Task 2: BOOTLE

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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 bottle 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 bottle was made. In this simulation case we use polyethylene of low density, which is the most common plastic used for many applications and for plastic bottles.

On the same hand, when we tried to find the worst use case, we faced the problem that this bottle is very hard to break because the high flexible property of the plastic but after several trials we discovered that if we torque the neck of the bottle and bend it at the same time with a lot of strength will be the way to broke it.

Forces Scheme:

We tried to torque the neck of the bottle and bend it at the same time in the simulation to achieve our goal of breaking the bottle using forces specified below.

The following scheme simulated in Solid Edge have the respectively properties for the movement simulation in Figure 1; 1000 N pull force and 57.296 grade / second velocity and 57.296 grade / second^2 acceleration.
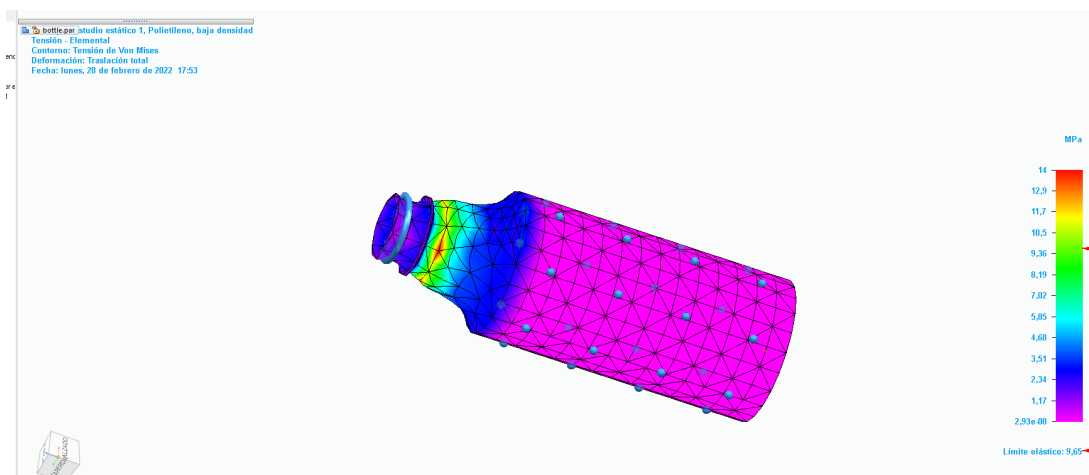

Figure 1: Solid Edge simulation of a bottle breaking.

Interpretation of the simulations:

After we applied the simulation of the worst case of use with the values illustrated before, we obtained figure 1 that 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 bottle that corresponds to the part between green and yellow.

In order to analyze the scheme simulation, we have to use as reference this elastic limit value (9.65), so in the neck of the bottle there are the green, yellow and orange color that means it is the part that will break with the movement and force applied.