Class 7c:

Computer Assembly and Part Modeling Assignment

7c.1 Engineering Modeling

7c.2 Geometric Computer Modeling

7c.3 Project Computer Modeling Assignment

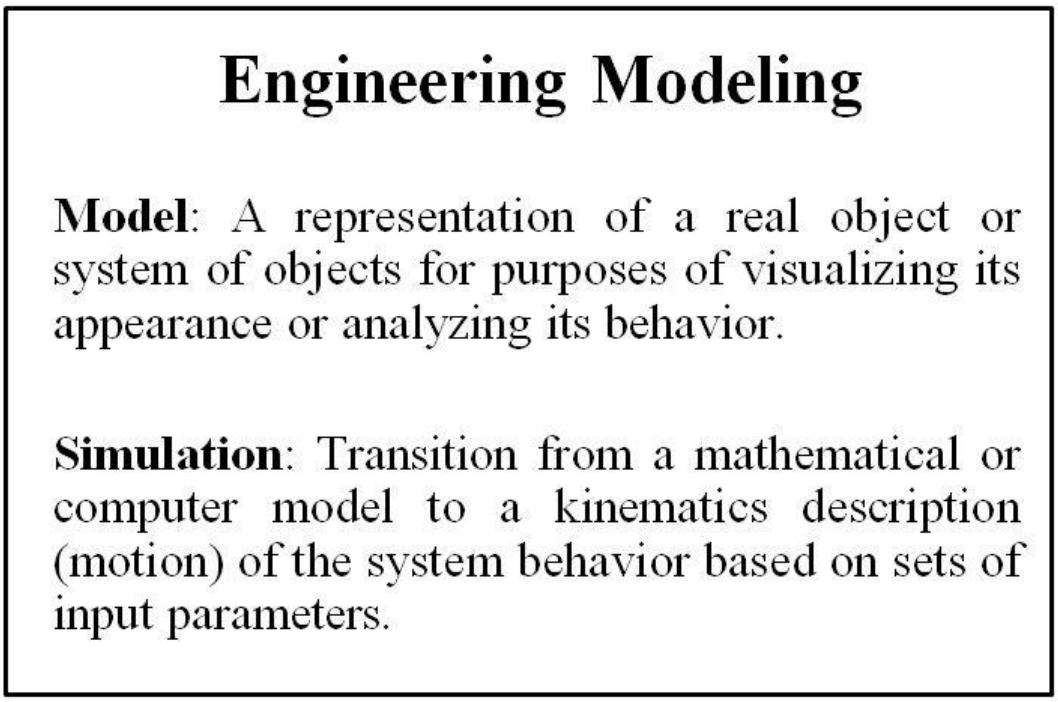


Figure 7c.1 Modeling is an important activity for design engineers. A model is an accurate representation of a real object for various purposes. Simulation is testing the model's behavior to a set of input parameters.

