ENGINEERING CAD C

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Teams will read a set of engineering drawings and collaborate to CAD parts in Onshape and then incorporate these parts with provided components to create an assembly.

   A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**
   a. Teams will use Onshape (onshape.com/edu) on two computers with mice to create the model.
   b. Each participant must bring a laptop capable of running Onshape for the purposes of completing the event unless specified by the Event Supervisor.
   c. Each participant may bring a wired or wireless mouse, a laptop charger, and writing utensils.
   d. No resource materials, except those provided by the Event Supervisor, may be used.
   e. Teams will be provided with a printed set of engineering drawings and a starting Onshape document with an assembly that has parts needed for creating the finished assembly. Teams will either be required to use their own Onshape accounts or use provided Onshape credentials at the discretion of the Event Supervisor.
   f. **Teams will provide the Event Supervisor with two Onshape account email addresses prior to the event. These account addresses will be used to provide testing materials during the event session.**

3. **THE COMPETITION:**
   a. Teams will use Onshape to CAD parts and an assembly based on the engineering drawings which specify the geometry, materials, and units for each part.
      i. For Regionals, teams will be required to model **3 to 6** parts for use in the assembly.
      ii. For State and Nationals, teams will be required to model **4 to 8** parts for use in the assembly.
   b. Students on the team will work collaboratively on the parts and assembly.

4. **SCORING:**
   a. The high score wins.
   b. Event Score = Individual Part Scores (IPS) + Individual Assembly Score (IAS)
   c. IPS is determined by comparing the volume of named parts as specified in the engineering drawing to the correct values. A perfect match for the volume is 100 points. Answers cannot earn negative points and will be worth a minimum of 0 points. Points for each part will be calculated as:

$$IPS = 100(1 - |\Delta_{volume}| \; where \; \Delta_{volume} = |\frac{volume_{student} - volume_{correct}}{volume_{correct}}|$$

   d. IAS is determined by comparing the X, Y and Z component of the center of mass (CoM) of the named assembly as specified in the engineering drawing to the correct values. A perfect match for the center of mass is 100 points and the minimum score is 0 points. Points for each assembly will be calculated as:

$$IAS = 100\left(1 - \frac{|\Delta_{X\,CoM}|}{3} - \frac{|\Delta_{Y\,CoM}|}{3} - \frac{|\Delta_{Z\,CoM}|}{3}\right) \text{ where } \Delta_{CoM} = \left|\frac{CoM_{student} - CoM_{correct}}{CoM_{correct}}\right|$$

   e. The tiebreaker is modeling time. The team with the lowest modeling time wins the tiebreaker. Time is measured from the moment the "Start assignment" button is pressed to the moment the "Submit" button is pressed. Work done after the last submission is not graded.

This event is sponsored by Onshape.