

# 20Additive Manufacturing Technology State Contest Information

## **DATE, TIME, & LOCATION**

The 2020 State Skills USA, Additive Manufacturing Technology Contest will be held Monday, April 20<sup>th</sup> at the Tulsa Cox center on the main floor.

Computer set-up and familiarization will be done from 1 PM to 4 PM on Sunday.

Contestants ID Badges will be handed out at this time. Contest orientation begins promptly at 8:00 a.m. and the contest will start at 9:00 a.m. on Monday April 20<sup>th</sup>.

**Resumes are required for all contests.**

**Important Dates: CMB File Upload to GrabCAD Community: 11:59pm, April 18th**

**\*Files not arriving by April 18<sup>th</sup> will not be accepted.** Below is submission address.

**Submittal of Engineering Notebook: At the end of orientation.**

**Purpose:** To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of Additive Manufacturing.

## **LUNCH**

Students will be expected to remain in the contest area, but because box lunches are so expensive instructors should plan to provide their contestant(s) with lunch. i.e. brown bag or bring in. The student will also need money for drinks and snacks out of the vending machines and concession stand.

## **CLOTHING REQUIREMENTS**

As in the past, skill contestants will not be penalized for not adhering to the national clothing requirements. Contestants should not wear clothing that has school identification visible to the judges. Those contestants wearing program uniforms will need to cover all identifying patches. Proper clothing includes **no watches or jewelry**. Contestants with long hair will have proper utensils to secure hair properly and in a safe manner.

## **AWARDS CEREMONY**

Contest winners will be recognized during the Awards Assembly at 9:00 a.m. on Tuesday, April 21st in the Tulsa Convention Center. Official SkillsUSA attire is required. According to the SkillsUSA Championships Technical Standards, clothing requirements are as follows: "*For men:* SkillsUSA official attire: Official red blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern or SkillsUSA tie from Midwest Trophy, black socks and black shoes. *For women:* Official red blazer or jacket, black dress slacks or skirt, with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer, black sheer or skin-tone hose and black shoes." Any contest winner who is not in official SkillsUSA attire will not be permitted on stage. The student will be escorted behind the stage to receive his or her medallion and awards.

# 20Additive Manufacturing Technology State Contest Information

## JUDGES

Some judges have been identified, but additional ones will be needed. If you know of an individual that could spend Monday with us in a judging role please contact Kevin Terronez , Sean Brockwell, or Michael Doering by e-mail at [Kevin.terronez@careertech.ok.gov](mailto:Kevin.terronez@careertech.ok.gov) , [Sean.Brockwell@francistuttle.edu](mailto:Sean.Brockwell@francistuttle.edu) [Michael.doering@tulsatech.edu](mailto:Michael.doering@tulsatech.edu)

**ONLINE TESTING:** Professional Development and a general knowledge test written exam will be given online at your school site over the internet. *This will become part of the contestants overall score, it is not used to determine who goes to State contest.* Your school's testing liaison will be responsible for proctoring the tests. The testing window is March 16<sup>th</sup> – April 10<sup>th</sup>. Please see that your students take the test during this time.

**Requirements:** Each team is responsible for bringing their 3D Printed model to the competition. Models must adhere to the contest outlines from the proposed standards. Models will NOT be printed in advance for students. Teams without models, or with models that were not created with the recommended Additive Manufacturing methods, will be deducted points from the presentation portion of the competition.

**Equipment: Note:** All contestants must bring their own computer hardware and ensure that their computer has the capability to run their software. The software should be activated and tested before the contest. It should be tested to make certain it works with the WI-FI turned off and while not connected to the school's network. No Internet access will be available. Teams without the ability to utilize their software will receive deducted points from the final score. Appropriate licenser is required for all software. Refer to National Standards below for more information on Equipment. All schools should bring a 25' UL Approved Extension Cord and Surge Protector.

**PLEASE NOTE:** Students will NOT be given a design modification at the competition this year. The computer and software are there to demonstrate the students understanding of the CAD software and the designed part. If the student cannot explain the use of the CAD software to the judges satisfaction, the score will reflect this.

**Needed Supplies;** Printed part of the design.

One Computer for CAD (Administrators rights required).

Pencil, Paper, Emergency Form,

**USB flash drive with a min. 2GB of memory**

*~ You must bring the licenses or hardware lock for the software that will be used ~*

*\*Any other tools you think you might need. It is a good idea to have one Spare computer that could be used. Just in-case one goes down.*

---

## **SkillsUSA 2020 – Additive Manufacturing State Challenge – Power Up!**

### Overview

The goal of the 2020 SkillsUSA Additive Manufacturing State Competition is to challenge competitors at that state level and send the best prepared students to compete at the National Competition in June. Each year's suggested state competition focuses on an additive manufacturing design with strict requirements on form, fit, and function of compact and intricate designs like nationals.

The below contest has been designed with the upcoming National Competition in mind and is designed to challenge the understanding of students and their skills in Additive Manufacturing.

This year's contest challenges students to redesign an outdoor 3D-printed outlet enclosure to be a USB outlet cover that leans into the needs of today's power user.

Competitors will need to use their 3D printing knowledge to design a part that prints within the specified build volume, materials and times specified. The designed enclosure will need to screw into the testing rig and meets the specified requirements on the score sheet.

Contest state chairs need to fill in blanks or modify contest to meet their contests needs or specs. **See yellow highlights!**

The contest descriptions have been written so that you can distribute directly to competitors. If you'd like to make modifications to fit your state's needs, please do.

