Energy Transfer Machine on Video Rules

The Energy Transfer (ET) Machine competition provides a hands-on opportunity for elementary, middle and high school students to use their STEAM skills in a fun and creative way. Student teams are challenged to transform everyday materials into unusual, Rube Goldberg – type machines to accomplish a team-specified task using a variety of energy transfers including power from a battery. The team must also videotape their ET Machine performing its various energy transfers from start to finish, and submit their video for judging on a team created web page.

The Energy Transfer Machine competition is comprised of three divisions, elementary, (3rd – 5th) middle (6th – 8th grades) and high (9th -12th grades). 'Teams' may be an individual or a group of two (2) to six (6) students.

Machine Specifications

The size, shape and dimensions of the ET Machines are not limited. However, it must be designed so that it is possible to video tape the performance of the ET Machine from start to finish from a single video camera without using cuts or edits in the taping.

The machine shall:

1. perform a team-specified operation at the one (1) minute mark as the final step of the machine
2. have a minimum of five (5) steps in completing its team-specified task with at least one (1) step powered by electricity provided by batteries (not to exceed a total of 9 volts)
3. demonstrate a series of energy transfers. Identical transfers of energy in succession (such as a row of dominoes falling into each other) should be considered one step
4. not use any actual timing devices manufactured for that purpose
5. be constructed solely of parts provided by the team. Individualized components may be purchased, but the entire timing apparatus must be designed, assembled and when possible, fabricated by students. All component and fabrication choices must also be made by student team members
6. not use animals, hazardous materials, explosives or flames
7. not imply nor convey profane, indecent or lewd expressions
8. be safe and not pose harm to anyone or anything.

The machine may use programmable logic controllers or any other electronic controller; however, the programmable logic controller must not use any internal timer.

Video Specifications

1. At least one team member is required to clearly narrate and be on-screen in the introductory segment. A non-team member may do the videotaping, but non-team members on-screen will result in disqualification.
2. In the introductory segment, the narrator(s) will include:
    - School name

- Division
- Project name
- How electricity is used in their machine
- Description of the various steps and energy transfers in their machine
- What the machine will do as its final task at the 1 minute mark.

3. As the steps and energy transfers are described, those areas of the machine pertaining to that step should be pointed to by the narrator (or other team member) and shown in the camera view. This sequence may not exceed 3 minutes in duration or judging points will be deducted. At the beginning of the machine sequence of the video, the announcer will say, "Ready, Set, Go" for the official timing process to begin.
4. No edits are allowed to the machine portion of the video from the point where the narrator says, "Ready, Set, Go" to the completion of the ET Machine's final task. A complete run must be documented in this fashion. Any edits to this portion of the video will be grounds for disqualification.
5. If any team member interacts with, interferes, or assists their machines once time has started, the machine timing (for the precision score) will stop at that point. However, judging for other criteria continues.
6. The clock will be stopped and time recorded when the team designated, one-minute, final task occurs.
7. It is expected that the video of your most successful run (from start to finish – no edits) will be submitted for judging on competition day. Take advantage of the opportunity to videotape your machine multiple times to get the best run documented.

Tips for better quality ETM videos:

1. Turn your phone on it's side. Wide videos look better on screen.
2. Speak up! Pretend you are on a stage and you need to talk to a person who is in the back of the auditorium.
3. Light it up. Turn on all available lights. If you are outside, make sure the sun is to the back of the camera operator.
4. High Quality. Record the video at the largest size and highest quality settings available. When you export it from your video editing program, don't compress it too heavily. Upload a large video file to maintain the quality.

Web Page Submission

Each team will populate a web page that showcases their project. Access to a Wordpress web page for the team to populate will be provided by the Florida Solar Energy Center. These pages will be used to judge the project, as well as be available for public viewing during EnergyWhiz. The web page **must** include:

- Team name
- School name
- First name(s) of students on the team (no last names on the public page)
- Grade level of each team member
- A still photo, possibly a close-up of one section of the ET Machine

- A link to the video of the ET Machine run. This video is to be hosted on another site (such as vimeo or youtube).

The rest of the web page may include anything the team wishes to promote their team or their machine, and to spark interest with the public to view their video. Students are encouraged to be creative using photos, fonts, colors, diagrams and other design elements to populate their web page.

Energy Transfer Machine submissions are due April 23rd. The following week is reserved for judging the projects.

Competition Day

During the week of EnergyWhiz, May 3rd - May 7th, all Energy Transfer Machine pages will be available for public view. Students are encouraged to share their web page address with family and friends, and to visit other teams' pages. Awards will be announced May 7th.

Judging Criteria

Teams will be judged on the performance of their Energy Transfer Machine, as well as how it is presented to the public. This will include the description of the ET Machine in the team video as well as the team web page.

Additionally, the judges will be looking at:

ET Machine:

- number of energy transfer steps
- complexity and technical sophistication of the machine
- use of the electricity from the battery
- precision – how close the team defined end task came to the one minute mark
- creativity, originality, unconventional material use and design aesthetics

Video of ET Machine run:

- team knowledge
- clear and effective communication skills
- clarity of the video to effectively showcase the ET Machine's operation

Web page:

- creativity of design–how creative/attractive is the web page?
- quality/level of the digital technology used

Energy Transfer Machine Awards

1st, 2nd & 3rd place awards will be given in each division, and one 1st Place Precision award will be given out to the team that accomplishes their specified task closest to the target 1 minute mark (plus or minus), as determined by our judges.