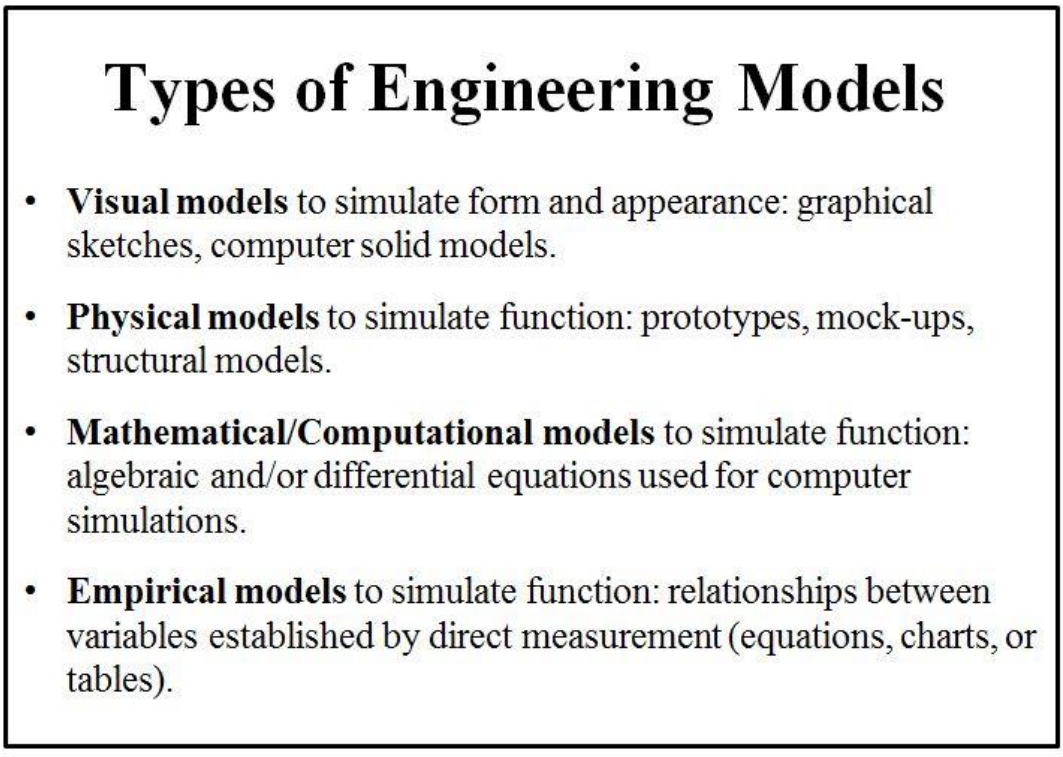


Figure 7c.2 Different types of engineering models serve different purposes, such as to show form and appearance, or to simulate performance.

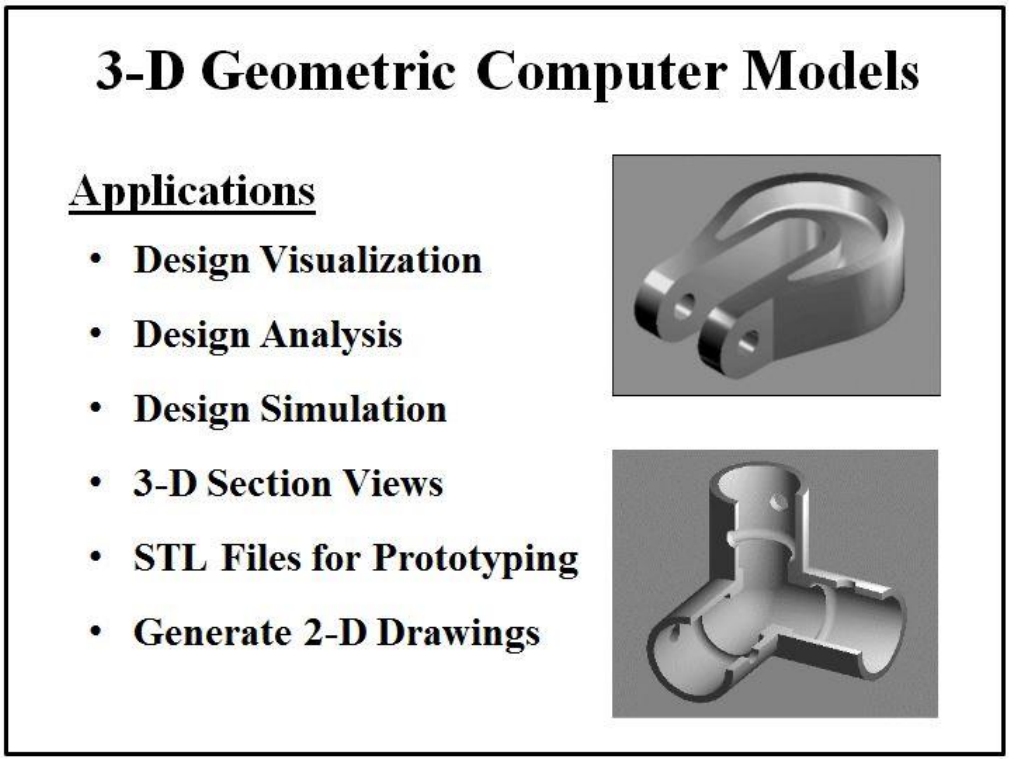


Figure 7c.3 Geometric computer modeling has many uses in engineering design. The solid computer model can be used for customer visualization of the design. Various analysis and simulations can be conducted to test the model, such as finite element analysis to show stress distribution or kinematic simulation to show how the model functions. STL files can be generated for 3-D printing of the model. The model can be used to project different 2-D views of the design. Thus, building a 3-D geometric computer model is a fundamental skill for the design engineer.

