FREDERICK UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

Machine Elements and Analysis I – AMEM 317 (AUTO 309)

Laboratory Work

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AMEM 317 (AUTO309): Laboratory work

Students will be ask to use computer software for designing machine elements and assemblies and learn how to use special software in order to make calculation of machine element.

INFORMATION TO THE STUDENTS

- **At the end of every exercise, students will have to show their work to the lecturer.**
- **At the end of the semester students should present their design portfolio to the lecturer.**

Week	Exercise	Lab Description
1st	Exercise 1	SolidWorks – Assembly Shaft
2nd	Exercise 2	SolidWorks – Gear Mate
3rd	Exercise 3	Gear box with various components (SEAS Laboratory)
4th	Exercise 3	Gear box with various components (SEAS Laboratory)
5th	Exercise 4	Simulation – Gear
6th	Exercise 5	Simulation – Spring
7th	Exercise 6	Simulation – Spring assembly
8th	Exercise 7	Simulation – Break disk

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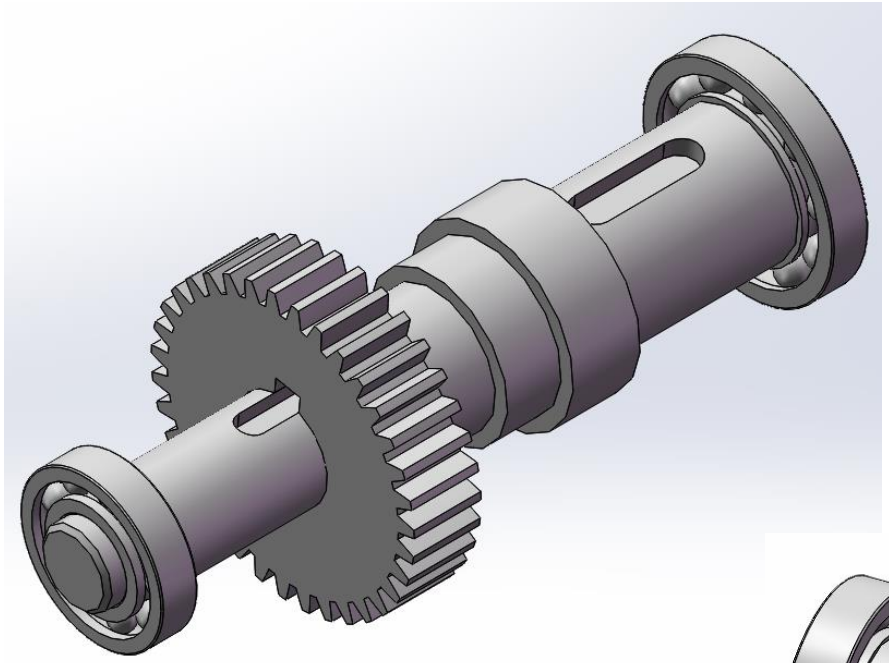
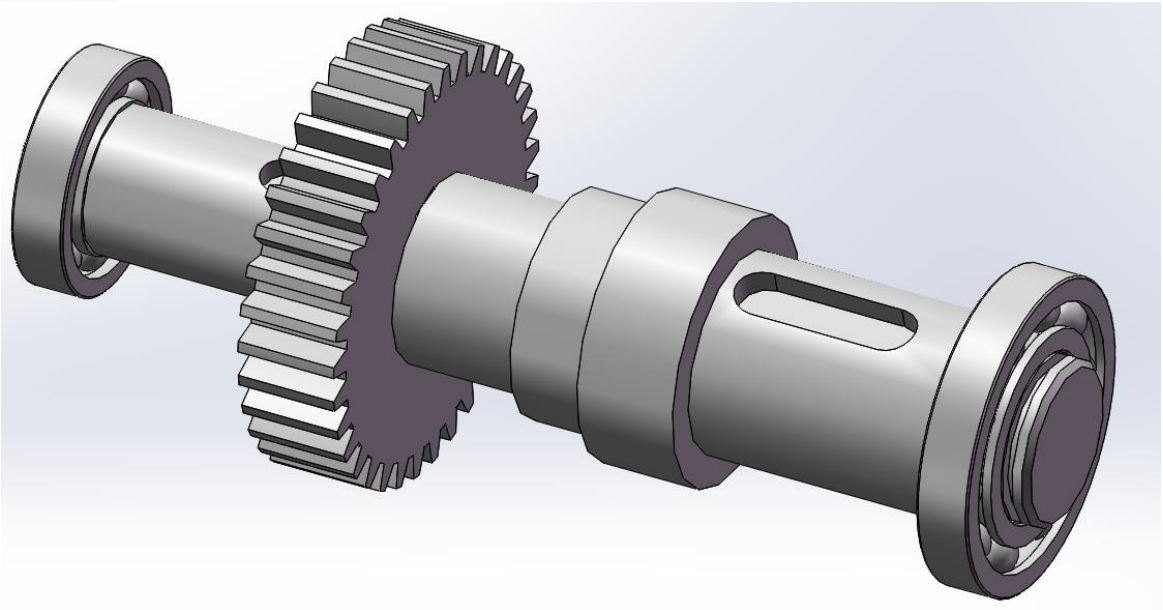
File: Exercise 1



