Event Supervisor Guide

Engineering CAD using Onshape

Event Coaches' Guide

Engineering CAD Event Overview

The Engineering CAD Event is sponsored by and co-created with Onshape. Onshape is a cloud-native CAD and data management software that allows anyone to create parts, assemblies, and drawings.

In Engineering CAD, teams of two students will collaborate to accurately model parts and assemblies from provided drawings as quickly as possible. Students will be scored on the accuracy of their models with the time from start to submission serving as a tiebreaker.

The process of running an Engineering CAD event follows these steps:

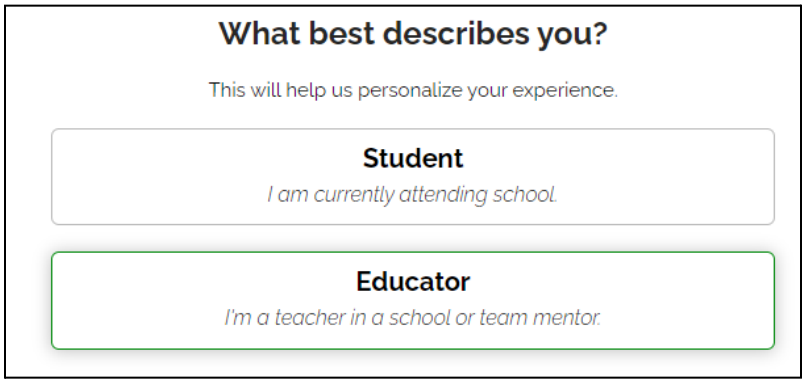
1. The Event Supervisor selects an Answer Key Document and Student Submission Document (either self-developed or provided by Onshape) that contains the required testing materials.
2. The ES collects the participating students' emails and adds them to an Onshape Class specifically for this Engineering CAD event.
3. The ES stages an Onshape assignment using the Submission Document. Students will not see this until the event time begins.
4. Pairs of students enter the event, log into their respective Onshape accounts, and wait for the event period to start.
5. Each pair of students is given a set of printed parts and assembly drawings.
6. When the event time begins, students model the parts and assembly shown in the drawings as accurately as possible.
7. When the event concludes, students submit their completed Submission Documents in the Onshape Class.
8. The ES uses the Engineering CAD Science Olympiad app to automatically score each student pair's Onshape submissions.

Creating An Onshape Account as a Coach

Science Olympiad students, coaches, and organizers are eligible for a free Onshape Education account. This will enable you to access Onshape's full suite of CAD features. Fill out the form at onshape.com/en/education/sign-up to create your account.

We recommend that coaches sign up for an Onshape account as an *Educator.* This will enable you to create an Onshape Class to administer and collect student submissions the same way that an event supervisor will. While this is not required, it will create a more realistic practice environment.

Please name your Classroom something that students will know is for practice purposes and not official event usage.



Have an Existing Onshape Account?

If you already have an existing account that is not an education account or your education account has expired, you will need to upgrade your account to an Education account.

To upgrade to an Educator account, fill out the form at https://www.onshape.com/en/education/educator-upgrade using the email of your existing Onshape account.

Creating Student Accounts

If your students already have Onshape accounts from personal use or through your associated school, you may skip this section.

Each student **must** have an Onshape account - a unique email identifier and corresponding password - to participate in an Engineering CAD event.

This account is not associated with the scioly.org platform, and there is no ability to link these accounts.

Choose the option below that best applies to your team to jump to instructions.

- My school has approved Onshape use.
- My students can use whatever software they choose with their school emails.

↳ Create Accounts with School Emails

- My school has not approved Onshape use.
- My students have personal emails they can use for Onshape.
- My students can create new email addresses for Onshape.

↳ Create Accounts with Personal Emails

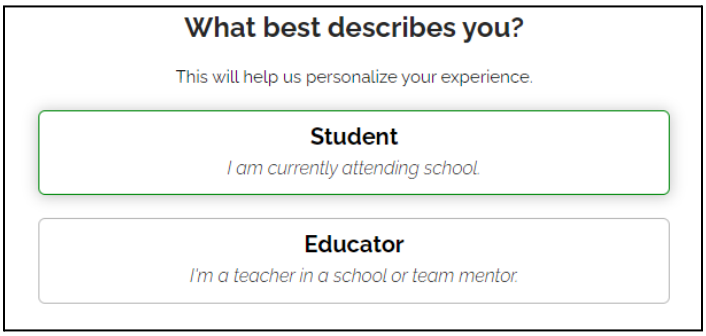
- My students cannot sign up for Onshape via any means.
- A coach would like to / needs to own the accounts.

