



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)

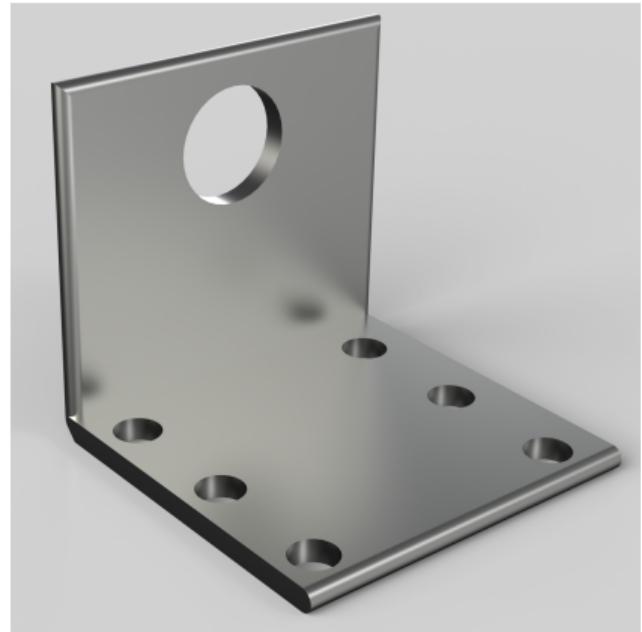


Task 1

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, small holes, etc).
Use 3D mesh.
 - 3.3 The same as in previous, but you need to use 2D mesh. Hint:
use Midsurface operation
4. Fix detail as it used to be fixed in real life
5. Add 12000 N force upper edge. Force should be perpendicular to
the ground
6. Obtain result and interpret it. Also compare the calculating speed
7. Modify the detail and repeat until the detail won't be broken



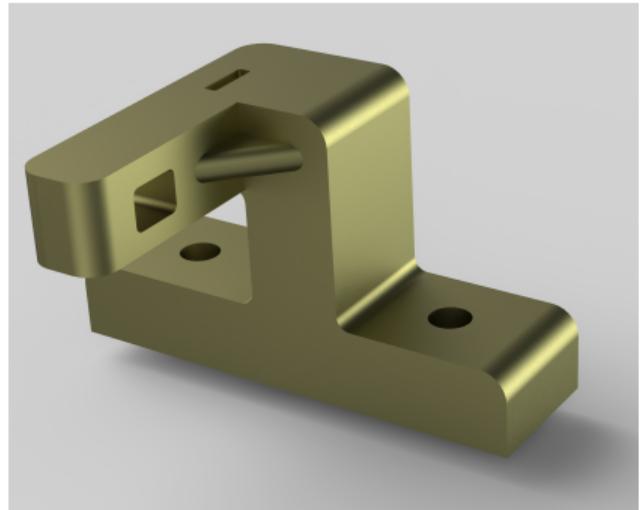


Task 2

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 left part of the body is 620° . Convection cooling should be on the right side.
6. Calculate a heat transfer in statics. Compare results, when you assign different materials (brass, steel)



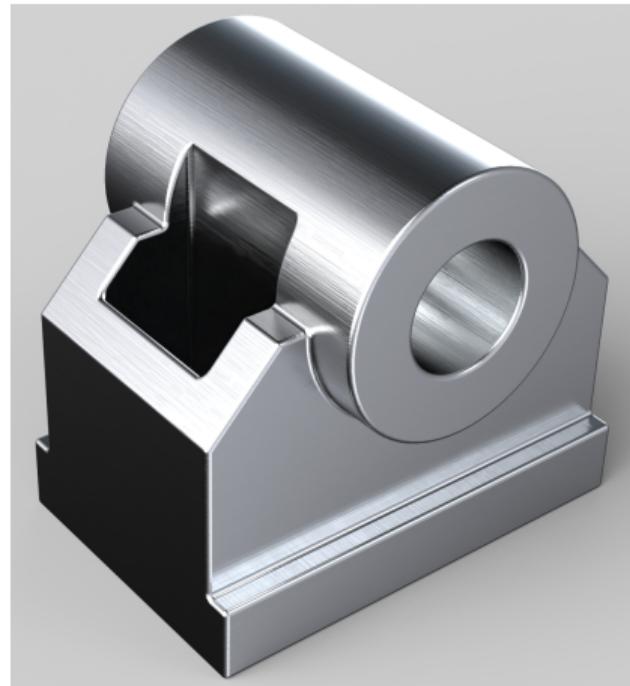


Task 3

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 biggest hole in detail and make a static stress analysis in 2 ways:
 - Make a steel rod (the same diam as a hole, 500mm length).
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 1st bullet) (More info in 9th pdf + Advance Sim Инженерный Анализ pdf page 85)
This task is not affecting on grade.
4. Compare results



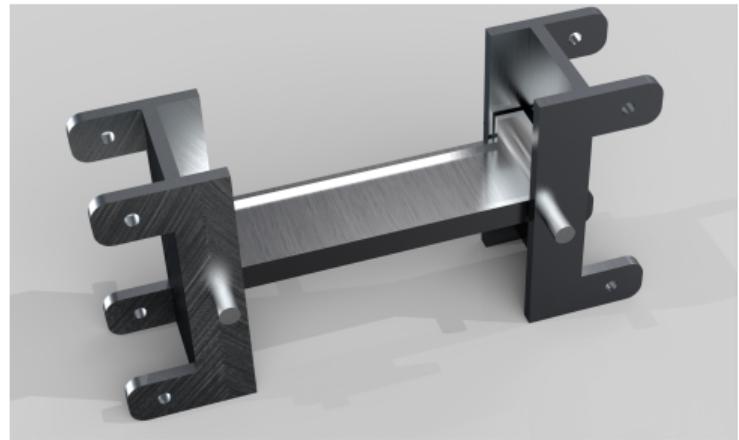


Task 4

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. Solve the task 1) using bolt connection for lugs and 2) without. Explain the difference
5. The main goal of the task to apply contact between bodies. You should try: 1) automatic 2) manual contact
6. Apply pressure 500 MPa to the central beam
7. Show the possible displacement of pins and the who assembly separately.



Deserve “A” grade!

– Oleg Bulichev

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↗ @Lupasic

🚪 Room 105 (Underground robotics lab)