Make the assembly of the following machine elements.
Design two keys and the missing gear (use m=2, N=30).
Make the construction drawings for the parts.



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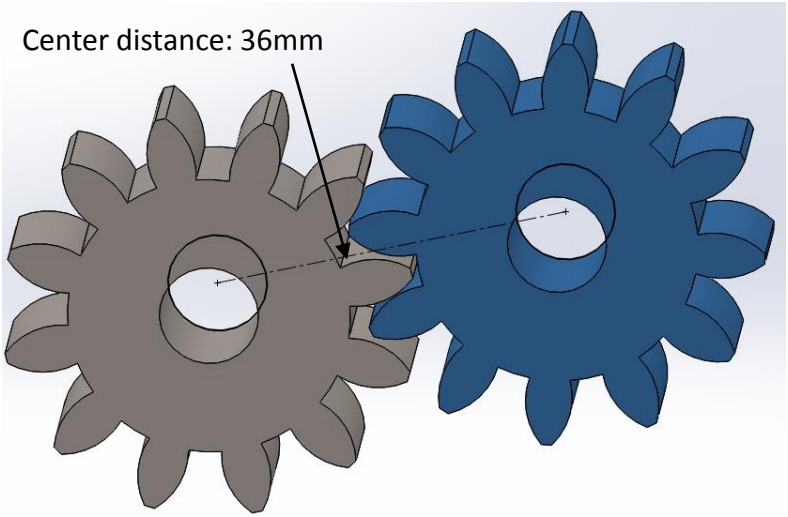
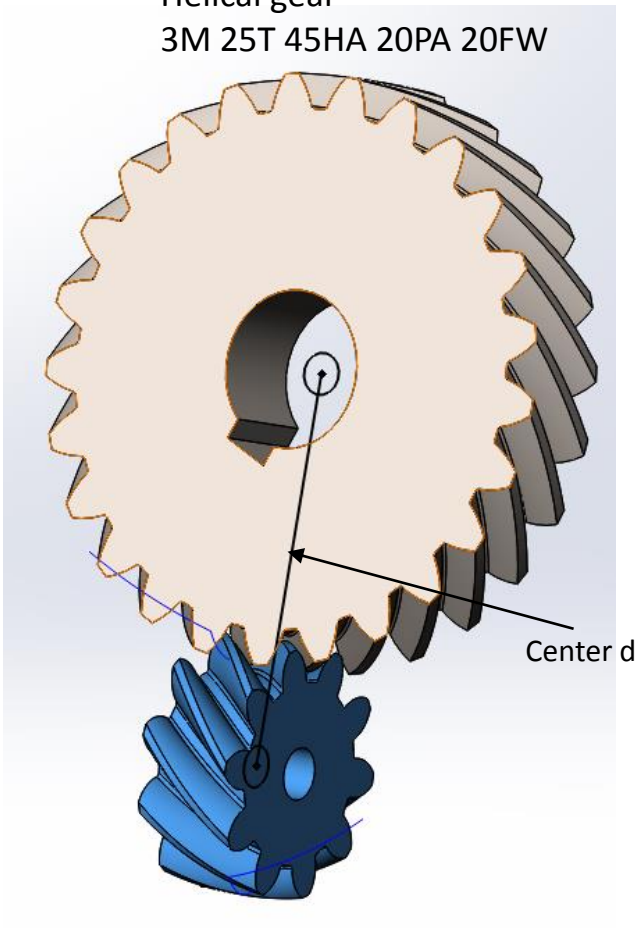
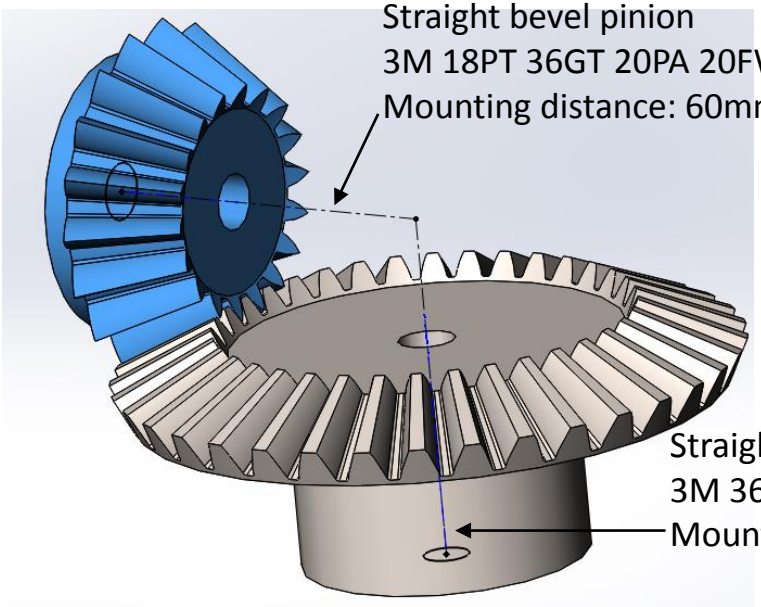
Spur gear 3M 12T 20PA 12FW

File: Exercise 2



Helical gear
3M 25T 45HA 20PA 20FW





Helical gear
3M 10T 45HA 20PA 20FW

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Design and assembly of a Gear Box

Each team (max 5 students) has to design the machine elements shown in the following picture. Give a name to each component. Each team has to demonstrate one gear assembly using all the other parts from all the teams.

Design Groups

Design Group 1: Case – Gear box
Design Group 2: Gears – Keys
Design Group 3: Caps – Screws
Design Group 4: Shafts
Design Group 5: Bearings – Spacers - Seals

Deliverables for each team:

- Draft drawings of each part (Hand sketches)
- Photos of each part at different view angles
- Construction drawings of each part
- 3D drawings each part
- One assembly manual using the drawings from other design teams