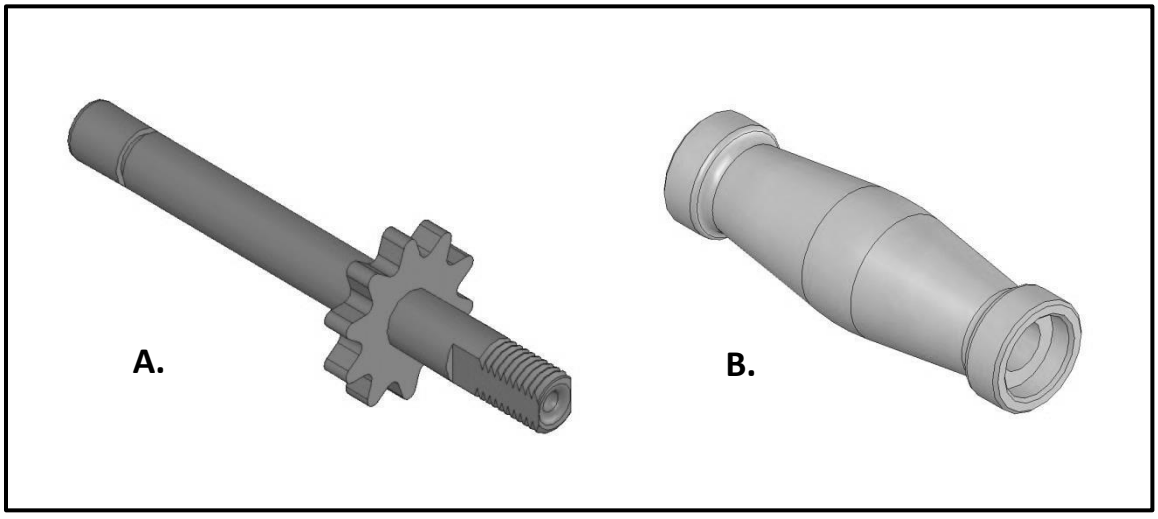


Figure 7c.4 Geometric computer models of individual parts (**A**. Pinion Shaft and **B**. Handle) for a trailer winch reverse engineering team project.

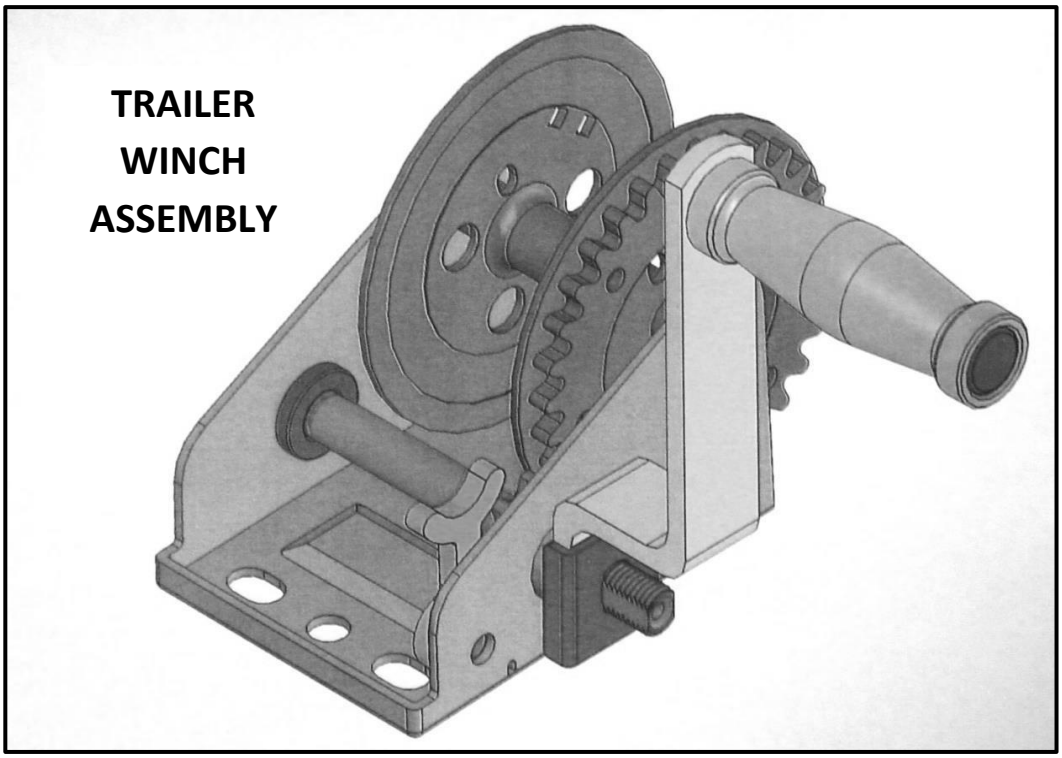
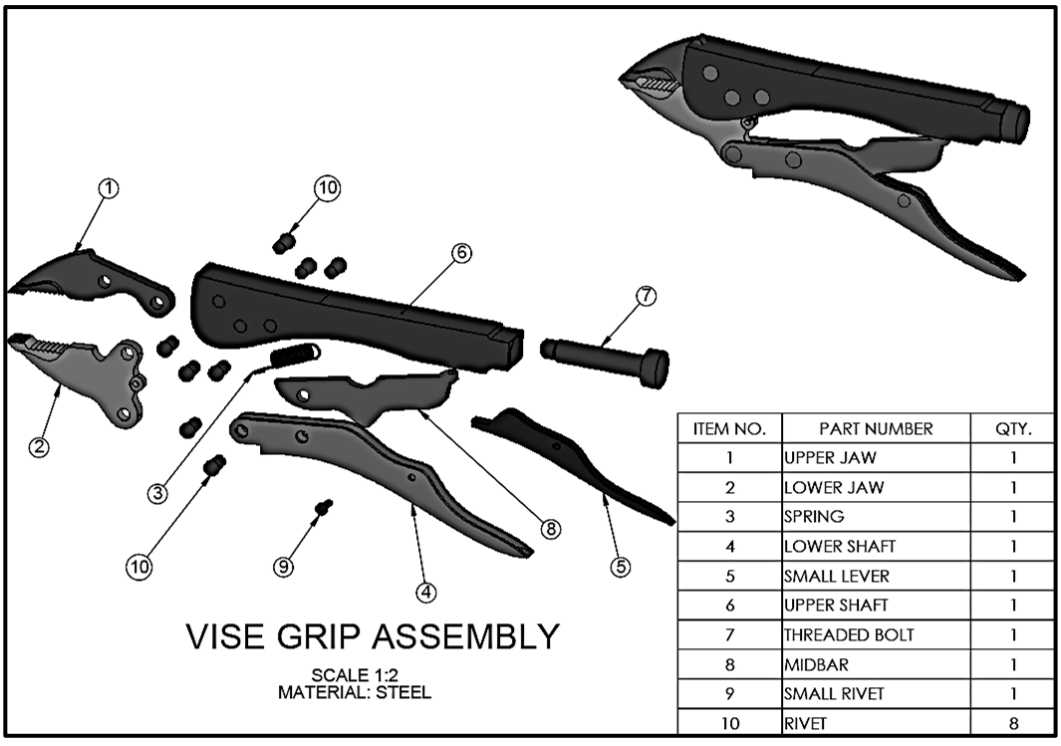


