Machining Ball-race Seatings

By GEOMETER

SEATINGS for ball races need extreme care in machining. They must be dimensionally accurate, so that the races cannot work loose; and they must be accurately positioned, because they locate the races,' and these in turn locate shafts or spindles, which usually work with other components.

Dimensional accuracy is the first consideration, as the ball races must be an interference fit which is neither too light nor too heavy. If components are subjected to considerable heat, allowance must be made for it, to prevent the expansion from taking the dimensions of seatings beyond the interference limit. The ball races would otherwise be loose, and so seatings are the nominal outside diameter of ball races, less the allowance for interference and expansion.

Because of these conditions, gauges for ball race seatings must be of appropriate size. In some instances it is possible to use an inside micrometer. At other times a telescopic gauge can be employed, set from an outside micrometer. Calipers, too, may be set from an outside micrometer; delicacy of touch is needed, with the feel in the seating the same as in the micrometer.

Consistent results demand plug gauges, of which there should be one for each size of seating, and preferably another-O.003 in. to 0.005 in. smaller. The smaller one serves to check size at the outset. Afterwards special care is required to finish the seating.

For checking the seatings of small ball races, gauges can be quickly made from commercial bolts and washers. A bolt is held in the chuck and the hexagon is machined so that the washer fits securely on a short spigot. When the two have been sweated and soldered, the washer is machined to size, ***Al.*** In this way a pair of gauges can be made in a few minutes. The method can be extended to general use with a handle, A2, and the gauge secured bv a nut. Others of different size can be substituted, and all can be mounted on a short mandrel, with nut, for turning in the lathe.

Larger gauges can be made as at ***B,*** each from two pieces of rectangular mild steel bar. The piece for the handle should be faced in the four-jaw chuck to stand squarely on the piece for the gauge. Then the two can be brazed or welded together. The handle is again held in the four-jaw chuck for turning the gauge to size.

When the ball race is larger than any available micrometer, its outside diameter can be taken as at C. The body of the device is a piece of heavy steel tube, two plates, and a bolt. One plate has a fixed anvil and the other is tapped for a lock-nutted screw, which admits of setting to the diameter of the race. A feeler gauge is used with the device for checking gauges for the ball race seating.

In machining a seating! it is usually possible to arrange for tnal cuts to be made on material which will be later removed. This is shown at ***D. The*** seating is in a casting which has a face that abuts to another component. For the shaft, there may be a cored hole, or solid metal. With the metal, a facing cut must be taken. Then a centre drill and ordinary drills are used.

In boring,. trial cuts should be taken at position U, until the bore is cut to size. For the race seating, trial cuts should be taken on width V. Depth cuts for dimension Wshould be taken in the area near the bore, which will be relieved to clear the centre of the race.

Should any dimension be over-run, correction is made for the final cut. A depth gauge will give dimension W, or, as at ***E,*** an end gauge X can be used to a stop on the bed. The tool is brought to the face to set the stop. A turned gauge Y gives the width of the seating.

All machining can be done by a tool with a small radius, F1; though with a round-nosed type, F2, a small undercut Z can be made to clear the comer.

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