



Introduction to Mechanical Engineering, CAD Details 1

Intro to subject

History of CAD

Solid modeling



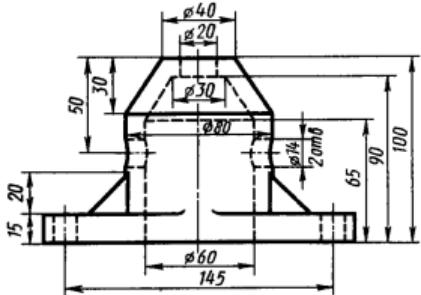
Lab Goals

To obtain the needed tools for solving the design part of
the competition



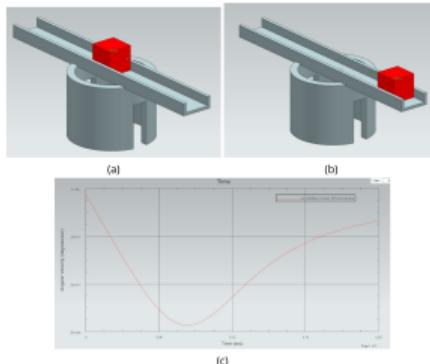
Final Exam (Previous Year)

1. (10 score) Make a CAD model of the blueprint, which provided below.
2. (2 extra score) Make the same blueprints (without dimensions), based on your CAD model.
3. (3 extra score) Perform the stress analysis of the detail. All forces and fix supports are on the picture. Material — Steel. You have to show the stress and strain diagrams and explain what happens to the parts after such a load.



CAD part

The task is to determine the maximum angular velocity of the structure that will be reached and the point in time when this maximum will occur.



CAE part

«Mechanics And Machines»
Final Exam
Theory part
Variant: 4

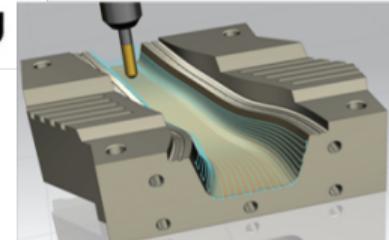
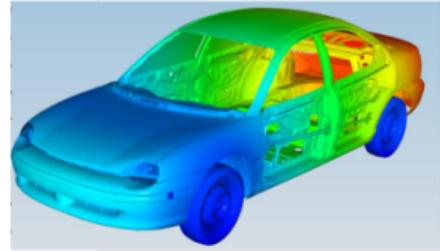
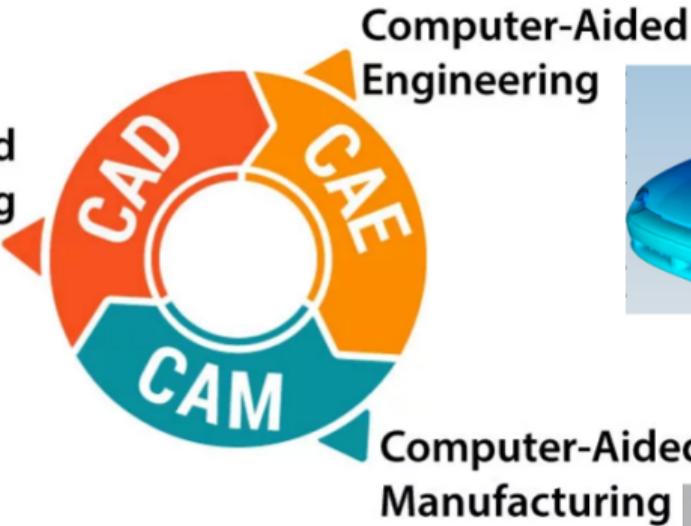
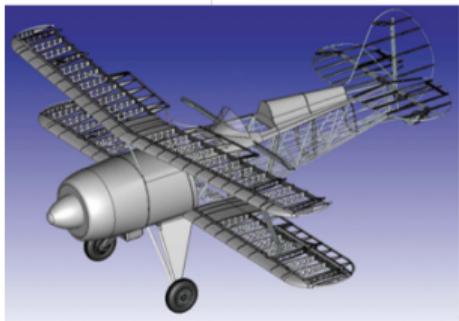
1. What the key aspects should we consider during the motor chosing? The general guideline of the motor selection.
2. Screw types. Multisided screws, prof and cons. Type of drills. Type of holes. How to distinguish them on a blueprints?

