MECH 300 Assignments

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How is my assignment graded?
MECH 300

Week 1 Assignment

- To start I-DEAS type: ideas at the UNIX prompt

If you have had no experience using the I-deas software, or it has been awhile since you have used it, go through the following tutorials which will acquaint you with the software and show you how to build simple parts. None of the parts from these tutorials will be graded.

Help→Help Library→Tutorials
Design, Part Modeling
1. Fundamentals
   1. Introducing the I-deas interface
   2. Quick tips to using I-deas
   3. Creating Parts

After completing the above tutorials, perform the tutorial called “Creating Basic Machine Parts”. This tutorial will have you build 5 parts. These five parts will be graded. Check these parts into the library for your class called “5MachineParts”. Also, make sure to save the model file.

Help→Help Library→Tutorials
Design, Part Modeling
2. Advanced Projects
   1. Creating basic machine parts

Checking a part into the library:
- Select "Check In" icon (10th row, right column).
- Click anywhere on the part to check in.
- Next to the project field select the "find..." button and then scroll down to our class.
- Under our class, select the proper library.
- Press the "OK" button on both forms.
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Assignment# 2

Design three parts for an automotive door hinge, as shown in the drawing below. Dimensions are up to you, the hinge base should be approximately 100 mm long. Check in the hinge parts into the library named “hinge” in your lab project, we will use them later on, probably around week 6, to make an assembly as shown below.
Assignment # 3

First, do two tutorials from the Design. Surfacing – Fundamentals set:

Creating lofted features and creating swept features.
At the end of each of these two tutorials there is a part to make on your own (just with some hints given in the tutorial) – a faucet in #20 and a paper clip in #21. Do these and check them in to a library specified by your lab instructor. Following that, design a cup of nice shape, with a handle, something like what you see below. You have to use splines for the basic shape and the handle, possibly combined with lines and arcs. You will decide how to use sweep, loft and shell operations, to get an aesthetically pleasing shape of the cup. Check in the cup, as well, into the library which your instructor specifies.
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Assignment # 4

First, do the tutorial "Modeling a Turned Part" from the Design-Part Modeling – Advanced Projects.

Following that, design the Toggle as shown below. Enter all dimensions which are tolerated in the drawing below at their lower bound value. Once the toggle is designed, find its mass (in kilograms) when it is made from generic isotropic steel. Before you check the toggle into the library, enter a note saying "mass = ... kg" giving the mass you just determined, attached to the part (you can create such a note through the annotation panel, a submeu below dimensions and constraints icons).

Check in both parts into the library, which your instructor specifies.
MECH 300 Assignment #5:

Complete the following tutorials first: DESIGN ASSEMBLIES:

Creating Assemblies; Animating Assemblies

Check out from the library the three hinge parts that you've designed in Assignment #2, and make an assembly from them, as shown below. Constrain the assembly so that the inside part of the hinge rotates with respect to the outside part – animate that motion. Verify that the hinge can move over 180 degrees angle without interferences or collisions. Save the animation sequence proving that, and check in this assembly into the library as indicated by your lab instructor.
MECH 300 – Assignment # 6.1:

Before starting the assembly assignment below, do the following: Complete the tutorial: Drafting, Associative Drawings, Creating associative drawings. Then using the toggle lever created during week 04, create a drawing with the driving dimensions and place it in the library for assignment 06. Next move to the assignment below. You can use one single hinge assembly instead of two if desired.

MECH 300 Assignment # 6.2:

Using the hinge you’ve designed, design a frame like the one shown below. You have to use your hinge twice (as a subassembly) and put together the entire assembly using standard fasteners of your choice (i.e. not necessarily the hexagonal head bolts and nuts as shown here). The complete assembly should be constrained so that it opens and closes, as shown below.
MECH 310 Assignment # 7:

Using the sketches for the parts given below create a piston mechanism. The dimensions are part of the design and the final mechanism must show a solution including translational motion for the piston. Also, use I-DEAS plotting capabilities to verify one motion cycle.
Do the first two Finite Element Analysis tutorials in “Simulation Projects” ("Introduction to Simulation" and "What is Finite Element Modeling?"). After doing the tutorials do as the assignment – finite element analysis of stresses and displacements of the same bracket that you did in the "Intro" tutorial, with the following changes: the dimensions should be as given below (in inches), and the load equal to 500 lbf should be applied to the front face of the bracket, also as shown below. Compare the resulting stress with the yield stress of the material (the default: generic isotropic steel), decide whether the part will fail or not under this load, and place a note saying "pass" or "fail" on the part – check everything into a library indicated by your lab instructor.
• Parts are graded based on quality of work, correctness of features and history (all nodes in the history tree should be green).

• Drawings are graded based on quality of work and placement of views and dimensions.

• Assemblies are graded based on quality of work, animation and correctness of constraints (relations browser should have no redundant, incorrect or inactive constraints).

• Mechanisms are graded based on quality of work, simulation and results.

• Finite element analyses are graded based on quality of work, quality of the mesh and accuracy of results.