

# **SkillsUSA 2022 Additive Manufacturing State Challenge Overview**

# Preparing for Nationals

- The goal of the 2022 SkillsUSA Additive Manufacturing State Competitions is to prepare students for a National Competition that will focus on an additive manufacturing (FDM specifically) design with strict requirements on form, fit, and function.
- Familiarity with nTopology software recommended
  - Link to nTopology Learning Center provided in student document



# Challenge

- Improve a process outside the home that can be improved using a tool that is printed or made using 3D printing



## SkillsUSA 2022 Additive Manufacturing State Challenge

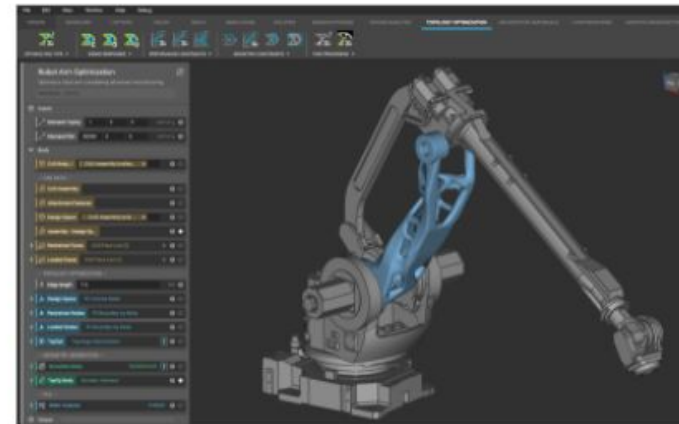
Solving real world problems

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



Design for Additive Manufacturing workflows in nTopology

# Competition Administration Document

- Challenge overview
- Materials and supplies needed
  - Student competitor
  - State competition host
- Judging suggestions

# Materials and supplies needed

## Materials to be provided by student competitor

- 3D design submitted by [REDACTED] submission date.
- Design files submitted to the correct location (GrabCAD Workbench recommended)
- Engineering notebook
- Presentation

## State Competition Host Requirements

- Student designs 3D printed
- A GrabCAD Workbench folder for the local competition.
- Judging criteria included in the “SkillsUSA.AM.2022.StateChallenge” document

# State Challenge Document Contents

- Challenge statement
- Competition requirements
- Tips for competitors
  - Includes relevant links and content where applicable
- State competition procedure
- State competition judging criteria

## **Competition Requirements:**

1. The solution you provide should have real, measurable results (increase 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 documented, proven measurements.
2. The design must contain and communicate thoughtful decisions around the use of additive versus traditional/off the shelf components. At a minimum, it must contain at least one non-3D printed (traditionally manufactured) component or at least 2 different 3D printed materials and colors in the final assembly.
3. 3D Printed Design – Students must create a design that:
  - a. Prints all parts in less than 24 hours
  - b. Uses less than 60 cubic inches of model and support material combined for all parts of the design.
4. Student must submit files to the judges via GrabCAD workbench no later than 11:59 PM CST on \_\_\_\_\_. Final prints matching the design submitted to the judges must be assembled and presented to the judges the day of the contest, at the beginning of the contest, for evaluation and judging.

## **Tips for Competitors to Maximize points:**

1. Get creative and be bold in solving a problem.
2. Meet with a local manufacturer to see if they will allow you to use DFAM (design for additive manufacturing) to help them solve a problem they have.
3. Use online resources; nTopology, YouTube, GrabCAD.
4. Whenever intellectual property (IP) deters you from a project, try using approximate geometries to communicate the design intent.
5. Consider using 3D Printing as a tool to create the tool (thermoforming mold, epoxy mold, drill guide, etc.)
6. Solve a problem that impacts multiple people.
7. Incorporate non-3D printed components in your final assembly.
8. Optional design for additive manufacturing (DFAM) learning resources:
  - a. <https://www.stratasys.com/en/industries-and-applications/3d-printing-industries/education/>