Quality assurance of the post-processing after straightening performed with a nanosecond UV-laser

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When performing microstamping operations at different similarity ratios, it is often encountered that it is not possible to design the radii of rounding of a sheet blank. This is due to both an increase in the stiffness of the workpiece as the ratio of the thickness of the workpiece to the average grain size (t/d) decreases, and to the rheological characteristics of the material itself or its ability to resist deformation depending on the deformation rate. In addition, the elastic properties of the workpiece will also be responsible for the stiffness of the workpiece, the tendency to spring back as a result of the Bauschinger effect. Experimental results of drawing/bending operation show that at $\lambda = 0{,}5$ and 0,25 there is a deviation from the radii of rounding of the die corners for copper M1 and brass L63. Subsequent straightening does not result in full filling of the radii. Application of serial exposure to nanosecond UV-laser radiation makes it possible to bring the rounding radii closer to the drawing radii without performing straightening operation. The values of stresses arising in the investigated materials at forming operations, as well as during straightening by UV-laser pulse have been determined by means of numerical modeling. Comparison of the initial and actual geometry of the "Plate" parts was performed using a non-contact 3D-scanning system based on the structured light.