# Avoiding CHATTER in turning

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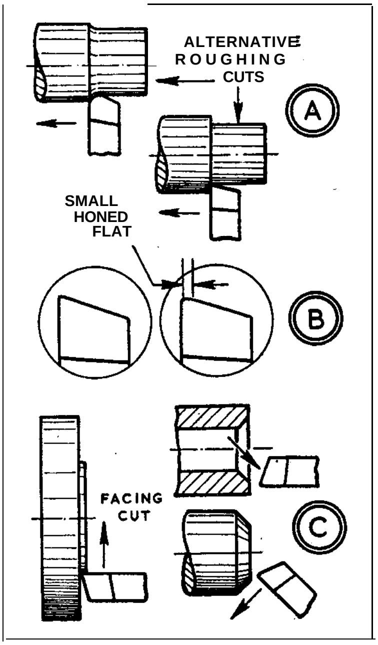


**CHATTER,** which leaves the surface of the work with ripples, can have various single causes; or it may arise from a combination of factors, each of which would be ineffective in other circumstances. On some light lathes or on worn lathes it may appear as soon as they are pushed beyond a modest limit of rotational speed and depth of cut; and to produce good work from these calls for the best conditions of machining.

In practice, working conditions are so varied that a brief consideration of what happens in normal smooth turning may perhaps be the best way of showing how irregularities leading to chatter occur. The material is rigid in itself and its mounting, and moves with uniform speed past the tool, which is likewise rigid and forced into the material by feed. All-round rigidity, material speed, tool pressures and feed are the main factors.

## Not too fast

Hence, lathe spindle and slides must be in good adjustment, and both material and tool firmly mounted with minimum overhang. Speed must not be too fast; and the tool must be sharp and capable of forcing its way into the material.

Irregularities occur when there is lack of rigidity in the lathe spindle or slides, or in the mounting of material or tool; and when the speed is too fast, or tool feed into the material is difficult. Reducing speed may then eliminate chatter, as also 'may reducing the depth of the cut--or the perimeter on which the tool is cutting.

In this connection, in rough turning, alternative cuts are as at ***A;*** but the round-nosed tool is more likely than the straight-sided one to cause chatter, because of its longer cutting edge for a given depth of cut. On the other hand, a sharp round-nosed tool may not cause chatter where a blunt one would; and in a borderline case, the use of oil or cutting suds may prevent chatter-as against dry cutting.

For roughing cuts taken at slow speed, in back gear when required, the straight-sided tool can be ground to a point, as at ***B*** (above), then the tip turned into a tiny radius with a hand hone. For finishing at a fast speed, a small feed-overlapping flat can be honed as shown (right), and a light cut employed. A tool for facing cuts on the same principle. may be of opposite hand, as at C (above).

When tools are used for cutting on long edges or perimeters, as in forming operations, chatter is likely to occur. For chamfers (which can be formed with angled tools), the solution is to set the topslide round and feed the tool, as at C. Form tools, or deep grooving tools, which must go straight on to the material, however, are usually improved, as at ***D,*** by grinding a small groove close to the cutting edge, and providing packing to the cross-slide. Side overhang on the topslide should be obviated if possible by bringing the slide to mid-position; and for a smooth finish, it is helpful to end the cut with the material creeping round to a halt.

For boring operations, tools should be used at minimum overhang, and where bore diameters admit, tool shanks or holders of maximum size are advisable. Open-ended bores can be machined with small round tool bits held by clamping screws in stiff mild steel holders; and in grinding these bits, the tool principles, as at ***B,*** should be applied.

For machining large diameters, particularly in roughing operations, rigid mounting is essential. For flywheels and pulleys, this can be in an independent chuck with jaws reversed, or on the faceplate, as at ***E,*** if there are spokes between which bolts can be fitted. Turning the outside diameter, machining the front face of the rim-using back gear, facing the boss and boring it, can all be done at a setting. Then reversing the wheel, the other side can be finished. Finally, should there be edge-wobble on it, light truing cuts with it mounted on a mandrel will Correct.

In part-off operations, joggling the tool for cuts. as at ***F,*** is helpful, both to reduce chatter and clear swarf-cut down 1, displace tool and cut down 2, return and cut off 3.