Figure 2 – Digital model of the object

The resulting DSM can be used in Autodesk Inventor and other packages for designing or improving metal structures and their elements (Fig. 3).

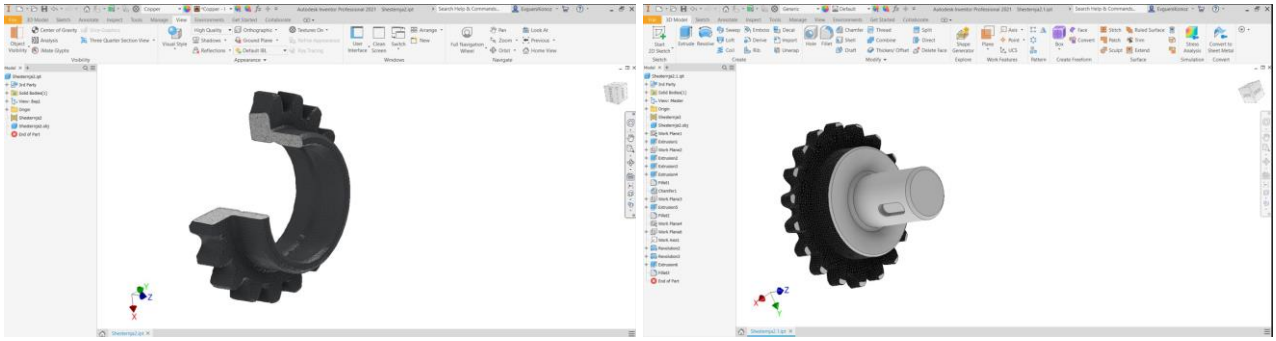


Figure 3 – Reproduction and refinement of objects in 3D models

Thanks to the identity of the DSM and the real object, the accuracy and quality of the design is improved.

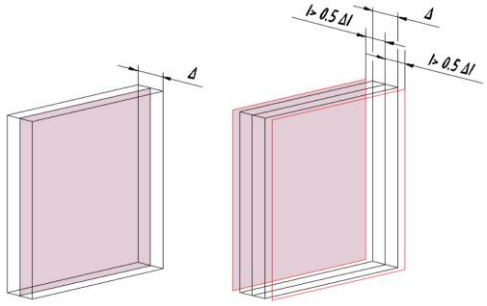
UDC 62-21

TAKING INTO ACCOUNT CONDITIONS AND SIMPLIFICATIONS IN ACCORDANCE WITH THE REQUIREMENTS OF CURRENT STANDARDS IN THE AUTODESK INVENTOR PACKAGE

Ivanov Evgen Martynovich, Ph.D. in Engineering,
Associate Professor, Department of Computer Graphics,
Kharkiv National Automobile and Highway University "KhADI",
e-mail: repositiv@gmail.com, ORCID: 0000-0001-9011-7269

The paper considers the issue of improving the construction of parametric three-dimensional models of parts and the development of their drawings in order to solve the problems of compliance with the requirements of current standards, in particular, the representation of part sections on drawings in the Autodesk Inventor package.

To solve this problem, the use of an additional parametric three-dimensional hollow element(s) was proposed, which uses the geometric information of three-dimensional models of parts and is tied to the cutting plane (Fig. 1).

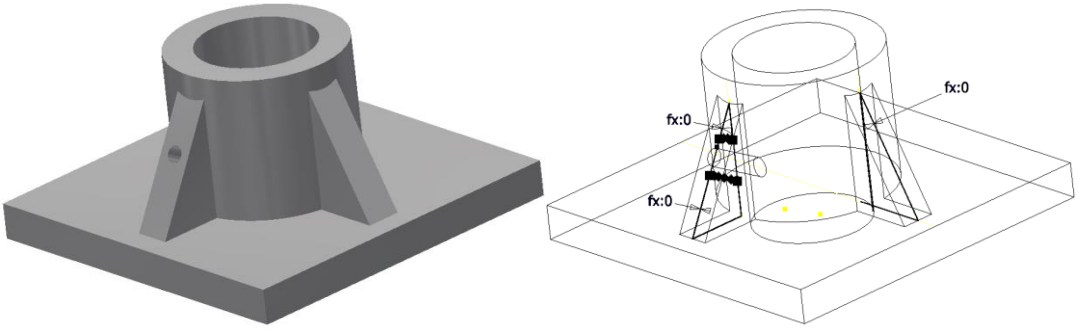


a b

Figure 1 - Parametric three-dimensional hollow element.
Position of the cutting plane relative to the parametric hollow element:
a – in orthogonal projections; b – in axonometry

The essence of the method is that when constructing a parametric three-dimensional model of a part, an additional three-dimensional hollow element(s) without physical properties is added. The location and dimensions of the element(s) are determined by the conditions of the sectional views of the parts on the drawings (Fig. 2). The conditions for constructing the element(s) allow it to be hidden if necessary. The possibility of changing the conditions for displaying the element(s) on the drawings is also taken into account.

