



Additive Manufacturing State Contest Memo

Times/locations and general information

Contestants will need to arrive to the Cox Convention Center on Monday, April 22, 2024, and check in the contest area at 8am.

Written testing will be held ON-LINE through technology centers testing centers. Testing will be open Monday, March 13th- Friday, April 9th. No provisions are being made for make-up testing on-site.

No Substitutions will be allowed this year after April 5th, 2024.

Resume

Each contestant will be required to bring his or her printed resume. A deduction will be applied to your overall score if you do not have a resume.

Contest Meeting

Contestant meeting at 4 p.m., Sunday April 21st, in contest area. Students will turn in their engineering notebooks, final print of their project file and resume for review by judges.

Industry Awards

As agreed at Summit each instructor is requested to secure a minimum of \$50.00 in prizes for each student that you bring to the State SkillsUSA Championships. These awards should be labeled with the name, address, and contact person for the donating industry so that the contestant they are awarded to can send an appropriate expression of his or her appreciation.

Awards Ceremony

Contest winners will be recognized at the General Session on Tuesday morning, April 23, at 9am. in the Tulsa Convention Center Grand Hall. Contest winners will not be allowed on stage if not in official dress. For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes. For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer, and black dress shoes.



SkillsUSA 2024 Additive Manufacturing State Challenge

Medallion Models

Welcome to the “logo Medallion” challenge!

The task at hand is to design an eye-catching medallion that represents your school, yourself, mascot, state, country, event, or hobby.

Design Examples:

- Bump Maps
- Displacement Texture
- Color/Material Changes
- Embossed/Debossed Text
- Motion

Example of a Basic Design



Competition Requirements

1. The design **must** be completely 3D printed.
2. The design **can** be 3D printed using any technology.
3. The design **must** contain at least two legibly printed words.
4. The design **can** contain 3D printed bodies that are glued together for the final part.
5. Parts **can** be colored or painted.
6. The printed design **can** have moving bodies.
7. The design **must** be at least 3" x 3" x 1/4"
8. 3D Printed Design - Students **must** create a design that:
 - Is original and designed by competitor.
 - Prints all parts in less than **8** hours.
 - Uses less than **5** cubic inches of model and/or support combined for all parts.
9. Students **must** submit files to the state designated file share site no later than **5pm, Friday April 19th**. A final print must be delivered the day of the contest to judges to be evaluated.

Tips for Competitors

Here are some tips to maximize the points awarded to you:

- Build debossed text on a horizontal surface for best results. This may require building the part on its edge or standing up.
- Paint 3D is a free tool to help design the part.
- Try to leverage a design with multiple printed colors or technologies for a more creative part.
- Leverage post-processing techniques to smooth or color printed bodies.
- Additional moving parts may add to your score but can produce more points of failure on the final assembly.
- Use online resources (YouTube, GrabCAD Tutorials)
- Whenever intellectual property (IP) deters you from a project, try using approximate geometries to communicate the design intent.
- Optional design for additive manufacturing learning resources:
 - Stratasys Think Additively™ Masterclass:
 - <https://youtube.com/playlist?list=PLUYaY5EIPtNBdU-s-7I9rl05IBHHITarI>

State Competition Procedure

1. Students must submit Engineering Notebook to judges during contest orientation, Sunday, April 21st, 2024. Orientation meeting will be held in the contest area.
2. Students submit print files in both CAD (.step, .iges, .sldprt, etc.) and mesh (STL, 3MF, OBJ, etc.) format to [2024 SLSC Additive Manufacturing File Submission](#)
3. Students submit their final project for evaluation at contest. **There will be no printing or assembly on the day of the contest.**
4. Students submit their presentation.

State Competition Judging Criteria

1. The Engineering Notebook should contain robust content, including, at a minimum, the following:
 - 1.1. Be clearly labeled with competitor name(s), date and page # on each page
 - 1.2. Begin with a problem statement
 - 1.3. Include discovery and documentation of approach to solve problem
 - 1.4. Include sketched design concepts with critical features labeled
 - 1.5. Critical dimensions clearly labeled in design sketch

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- 1.6. Considerations for designing for additive manufacturing distinctly addressed (i.e., part strength, part orientation) especially including any expected risks during printing.
 - 1.7. Screenshots of the print time and material usage for all printed parts
 - 1.8. Design decisions and alternatives are documented and evaluated thoughtfully
2. The design must adhere to the Competition Requirements stated on the prior page.
3. Quality of final assembly
 - 3.1. Does it perform the function in the manner it was designed to do?
 - 3.2. Does it meet all requirements in the competition guidelines?
 - 3.3. Do inserted components or multiple printed parts mates together properly?
 - 3.4. Did the students design the part with additive manufacturing in mind?
 - 3.5. Is there sufficient tolerance between parts for movement?
4. The design must illustrate best practices for “design for additive manufacturing (DFAM)”. Below are some *potential* DFAM metrics to optimize for.
 - 4.1. Build Time
 - 4.2. Post-Processing/Support Removal Time
 - 4.3. Functionality Optimization (gear ratio, pliability, strength, etc.)
 - 4.4. Monetary Savings
 - 4.5. Material Consumption
 - 4.6. Energy Usage
 - 4.7. Component Consolidation (lack of store-bought hardware)
 - 4.8. Lightweighting for Ergonomics
5. Presentation Criteria
 - 5.1. The team clearly describes their understanding of the problem to be solved.
 - 5.2. Design Process: good design logic is used for key design choices. Intentional and well-communicated
 - 5.3. The presentation is professional and well-rehearsed.
 - 5.4. The presentation emphasizes quantitative improvements (measured and estimated) of the time, quality, or cost of the improvement as well as any DFAM tactics employed.

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- 5.5. Practical evaluation: team demonstrates visually (videos, photos, drawings, animation, etc.) the task they improved, both before and after.