



SCIENCE OLYMPIAD WINDWATTS 2008

DESCRIPTION: This event requires participants to design and construct a device that will convert wind generated from a standard 19" box fan and tunnel to DC electric power. The tunnel provides directed flow and improved laminarity to the students project. Scoring will be based on the construction, materials, technique, logbook, and efficiency of the device. Teams should maintain and submit a logbook containing research, design and development information of the project that can be used to improve future design of the wind generator.

TEAM: 1 or 2 students **IMPOUND:** Yes **APPROX. TIME:** 10 minutes

MATERIALS:

- The project is to be a single structure using students' choice of materials for fan blades, or other innovative air collection device.
- Electric generation, using students' choice of components, shall be an integral part of the structure,
- Additional electronic circuitry may be used; diodes, bridge rectifiers, capacitors, coils and resistors to condition the DC output, but shall also be an integral part of the structure. No batteries or external electric power may be employed.

CONSTRUCTION:

- Wind collection area of the device shall not exceed 144 Square Inches, as measured at the face of entry. There is no limitation for depth of wind collection area, to allow for turbine or other unique wind collection technique.
- Single structure is to include all sub-components such as generator or circuitry.
- It shall be self-supporting to minimize movement during testing.
- Electrical generation is to be without aid of a secondary power sources.
- The project is to provide 24" long wires clearly labeled (+/-), plus/minus, or color-coded, positive (red) and negative (black), for connection to testing apparatus.
- Prior to impoundment, all construction is to be complete, with project and logbook clearly labeled with team name and school so the event supervisor can easily identify the team to which it belongs. Once impounded, no adjustments or testing is allowed until competition test time.

TESTING APPARATUS:

- Conventional 19" box fan with 19" square and 40" long cardboard tunnel taped to fan shroud and table shall provide wind power concentration, set on a 6 ft long (min) table close to the center a room, using low and medium fan speeds.
- Test apparatus will employ 5-inch electrical leads with alligator clips for connection to project power leads.
- A terminal strip, with alligator clips shall be provided to connect project wiring. The terminal strip has a 100-ohm 25-watt resistor in parallel with a 300-microfarad (min) capacitor to help filter and smooth DC voltage readings. The project leads connect in parallel with both the resistor and capacitor serving as a resistive load.
- A DC voltmeter will be used to measure voltage across the test load. The voltmeter shall be capable of measuring from 0.001 to 100.00 volts.
- A stopwatch shall be used to monitor setup time, and measurement test times at each fan speed.

COMPETITION:

- a. All projects and logbooks shall be impounded before starting of the event. No alterations are allowed following impoundment. Both projects and logbooks should be labeled with team name and school. Projects may be released from impoundment after the team has finished competing and appeals have been satisfied. However, appeals by teams will not be processed after they remove their device from impound unless it has been inspected and released by the Arbitration Board.
- b. All projects will be assessed and scored for material and construction per specifications following impoundment, and prior to testing.
- c. Only team members are allowed in the area during testing, no outside assistance is permitted. Teams violating these rules shall be disqualified.
- d. Teams will be allowed 5 minutes to set up their apparatus and connect leads to test apparatus.
- e. Device may be positioned any location, rotation, or height outside the tunnel as part of setup time. The fan will be on low speed to assist with this setup. The wind collection components must be located distance of 48"(min) from face of 19" fan, and beyond tunnel.
- f. Following setup the fan shall remain on low speed. The first voltage shall be recorded as the (Low Speed) peak DC Voltage observed during the 30-second period following set-up. The fan shall then be turned up to medium speed, and the peak DC Voltage observed during the second 30-second period (Medium Speed) shall be recorded.

SCORING:

- a. The score will be determined by innovation, construction, materials, logbook entry, labeling, set-up time, and the sum of voltage recordings (representing device efficiency) from both speeds.
- b. Scoring will be conducted in three tiers:
 - i. Projects that meet all specifications for materials and construction shall be rated in the first tier.
 - ii. Projects that do not meet all specifications for materials and construction shall be rated in the second tier.
 - iii. Projects that cannot be tested shall be rated in the third tier.
- c. Ties will be broken in review of team logbooks for legibility and accuracy.



WINDWATTS EVENT SCORE SHEET

SCHOOL _____

TEAM _____

Project impounded in time: (1 Point) _____

Project labeled with School/Team: (1 Point) _____

All components integral to structure: (1 Point) _____

No external electric power source: (1 Point) _____

Power wires labeled or color-coded: (1 Point) _____

Construction per spec: (1 Point) _____

Materials per spec: (1 Point) _____

Innovative design technique: (1 Point) _____

Structure does not move during test: (1 Point) _____

Setup time does not exceed 5 minutes: (1 Point) _____

Inspection and Setup Points (10 Maximum) _____

TIER PLACEMENT:

Tier 1 Scoring (all materials and constructions to spec, Allow Testing)

Tier 2 Scoring (materials and constructions NOT to spec, Allow Testing)

Tier 3 Scoring (cannot be tested)

SCORING:

Peak observed Voltage during slow fan speed (First 30-sec. Period) _____ (a)

Peak observed Voltage at medium fan speed (Second 30-sec. Period): _____ (b)

Total Efficiency SCORE: (a) plus (b) = _____

Inspection and Setup Points multiplied by 0.1 (1.0 maximum) = _____

Total Final Score _____

TIE-BREAKER: Logbook Review (Score: 1 lowest –10 highest): _____

Comments: _____
