

Regional Design Challenge 2017

Repeatable 'vehicle'

The competition date is to be determined in each region.

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1.0 Introduction.

This year the competition is to build a repeatable 'vehicle'. The 'vehicle' can be any movable device - wheeled, walking, sliding, jumping, rolling or other. It must move from a point on a flat surface to touch a wall placed at right angles to the point and then return to stop as close as possible to the start point. The vehicle is to be started manually, but once it has started no interference or outside control is allowed.

Schematically (in stages) what needs to be done is shown in Figure 1. The aim of the competition is to make a vehicle stop with 'd' as small as possible.

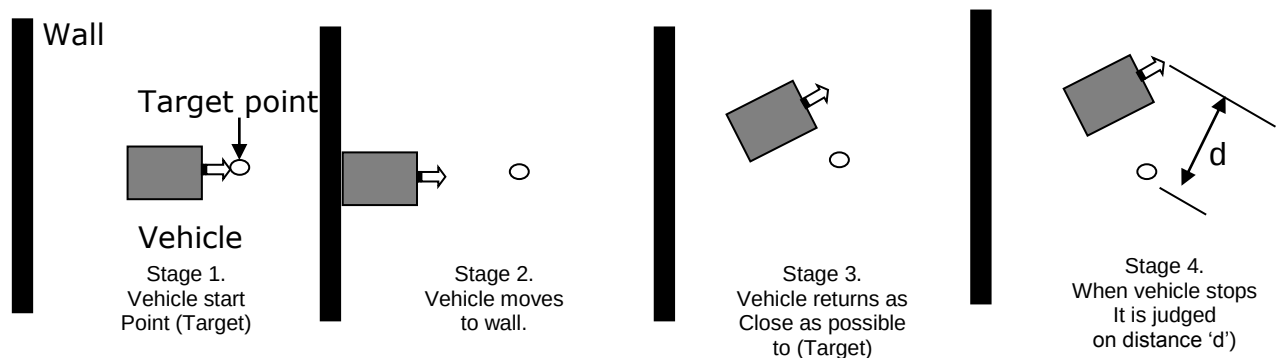


Figure 1. Schematic of the competition (not to scale; 'vehicle' does not have to be as shown).

The challenge will be in four parts, each part will be awarded separate prizes.

1. Work in teams to design, build and test a vehicle to compete with other teams
2. Produce a poster to publicise the teams' work. The poster is a demonstration of the team's ability to sell their design solution.
3. Give a short presentation explaining the design and development of the device to demonstrate their verbal and presentational skills.
4. Submit a peer review where all students have the chance to vote for the best engineered solution to the problem.

In the spirit of the competition, it is expected that the device be designed, developed and manufactured by students within the facilities of their university. Any member of the team should have a good understanding of the design principles, theories, manufacturing methods and materials used.

2.0 Competition Rules.

2.1 The 'vehicle' can be any type of device, but must be self-contained and at all times during the competition must fit within a maximum working envelope of 0.4m x 0.4m x 0.4m. Nothing used by the vehicle to navigate or move can be outside that volume during the race (no remote control, power leads, laid tracks, left behind markers, gps etc.)

2.2 The lane will be a flat, horizontal, wooden surface; the wall will be 0.3 m high, vertical, rigid and heavy (see Appendix A).

2.3 No proprietary vehicles or proprietary, pre-programmed control units may be used. The means of determining distance is to be mechanical

2.4 Any electrically operated vehicle must be appropriately fused.

2.5 The final position of the vehicle will be determined from a datum point on the rear of the vehicle. The datum point will be the tip of a "RS Pro Steel Brass Plated Square Hook 20mm", which is to be held in the vertical position (See figure 3 appendix B). The square hook must be securely fastened to the rear of the vehicle and must be clear of the vehicle to allow accurate sighting.

2.6 The competition will consist of heats whereby each team will have a single run, at the wall, in each of the three different wall range distances. The wall will be placed in the short range (1.4-2.4m), medium range (2.4-3.2m) and long range (3.2-4m). The wall distances will be the same for all teams, but will not be known in advance, and will be determined on the day.

2.7 After each single run the distance from the vehicle datum to the target point on the board will be scored and recorded. After the three single runs the three scores recorded will be added together and the three teams which achieve the highest combined score go forward to the final.