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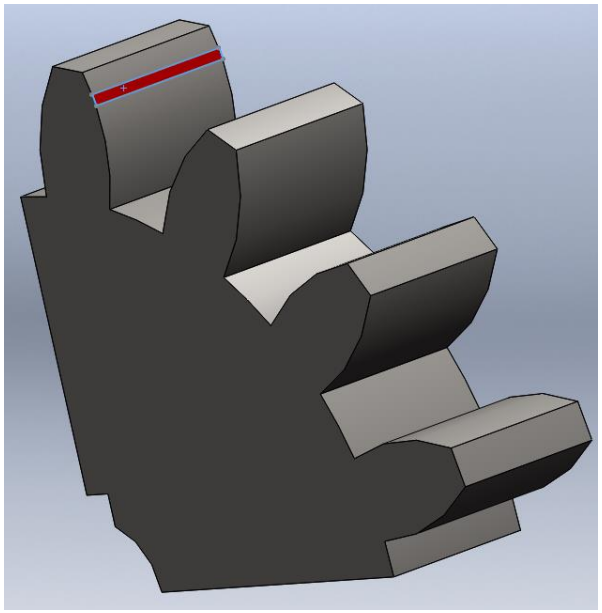
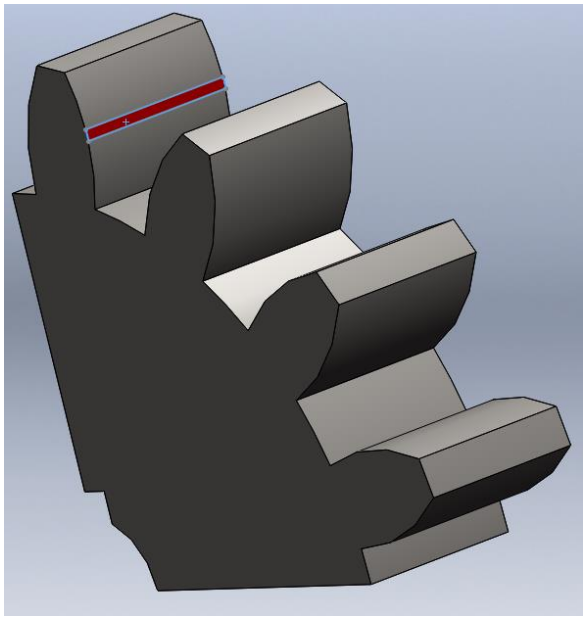
File: Exercise 4

Make the force simulation and then the graphs of load vs stress, load vs displacement, load vs strain. Use max load.





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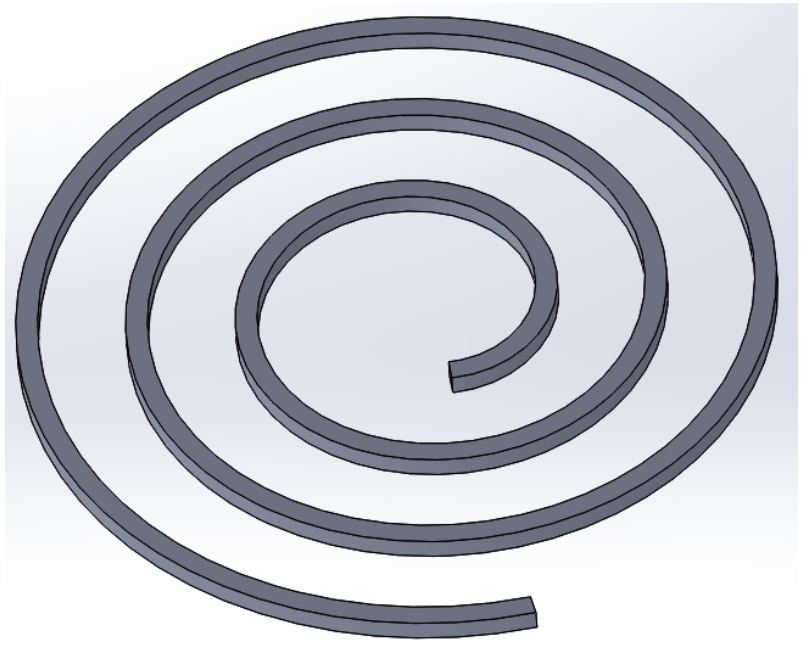
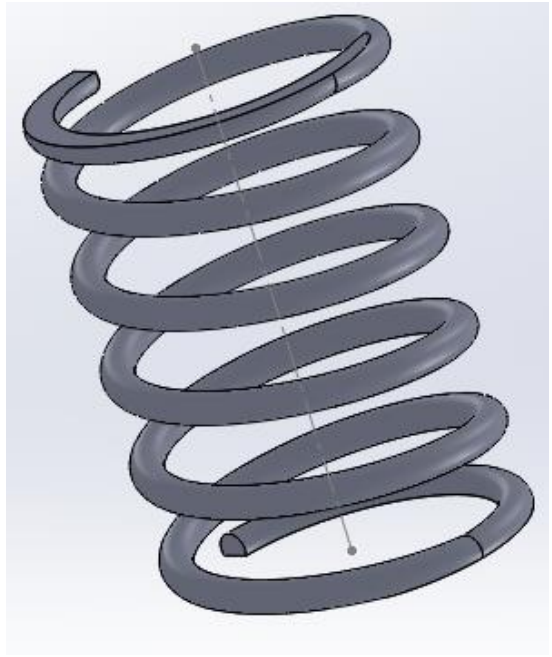
File: Exercise 5

