Grinding spherical and annular radii

By GEOMETER

As in the case of rockers for o.h.v. engines, the requirements of components carrying a radius which is no more than a regular curve along a straight edge can be met by set-ups, either on forming or on generating principles, where the grinding wheel is run on a mandrel in the chuck and the. components are mounted on suitable jigs, often in conjunction with the vertical slide.

If need be, quite a lot of work can be done in this way; but the method is not applicable where radii are spherical (either external or internal) or annular, forming a circle round a periphery or in a face, or joining a diameter to a shoulder. For features such as these--common enough for ball pins, ball screws, journals on shafts, ball-race-type components, the work must revolve as well as the grinding wheel, and so should be mounted in the chuck; which means there must be a portable grinder or motorised head on which grinding wheels can be mounted.

Within scope of lathe

Given either of these, however- and suitably dressed wheels-some of the more common spherical and annular radii come within the scope of the lathe, and, indeed, advantageously so from the capacity of a grinding wheel to deal with hard materials, with light regulated cuts on lines of contact the length of which would inevitably defeat form tools from the heavy chatter induced.

To be certain of good and accurate results in grinding, the wheel should be set up to contact the work at centre height; and it is generally advisable that it should then be dressed before being used. For grinding a plain diameter, this means the -diamond dresser must be fixed at centre height, either on a bracket on the bed, or perhaps more conveniently in a holder in the chuck. Then with the wheel running, cut can be put on from the cross slide, and traverse made from the saddle. The grinding wheel will then spin truly, and touch a diameter across all the periphery.

The same applies when a swivelling jig mounts the diamond tool to generate a radius on the wheel. The diamond tip must be at centre height and capable of being swung at the appropriate radius. The base of the jig may be adapted to mount on the lathe bed; or the bracket may have a spigot to grip in the chuck. In the case of a build-up jig, as at A, the plate indicated can be flat and bolted to an angleplate on the faceplate.

Dimension X to produce a convex radius on the wheel, or Y to produce a concave one, can be arranged by suitably setting the diamond tool. When necessary, the swivelling holder can be held by a sliding plunger tightened by a screw; and it is also advantageous for the plate to carry stop screws, obviating excess movement on the holder.

Finishing internal radii

Thus, in dressing a wheel as at Bl, the diamond toolholder can be clamped by means of the screw and plunger at its most remote position for finishing the straight periphery, and unclamped and swung either way for producing the radius at the ends, the holder coming up against stops. The radii at B2, 3 and 4 can be produced simply by swinging the toolholder-and for 3 stops are advantageous to avoid digging in. A mounted wheel, as at ***B5,*** easily dressed barrel-shaped with a convex radius on its periphery, can be employed on occasion to finish sections of internal spherical radii.

Typical applications of the form-dressed wheels appear at C, ***D*** and ***E.*** As at Cl, ball pins can be accurately finished-then checked for size by micrometer measurement. In-feed and a radius gauge will finish ball screws as at C2; or a straight saddle traverse and cross set-up will do the same, as at C3. Annular and shoulder radii may be finished with straight wheels as at ***Dl*** and 2; while a track in a face and internal radii can be finished with suitably-shaped mounted wheels, as at El and 2. ❑