

NT09

Research on the optimization of stress relief holes applied in blanks used for body-in-white stamping parts with complex asymmetrical shapes

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Abstract. Increasing the degree of deformation when stamping body-in-white parts with complex asymmetrical shapes can be achieved by optimizing the discharge holes in the flange of the blank. For this purpose, the numerical simulation of the deep-drawing process with finite element is used. Considering the circular shape of the unloading hole, the expanded shape of this hole is determined using the FEM, taking into account the safety limit given by the final shape of the stamped part. To check that the deformation that occurs at the edge of the expanded hole not cause cracks in the part the area with deformations whose values exceed the permissible limit is delimited. The arc that stretches this area along the contour of the expanded hole is divided into a convenient number of equal segments. The points at the end of each segment are then translated on the edge of unloading hole by measuring the distances between these points on the expanded blank hole. Using a mathematical modelling of the allocated points on the contour of the unloading orifice, the corrected shape of this orifice is determined, which is perforated in the flat blank.

The full paper is published in IOP Conf. Series: Materials Science and Engineering, Volume 968:

<https://iopscience.iop.org/article/10.1088/1757-899X/968/1/012011/pdf>
