



---

## **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.

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

---

## Materials & Supplies Needed

Materials to be Provided by Student Competitor:

- 3D design submitted by **Wednesday, April 8th at 11:59 PM CST** sent to **[Skills@ttaweb.com](mailto:Skills@ttaweb.com)** (labeled with school name)
- 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

***Important – Schools must submit designs to the [Skills@ttaweb.com](mailto:Skills@ttaweb.com) address by the deadline. The file(s) must be processed using the GrabCAD software and the guidelines provided in the description of the competition.***

***You may indicate in the email at that time that you wish to have your competition parts 3D printed by the chair committee for the Additive Manufacturing competition. If you choose not to have your parts printed by the committee, it is your responsibility to bring printed parts the day of the competition for evaluation.***

## 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?



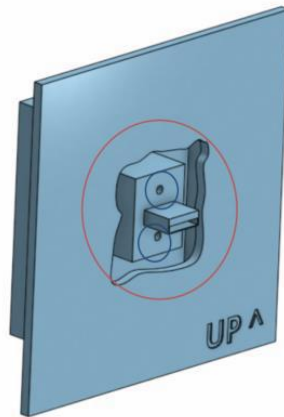
## SkillsUSA 2020 Additive Manufacturing State Challenge

### 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 ABS 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:

Students should submit designs by

**Wednesday, April 8th at 11:59 PM CST**

sent to [Skills@ttaweb.com](mailto:Skills@ttaweb.com) (labeled with school name)

On contest day, students must submit:

1. Engineering Notebook (Engineering notebook guidelines below)
  2. 3D printed design files on USB thumb drive
  3. Printed part (Provided by contest chair day of contest) or printed at school
  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
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.

**There is no orientation meeting on Monday, April 20<sup>th</sup>, 2020. Everything is covered the day of the competition. Students/Schools will be assigned presentation times the day of, shortly after the chairperson addresses the participants of the competition.**