

Freshman Engineering Clinic I  
Dr. Jennifer Kadlowec  
Mechanical Engineering Module

## Measurements and Engineering Drawing

### Objectives

Make engineering measurements using calipers

Use your measurements and Solidworks to create an engineering drawing

### Solidworks

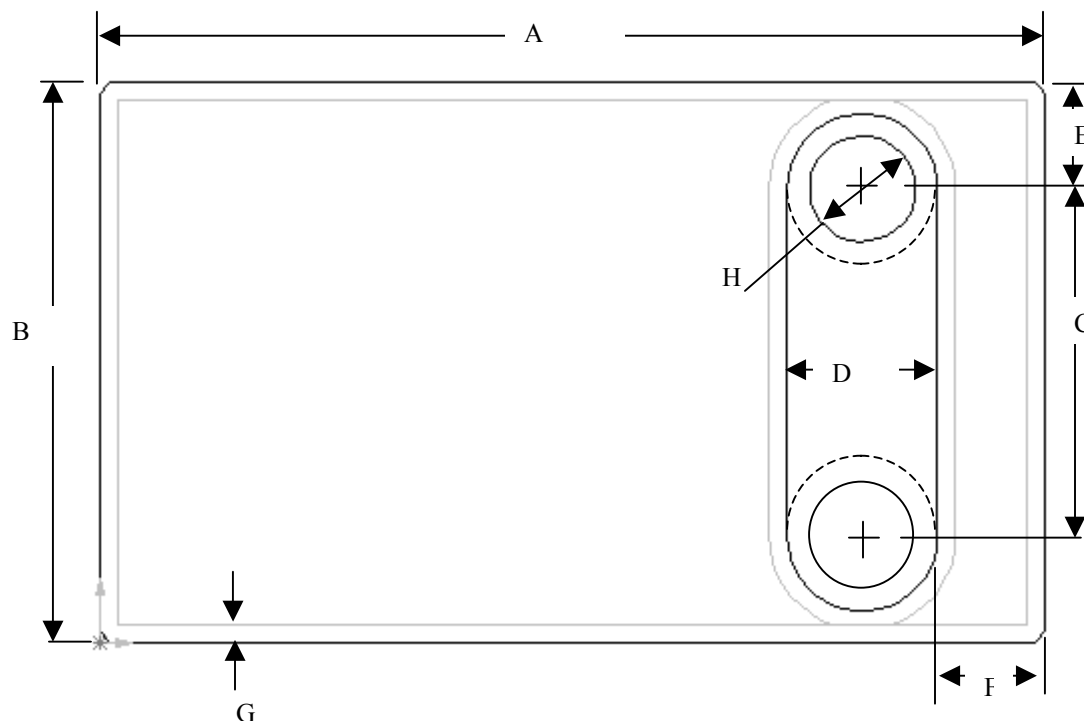
Mechanical design is a process that involves modeling to complete the design task.

SolidWorks® is a mechanical design software that makes it possible to quickly sketch out ideas, experiment with features and dimensions, and produce models and detailed drawings. From these drawings a prototype of a part can be manufactured and advanced analysis of strength, motion or function can be conducted. With calipers, you will take measurements of a control box in order to produce an engineering drawing.

- 1) Remove calipers from the box
- 2) Be sure that the calipers are closed and turn the dial to zero
- 3) Measure each of the dimensions shown on the drawing and write them on the sketch
- 4) Now you have the measurements needed for your Solidworks drawing

### **For next week – lab report**

As an appendix to your lab report, **each** person please turn in a printout of your engineering drawing in Solidworks with your name on it. Also include one copy of the sketch below with your measurements written on it.



## **Solidworks – Instructions for creating the Robot soccer control box**

Step 1 - make a rectangular solid

- Sketch a rectangle
- Dimension the rectangle - A inches in length by B inches
- Extrude this base feature - Direction 1, End condition blind, 1.065 in., extrude as a solid feature

Step 2 - cut out the rectangular solid where the control joysticks are

- Select the top surface of the rectangle in step 1
- Sketch a rectangle
- Dimension the rectangle C by D inches
- Click Dimension, then click the A inch edge from part 1 and the D inch edge on the current rectangle, set that dimension to E inches
- Click Dimension, then click the B inch edge from part 1 and the C inch edge on the current rectangle, set that dimension to F inches
- Extrude cut 0.25 inch deep

Step 3 - cut out the rounded edges where the control joysticks are

- Select the top surface of the rectangle in step 1
- Sketch a circle of diameter D inches near the end of the rectangle in Step 2
- Click Add Relation. Click the long edge from part 2 and the circle. Choose Tangent and Apply. Next click the short edge from part 2 and the midpoint of the circle, choose Coincident and Apply, then close the window.
- Extrude cut 0.25 inch deep
- Repeat sketch, dimension, add relation and extruding of another circle at the other end of the small rectangle in part 2

Step 4 - use shell so that only a thin wall of the solid remains

- Click Back so that the back of the box faces you
- Click Shell
- Click the back face to select it, so that it appears in the Faces to Remove list
- Set Thickness to G inch

Step 5 - fillet the top edges of part 1 rectangular solid

- Select the four edges on the top surface
- Fillet with a 0.05 in. radius

Step 6 - cut out holes for the joysticks

- Click the face consisting of the rectangle with half circles at the ends
- Sketch a circle of diameter H
- Add relation, concentric with the circular edge from part 3
- Extrude cut, Through all