



Delaware Technology Student Association

2020 MAGNETIC LEVITATION VEHICLES

Delaware Only Competition

*"SERVING TECHNOLOGY EDUCATION STUDENTS"
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2020 Theme: Hybrid Maglev Vehicles

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MAGNETIC LEVITATION VEHICLES

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Overview: Delaware TSA students entering the Maglev vehicle race are **required to design and construct a vehicle on-site using the supplied materials.** The vehicle will race over a 16-foot long magnetic track. The vehicle must be powered by wind AND a single DC motor with a propeller. The first 8 feet of the track *will not* be energized, and the vehicle will be powered by the wind. The last 8 ft of the track will be energized by a 12-volt dc transformer providing DC power to propel the vehicle to the finish line. Participants are to produce a Multiview Orthographic engineering drawing of the front, top and side view of the vehicle that will used to design the vehicle that is reflective of the materials provided on-site.

Contest Purpose: The Maglev contest will provide a means for TSA members to demonstrate their understanding of magnetism, aerodynamics, the design process, hybrid vehicles and both wind and electrical energy through the construction of a model maglev vehicle.

Eligibility for Entry: Entries are limited to one maglev per student. The competition will be for level I (Middle School) and level II (High School) students.

Time Limitations: The contest will run at the assigned time on the day of the conference. Up to a 1-hour window of time will be announced to allow students time to adjust their vehicles for maximum performance. Students who complete the on-site build early may begin testing and refinement early with prior approval of the contest coordinator. At the announced time, each entry will be tested through time trials.

TSA Regulations & Procedures:

- a. The challenge in 2020 is to design and build a Hybrid Maglev vehicle that will be built with provided items to catch the wind and a motor with a propeller that will have wires connected from the motor that will touch the inside of the track.
- b. DETSA will supply the contest materials on-site. **Tools will not be provided.**
- c. **Participants are required to provide their own tool box/container that must include identification (school name, address, and advisor cell phone number) that should not exceed twenty (20) inches (508 mm) length x ten (10) inches (254 mm) width x ten (10) inches (254 mm) height.**
- d. The tool box should include masking tape, double sided tape, x-acto blade or utility knife, scissors, sandpaper, ruler, 8 ½" x 11" grid paper, pencil, and a 12x12" piece of cardboard to be used as a work surface.
- e. **A Multiview Orthographic engineering drawing of the front, top and side views of the vehicle that will used to design the vehicle (drawing will be graded as part of the project, see rubric)**
- f. The vehicle shall be suspended solely by means of magnetic levitation.
- g. **Vehicle must only be constructed using the supplied on-site materials.**
- h. Conductive wires may not rest on the top of the rails.
- i. Students will be allowed time to adjust magnetic polarity prior to racing.
- j. Students will be allowed time to test vehicle on the track and make adjustments prior to racing.
- k. The track will be 16 feet long (14 ft race length).
- l. Energy to propel the maglev vehicle the first 8-foot section of track will come from a typical home style box fan set on the highest power setting available.
- m. The fan must remain on the table/provided and cannot be manipulated or moved in any way by students to keep the competition fair and consistent during testing and judging.
- n. The last 8-foot section of track will be powered by a DC transformer energizing the DC motor, spinning the propeller in turn moving the vehicle.
- o. Once time trials begin, repairs and modifications cannot be made.
- p. Students must wear eye protection during the construction, adjustment, testing, and competition periods.
- q. The vehicle will be judged based on the criteria established in the regulations, procedures, of the challenge and rubric.

- r. Students will have three race attempts - if vehicle is no longer able to run or does not have forward motion for 5 seconds, the time trial will be rated as Did Not Finish (DNF). Should an entry earn three (3) DNF's, the entry be disqualified (DQ).

Criteria for Judging:

- a. Production Quality – See Contest Rubric Provide Onsite
- b. Drawing Scale and Dimensioning – See Contest Rubric Provide Onsite
- c. Drawing Completion and Quality..... – See Contest Rubric Provide Onsite
- d. Time Trial Results – See Contest Rubric Provide Onsite