



Mechanics and Machines, HW CAE STR 1

Static Analysis



Short Task Description

Description: Solve several tasks

Artifacts:

- Zip archive with NX detail files (.prt) and simulation (.sim)
- Report, which contains screenshot results and brief explanation (.pdf)

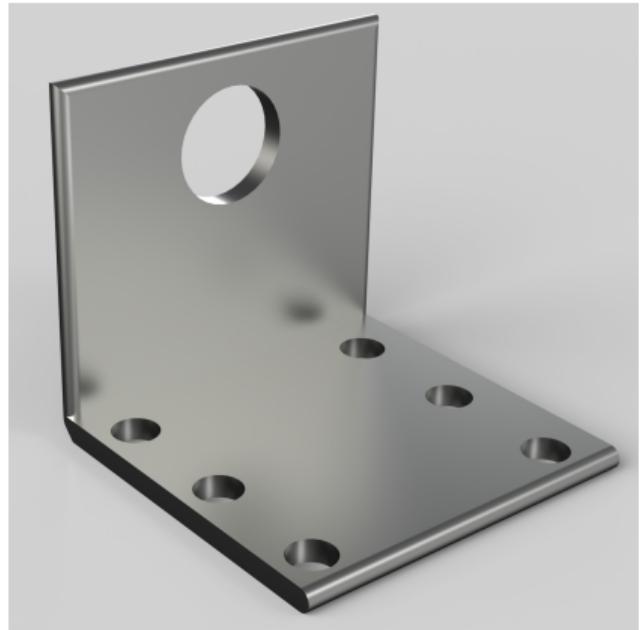


Task 1

Zip archive, which contains all needed data:

HWs/HW_CAE_STR1/task_data/HW_CAE_STR1_1.zip

1. Take the detail from zip archive
2. Assign «Steel» material
3. You should solve task in 3 ways:
 - 3.1 Without creating idealized model. 3D mesh.
 - 3.2 Simplify model (remove edge bendings). Use 3D mesh.
 - 3.3 The same as in previous, but you need to use 2D mesh. Hint:
use Midsurface operation
4. Fix detail on the bottom 6th holes.
5. Add 60000 N force upper edge. Force should be collinear to the base. We are unbending the detail.
6. Obtain result and interpret it. Also compare the calculating speed
7. Modify the detail and repeat until the detail won't be broken.



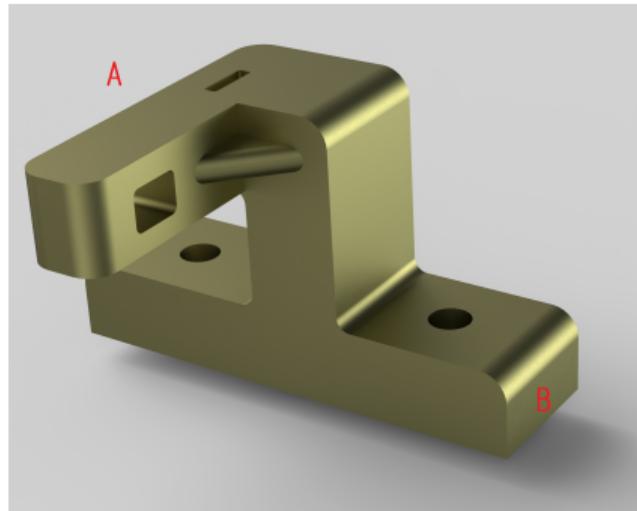


Task 2

Zip archive, which contains all needed data:

HWs/HW_CAE_STR1/task_data/HW_CAE_STR1_2.zip

1. Take the detail from zip archive
2. You need to create idealized model: remove all edge bending, useless holes. You should cut the object on several pieces for easier mesh creating.
3. Generate a mesh using hexahedron
4. Assign «Aluminum» material
5. In simulation constant temperature on the «A» part of the body is 620° . Convection cooling should be on the right side («B»).
6. Calculate a heat transfer in statics. Compare results, when you assign different materials (brass, steel)





