Cutting worm threads

By GEOMETER

Methods of machining, and precautions for ensuring accuracy

So long as its pitch is a simple fraction of an inch, and capable of being expressed as t.p.i. without nunning into decimals, the tooth profile or thread of a worm can be cut in a lathe in a manner similar to that employed for other threads. It can be a single-start, double-start, and usually a three-start without any difficulty.

But the more numerous the starts, the longer the axial movement for one revolution, and the more rapid the saddle action. Six-start threads are quite possible on a component screwcut in a lathe, though it is getting away from a worm towards the driving member of a pair of skew gears.

Preparatory work consists of drilling and reaming the bore, or finishing with a boring tool, then turning the outside or top diameter to size. A small blank may well be screwcut on the parent bar before parting off, supporting the open end with a tailstock centre,, as at ***A.*** Where, however, this would mvolve running at a large diameter on the centre, or when desiring to retain the principle with a bore larger than the centre, a centred bush can be used for support, though it should be fairly long and a good fit in the bore. Again, particularly in larger sizes for which a casting may be used, the blank after boring and facing can be mounted on a mandrel to run between centres.

In many instances, it is useful to leave at one end, or both ends, of the blank, a portion which is the root diameter of the thread,, to serve as a reference down to which eventually to take the tools in a series of cuts, working from the cross-feed micrometer collar.

It is important for the lathe spindle and slides to be in good adjustment. There must be no endplay apparent on the spindle; and support given from the tailstock should be as uniform as possible, the handwheel tightened with the same touch on each occasion, and the barrel clamped to the same degree of tightness. This is to say, the endwise position of the job can be varied slightly by the force, or lack of it, applied from the tailstock, even on quite powerful lathes; and the effect is, of course, particularly apparent when work is run between centres.

In ordinary turning, chatter, roughness, or binding might ensue; but in any screwcutting, and particularly where the thread form is deep, variations in deoth of cut mav result in Serious tearing, or jamming and breaking of the tool.

Slides should be adjusted to eliminate play, and backlash on the topslide feedscrew taken up to oppose the thrust of the cut, right- or left-hand. For screwcutting steel, lubrication is also important, and there should be a good supply of suds or cutting oil flowing over the tool in use.

The carrier for a mandrel mounted blank must be tightened firmly, and care exercised that its leg is against the driving pin before commencing a cut. To ensure this, a stud can be fitted to the driving plate,. as at ***B,*** or an angle piece under the pm, as at C. With either arrangement, it may be advisable to locate the carrier outside first, to check touch on the tailstock. A stud can, of course, be screwed in afterwards.

The thread form is best taken to depth in two stages, employing front-cutting and right-and-left-hand tools, with cuts 0.002 in. to 0.004 in. deep. In the first stage, the front-cutting tool provides a square groove of half depth which is opened out at the sides with angle tools. Then it can be used again to full depth.

At ***D1,*** the tool is in a finished. thread, while 2 illustrates its section; and 3 shows the side view with hollow grinding at X for the chips to curl off freely. Right-and-left-hand tools, as at ***E*** and ***F, are*** shaped as 1, with sections 2, and hollow grindmg Y and