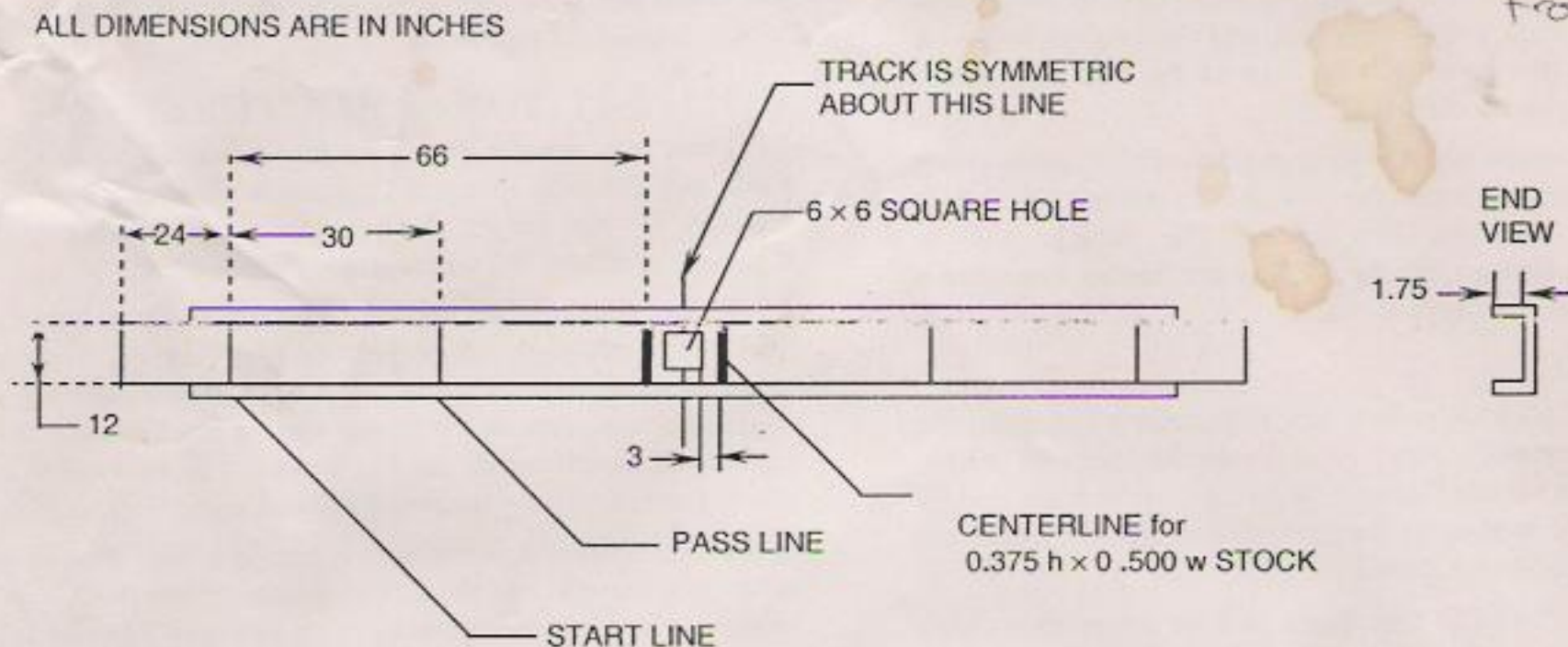


2004 DESIGN COMPETITION RULES AND PROCEDURES

↑
Coffee

from Kwall



OBJECTIVE:

To design and build a vehicle that will roll across a track carrying a footbag ("hackey sack"), drop the hackey sack into a 6-by-6-inch hole and return down the track past the original starting line in 15 or fewer seconds.

VEHICLE SPECIFICATIONS:

1. The complete vehicle must be designed to fit in a 12-inch cube at the beginning and end of each run. The complete vehicle is defined by all its parts, except the hackey sack. The vehicle may change shape during the run.
2. The vehicle must include at least three wheels and must roll on its wheels while traversing the track.
3. The vehicle must have an original chassis.
4. The vehicle must use a momentary switch (normally closed) to activate the vehicle at the start of each run. An additional toggle switch may also be used in the circuit to turn off the vehicle when not competing. No "hot starts" will be allowed. (See website for further details.)
5. No remote controls (wired or wireless) are allowed.

THE HACKEY SACK:

For purposes of this contest, a hackey sack is a soft, particle-filled object with a knitted outer cover. It approximates a sphere 2.50 inches in diameter and weighs 40 to 50 grams. The official hackey sack to be provided by the judges at the Design Competition will be Style #733 as described at www.worldfootbag.com. Participants are responsible for providing their own practice hackey sacks on the day of the competition.

THE TRACK:

Top and end views of the track are shown above. All dimensions have a tolerance of ± 0.13 inches unless otherwise noted. The track is made from BD plywood with the B-side facing up as the track's running surface. The side rails are made from 1-by-3-inch No. 2 pine.

An infrared light source will be mounted 1 inch (± 0.13 in.) above the surface of the track perpendicular to the side rails. The beam will be aimed at a sensor placed in the opposing side rail, so that the beam forms a line parallel to, and 1 inch above, the start line. This beam will be used to judge all starts and to time all finishes. Vehicles will need to be constructed to ensure that this beam is broken at the start and finish of the run. The beam will not be visible to the naked eye.

