

# Additive Manufacturing RemotEDx SME/NRC Challenge

Middle School, High School, Post-Secondary

**(NEW for 2022)**

## OVERVIEW

The goal of the Additive Manufacturing RemotEDx SME/NRC Challenge is to challenge competitors is to give students to additional opportunities to experience simulated manufacturing projects that will enable to use the skills learned from the SME/ToolingU training while in the RemotEDx program. The event focuses on an additive manufacturing design with strict requirements on form, fit, and function of compact and intricate designs.

This contest has been designed with the upcoming National Robotics Challenge competition April 7th, 8th and 9th, 2022 in mind and is designed to challenge students understanding of and skills in Additive Manufacturing.

Participants use basic engineering techniques to evaluate designs they have modeled, 3D printed and tested. Each team researches, designs, and tests models to determine superior engineering. Teams research, model, and test a structure designed to hold the greatest load. Each team is given the selected height to be tested and must plan, 3D print, and submitted a model for destructive testing.

## MATERIALS AND SUPPLIES NEEDED

Materials to be Provided by Student Competitor:

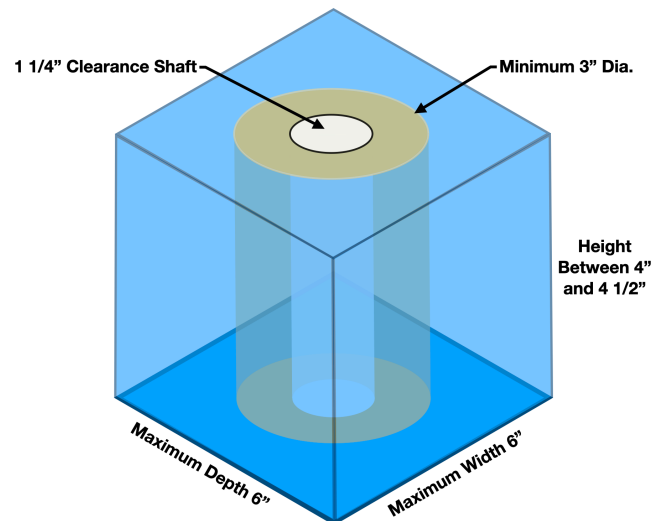
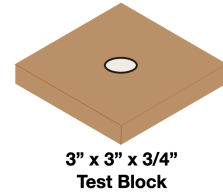
- Printed 3D designed structure
  - Structures can submitted in person by 10:00 AM Eastern Time on Friday, April 8th, 2022 at the National Robotics Challenge in Marion, Ohio or they can be postmarked by March 18th and mailed/shipped to:  
Ritch Ramey  
268 Thew Ave  
Marion, Ohio 43302
- In addition to the printed structure, the following items must be submitted via email to [ritchramey@gmail.com](mailto:ritchramey@gmail.com) by 4:00 PM on April 1, 2022.
  - Computer design rendering files in STL or CMB format.
  - Digital Engineering notebook
  - Video Presentation showing structure in printing process and students describing why they made design choices specific to their submitted structure.

Note: If needed, students may have an online interview with a panel of judges to further evaluate their project.

## REGULATIONS

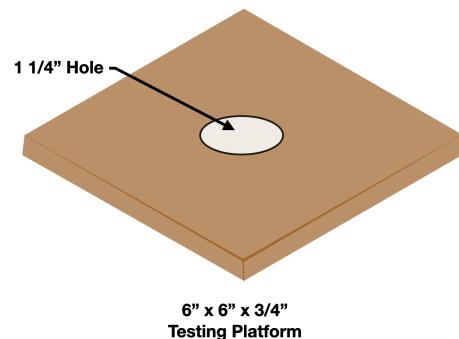
### 1. Structure Specifications

- 1.1. The height is the distance from the bottom of the base plate to the top of the structure. On the final submitted model this measurement must be between 4" and 4.5".
- 1.2. The maximum width and depth of the structure must not exceed 6" by 6".
- 1.3. The minimum width and depth of the structure must not be less than 4" in diameter.
- 1.4. The structure must support the 3" x 3" x 3/4" test block at the top of the structure.
- 1.5. The center of the structure must have an internal clearance shaft to allow passage for the test rod. The clearance shaft must allow for a 1 1/4" outside diameter cylinder to pass completely through the structure from top to bottom.
- 1.6. Structures that do not permit the passage for a 1 1/4" test rod are not tested.
- 1.7. Maximum total weight of the submitted structure is 50 grams.



### 2. Materials

- 2.1. All structures must be printed in a single print as one piece from PLA, ABS or Nylon.
- 2.2. Build material can be removed after the print is complete, but nothing may be added to the structure.



## EVALUATION

### 1. Testing

1. All structures are destructively tested by attaching a testing device of the coordinator's choice to the test block and adding resistance until the structure fails.
  - 1.1. Structures are NOT tested if:
    - 1.1.1. Center is blocked.
    - 1.1.2. Test block will not rest on top.
    - 1.1.3. Structure is outside of stated size limitations.
  - 1.2. Weight will be added to the test block until the structure fails.
  - 1.3. The structure will be deemed to have "failed" once the bottom of the test block reaches 3 1/2" away from the base of the structure/testing platform.
  - 1.4. Structure will be evaluated by a strength to weight efficiency ratio. The total weight held in pounds will be divided by the total weight of the structure. The structure with the highest strength to weight ratio will be deemed the winner.