Transportation Challenge

teeca

EAST 2025

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Goals:

The primary goals of the competitive event publications are to:

1. Increase learning and participation value for students
2. Increase validity through alignment with course curricula and standards
3. Increase reliability through descriptive rubrics with standardized quality levels or detailed scoring systems
4. Standardize heading/sections and terminology for more consistent reference across documents
5. Allow more seamless updating, collaboration, reviewing, and publishing
6. Provide an accessible system that can be more readily copied and edited for subsequent years.

The audiences for the challenges are TEECA members participating in the competition that year and current judges. Use the following sections in your design challenge document. Below each section is the type of information you should include in that section.

1. **Challenge Description**

   This year's challenge is designed around aerial firefighting in the North American West and the challenges associated in coordinating such efforts. For this challenge you must design a system that will be able to apply fireproofing material to a set of target locations to the best of your ability. You must then be able to extract valuable cargo from the area.
2. **Standards and Benchmarks**
   a. **Standard:** STEL 2 Core Concepts of Technology and Engineering
      i. **Benchmark**: STEL-2W - Select resources that involve tradeoffs between competing values, such as availability, cost, desirability, and waste while solving problems

   b. **Standard:** STEL 2 Core Concepts of Technology and Engineering
      i. **Benchmark**: STEL-2Y - Implement quality control as a planned process to ensure that a product, service, or system meets established criteria

   c. **Standard:** STEL 8 Applying, Maintaining, and Assessing Technological Products and Systems
      i. **Benchmark**: STEL-8P - Apply appropriate methods to diagnose, adjust and repair systems to ensure precise, safe and proper functionality
   d. **Standard:** STEL 2 Core Concepts of Technology and Engineering
      i. **Benchmark:** STEL-2Z - Use management processes in planning, organizing, and controlling work
3. **Knowledge and Skills**
   a. Communication
   b. Item identification
   c. Implementation of electronic and mechanical devices
   d. Understanding of characteristics of materials
   e. Planning, implementation, and modification of complex systems

4. **Procedures and Timeline**
    a. The aircraft must be able to lift approximately 200 grams or less and fly stably
    b. The simulated fireproofing material will be a small water balloon or custom made refillable container for water
        i. Must hold no more than 200 grams of water
    c. The course will have 3 target locations outlined with reflective caution tape
    d. The aircraft must drop the water balloon and coat the target area
        i. The target area will be a square zone divided into a 3x3 grid, each piece being worth 1 point
    e. The staging zone will be no less than 50’ away from the drop zone
    f. Each team will be given a sectional aeronautical chart of the competition field and weather briefing at the competition and must file a plan for their operations prior to starting the competition
5. **Rules and Constraints**
    a. Each team will have 3 total attempts to drop balloons and will be able to reload manually at the starting area
    b. Each team may use a spotter who is standing no closer than 5 feet from the drop zone to guide the pilot
    c. There will be certain restricted airspace that will result in penalty points if entered
    d. Flight plans must be filed prior to takeoff
6. **Equipment and Materials**
    a. Team members MUST be members of an affiliated TEECA university. Each transportation team will consist of 2-5 students. Each team may have a maximum of one graduate student. A maximum of one transportation team may enter from each institution at each TEECA East Conference.
    b. Balloons will be provided at the competition filled to 200g or less
    c. Any custom made water holder must not hold more than 200g and tested to prove that
    d. You may use any vehicle that is remote controlled
7. **Evaluation and Judging**
    a. Teams will be evaluated based on:
        i. Technical documentation of solutions
        ii. Live performance
        iii. Successful solution
        iv. Ingenuity
        v. Coverage of drop area
        vi. Speed to deploy material
    b.
8. **Learning and Resources**
    a. This will include links to online learning materials that relate to the knowledge and skills specified above.

Links to online tools, such as conversion charts or technical notes that the team may need to consult.

These may also be included with contextual links in the procedures section when appropriate.

START HERE:

Challenge Description

Challenge Description:
This year's challenge is designed around firefighting in the North American West and the challenges associated in coordinating such efforts. For this challenge you must design a system that will be able to apply fireproofing material to a set of target locations remotely to the best of your ability with the aid of a spotter much like is done in true firefighting efforts.

Standards and Benchmarks

International Technology And Engineering Educators Association (ITEEA)

- Standards for Standards for Technological and Engineering Literacy (STEL)
    - **Standard:** STEL 2 Core Concepts of Technology and Engineering
        - **Benchmark**: STEL-2W - Select resources that involve tradeoffs between competing values, such as availability, cost, desirability, and waste while solving problems
    - **Standard:** STEL 2 Core Concepts of Technology and Engineering
        - **Benchmark**: STEL-2Y - Implement quality control as a planned process to ensure that a product, service, or system meets established criteria
    - **Standard:** STEL 8 Applying, Maintaining, and Assessing Technological Products and Systems
        - **Benchmark**: STEL-8P - Apply appropriate methods to diagnose, adjust and repair systems to ensure precise, safe and proper functionality
    - **Standard:** STEL 2 Core Concepts of Technology and Engineering
        - **Benchmark:** STEL-2Z - Use management processes in planning, organizing, and controlling work

Knowledge and Skills

- Communication
- Writing skill
- Item identification
- Implementation of electronic and mechanical devices
- Understanding of characteristics of materials
- Planning, implementation, and modification of complex systems

Procedures and Timeline

1. The aircraft must be able to lift approximately 200 grams and fly stably
2. The simulated fireproofing material will be a small water balloon or custom made refillable container for water
    a. Must hold no more than 200 grams of water
3. The course will have 3 target locations of 3 feet x 3 feet, outlined with reflective caution tape and divided into a 3x3 tic-tac-toe style grid for scoring
4. The aircraft must drop the water balloon and coat the target area
5. The staging airport will be no less than 100’ away from the drop zone
6. Each team will be given a mock sectional aeronautical chart of the competition field and weather briefing at the competition and must file a flight plan for their operations.

Rules and Constraints

1. Each team will have 3 attempts to drop balloons and will be able to reload manually at the starting area
2. Each team may use a spotter who is standing no closer than 5 feet from the drop zone to guide the pilot
3. There will be certain restricted airspace that will result in penalty points if entered
4. Flight plans must be filed prior to takeoff

Equipment and Materials

Team

1. Team members MUST be members of an affiliated TEECA university. Each transportation team will consist of 2-5 students. Each team may have a maximum of one graduate student. A maximum of one transportation team may enter from each institution at each TEECA East Conference.
2. Balloons will be provided at the competition filled to approximately 200g
3. You may use any aircraft that is remote controlled

Event Coordinator

4. Authoring a unique problem for the contestants.
5. Clearly identifying if the solution is to be fabricated on-site or if it should be preconstructed or some combination of both (hybrid).
6. Identifying if there are any specific tools, consumables or equipment required on behalf of the competing teams.

7. Providing all necessary props, consumables and testing equipment (such as stop watches or tape measures) to properly conduct the live testing element of the contest.
8. Working with the judges to ensure a fair contest for all teams that enter.
9. Confidentially reporting the results of the contest to the conference coordinator.

Evaluation and Judging

Teams will be evaluated based on:

1. Technical documentation of solutions
2. Live performance
3. Successful solution
4. Ingenuity
5. Coverage of drop area
6. Speed to deploy material

Learning and Resources

- Maps/Charts will be provided on site

References

International Technology Education Association (2021). *Standards for technological and engineering literacy: The role of technology and engineering in stem education*. Reston, VA: Author. Available in electronic version from the ITEEA web site.