Make the force simulation and then the graphs of load vs stress, load vs displacement, load vs strain. Use max load.





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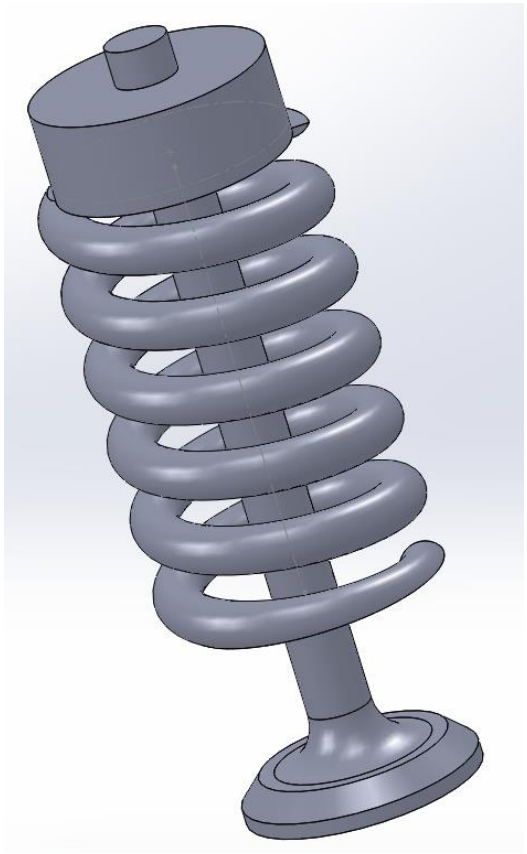
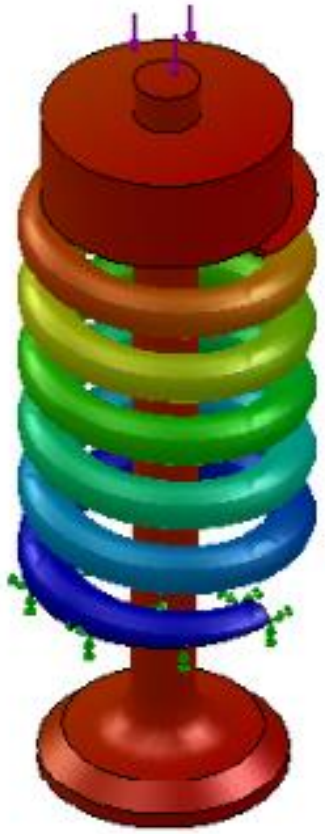
File: Exercise 6

Make the force simulation and then the graphs of load vs stress, load vs displacement, load vs strain. Use max load.





