Abstract

RZESZOW UNIVERSITY OF TECHNOLOGY

Faculty of Mechanical Engineering and Aeronautics

DOCTORAL THESIS ABSTRACT

Analysis of the Plastic Forming of Special-Purpose Bolts Using Segmented Dies

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The subject of the doctoral dissertation was the development and analysis of a cold forging technology for a stabilizer link bolt with an unconventional head geometry, characterized by a concave-convex lateral surface. The main objective of the study was to determine the feasibility of forming such a geometry using a segmented die in a forging machine and to identify the technological conditions that allow the required geometry and quality of the forging to be achieved.

As part of the study, an analysis of the plastic forming process of the material during the successive forging stages was carried out, with particular emphasis on the manner in which the segmented die cavity is filled and on the formation of the concave-convex lateral surface of the screw head. The influence of the adopted tool geometry and the sequence of positioning the components in the working cavity of the forging machine on the possibility of obtaining the assumed forging shape was analyzed.

The conducted research made it possible to determine the technological conditions under which the concave-convex lateral surface of the stabilizer link bolt head can be properly formed. The research results confirmed the possibility of using a segmented die to carry out the analyzed cold forging process. The developed technological solution enables the required geometry of the component to be obtained while maintaining the appropriate quality of the forging and provides a basis for implementing the technology under industrial conditions.

The conducted research enabled the development of a complete manufacturing and inspection process for the stabilizer link bolts.