Theory part



Computer Aided Design

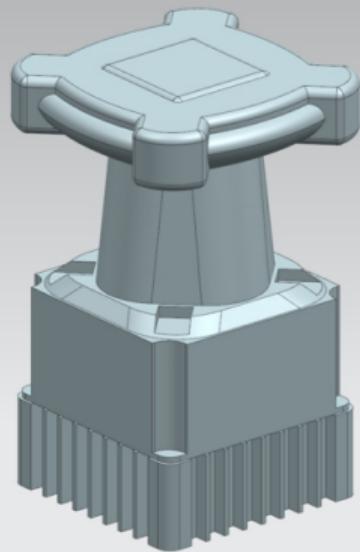
Computer-Aided
Drafting





Computer Aided Design

Types of modeling



Solid Modeling



Surface Modeling



History of CAD

- 60th** — Theoretical studies of the possibility of solving design problems on the computer were carried out.
- 70th** — Methods, algorithms and programs for solving individual tasks for different design stages were developed.
- 80th** — CAD is being developed and improved. 3D modeling became more popular.
- 90th** — Developers had finished formation of base concepts of CAD and unified data transfer between systems.



CAD benefits

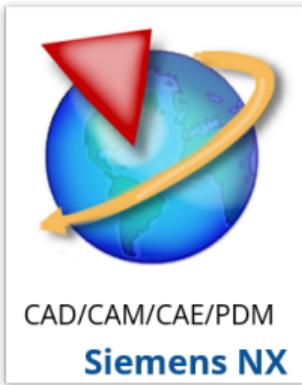
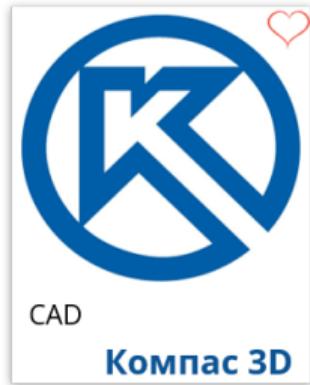
Cheaper

Safer

Faster



Popular CAD systems in Russia

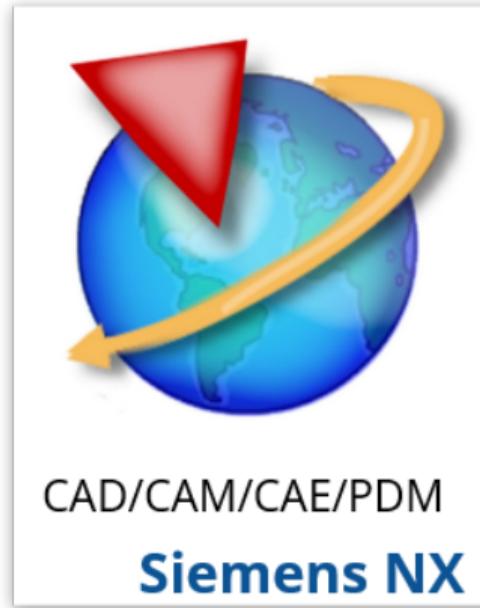




Siemens NX

Prof

- All in one system
(CAD,CAM,CAE,PDM)
- Free for students
- Can create a real aircraft
in it



Cons

- Complex system
- Not popular in small
companies



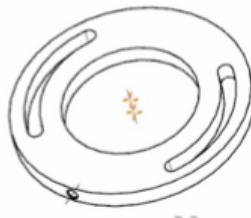
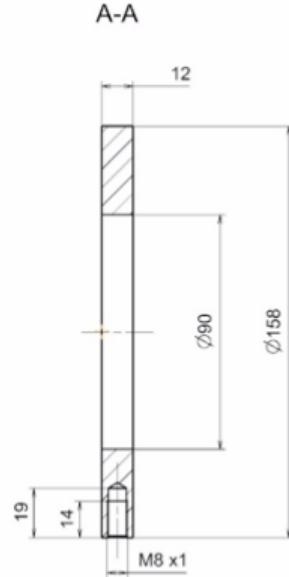
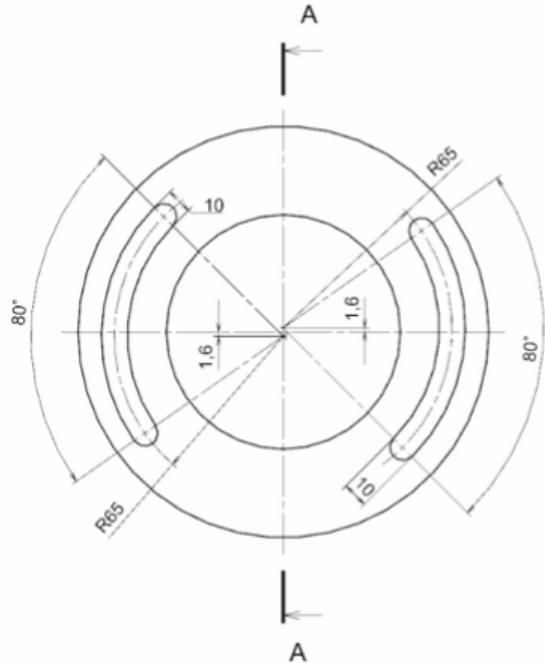
Common usage of other systems for our tasks

- If you need a good drawings. Make CAD anywhere, afterwards import to Kompas-3D.
- If you need Standard Component Library (SCL), use either Kompas, or Solid Edge, or [mcmaster](#). Insert needed stuff in NX.



