Additive Manufacturing

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

Contest Location	▪ C-Hall ** Contest in A, B, C or D Hall will not be able to leave for lunch, please select "Contestant Plus" when registering or having contestant prepared to purchase lunch with credit card at vendors in the Exhibit Hall.
Special Notes	▪ Competition will begin immediately after orientation. All competitors must check-in by 10:00 a.m. Computers and other related items may be dropped off prior to competition. ▪ Upon arrival at orientation, students will be provided the timeslot for their competition. The first timeslot will begin at 10:30 a.m. and will run every 30 minutes until we have accommodated the number of teams there to compete. ▪ Students are to return to the competition area 30 minutes after the last timeslot (official time will be provided at the competition) to hear the top 6 teams that will be called back for the 2nd round of group judging. The top placing teams will be selected from this group of 6 ▪ No smart watches and/or phones are permitted during the contest and/or in the contest ▪ No contact with anyone outside of the contest area once the contest begins ▪ No inappropriate communication between contestants such as verbally degrading another contestant ▪ No cheating on any portion of the contest such as informing another contestant of the skills/test prior to competing.
Testing	▪ N/A
Eligibility	▪ One (1) team for each school

Clothing	Jeans (with no holes) or Khakis accepted. No shorts or open-toed shoes or sandals. Students can wear tennis shoes or work boots, but laces must be tied. Short sleeve polo, button up shirts, and plain non-graphic T-shirts are also acceptable. School and contestant names must be covered with tape.
Provided by Contestant **(Tool List)**	▪ Each team is responsible for bringing their 3D Printed model to the competition for testing. No parts will be printed at the competition. Models must adhere to the contest outlines from the proposed standards. o Present design to judges and answer questions o Showcase the functionality of the 3D printed component o Each participant must present hard copy of resume to the judges. Each participant must have one, these will not be collected, only verified that they have them. ▪ **Provide engineering notebook (guideline below)** o Be clearly labeled with contestant number, date and page number on each page o Begin with a problem statement o Include discovery and documentation of approach to solve the problem o Include sketched design concepts with critical features labeled o Critical dimensions clearly labeled in design sketch o Consideration for designing for FDM distinctly addressed (i.e. part strength, part orientation) especially including any expected risk during printing o Design decisions and alternatives are documented and evaluated thoughtfully ▪ **3D Printed Design Specification** o Design must adhere to the criteria listed in the contest outline below. Quality of final assembly (Form, Fit, Function) is important. o The design must illustrate best practices for "design for additive manufacturing (DFAM)". You must explain your selection and use of software for DFAM. It is highly suggested to use a free student license of nTopology (https://ntopology.education/academic_license) to assist you in performing design for additive manufacturing, and to help with explaining the "before and after" effects of DFAM practices. Below are some *potential* DFAM metrics to optimize for. ▪ Build Time ▪ Post-Processing Time ▪ Functionality Optimization (better grip, pliability, strength, etc.)

	▪ Monetary Savings ▪ Material Consumption ▪ Energy Usage ▪ Component Consolidation ▪ Lightweighting for Ergonomics ▪ **Presentation Criteria** o The team clearly describes their understanding of the problem to be solved. o Design Process: good design logic is used for key design choices was intentional and well-communicated o The presentation is professional and well-rehearsed o Practical evaluation o Teams may use a laptop to assist with the presentation, though not required.
Competition Standards **(Not all will be tested but contestant should be knowledgeable of all)**	Please refer to the National Technical Standards
Resume	▪ In conjunction with National Standards, violations may result in student loss of contest. ▪ All SkillsUSA Ohio State Championship Contest will require a short interview component. Students should be prepared with basic job interview skills.

SkillsUSA 2022 Additive Manufacturing State Challenge

Solving real-world problems

Welcome to the "Solving real-world problems" challenge!

The task at hand is to improve a process outside your home that can be improved using a tool that is printed or made using 3D printing.

Here are some ideas to start you thinking:

- a tool for improving a storage process
- a guide to help with repetitive tasks
- a tool for improving the accuracy of a process
- a visual indicator to reduce time or risk of error
- a problem that affects multiple people
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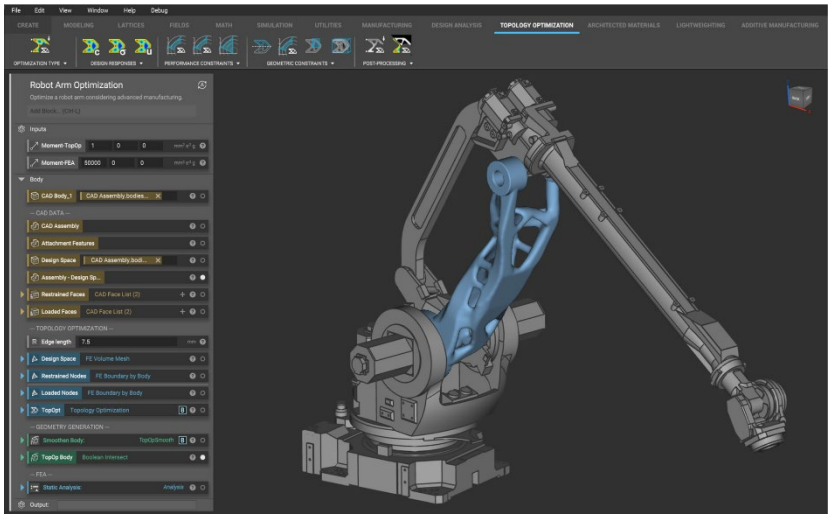

Design for Additive Manufacturing workflows in nTopology

Below are some additional requirements that the problem and solution must satisfy.

Competition Requirements

1. The solution you provide is recommended to have real, measurable results (increase in productivity, reduction in user fatigue, time/money savings, reduction in lead time, etc). Theoretical or guessed improvement metrics will not be graded as highly as experimental, proven measurements.

2. The design must contain (and communicate) thoughtful decisions around additive versus traditional/off-the-shelf components. At a minimum, it must contain at least one non-3D printed ("traditionally manufactured") component OR two different materials or colors in the final assembly

3. 3D Printed Design - Students must create a design that:
    - Prints all parts in less than 24 hours
    - Uses less than 60 cubic inches (1kg) of model and support combined for all parts

Tips for Competitors

Here are some tips to maximize your points:

- Get creative and gutsy in finding a problem
- Travel to a local manufacturer to uncover pain points
- Use online resources (nTopology, YouTube, GrabCAD)
- Whenever intellectual property (IP) deters you from a project, try using approximate geometries to communicate the design intent
- Consider using 3D printing as a tool to create the tool (thermoforming, epoxy molding, drill guiding, etc.)
- Solve a problem that impacts multiple people
- Incorporate non-3D printed components in your final assembly
- Optional design for additive manufacturing learning resources:
    - Stratasys Think Additively™ Masterclass:
        - https://youtube.com/playlist?list=PLUYaY5EIPtNBdU-s-7l9rl05lBHHlTarI
    - nTopology Learning Center:
        - http://learn.ntopology.com

For questions pertaining to the competition, please contact Chad Whited (cwhited@atctrain.com) or Bob Kelly (bkelly@atctrain.com).