

Task 1: LEGO PART 2

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Goal: Identify the most unfavorable use of the product, simulate and identify which are the areas subject to the highest stress.

Brief description of the worst use case:

The Lego example is a very good case where the importance of the material is illustrated because beside the form, we must take in account the kind of material the block was made. In this practical case we use polyethylene of high density, which is the most common plastic used for many applications and also for plastic Lego pieces.

When we tried to find the worst use case, we faced the problem that this Lego is very hard to break because this plastic is very flexible but after several trials, we discovered that if we fix one side of a block and push it opposite directions - up and down, we will break it. The biggest breaks will appear in the bottom side of the block, but also the whole part near fixation will be deformed.

Forces Scheme:

- Material: Plastic high density
- Force: 1000 N
- Fixation with force used up and down

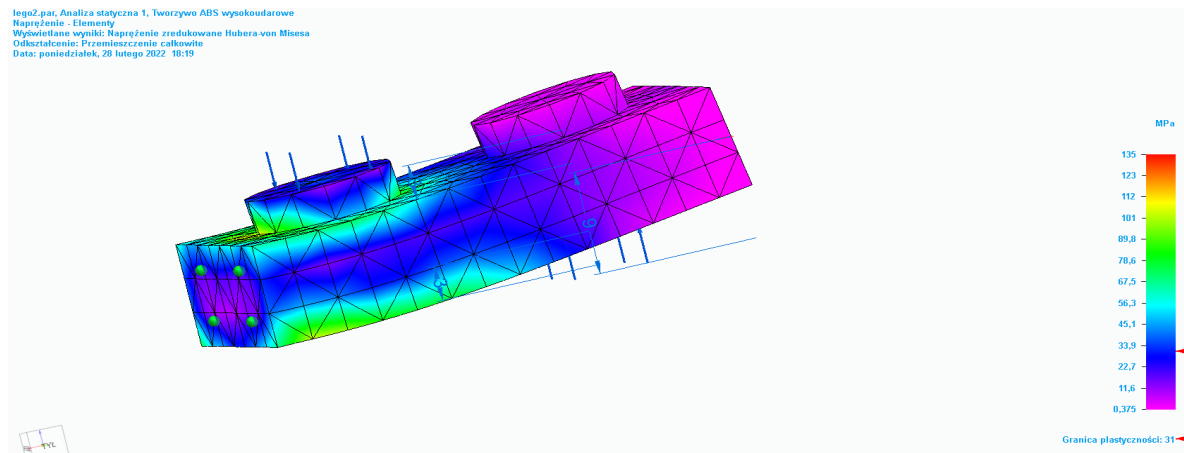


Figure 1: Lego simulation.

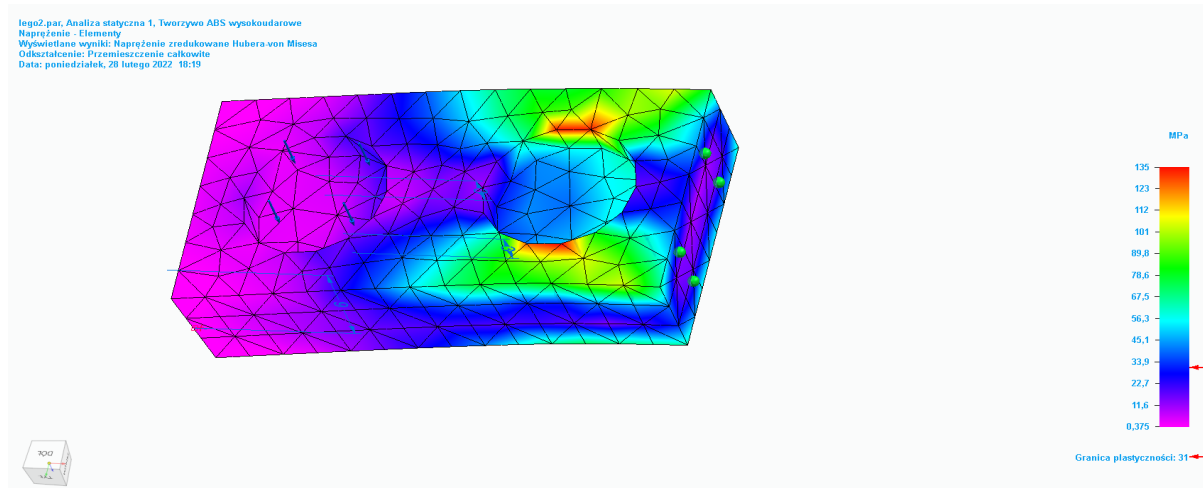


Figure 2: Side view of Lego simulation.

Interpretation of the simulations:

After we applied the simulation of the worst case of use with the values illustrated. Figure 1 shows the simulation we made. On the right we have the colors bar that tells us the values depending on the color and in the bottom part there is the elastic limit of the Lego that corresponds to the part between blue and red.

In order to analyze the scheme simulation, we have to know the elastic limit value (31). For example, the side connected to the wall is blue and green. It means this part of Lego is almost cracked. Figure 2 shows there are some parts of it that are broken around the hole.