The construction of an additional three-dimensional hollow element(s) does not require knowledge of the built-in VBA programming language or the use of iLogic tools.



a b

Figure 2 - Additional three-dimensional hollow elements a – 3D model of the part;
b – location and geometry of parametric hollow elements

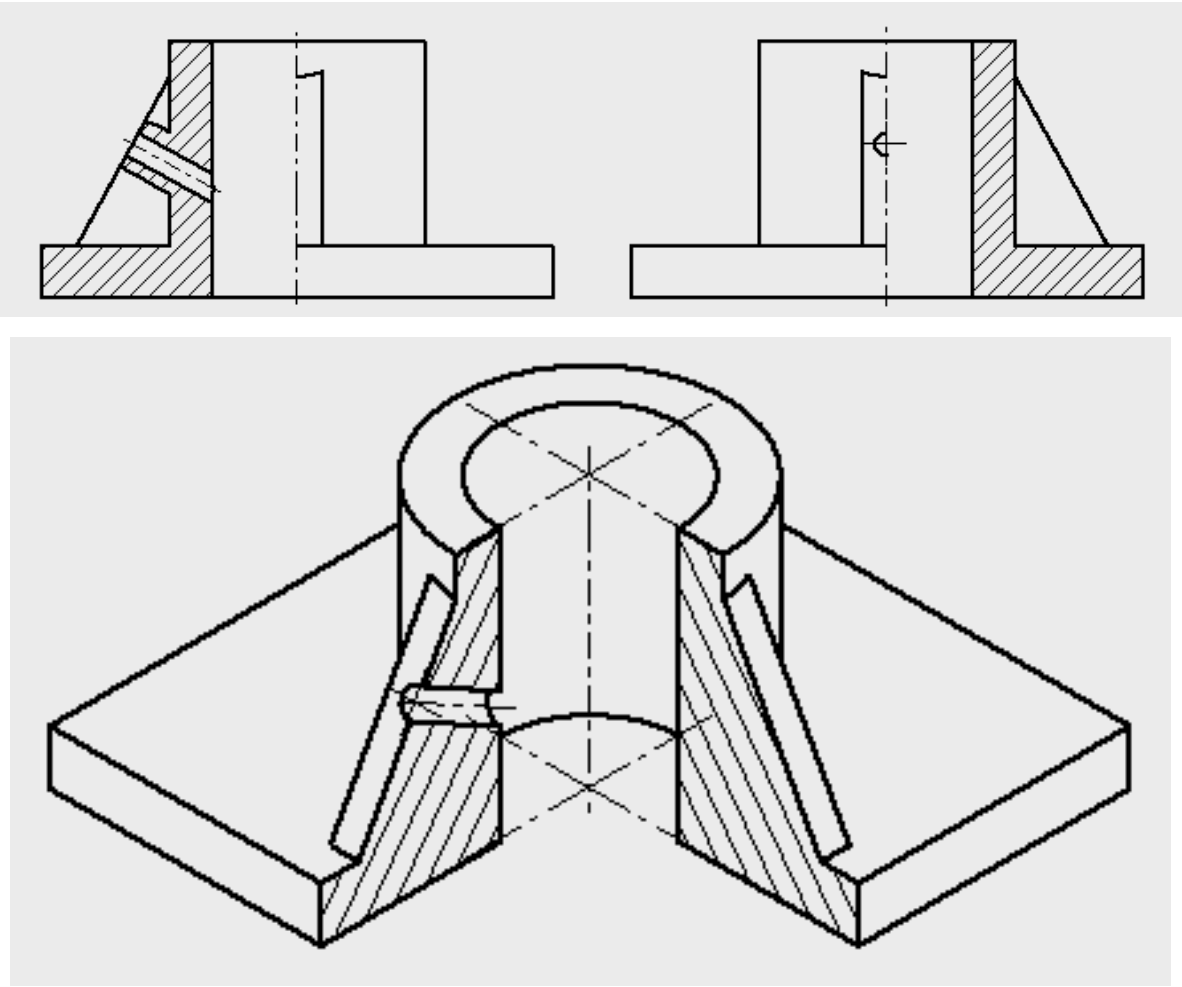


Figure 3 - Result of using parametric hollow elements
in orthogonal projections and axonometry

Studies conducted on the limitations of using a generalized algorithm in the construction of three-dimensional models and the design of detailed drawings have shown that three-dimensional hollow elements can be used to construct any incision(s) and section(s) without restrictions, namely: regardless of the position of the cutting plane relative to the projection planes; regardless of the position of the cutting plane relative to the part; regardless of the number of cutting planes; regardless of the position of local sections, taking into account conventions and simplifications in accordance with the requirements of current standards.

The proposed method for improving the construction of parametric three-dimensional models of parts and the development of their drawings in order to solve problems of compliance with current standards does not affect the distribution of stress fields when conducting studies of the stress-strain state of part models.

The proposed method has been successfully tested and implemented in the educational process.