If you have questions about the contest, please email:  
[edu.curriculum@stratasys.com](mailto:edu.curriculum@stratasys.com)

---

## Materials & Supplies Needed

### Materials to be Provided by Student Competitor:

- 3D design submitted by April 18th
- Thumb drive loaded with 3D design
- Engineering notebook
- Presentation

### Materials to be Provided by State Competition Host:

- 3D printed testing rig
- Lumber (least 12"x12" to secure rig to)
- USB cord (such as iPhone charging cable)
- "Standard" screws
- \*Student designs 3D printed

*\*At the national competition Stratasys prints on-site, at the state level you have to have students print their designs before and bring them, print them at a 3D printing partner before and bring them on competition day*

## About the Testing Rig

- The Challenge Rig is a single 3D-printed bracket consisting of 2x ¼-inch "mounting holes"
- The overall dimensions of the rig are as follows: 2" (long) x 2.75" (wide) x 0.625" (tall).
- It is recommended that competition host have the rig printed and attached to a flat surface (a piece of lumber or plywood is sufficient). The Contest 2 rules will utilize the flat surface below the rig; so the surface should be at least 12"x12".
- The files to print can be found on GrabCAD here:  
<https://grabcad.com/library/skillsusa-2020-state-challenge-1>

---

### **Judging Suggestions:**

Students should be judged on:

- 1) Engineering notebooks
  - a) Did the students follow the guidelines provided? States are encouraged to provide their own Engineering Notebook Guidelines.
  - b) Did students show their design process?
  - c)
- 2) Following all requirements outlined in contest criteria
  - a) Dimensions
  - b) Build time
  - c) Build volume
  - d) Material usage
  - e) Support material usage
  - f) Did the students consider additive manufacturing when creating their design? Are they able to explain the role that additive manufacturing played in their design?
- 3) Presentation
  - a) Does the presentation include:
    - i) Explanation of the design process through examples in their engineering notebook
    - ii) Understanding of form, fit, and function
- 4) Quality of final 3D printed part
  - a) Does it perform the function in the manner it was designed to do?
  - b) Does it meet all requirements in contest guidelines?
  - c) Does the printed part include a moving assembly?
  - d) Did the students design the part with additive manufacturing in mind?



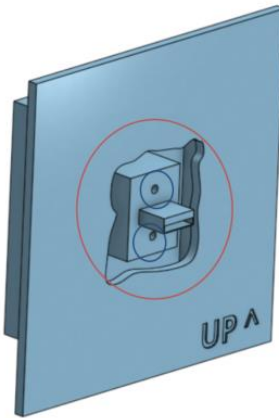
## SkillsUSA 2020 Additive Manufacturing State Challenge

### Power Up! - USB Outlet Redesign

Welcome to the “Power Up!” challenge! The task at hand is to design a hinged, covered enclosure (like the one pictured above) for a wall-mounted standard USB port.

“What’s the catch?” you say. Well, there are five, and here they are:

1. The enclosure must affix securely to the provided USB port (see illustrated CAD below) using the screw holes (screws will be provided at the testing location).
2. The enclosure must completely close the “hole in the wall” (see illustrated CAD below by red circle)



3. The enclosure must have a mechanically hinged lid (printed in place) that does not use external parts or hardware. This enclosure lid must open at least 180 degrees and stay open at 90 degrees when placed in that position.
4. Device should have some uniqueness in design – such as shape, 3D printed texture, text... the options are endless – you are the product designer – flex your creative muscle.
5. The device must follow these 3D printing specs measured in GrabCAD Print (when measured using 0.010” solid ASA standard build settings):
  - Prints in less than \*3 hours\*
  - With a build volume of no greater than \*3X3X3in\*.
  - Using no more than 5 in<sup>3</sup> of build material
  - Using no more than 2 in<sup>3</sup> amount\* of support material

## Contest Criteria

Prior to contest day: April 20th, Cox Ctr.

Students should submit designs by

April 18th to: apaul@atctrain.com

On contest day, students must submit:

1. Engineering Notebook (Engineering notebook guidelines below)
2. 3D printed design files
3. Printed part (Provided by contest chair day of contest)
4. Presentation of design

### 1. Engineering Notebook should:

- Be clearly labeled with contestant name(s), date and page # on each page
- Begin with a problem statement
- Include discovery and documentation of approach to solve problem
- Include sketched design concepts with critical features labeled
- Critical dimensions clearly labeled in design sketch
- Considerations for designing for FDM distinctly addressed (i.e. part strength, part orientation) especially including any expected risks during printing
- Design decisions and alternatives are documented and evaluated thoughtfully

### 2. 3D Printed Design - Students must create a design that:

- Prints in less than \*3 hours\*
- With a build volume of no greater than \*3X3X3in\*.
- Using no more than 5 in<sup>3</sup> of build material
- Using no more than 2 in<sup>3</sup> amount\* of support material

*Students must submit .print files to be printed via GrabCAD Workbench no later than 11:59 \*CST\* on \*April 18th\*. Final prints will be delivered day of contest so that students can test, assemble/modify and be evaluated.*

### 3. Presentation Criteria

- The competitor clearly describes their understanding of the problem to be solved.
- Design Process: good design logic is used for key design choices was intentional and well-communicated
- The presentation is professional and well-rehearsed
- Practical evaluation: Part functions way team intended 100% of time.

# 20 Additive Manufacturing Technology State Contest Information

For questions pertaining to the competition, please contact Aaron Paul ([apaul@atctrain.com](mailto:apaul@atctrain.com))

[Weblink](#)

**Sunday, April 19<sup>th</sup>, 2020**

1:00-4:00 p.m. Set-up Tulsa Convention Center

**Monday, April 20<sup>th</sup>, 2020**

8:00 a.m. Judges Orientation, Contest area

9:00 a.m. Students description of design and explanation of print

11:30 a.m. Lunch

12 Noon Contest continues

3:00 p.m. finalize the event

Clean up area