



Engineering / CAD

"Extinguisher Vehicle Design"

Objective:

In this engineering design exercise your team of (1 to 3 members) will design, document, and construct a self-propelled, rubber band and/or battery powered, vehicle, which will facilitate the suppression of a candle flame positioned 12" above the floor and 12'-4" from the starting line. In order to evaluate the efficiency of the group's design, each team will compete on the course outlined below.

Information and Criteria:

- Tile floor (12" x 12" tiles) **3 ft. wide by 12 ft. long lane** (marked by tape)
- The "**stop zone**" will be 9 feet and ending at 12 feet. **Zone Area (3' x 3' x 3')**
- Candle and adjustable holder.
- Scrap materials, wood, metal, plastic, etc..
- Rubber bands.
- One or more battery(ies)
- Vehicle must be fabricated from scratch with scrap like materials.

Design Restrictions:

1. The device must leave the starting line under its own power. The devices may employ manual brakes (i.e., human fingers on the wheels or power source) to position it on the track. The operator may only "let the device go" without pushing.
2. Once the vehicle is started, no external communication, interaction, or influence of any kind is allowed (i.e., the system must be completely autonomous).
3. The device must fit into a 12" wide x 12" long x 14" tall box.
4. Travel and suppression delivery capabilities must be accomplished through the use of one or two AA battery (ies) and rubber bands. Each run must be accomplished within two (2) minutes.
5. Any number and combination of rubber bands may be used.
6. No part of the vehicle and the suppression delivery device may be left behind at the start line.
7. Only one suppression cycle per run will be allowed. The run is considered completed once the candle flame has been extinguished or one suppression cycle was completed

(within the two-minute limit). The vehicle and the suppression delivery device can not touch the candle, candleholder, or flame.

8. The vehicle and the suppression delivery device must stop in the stop zone or area.
9. The suppression system must only be activated when the vehicle is in the stop zone.
10. The holder and candle cannot be hit, touched, moved or knocked down.

Scoring:

- The objective is to move the vehicle from the start line to the stop zone and then activate a suppression system that will extinguish a candle flame. Scoring is based on these factors listed in the grading criteria below...
- In the event of a tie, the highest average score for the three runs will be the winner.
- In the event of an average score tie, the fastest average time from start to final candle flame suppression will be the winner.

Grading Criteria

Specific Criteria Items	Pt's. Possible
Designing a vehicle that meets specifications and is able to move "any" forward linear distance.	25
Vehicle travels (in bounds) the length of the 12 ft. approach lane.	25
The vehicle stops within the 3' x 3' stopping zone. (9'-12')	25
Delivery of the suppressant in an attempt to extinguish the candle.	25
The device totally suppressing the candle flame "from the stop zone".	25
3 View Scaled & Dimensioned CAD Drawing	100
Isometric Scaled CAD Drawing	75
Rhino 3D Modeled Drawing	100
Total Points	400
Extra Credit - Successfully "completing" all criteria above...	50