2.8 In a run, the vehicle will have one attempt to return to the target. The run is on accuracy alone, not on speed.

2.9 Three vehicles will be run simultaneously on different lanes. During a run all team members must be outside the test area. A judge will be allocated to each test area to ensure the correct procedure is followed.

2.10 A team will score zero points,

- if the vehicle does not hit the wall,
- if the vehicle leaves the lane (see Appendix A),
- if the vehicle has not come to a stop after 3 minutes,
- if the vehicle, or its team, does not comply with the competition rules, or
- if a vehicle does not stop within the target area around the datum point

A vehicle, disqualified from one of its attempts can still take the other attempts.

2.11 Repairs and minor alterations to the vehicle between the single runs in each heat is allowed, but is limited to 2 minutes.

2.12 In the event of a tie affecting qualification to the final or placing in the final, the tied vehicles will be retested in head-to-head heats until a winner is found. In the unlikely event that a winner cannot be determined after three attempts the distance to the datum point will be measured and the vehicle with the shortest distance will be the winner

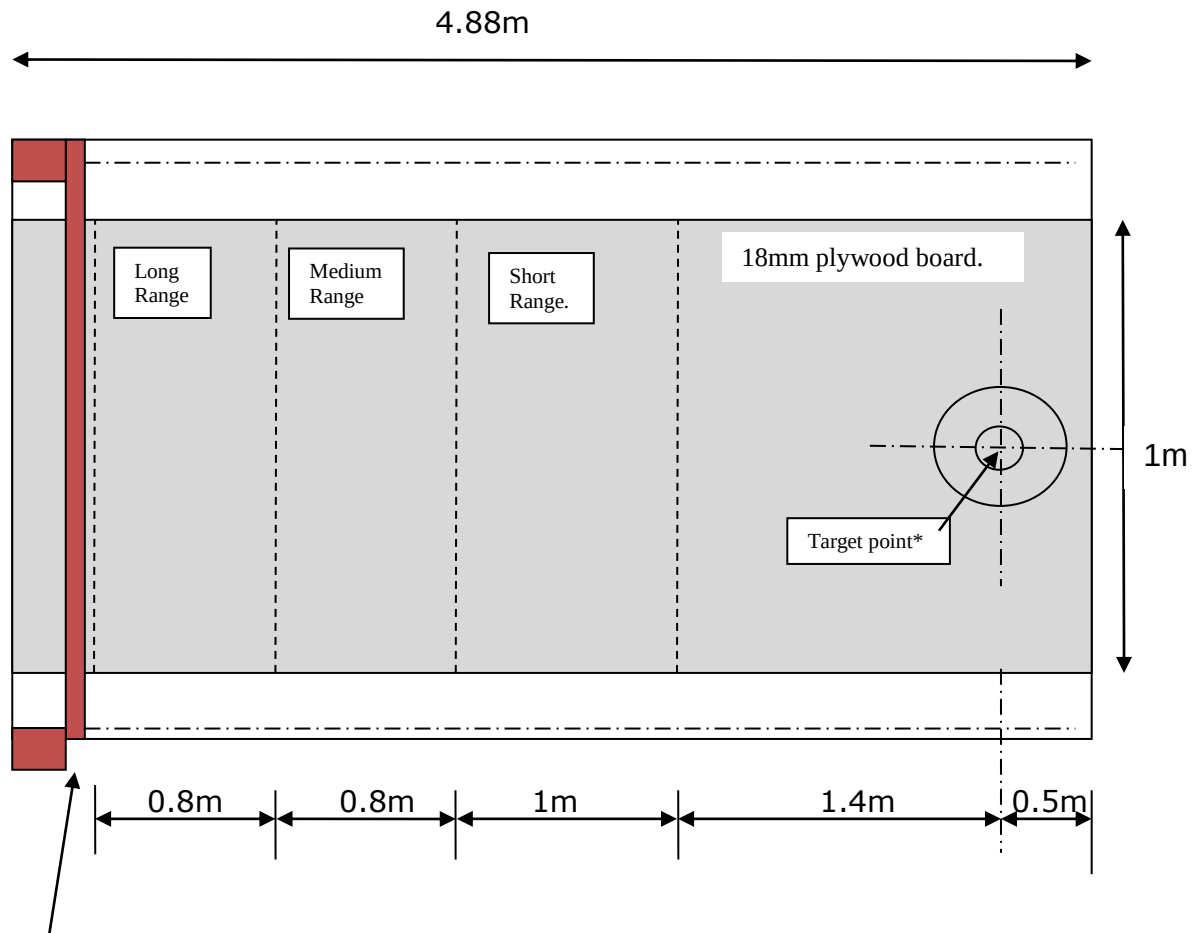
Appendix A

Run procedure and lane area

Procedure for each run:

