

19 Additive Manufacturing Technology State Contest Information

DATE, TIME, & LOCATION

The 2019 State Skills USA, Additive Manufacturing Technology Contest will be held Monday, April 29th 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 29th.

Resumes are required for all contests.

Important Dates: CMB File Upload to GrabCAD Community: 11:59pm, April 27th

***Files not arriving by April 27th 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 30th 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.

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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 and Michael Doering by e-mail at Kevin.terronez@careertech.ok.gov and 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 25th – April 15th. 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 licensure 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.

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SkillsUSA 2019 – Additive Manufacturing State Challenge – Heads to Tails

Overview

- The goal of the 2019 SkillsUSA Additive Manufacturing State Competitions 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 similar to nationals.
- The below contests have been designed with the upcoming National Competition in mind and are designed to challenge students understanding of and skills in Additive Manufacturing.
- This year's contest challenges students to design a 3D-printed device to flip an un-modified U.S. quarter) from heads to tails. They will need to design a device that fits into the testing rig and performs a specific task. They will also need to use their 3D printing knowledge to design a part that prints within the specified build volume, materials and times specified.
- If you have questions about the contest, please email: apaul@atctrain.com

Materials & Supplies Needed

- **Materials to be Provided by Student Competitor:**
 - 3D design submitted by 4/27/2019
 - 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)

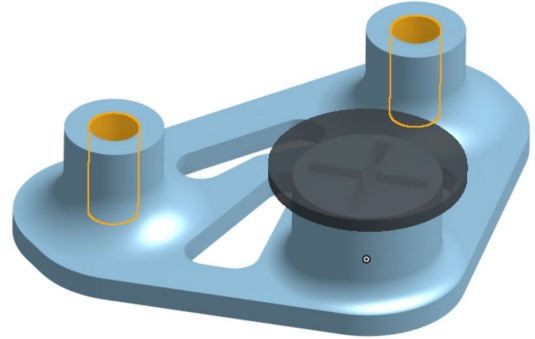
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US Quarters

“Standard” 4 cm rubber bands for each competitor ([Amazon Link](#))

About the Testing Rig

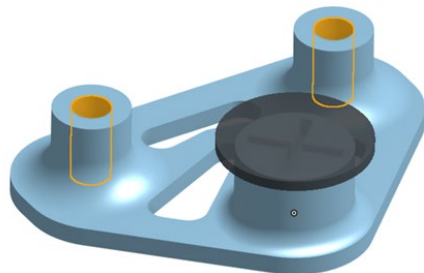
- The Challenge Rig is a single 3D-printed bracket consisting of 2x ¼-inch “mounting holes” and a “coin stand”.
- The overall dimensions of the rig are as follows: 2” (long) x 2.75” (wide) x 0.625” (tall).
- It is recommended that competition host have the rig printed and attached to a flat surface (a 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 these two parts can be found on GrabCAD here:
- <https://grabcad.com/library/2019-testing-rig-1>



SkillsUSA 2019 Additive Manufacturing State Challenge

Quarter Query - Heads to Tails

Welcome to the “Quarter Query” challenge! The task at hand is to design and use a device made of only 3D printed parts to flip an unmodified U.S. quarter (provided at the competition location) from heads to tails.



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

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1. The device may only be operated by a single, unbent finger. Note: the device may not attach to the finger in any way.
2. The device must remain in contact with at least one Connection Point (orange in the diagram) at all times.
3. The quarter will begin heads-up on the Coin Pedestal (X mark) and must finish tails-up anywhere on the flat surface provided.
4. The device must follow these 3D printing specs. Measured in GrabCAD Print:
 - Prints in less than 2 hours
 - Has a build volume of no greater than 2x2x2 in
 - Uses no more than 5 in³ of model material
 - Uses no more than 2 in³ of support material

Sound impossible?

- Here's some help: you may use one rubber band in your design. The rubber band that you must use in testing will be provided to you at the competition, but if you want to practice ahead of time, this is the model that will be provided.
- The competition rig will be fixed to a large flat surface, and its file can be found here <https://grabcad.com/library/2019-testing-rig-1>
- (Moderate)

Contest Criteria

Prior to contest day:

- Students should submit designs by **11:59PM CST 4/27/2019** via GrabCAD.
- See instructions for creating a GrabCad Workbench here: <http://help.grabcad.com/article/83-demo?locale=en>
- Make sure to invite contest coordinators with email: apaul@atctrain.com

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Knowledge Test:

- A Knowledge Exam will also be administered during the competition to test students understanding of additive manufacturing and general CADD knowledge.
 - On contest day, students must submit:
 - Engineering Notebook (Engineering notebook guidelines below)
 - 3D printed design files
 - Printed part (Provided by contest chair day of contest)
 - 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 *2 hours*
 - With a build volume of no greater than *2X2X2in*.
 - Using no more than 5 in³ of build material
 - Using no more than 2 in³ amount* of support material
- Students must submit CMB files to be printed via GrabCAD Workbench no later than 11:59 *CST* on 4/27/2019.*
3. Presentation Criteria
- The team clearly describes their understanding of the problem to be solved.

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- 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 in 3 out of 3 tests.

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

[Weblink](#)

Sunday, April 28th, 2019

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

Monday, April 29th, 2019

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