Machining difficult castings

By GEOMETER

A SMALL lathe, because of its size, and the fact that it is often the only machine tool in the workshop--or at least the major one-may have to work near the limit of its capacity more frequently than its production counterpart. It is a circumstance that poses problems for the owner, and puts a considerable premium on his skill in dealing with the larger components of a model or piece of equipment, when a small machine may be actually at the point of overloading.

With a little more power in the drive, a larger spindle, a wider bed, and a longer saddle, what in existing conditions is something of a struggle would be a walk-over-though there is always satisfaction in achieving one's ends in the face of drawbacks.

In dealing with a large casting, like that for a flywheel, conformity with general procedure for such a component, and some preliminary attentions to the lathe, help materially in overcoming difficulties. A firm set-up is a prior concern, and so if the casting is held in the chuck it should be at its rim rather than on its boss. If it has holes or spokes, it can be clamped to the faceplate-with packing interposed for proper butting-up. Slackness should. be adjusted from the spindle bearmgs, and backgear engaged.

As most of the machining may be done with the cross-slide and top slide, their action may be stiffened by adjustment. Brought into position, the saddle can be adjusted almost to be clamped to the bed, and given support against thrust by engaging the leadscrew nut.

The material of tools, its heat treatment and grinding, and the cutting angles employed, are similarly factors of considerable importance to trouble-free working. Something better than ordinary silver steel or cast steel tools is advisable for machining hard cast iron, and a few tools of special material are never a bad investment. Various makes are obtainable, and all are tougher than carbon steel and less easily damaged by heat in use. Nevertheless care should be exercised in their grinding,; and in their mounting, the axiom IS, of course, as always-minimum overhang.

In general use, a turning tool carries top rake, as at A (1) to assist free-cutting from the sharp point given by the front clearance angle. But such a point is weak, for tough materials, and likely to overheat on those that are hard. Consequently, a tool with zero rake (2), or even one with negative rake (3) may be used with advantage on a hard casting-if only for the early cuts, until scale and skin have been removed..

Work with a suitable file, or on a grinder, to remove roughnesses and casting irregularities will save a tool from damage in scraping a rough finish; and if there 1s sufficrent material, a small chamfer can very well be made at the edge of a rim, as at B, for the tool point to enter clean metal. Another way is to dig below the surface of a casting with a pointed tool, which can be effectively done on a boss, as at C. Instead of facing from the outside to the centre, scraping the tool edge during the early revolutions, a point tool at centre height (1) can be forced in (2) at minimum surface speed, then drawn out towards the diameter (3).

It can be done on the face of a rim, as at *D,* using a slow rotational speed, with a firm in-feed of the tool, and taking care that it is not entered so far that a ring will be left in the tlnished surface. Once started, the groove can be widened by facing feed until the ordinary tool can be substituted.

Whenever possible, a cut along a diameter, as at *E,* should be deep enough, even with wobble, for the tool edge never to scrape the surface -for only a definite hard spot is more damaging to a cutting edge than a gentle ramp of scale or skin.

The problem of a first cleaning cut in a rough bore can on occasion be solved as at *F,* using a tixed steady-orthodox or made for the purpose-close to the work, supporting a round boring bar which is fed from the tailstock.