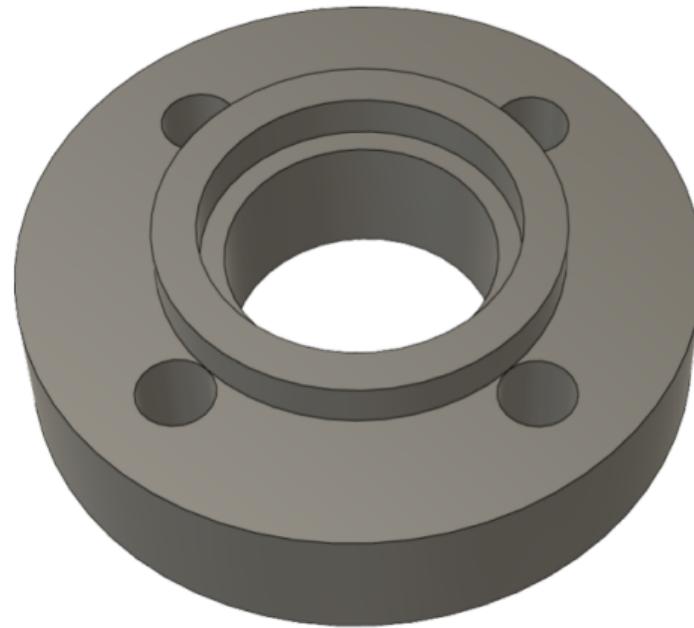
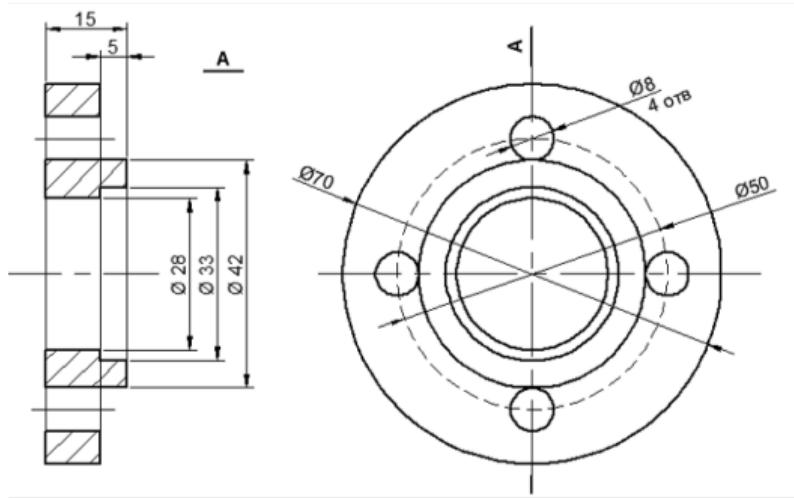
Basics