1. Teams put forward their vehicles.
2. Teams put vehicles in the test area with the vehicle datum over the target point.
3. Judges check position of datum etc.
4. Teams start vehicles manually and then leave the test area.
5. The attempt ends when a vehicle has stopped.
6. Judges will determine points from the scoring rings around the target point.
7. Teams collect vehicles when authorized by the judges. Minor repairs and adjustments can be made at this stage.
8. Run is repeated (steps 2-7) on each of the three lanes.
9. A team's final accumulated point score is taken as the sum of the values recorded after each single run.

Lane area:



Moveable (22mm plywood) wall.

* Target point: There will be a series of circles around the target point and each band between the circles represents a number of points. The highest score being the target point and then the points becoming progressively less as the circles increase in diameter. (See appendix C)

Lane area is 1m wide (shown shaded in figure 2).

The surface board will be Plywood Hardwood Throughout 18mm x 2440mm x 1220mm supplied by: TravisPerkins.co.uk (Item Code 767336)

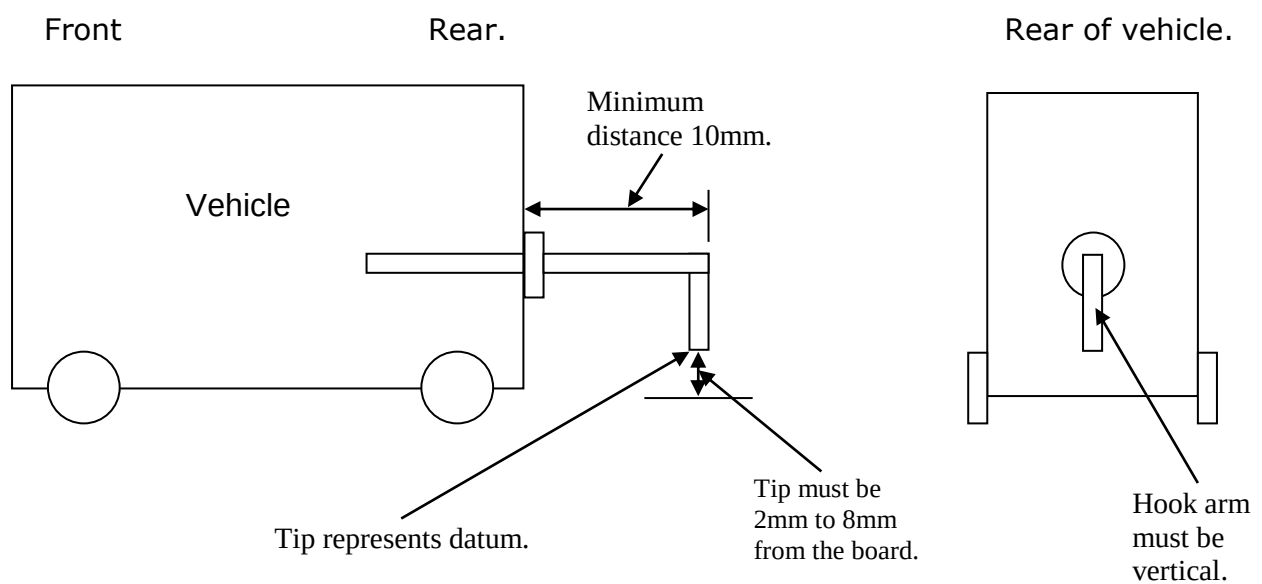
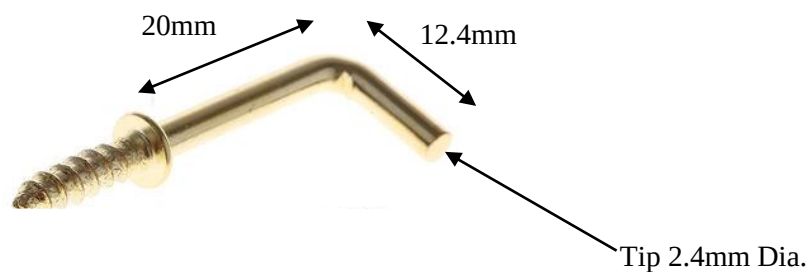
Figure 2. Schematic of lane area (plan view). A vertical wall of 0.3 m height is placed normal to the centreline. Vehicles must remain within the grey area.