Figure 7c.5 A Computer Assembly model of all the parts for the Trailer Winch team project. This is an assembled assembly model.



ITEM NO.	PART NUMBER	QTY.
1	UPPER JAW	1
2	LOWER JAW	1
3	SPRING	1
4	LOWER SHAFT	1
5	SMALL LEVER	1
6	UPPER SHAFT	1
7	THREADED BOLT	1
8	MIDBAR	1
9	SMALL RIVET	1
10	RIVET	8

Figure 7c.6 A Computer Assembly model of all the parts for the Vise Grip team project. This is an exploded assembly model with parts numbered to conform to the Parts List.

Design Check #4:

Computer Modeling Team Project Assignment

1. <u>Build a Computer Solid Model of Each Individual Part</u>.

Recall your team was asked to make Xerox copies of your original sketches and to use those Xerox copies to measure and write part dimensions during the dissection process for this next task. Use the software you have learned in the computer graphics lab to aid in your computer modeling. Be sure to save your computer model files on a memory device or in your user computer account. You will need these files later.

2. <u>Build a Computer Assembly Model with All the Individual Parts Properly Mated</u>.

Use the same software to create a computer assembly model of the entire mechanical device with all the individual parts properly mated. You may wish to use different colors for the parts so that they each standout in the assembly model.

3. <u>Make a Shaded Color Hardcopy of Each Part and of the Assembly Model</u>.

Once you have completed the computer models, obtain a shaded color hardcopy on a "Title Sheet." Also make a color assembly model of your entire system and submit it along with the individual parts.

4. <u>Make an .STL File of Each Part.</u>

Make an .STL file of each part that you plan to prototype, and save the files. Make sure that you follow the correct instructions for the .STL file command. Save these files for later use in the rapid 3-D printing lab.

5. <u>Submission</u>

Submit items **2** and **3** above as a TEAM. Be sure to include a cover sheet. Item 4 will be needed when your team goes to 3-D print the parts in the makerspace.

Team Name _____ Unique No. _____

Design Check No. 4 Grading Form

Grade

Cover Sheet (5 points)

1. Semester and Year
2. Project Title
3. Team Name and Logo
4. Team Members Names, Emails, Leader
5. Instructor Name and Section Unique No.

Computer Assembly Model (10 points)

1. Assembly Layout
2. Mating Connections
3. Sub-Assemblies Grouped
4. All Parts Included
5. Part Numbers in Balloons
6. Proper Use of Leaders and Balloons
7. Font Style
8. Line Style
9. Use of Space and Page Layout
10. Overall Graphical Quality

Individual Part Computer Models (10 points)

1. All Parts Included
2. Part Number in Balloon
3. Part Name
4. Part Scale
5. Part Material
6. Shading Quality
7. Font Style
8. Line Style
9. Use of Space and Page Layout
10. Overall Graphical Quality

Total Grade (25 max.)