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DEVELOPMENT OF STAMPING EQUIPMENT FOR MAKING COLLECTING RINGS OF THE ALLOY OF BERYLLIUM BRONZE

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In various branches of engineering, including space, are widely used collection items. The requirements for their making and properties depend on many factors and are determined by the purpose of those parts. Especially they are tightened in the production components flying vehicles in aviation and aerospace engineering.

Task scientific research was to get workpieces for making collecting rings with inner diameter 8.8 mm, wall thickness of 0.65 mm and a height of not less than 15 mm. These workpieces are used for making collecting rings with small diameters and wall thickness of the alloy BrB2. Currently, of their production is machining. While the product high requirements not only quality, but also the structure and properties of metals (grain size, hardness, heat resistance).

The main method for making rings proposed a method of stamping, and we got an open top, hollow article (glass) with the required (or close to the set) size. While were calculated transitions in the drawing without thinning and with thinning, sizing semifinished on transitions, the calculated diameter of flat blank, determined efforts of deformation and selected equipment [1]. Calculations have shown that for such a product takes six transitions drawing, and requires at least one operation of the intermediate heat treatment.

To determine the feasibility of this technological scheme was designed stamping equipment and experimental studies. In Fig. 1 shows drawings of universal exhaust stamp for details set size, and in Figure 2 - detailing one of the transitions drawing.

Diameter of workpiece was calculated and checked by production of flat samples with the selection of such a size that would be on the one hand provided the set height glass, and the other hand - is consistent with the minimum allowable factor drawing [2]. This approach allowed us to determine the optimal diameter of the workpiece from which the first transition drawing obtained intermediate product, which is not observed in the bottom of the separation of its walls.

Drawing blanking dies shown in Fig. 3.

The obtained product was subjected to metallographic examination, with the studied transverse sections of semi-finished alloy BrB2, obtained by deep drawing of sheet metal. In the first stage were studied semi-prefabricated (sample 1) and the samples produced by the new technology (samples 2-7). At the laboratory equipment was determined middle thickness of the samples, the size of the micrograin and their hardness. The measurement results are shown in Table 1.

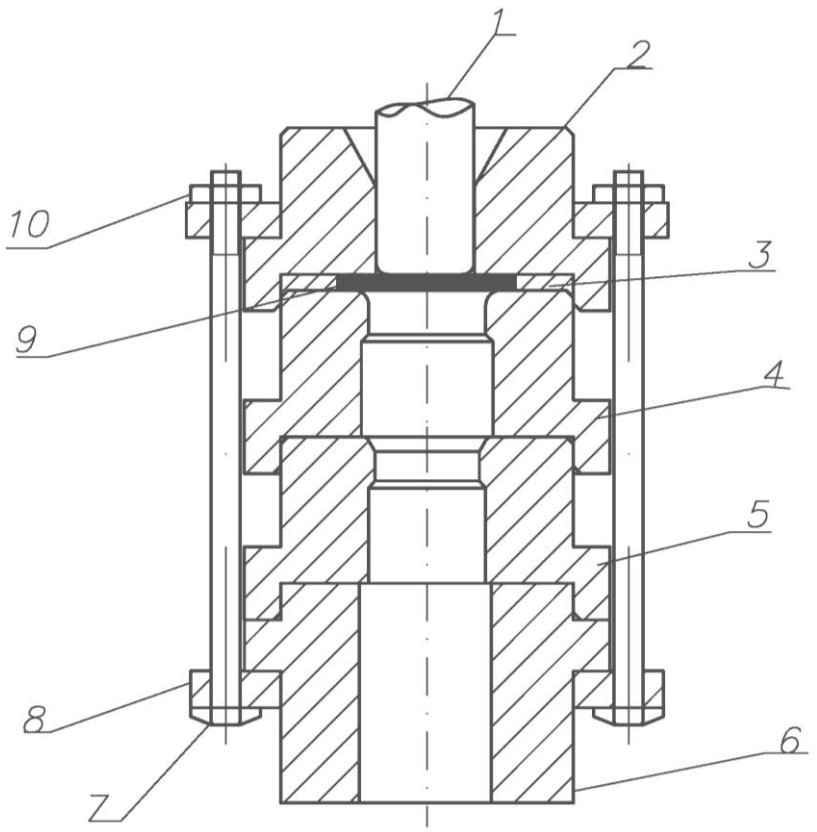

Figure 1 - Schematic exhaust stamp: 1 - punch 2 - the upper part of the stamp, 3 - the compression ring, 4.5 - matrix, 6-lower part of the stamp, 7 - coupling bolts, 8 - pads, 9 - blank, 10 – Nuts

