

**APPLICATION OF INFORMATION TECHNOLOGIES BASED ON SOLIDWORKS FOR DESIGN OF VEHICLE REPAIR DEVICES**

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*For the designed two-post lifter with an electro-hydraulic drive, calculations were made for the inner rear lever: the material was selected, the support was fixed and the load was applied, contact interactions were determined, a finite element model was created, and the stiffness matrix was constructed; carried out the synthesis of finite elements of the model; solved the resulting system of algebraic equations; determined the components of the stress-strain state.*

Today, information technology (IT) is the most important factor affecting the quality of the education system. The main prerogative is the quality and level of training of students in universities, which is the key to the successful functioning of the education system. The use of IT in the educational process unleashes students' creative abilities during their studies [1, 2].

In today's realities, when the requirements for the quality of graduate training are increasing, global informatization and the development of the latest IT are taking place, which will also improve the training of future specialists. One such IT is computer engineering, or CAE-technology [3].

CAE systems (Computer-Aided Engineering) are systems for automating engineering calculations. With the help of CAE systems:

- develop and apply rational mathematical models that have a high level of adequacy to real objects and physical and mechanical processes;
- perform efficient solution of multidimensional research and industrial problems described by unsteady nonlinear partial differential equations in spatial domains of complex shape.

To effectively solve these problems, various variants of the modern and most powerful and versatile numerical method, the Finite Element Analysis (FEA), are used [4]. The leaders of CAE programs include the SolidWorks complex [5].

Thus, the authors [6] designed a two-post lifter with an electro-hydraulic drive and carried out calculations of its most heavily loaded part – the bracket to which levers with legs are attached. For this, we used the SolidWorks application – SolidWorks Simulation. It has been established that the maximum weight of the car, which will not lead to safety violations, will be 13800 N. But it is necessary to check the performance of other parts of the lifter. Therefore, the purpose of this study is to determine the static strength of the inner rear lever (item 4 in fig. 1 [6]).

The beginning of the calculation is the selection of the lever material from the SolidWorks library: steel X40Cr14 (DIN 1.2083 – fig. 1, a).

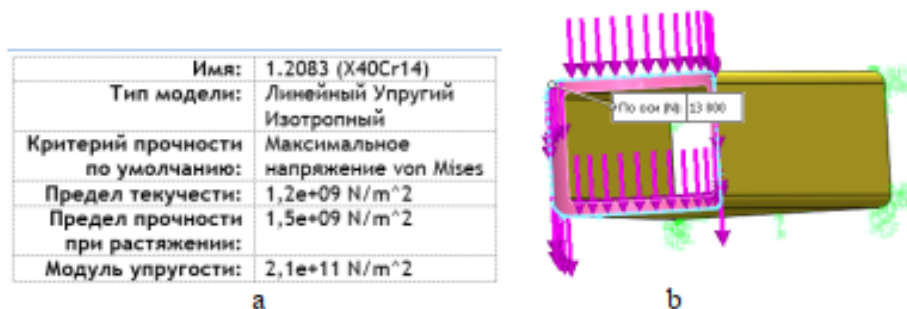


Figure 1 – Properties of X40Cr14 steel (a), fixing of the lever support and application of loads (b)

The following stages: fixing the lever support and applying loads (fig. 1, b); definition of contact interactions; creation of a finite-element model of a lever (fig. 2); construction of the stiffness matrix;

implementation of the synthesis of finite elements of the model; solution of the resulting system of algebraic equations; determination of components of the stress-strain state fig. 3).

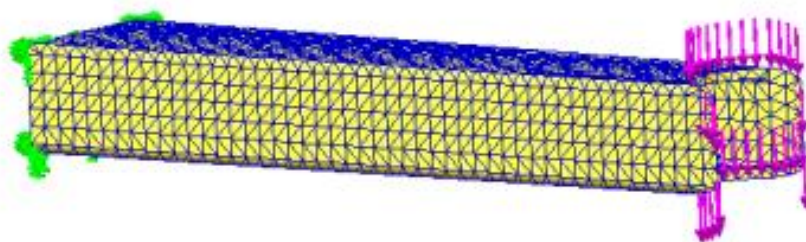


Figure 2 – Mapping the grid on the lever model

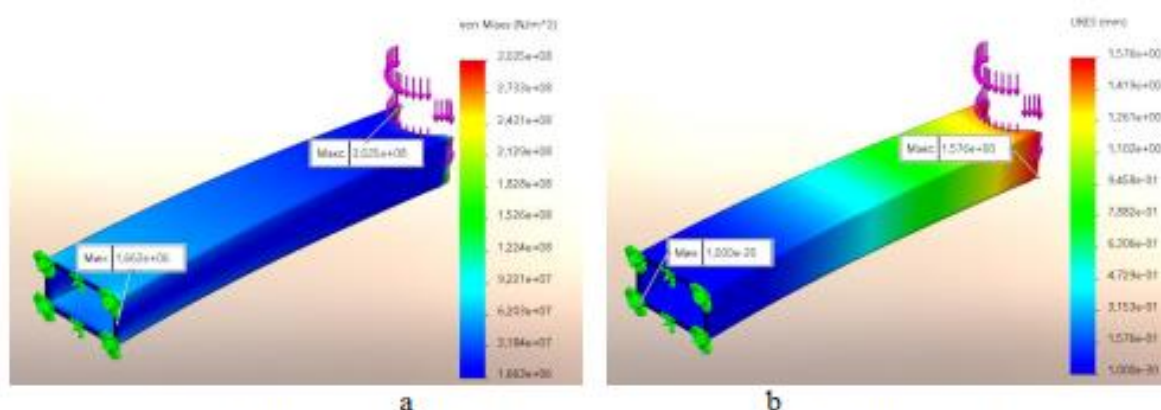


Figure 3 – Plots of total von Mises stresses (a) and URES displacements (b)

Since the minimum margin of safety for the lever is  $n = 3.954$ , which is more than permissible, the margin of safety is sufficient.

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