↳ Create Accounts with a Team-Managed Email

Create Accounts with Student Emails

To create an Onshape account, students will fill out the form at onshape.com/en/education/sign-up using their school email address.

Please ensure that they sign up as a *student.* If you are unsure about information to enter relating to your school, please use the Science Olympiad website, address, and name.



Students should then receive an email from alerts@onshape.com. This email contains a link that will direct to Onshape and allows students to set their password and account settings.

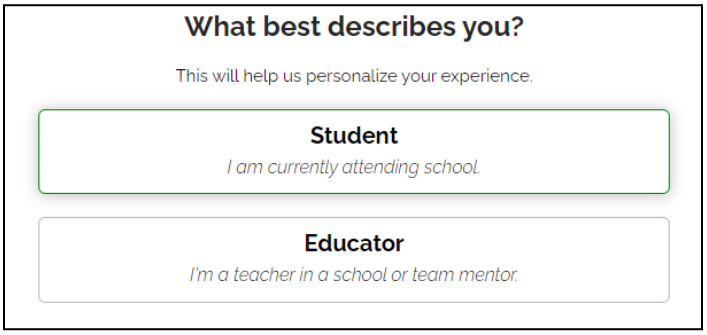
If this email does not appear in any inbox and you ensure that everything was typed correctly, it's likely that the school's email service is blocking emails from outside services. If so, please work with your IT department to implement the firewall changes listed at https://www.onshape.com/en/domain-whitelisting.

Create Accounts with Personal Emails

To create an Onshape account, students will fill out the form at onshape.com/en/education/sign-up using a personal email address.

If students don't have an email address, services such as Gmail make it quick and easy to create a new account. If they want to use this email address for Science Olympiad only, that's fine!

Please ensure that they sign up as a *student.* If you are unsure about information to enter relating to your school, please use the Science Olympiad website, address, and name.



Students should then receive an email from alerts@onshape.com. This email contains a link that will direct to Onshape and allows students to set their password and account settings.

If this email does not appear in any inbox and you ensure that everything was typed correctly, it's likely that the email service is blocking emails from outside services. Please implement the firewall changes listed at https://www.onshape.com/en/domain-whitelisting.

Create Accounts with a Team-Managed Email

Creating Onshape accounts with a team-managed email ensures that no student personally identifiable information is ever entered and allows teams to re-use accounts for multiple seasons.

Below are our recommendations on how to set up these accounts:

1. If your Science Olympiad team already has an email account, you can use that address, or you can use a service like Gmail to make a new address.
    a. For this example, we will use SeaportSciOly@gmail.com as our team-owned email address.

2. You will want to make **at least 2** Onshape accounts tied to this email. Use **plus addressing** to create multiple unique accounts.

3. Go to onshape.com/en/education/sign-up and fill out the form as follows:
    a. First Name: Use your team name or high school name as one word.
        i. Ex: "SeaportSciOly" or "MetroHS"

    b. Last Name: Use the number or letter for this account.
        i. Ex: "One" or "A"

    c. Email: Use the email address owned by the team with plus addressing. Use a plus address of simple numbers or letters.
        i. Ex: "SeaportSciOly**+1**@gmail.com" or "SeaportSciOly+A@gmail.com"

4. Select **Education** and **Student,** then fill out the rest of the form.
   If you are unsure about information to enter relating to your school, please use the Science Olympiad website, address, and name.

5. Repeat this process, changing the number or letter, to create multiple accounts tied back to the same base email address.

6. You will receive an email from alerts@onshape.com for each account created. Select a password that is easy to remember and can be provided to the students that will be using the accounts for a given competition.

Selecting a Practice & Training Style

With Onshape accounts created, your students now need to practice their CAD skills to compete in Engineering CAD.

Choose the option below that best applies to your team to jump to instructions.

- I want to set up a realistic testing environment for my students.
- I want to run the SciOly auto-grading application for my students.
- I understand that this will be a more hands-on approach to practice.

Setting Up Your Onshape Practice Classroom

- I want my students to take a self-guided approach to practicing.
- My students can handle grading and evaluation on their own.

Using an Onshape-Provided Answer Key Document and Submission Document

Setting Up your Onshape Practice Classroom

As a coach with an Educator plan, you have the ability to set up a realistic testing environment for your students. By following the instructions below, you can add your students to a class, provide the assignments, and then have them submit like they would in a real event.

