling cutters and taps which must be sharp to cut cleanly without breakage, jigs are also essential. Suitable types are as at **D** and **E**. A saucer wheel or saw gummer may be used for milling cutters and a straight type with edge for taps.

The jig for a milling cutter can be a plate on the angleplate on the vertical slide, with a spigot to take the cutter and clamp by a nut and a screw-m stop to locate the teeth from one another. Whenever possible sharpening should be done grinding the front edges of teeth, as this least changes the size and shape of a cutter.

The jig for taps consists of a base-plate carrying centres, one adjustable. As a carrier there can be a type of collar with a stud sliding in a hole in the base, so the tap can be turned and set as required.



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