Task 3

Zip archive, which contains all needed data:

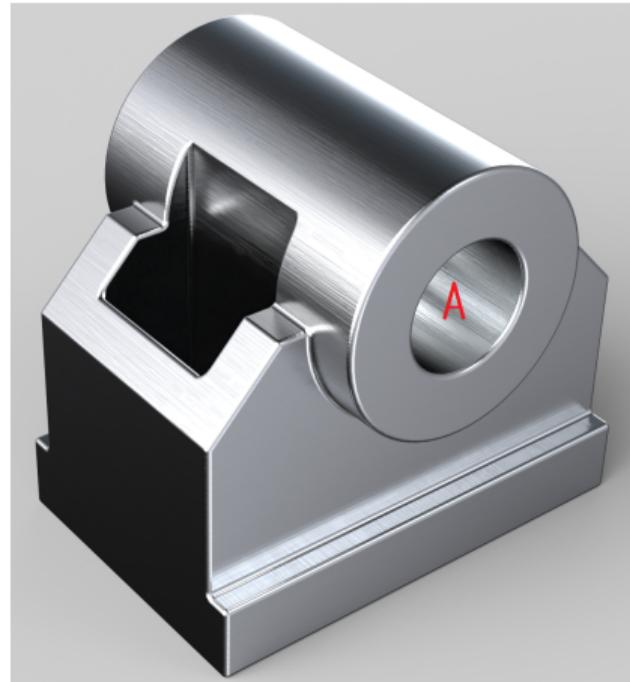
HWs/HW_CAE_STR1/task_data/HW_CAE_STR1_3.zip

1. Take the detail from zip archive
2. Assign «Aluminum» material
3. Find the hole «A» in detail and make a static stress analysis in 2 ways:

- Make a steel rod (the same diam as a hole, 500 mm length).
The end of the beam must coincide with the end of the detail.
- Apply a force 3000 N to the end of rod.
- * Remove the rod. Apply a moment (you need to calculate it based on knowledge from 2nd bullet) (More info in 9th pdf + Advance Sim Инженерный Анализ pdf page 85)

This task is not affecting on grade.

4. Compare results



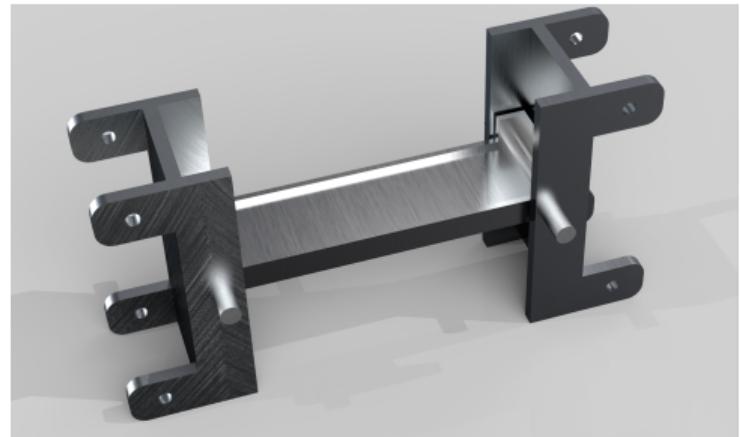


Task 4

Zip archive, which contains all needed data:

[HWs/HW_CAE_STR1/task_data/HW_CAE_STR1_4.zip](#)

1. Take the detail from zip archive
2. Assign «Steel» material
3. Generate a mesh using tetrahedron
4. The detail should be fixed in lugs (ушки) on both sides of the detail.
5. Solve the task 1) using bolt connection for lugs and 2) without. Explain the difference
6. The main goal of the task to apply contact between bodies. You should try: 1) automatic 2) manual contact
7. Apply pressure 100 MPa to the central beam. You should apply the pressure on central 1/3 part of the beam.
8. Show the possible displacement of pins and the assembly separately.



Deserve “A” grade!

– Oleg Bulichev

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↗ @Lupasic

🚪 Room 105 (Underground robotics lab)