Creating a Class for Engineering CAD Practice

Creating a class that includes all of your students' emails will allow you to distribute the starting document like a real event session. To create a class:

- Ensure you are on the Onshape Educator plan. If you do not see a subscription type of Educator in the bottom left-hand corner of your Onshape documents page, click here to go to the instructions on how to upgrade your account.
- Click the blue **Create** button and select **Class**.
- Fill out the name with a name that follows the convention "Practice for (School/Team name) Engineering CAD". Leave the description blank.
    - An example is "Practice for Seaport HS Engineering CAD"
- You will land on the Assignments page which will be blank.

Adding Students to the Class

- Navigate to the relevant Class and click on the Members button near the top of the screen.
- To add students to the Class, use one of the following options:
    - Click the **Invite** users button and enter the participants' emails. Ensure they are all added as students.
    - If any address does not return an account, please ensure they have an Onshape account and you have the correct email address.

- You can add as many coaches or assistants as you need to help with administration. Click the **Invite users** button, enter the email, and add them as Educators.
- Once you've entered each email, double-check your list!
- Click **Publish class** in the top right-hand corner.

Students will be notified that they have been added to an Onshape Class and will be able to see the Class; however, because no assignment has been published, they will not see any Onshape documents yet.

Staging the Submission Document Assignment

At this point, you will pick the starting document you want your students to practice with. Creating your own copy of this document is explained in the "Using an Onshape-Provided Answer Key Document and Submission Document" section.

- Navigate to the relevant Class and click on the **Assignments** button near the top of the screen.
- Click the Create assignment button in the top left corner.
- Title the assignment with the name for this practice session.
    - "Engineering CAD Practice Session 2 Test" would be a suitable name.
- For the instructions, we recommend putting the following text:

  One member of your team will need to click the blue **Start Assignment** button to create their copy of the starting document. This member will need to use the Share settings in Onshape to share the document with the other team member; make sure to provide edit permissions. When your team is done, click the blue **Submit** button at the top of the modeling window.

- Click Create and then click the **Students begin with a copy of selected document** option.
- Click Select document and navigate to the Submission document that you copied or created.
- **Click Apply. Do not click Publish Assignment!**
- This will store the submission document in a draft state.

Printed Drawing Package Setup

You may print the drawing packages or you may simply leave them as tabs in the Onshape Submission document. Students can more easily reference and mark up a printed drawing, and this is how official events will operate.

However, each Student Submission document contains all of the drawings needed to complete a test. Leaving drawing sheets as tabs in your document does reduce printing overhead and overall setup time.

To download a drawing package from Onshape:

- Open the Answer Key Document that has the drawings you need to print.
- Right-click on any drawing tab at the bottom of the Onshape window.
- Click **Export...**, which is the second option from the bottom of the menu.
- Set the **Format** to **PDF**.
    - All of the default options are fine, but make sure that the drawing will print in Color.
- Click **Export**.
- Repeat this process for all of the part drawing tabs as well as the assembly drawing tab.

Once all of the drawing pages have been printed, we recommend that they are stapled together. Ensure that enough are printed for each pair of students to have a drawing package.

Starting a Practice Session

To start a practice session, you will need to publish an assignment in the Class using the submission document. To set up the submission document assignment:

- Start by ensuring that each student has a printed drawing packet *or* that the drawings are in the submission document. Instruct them to keep the packet face down until you indicate that the assignment has been shared and the practice session has started.
- From the documents page, click on the **Classes** filter on the left-hand side of the screen. Then, click on the Class you recently created for this event session.
    - It should appear in the "Classes" list; if it appears in the "Unpublished classes" list, click on it and then click the blue Publish button.
- You should see your previously staged assignment in the assignments list. It should also have a Draft label.
- Click on the assignment's name to open it.
- If you click **Publish assignment**, students will immediately gain access to the assignment. Only do this when you are ready for the practice to start - otherwise, students can start the assignment early.
    - Students will receive an email notification that a document has been assigned to them when you click Publish assignment.
- **NOTE: Students must click the blue Submit button for their assignment to be graded. Please remind them!**

Using an Onshape-Provided Answer Key Document and Submission Document

Onshape Education has created multiple sets of parts, assemblies, and drawings for students to practice with. All required materials will be included, so you will not need to do any model development to practice at home.

Copying a Provided Answer Key & Submission Document

- Start by opening the **Engineering CAD Practice Exam Library** linked here!
- Select the test you would like to use.
- Click on the link to the Submission Document.
- Click on the ☰ icon next to the Document name.
- Click **Copy Workspace** to create your own copy of the document.
- In the window that appears, make sure the "Copy document to" location is the Classroom that will be used for practicing. Click the **Open** button.
- You can copy the documents to a specific folder if it helps with organization, or copy it to the Classroom. Click **Copy Here** to copy the document.
    - If the document does not appear in your classroom, you will need to find it in your Owned By Me. Right-click the document, select Transfer Ownership, and then click the Classroom.
- Repeat the above process for the Answer Key document.
    - You will only need this at the end to compare finished answers to.

