Additive Manufacturing Contest

Open to pairs of students who have access to 3D design software.

OBJECTIVES

1. To demonstrate the application of additive manufacturing.
2. To apply engineering principles.
3. To promote creative thinking and demonstrate problem solving skills.
4. To display skills using 3D design software.
5. To exhibit principles of dimensioning on all prints.
6. To document design process from conception to conclusion.

CLOTHING / PPE REQUIREMENTS

Day 1 of the Event (Thursday afternoon from 4 pm to approximately 6:30 pm)

1. Business casual for all participants
2. ANSI Z87.1-approved protective eyewear

Day 2 of the Event (Friday morning from 10 am to 12:30 pm)

1. For men: Official red blazer or jacket; black slacks with white button-down shirt, black socks, black shoes, black tie.
2. For women: Official red blazer or jacket; black dress skirt (knee-length) or slacks 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 seamless hose and black dress shoes.
3. ANSI Z87.1-approved protective eyewear
4. The above clothing-based regulations refer to items that are pictured and described at: www.skillsusastore.org

SCOPE OF CONTEST

This skill-performance contest will require each two-person team to:

1. Develop and design a solution to the given problem (Day 1)
2. Submit a design to be 3D printed (Day 1)
3. Present solution and expectations for performance (Day 2)
4. Submit an engineering notebook which outlines the team's project process (Day 2)
5. Setup and destructively test the designed part in provided test fixture (Day 2)
6. Complete a written exam that covers the principles of additive manufacturing (Day 2)

Each team will design and submit a 3D model of their created solution so that a professional organization can 3D print the device overnight for the following day's final competition. On the first afternoon of the contest, a problem will be presented that will require each two-person team to create a solution within a time period of two hours. On the following morning of the competition, each team will provide the contest judges with working drawings (correct orthographic views), an isometric drawing, an engineering notebook, and also give a presentation to the respective judges. A 3D print of the submitted file will be subjected to a destructive test.

A full definition of the problem will be given to all of the participating teams on the first day of the competition. The contest will include the need to understand the limits of 3D printing parameters with adherence to material volume and build time requirements. The destructive test will involve forces being applied to the 3D printed part in compression, tension or torsional directions within a test fixture.

NOTE: Each two-person team must bring their own computer(s) with their preferred CAD software, as well as their own ANSI Z87.1-approved protective eyewear.

REQUIRED EQUIPMENT AND MATERIALS

1. **Supplied by the technical committee**:
    a. 3D print of contestant's submitted file.
    b. Post-printing processing tools.
    c. Blank engineering notebooks for teams to use during contest.

2. **Supplied by the contestant**:
    a. Personal computer system (Laptop) with a computer design system capable of rendering files in STL format. Make sure software licensing will work in the contest space outside of your school's location and outside of your school's normal calendar year.
    b. GrabCAD Print software downloaded to computer for use at contest. This software will be used during the contest.
    c. USB Drive for transferring STL or CMB files clearly labeled with team identification (number and letter). ID must be on USB drive, must not be able to fall off, and clearly visible to the naked eye.
    d. Calipers
    e. Ever-sharp pencils or pens
    f. A one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.