Mechanics and Machines, HW CAE STR 1

Static Analysis

Innopolis University

Short Task Description

Description: Solve several tasks

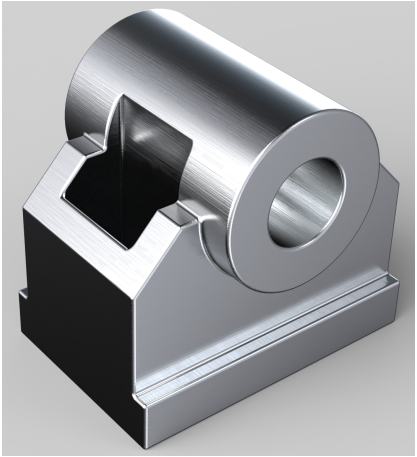
Artifacts:

- 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

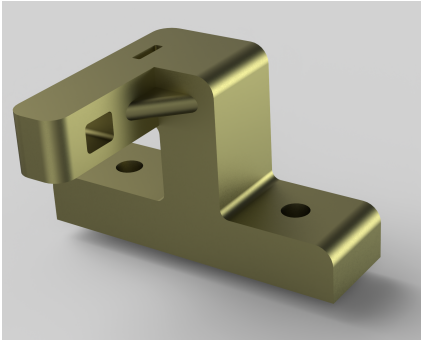
1. Take the detail from zip archive
2. Assign «Aluminum» material
3. Find the biggest hole in detail and make a static stress analysis in 3 ways:
   - Make a steel rod (the same diam as a hole, 500mm length). Apply a force 3000 N to the end of rod.
   - Remove the rod. Apply remote force with the same length as in previous bullet to 1) face 2) edge.
   - Remove the rod. Apply a torque (you need to calculate it based on knowledge from 1st bullet)
4. Compare results



Task 2

Zip archive, which contains all needed data:
HWs/HW_CAE_STR1/task_data/HW_CAE_STR1_2.zip

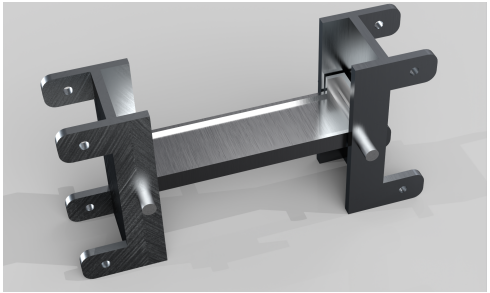
1. Take the detail from zip archive
2. You need to create idealized model: remove all edge bending, useless holes. You should cut the object on several pieces for easier mesh creating.
3. Generate a mesh using hexahedron
4. Assign «Aluminum» material
5. In simulation constant temperature on the left 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 «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 0.5MPa 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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Room 105 (Underground robotics lab)