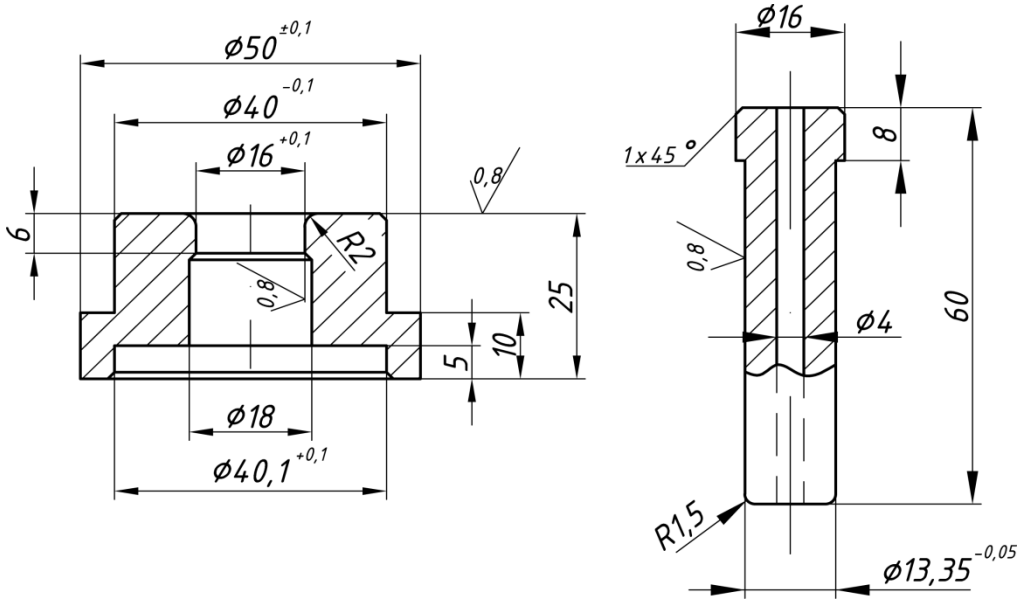

Figure 2 - One of the variants of the working tool for semi-finished products with outer diameter of 16 mm.

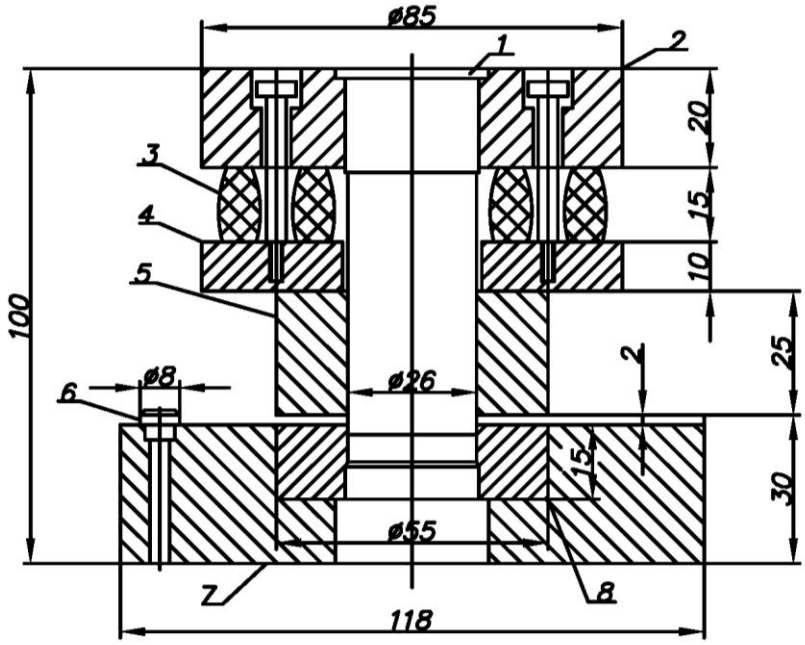

Figure 3 - Stamp blank

Table 1 - The thickness, size and hardness of the samples micrograin

№ sample	thickness, mm	Grain size, mkm	hardness, HV
1	0,96	8,4	293
2	1,16	10	-
3	0,78	12,2	-
4	1,32	12,1	116
5	1,21	9,1	245
6	0,81	8,0	247
7	0,65	7,3	270

Results of tests showed that with increasing degree of deformation the grain refining and growth hardness patterns of Vickers. While the grain size of no more than 30 microns, that meets the requirements of the customer to the product. Then followed the heat treatment (aging) to increase the hardness, with the results of measurements is greater than a predetermined level, to 320 HV.

Studies have shown that the application of the developed stamping equipment and implementing a new technological scheme stamping significantly reduced the complexity of manufacturing rings, and metal recovery of 88.8%

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