Appendix B

Datum point required on the vehicle.

Figure 3 RS Pro Steel Brass Plated Square Hook 20mm to be used as datum on the vehicle.

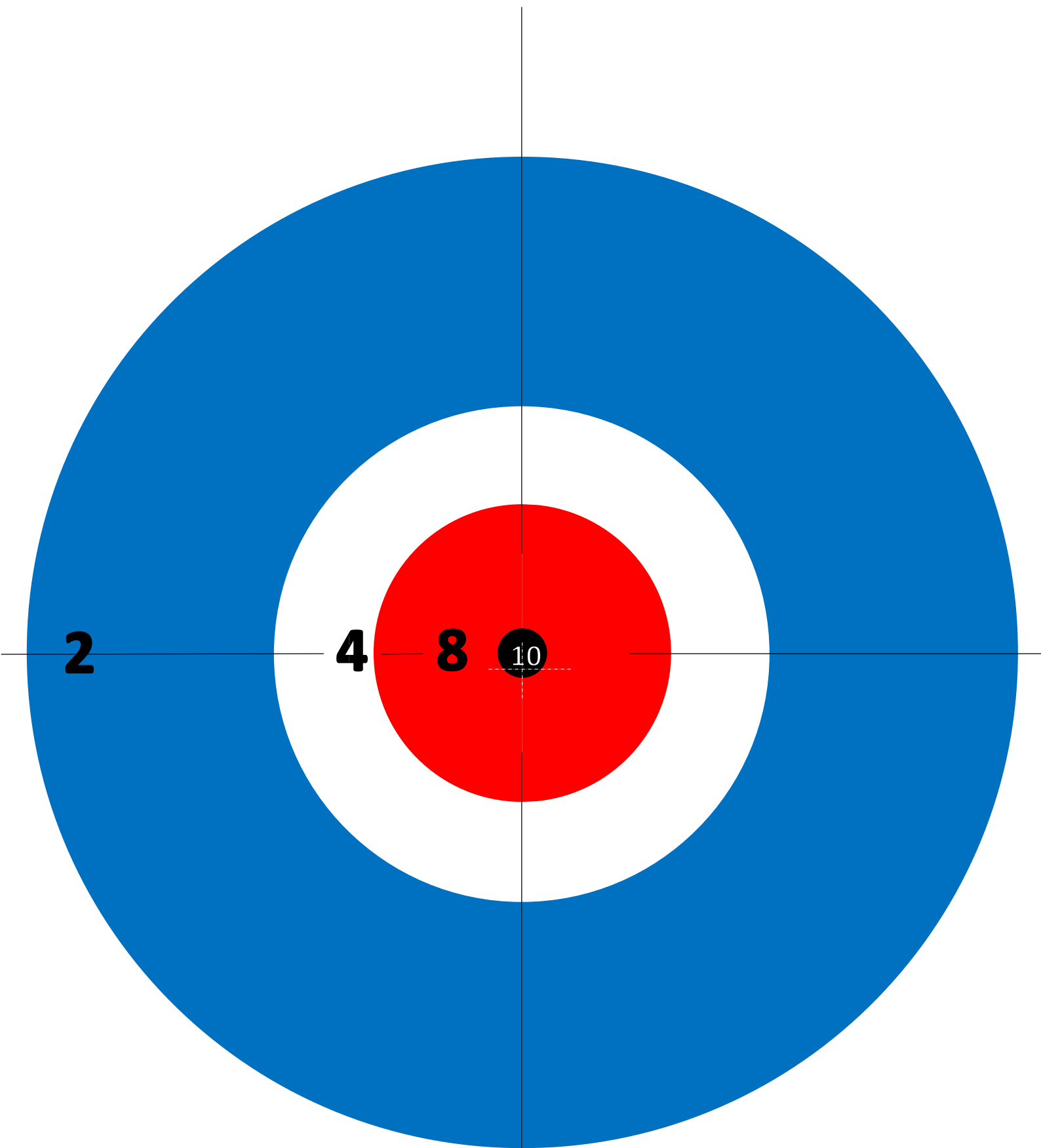
- RS Stock No. 397-4954



Appendix C

Suggested Target.

On next page.



Outer Diameter 20cm.