

# ME 471: COMPUTER-AIDED ENGINEERING APPLICATIONS

## LAB 9: PART FINITE ELEMENT MODELING

**NX Due Date:** 9 Nov 2011 (10:00AM MT)

**CATIA Due Date:** 11 Nov 2011 (10:00AM MT)

**Points: 20**

### Grading Rubric

#### In Class Exercises

- 5 points for 2
- 5 points for 4

#### Homework

- 10 points for 2

### Objective:

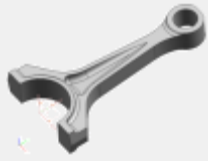

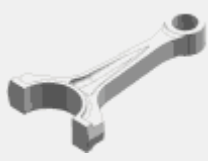
It is useful to conduct FEA within your CAD system because the mesh will adapt to changes in geometry (as long as they are simple changes). It is also very fast. FEA is a powerful tool in general because it can give you very quick feedback on the quality of your part. Learning how to use the finite element solver found within the CAD packages is one of the main objectives of this lab. You have already used Hypermesh and Optistruct, now you are to focus on the FEA tools and capabilities available within your chosen CAD system.


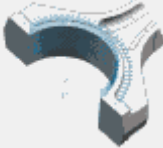
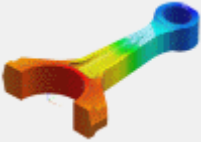
### Reference Material:

Help documentation for NX or CATIA

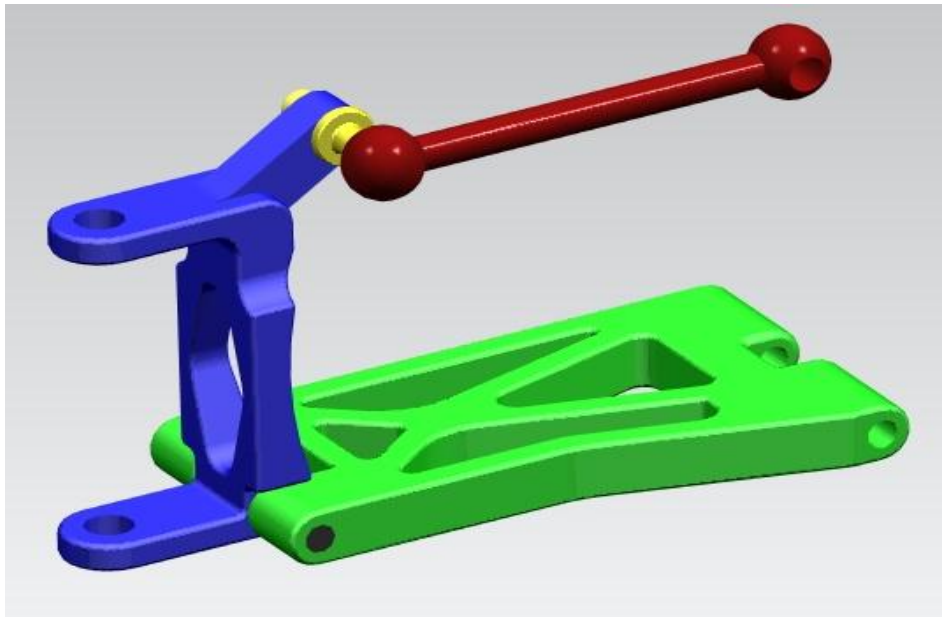
### In Class Exercises: (10 points)

1. Use NX Advanced Simulation (CATIA: Analysis and Simulation, listed under Generative Structure Analysis) to analyze the rod solid part. By following the steps of this tutorial you will learn how to:

	Create FEM and Simulation files.
	Define a material for the mesh.
	Idealize the geometry before meshing.

	<p>Mesh the part.</p>
	<p>Apply loads and constraints.</p>
	<p>Solve the model and view the analysis results.</p>

2. After completing the Rod tutorial generate a Simulation Report, save it as a PDF. Add images to the report. (all points or none)
3. Use the techniques illustrated in the Rod tutorial to do structural analysis of the lower control arm from Lab 4.



4. Create a PDF file containing the output report of your simulation. Add images to the report. (all points or none)

### **List of In Class Submissions**

- Email your two PDF files to [byu471fall@gmail.com](mailto:byu471fall@gmail.com).

### **Homework Exercises: (10 points)**

1. Apply these FEA techniques to components of your vehicle that incur structural loads. Start with the most critically loaded components making sure that they are sized correctly and have appropriate transition shapes and blends.
2. After applying FEA to a component of your vehicle generate a Simulation Report with an image of the deflection and the stress. Discuss how you could make this component better.

### **List of Homework Submissions**

- Email to [byu471fall@gmail.com](mailto:byu471fall@gmail.com) your simulation report, discussion, and image of deflection and stress, see #2 above.