Grading the Submission Documents with the Science Olympiad Checker Grading App

You can use the Science Olympiad Checker Onshape application to automatically grade the modeling portion of the event. There are two ways to grade - collecting individual URLs or using the assignment list from the Class - and it is up to you to decide which method you prefer.

Adding the Science Olympiad Checker Application

To add the Science Olympiad Checker app to your account:

- Click on this link to open the Onshape App Store page.
    - Make sure you are logged into Onshape.
- Click the blue **Subscribe** button. The application is free and will remain free.
- Click **Get for free** and then close out of the tab. You can go back to cad.onshape.com. If prompted for the number of seats, enter 1.
- Check if the application is added by going back into any Onshape document. On the right side of the screen, you should see a small box with the Science Olympiad Checker icon inside. If prompted to authorize the app, click the blue **Authorize application** button.

Recommended - Grading with the Science Olympiad Checker Application using the Classes & Assignments Mode

To grade using the Classes & Assignments mode:

- Open the Answer Key Document.
- Click on the Science Olympiad Checker icon on the right side of the screen.
- Click **Check using Classes & Assignments**.
- Click on the Class name that corresponds to the event session you need to grade.
- Click on the Assignment that corresponds to the test the student teams completed.
- Click **Grade Model(s)**.
- The Science Olympiad Checker app will calculate the results of the part studios and assemblies in accordance with the Science Olympiad rulebook.

Troubleshooting Tips:

If a document can't be graded, it will show in the "Part Studio or Assembly Name Mismatch" section:

Element Mismatch

Team Name	Document Name	Thumbnail
EngCAD C48	EngCAD C48_Engineering CAD Nationals Test_C-Level National Student Submission Document	

The error message contains what we believe will be the most common cause of this issue, which is that the names of the part studio and assembly tabs do not match. If any of the tabs to be graded fail to find a match, the entire document will not grade. Open the document using the link and ensure that the part studio and assembly names match the answer key exactly. This will affect the time to submission.

If you are still having issues, please contact competitions@ptc.com. Note that we will likely not be able to respond on weekends.

Manually Checking the Submission Documents

You can manually compare the mass and center of mass to quickly determine if a model was completed correctly or not.

- In the Student Submission Document, select a part and then click the **Display mass properties** tool in the bottom-right corner to evaluate the masses of modeled parts.
    - If no mass is shown, the material for the part has not been set.
- In the Submission Document, select the assembly tab and then click the **Display mass properties** tool in the bottom-right corner to evaluate the center of mass values.
    - **Ensure that you match the X, Y and Z values - switching them will create incorrect scores!**
- Use the equations provided in the Engineering CAD Event instructions to manually check values against the answer key values.

Technical Troubleshooting

Here are some general recommendations:

- **E*ach student* needs to bring their own laptop and mouse for the event.**
    - If you are able to procure extra laptops and mice, offer these as a backup for students that have issues before/during the event.
- You will want a consistent connection to the internet. We generally recommend at least 20 Mbps up/down.
    - Work with IT as needed to ensure that the internet connection will be stable and the wireless access point can support the number of student participants who will be working at one time.
    - If you are having issues with your wireless network, please use our Security and IT Checklist: https://learn.onshape.com/courses/security-and-it-checklist

Onshape Learning Resources

Onshape has developed a large library of learning resources in the Onshape Learning Center. Both new users and existing users will be able to find helpful workflow tips, best practices, and tutorials.

The Onshape Learning Center can be accessed here:
https://learn.onshape.com/

Some courses that we highly recommend:

- CAD Basics Learning Pathway
- Onshape Fundamentals: CAD Learning Pathway

Some applications that we highly recommend:

- Science Olympiad Checker in the Onshape App Store
- CAD Challenges App in the Onshape App Store
    - This app provides great part, multi-part, and assembly modeling challenges with automatic grading and model comparison if needed. While this doesn't exactly mirror Engineering CAD, it's a great practice tool!

Practice Model Library

The Practice Model Library can be found here.
It is a living document that will update as more practice models are added.

Contacting Onshape Education for Feedback & Help

If you need assistance with Onshape, are looking for exam document review, or have any general questions, please reach out! You can contact Onshape Education at competitions@ptc.com.

Any and all feedback is welcome!