POWER:

1. Power to propel the vehicle may be derived from two "AA" alkaline batteries only. No additional power sources may be used to move the vehicle. However, additional power may be derived from other batteries, springs, rubber bands, or other suitable means for the purpose of powering on-board electronics or releasing the hackey sack.

2. The vehicle must not use CHEMICALS or DANGEROUS SUBSTANCES. No rocket-type devices, no CO₂ propulsion devices, and no chemical reactions are allowed. Fire is considered a chemical reaction. Any vehicle deemed dangerous by the judges must be suitably modified or will be disqualified. No substance that can damage the tracks or cause harm to the participants may be used.

THE CHALLENGE:

1. The entire vehicle must remain completely behind the start line before the starting signal.
2. The entire vehicle must stay within the track's side rails while traveling down the track. The tops of the side rails may not be used to support the vehicle in any way.
3. To be eligible to score points, the leading edge of the vehicle must pass the "pass line." The vehicle need not travel to the end of the track before dropping its hackey sack.
4. To score drop points, the hackey sack must be placed into the hole and pass through the hole into the retainer below. A hackey sack that hangs on the edge of the hole will not be considered to be "in the hole."
5. To score return points, the complete vehicle must return down the track and break the plane of the starting line within 15 seconds from the start signal. The vehicle will be considered to have broken the plane of the starting line when it first breaks the starting-line.

SCORING:

1. **DROP POINTS:** A vehicle that completes a run down the track and successfully drops its sack into the hole will receive one point. The vehicle that completes the drop first, defined by the sack at the bottom of the cone-shaped retainer under the hole, is awarded an additional point.
2. **RETURN POINTS:** One point will be awarded to each vehicle that returns down the track and crosses the plane of the starting line within the 15-second time limit. The vehicle that does this closest to, but does not exceed, the 15-second time limit, is awarded two additional points.

RULES OF ENGAGEMENT:

1. Team members will have two minutes to get to the starting position after being called for a round. After two minutes, the judges will initiate a countdown to the start. At the judge's discretion, any vehicle not ready will forfeit the round. If neither vehicle responds to the start, the judge may allow a second attempt.
2. The start countdown will be indicated by a series of four audible beeps (accompanied by a visible light placed near each starting line). These beeps will sound at approximately half-second intervals. The start will be on the fourth beep (i.e., "three, two, one, go"). The momentary switch must be depressed through the countdown sequence and can only be released on or after the fourth beep ("go").
3. If any part of the vehicle breaks the starting-line beam prior to the start signal (the fourth beep), a false start will be declared. Any vehicle causing three false starts within a given round will forfeit that round.
4. Vehicles may not be touched after the start until the 15-second time limit has elapsed, even if one vehicle appears to be the winner. If a team member touches his or her vehicle before 15 seconds has elapsed, the vehicle will be disqualified for that round.
5. Team members may change batteries at any time except when a run is underway. If done between attempts during any one round, a one-minute time limit will be enforced.

6. Teams may modify the vehicles between rounds, but not between attempts in the same round. Teams will be assigned a work area, but no tools will be supplied. Teams are expected to bring everything they need to repair or modify vehicles during the competition, including spare batteries and parts.

7. Only team members may be in the competition area. In addition, only team members may request that the opposing vehicle be verified for compliance with contest rules and design limits. Any compliance challenge must be made to the judge prior to the awarding of points. If a vehicle is challenged and found not to be within the specified design limits, it will be disqualified for that round.

COMPETITION STRUCTURE:

1. Teams will compete in at least four rounds of competition. Each vehicle will compete against a different opponent, selected by the judges, during each round. Requests for schedule modifications will not be accommodated.
2. The top 16 teams will advance to the Semifinals, based on total points accumulated in the first four rounds. When ties result in more than 16 teams, a random drawing among the lowest point scorers in the group will be used to reduce the number of Semifinalists to 16. Teams will be seeded and scores reset to zero for the two Semifinal rounds.
3. The top scoring 8 teams during the Semifinal rounds will advance to compete in the Grand Finale. When ties result in more than 8 teams, a random drawing among the lowest point scorers in the group will be used to reduce the number of Finalist to 8.
4. During the Grand Finale, a "double elimination" format will be used in which teams are eliminated after two losses against other finalists.
5. In all cases, decisions made by the judges are final.

HELPFUL HINTS:

1. Design for both offensive and defensive strategies. However, vehicles intentionally designed to destroy or otherwise damage other vehicles will be disqualified at the judges' discretion.
2. Design so changes can be incorporated quickly. New ideas seen on other vehicles may be used. Vehicles may be redesigned or rebuilt at any time as long as they are operational when called for a round and meet specifications.
3. Design for durability. Opposing vehicles and accidents can damage a fragile design.
4. Design for easy repair. Keep the design simple. Complex designs are more prone to breakdowns and are difficult to repair.
5. HAVE SPARE "AA" BATTERIES AVAILABLE.

FINAL NOTE:

Please visit the Design Competition website (www.bu.edu/eng/events) periodically for updates, pictures of the track and some prototype designs. If you have any questions about the Design Competition, please call or e-mail Marc Davino, the event coordinator, at 617-353-6447, 1-800-578-1223, or engineering@bu.edu.