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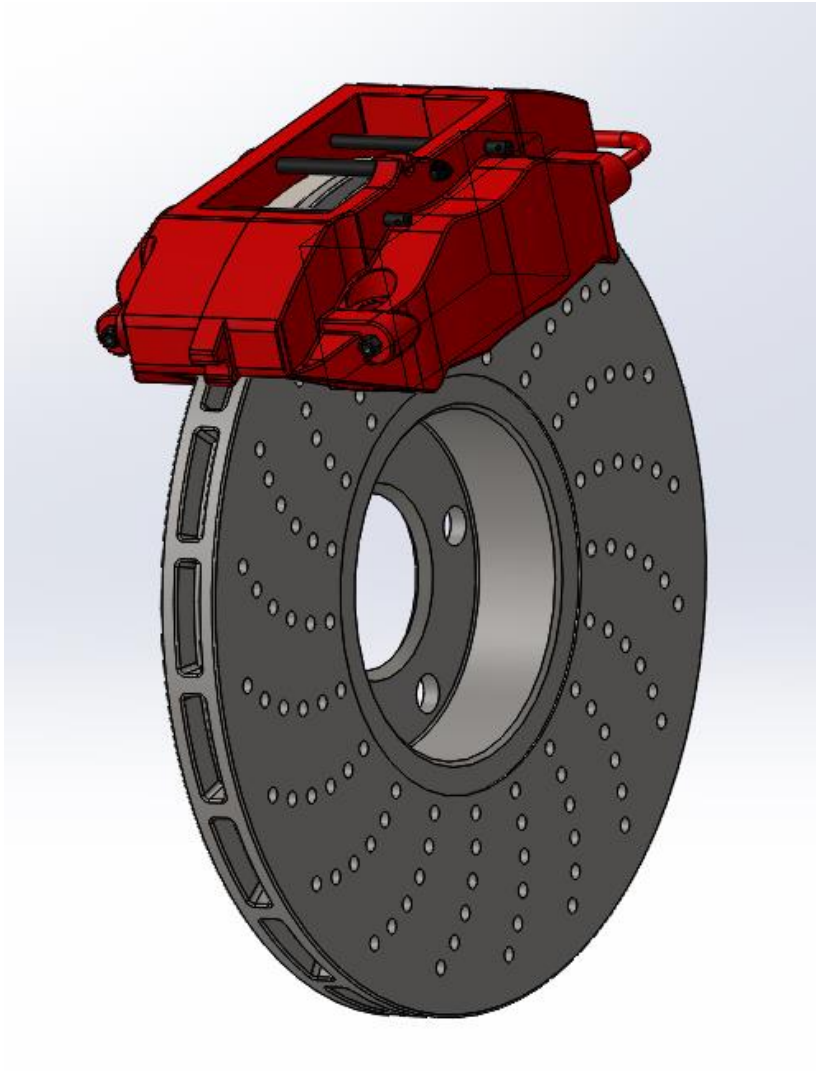
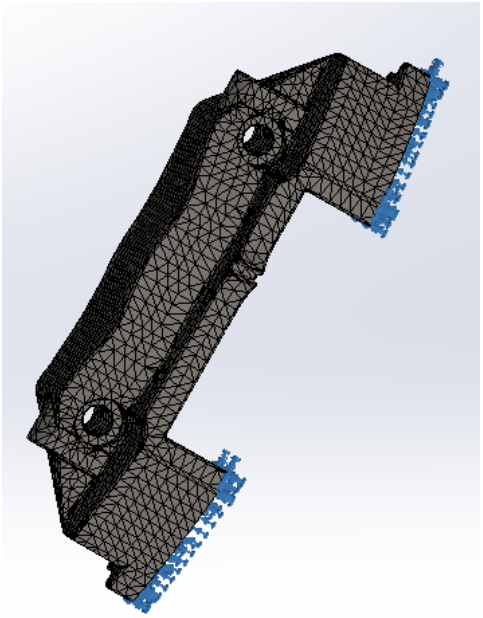
File: Exercise 7

Make the force simulation and then the graphs of load vs stress, load vs displacement, load vs strain. Use max load.





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