Video + labs/CAD_DET1/task_data/video1.zip





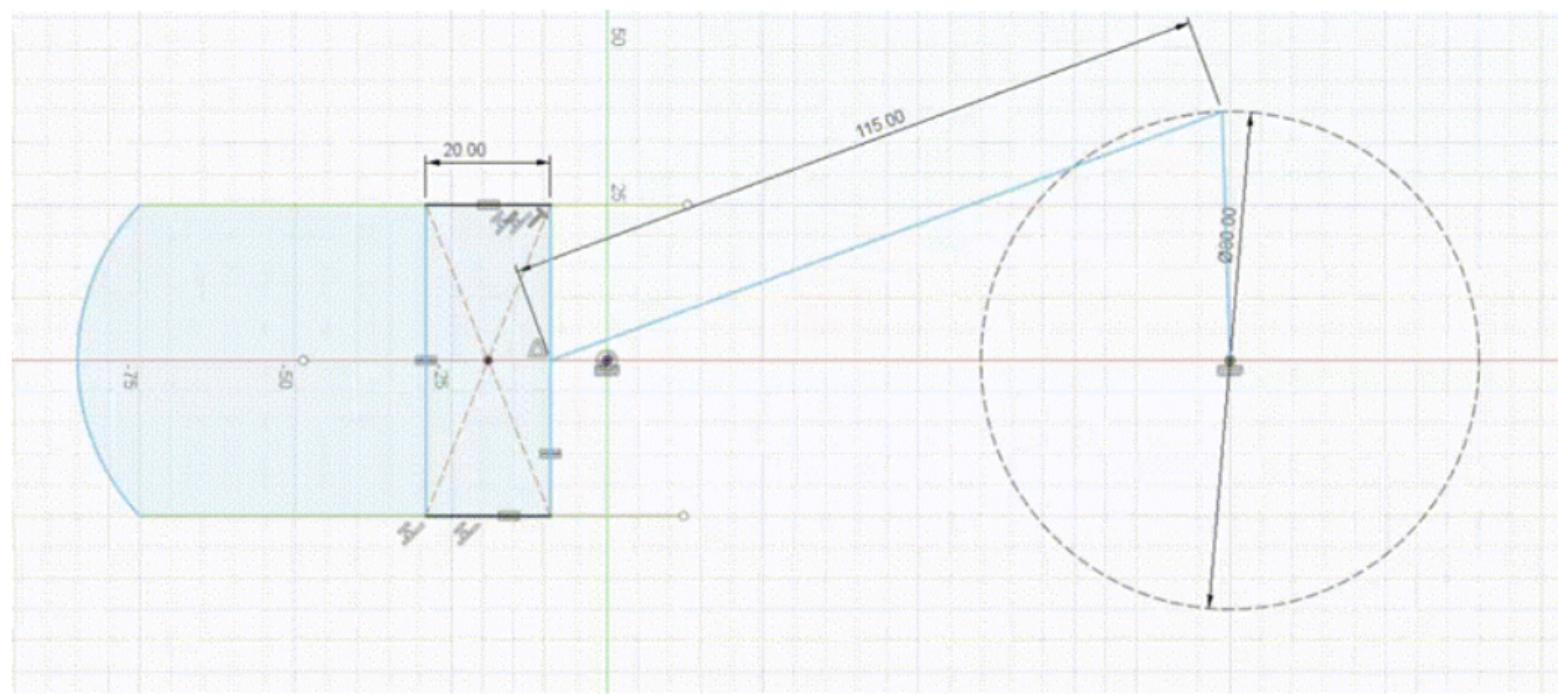
Task 1: make CAD model of detail below





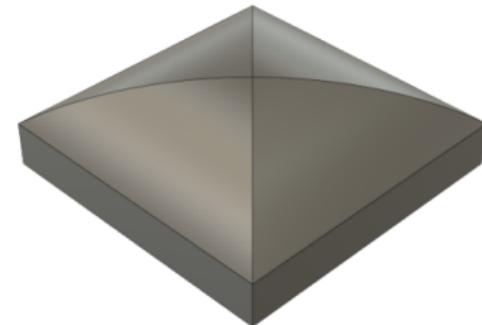
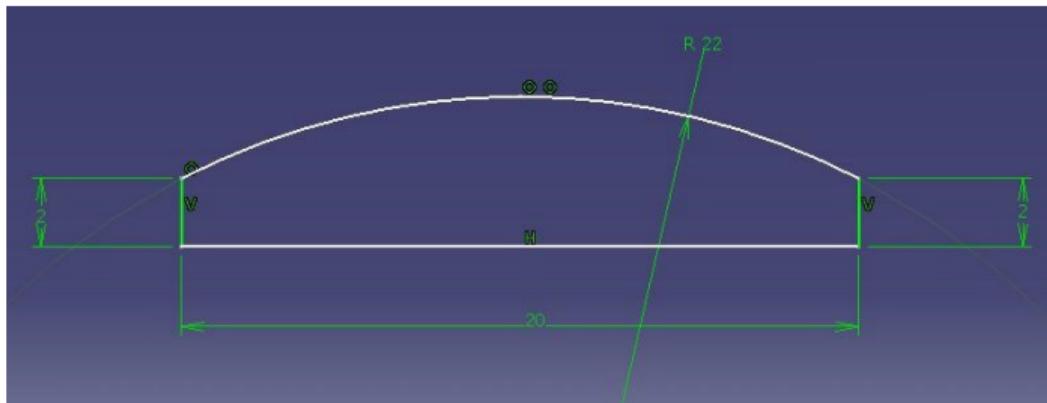
Task 2: make an animated sketch

Video (*repeat the figure, not video*)





Task 3: make CAD model of detail below



Hint: It can be solved making 2 equal sketches perpendicular to each other, extruding them and using “combine” command.

Deserve “A” grade!

– Oleg Bulichev

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↗ @Lupasic

🚪 Room 105 (Underground robotics lab)