EVENT SUPERVISOR GUIDELINES FOR HOVERCRAFT 2017-2018

A major change for this year is the track surface is now the floor. You should pick a section of floor that is clean and reasonably level. You must fasten down your studs (probably with tape) to form the rails of the track. You are strongly encouraged to use photogates to time the vehicles. You can buy cheap lasers (I found mine on Amazon) and wire them to a battery pack of two AA batteries and they should run all day. You need photogates with external ports (Vernier Software sells wide photogates like this). You need some hardware to hold the photogates and lasers so they are aligned. You can use ring stands or build some kind of rack. I prefer to build something that will keep the laser aligned to the photogate port in case someone bumps it. You might also want to attach the rack to the studs in some way, but if you plan to run this at more than one tournament, you need to be able to vary this attachment point to get different track lengths. You should put down tape to serve as the start line and the finish line. See pictures of a simple track setup.

This version is hinged in the middle. This picture shows the track folded in half. I have fastened a piece of near the hinges for handling and travel. Otherwise the rails would move around damaging the track. A rope is tied around the boards that form the ends of the track.

This picture shows the track opened up. The support board near the hinge has been removed. This fastens on with bolts and wing nuts through a hole drilled near the hinge. The support board and rope are lying next to the track. I used small steel studs instead of 2 x 4 metal studs. They are lighter and take up less space (from Home Depot).

Support board and bolt

You should notice that I cut boards to fit into the rails. This gives more weight and keeps the rails lying flat (metal studs are very flimsy, but straighter than wood and have less friction than wood). I drilled the metal studs and wood, then used small bolts to fasten the rails together.

This shows the hinge type.

Photogate and laser rack. I glued magnets to the inside edges of the rack so they will attach to the rails and keep the rack in place.

The photogate is mounted to a ¼" threaded rod that goes through the rack and fastened with wing nuts inside and out. The photogate stem goes into part of a bracket sold by Vernier software (it has a ¼" threaded rod in the middle of the bracket and made it easy to thread onto the ¼" rod I used.)

The laser is taped onto a ¼" threaded rod and wired to a AA battery pack.

We simplified the check in process by requiring the vehicle must fit into a 40.0 cm x 40.0 cm x 40.0 cm box. So you can build a box to check this or just measure the dimensions. The larger footprint should give more success than last year. The vehicle can be wider, longer, or higher than this when running. You no longer need to mass the vehicle.

The vehicle must have a place/way to hold up to 16 rolls of pennies that serves as the load. You can pre-mass the penny rolls to 0.1 g at least and write it on each roll so all you need to do is add them up to determine the overall load. That way you don't need a balance at the tournament.

Hovering can be checked by having the team push down on their vehicle and you should see it rise slightly.

The event supervisor should never touch the vehicle. Have students handle it and put it into your box to check dimensions and do whatever handling is required.

Shielding has been changed to ⅜ " squares to encourage more success. Fine screen or mesh blocks too much airflow and leads to failed runs. You need a ⅜ " dowel to check this. Make sure the bottom is shielded with a bag or screen. Holes in the bottom bag must be ⅜ " or less.

We have simplified the electrical components to just those listed in the rules. Make sure you know and can recognize them. The team must be able to identify the components and must provide a schematic diagram for you to review.

I never say the target distance and time out loud. I show it on paper to teams as they begin their 8-minute vehicle testing period. Making adjustments for the distance and time is part of this window of time and announcing it earlier gives an advantage to teams in later time slots. The time must be whole numbers, no fractions of a second are allowed. The distances must be whole numbers of centimeters.

I strongly encourage you to check vehicles during impound so that teams have time to fix things without penalty (if they return during the impound period, they are not penalized if they were able to fix a problem). If the team cannot fix the problem, they should complete the impound anyway. They may fix things during the 8-minute vehicle testing period, but this does result in a penalty (construction violations corrected).

Use a stopwatch to time the run (starting it as the vehicle crosses the start line and stopping it as the vehicle crosses the finish line). This stopwatch also allows you to determine a failed run for taking more than 3 times the target time (this also begins as the vehicle crosses the start line). If the vehicle stops, you should count 3 seconds and then declare a failed run.

A spreadsheet for scoring this event is available on SOINC.org. I encourage you to use it.

You need one track and measurement stuff for each 6 teams (6 teams x 8 minutes per team). You should check each device for compliance with specs as they arrive at impound. This gives teams a chance to fix things without penalty. A 40.0 cm x 40.0 cm x 40.0 cm box will help this to go quicker than measuring each dimension. The hovercraft may be larger (ex. bag or wires may extend beyond 40.0 cm when running) as long as it fits into the box at check-in.

I am concerned about uneven floor surfaces, so I have built tracks that have a bottom on them. I used whiteboard material available from Home Depot or Lowes. I also ripped wooden 2 x 4s to fit into the metal studs that is the same depth as the studs. This allows the rails to be fasten to the whiteboard without the whiteboard denting into the rail. The whiteboard is somewhat flimsy since its only 1/8" thick.

This is the track opened up. It is hinged in the middle (just like the above version). The plywood behind the track is just for working on it and is not part of the track.) The whiteboard is bolted and screwed to the rails. Because of the track dimensions, there will be a seam in the middle of the track. I will put mylar tape (used for fiberglass ducts in heating systems) on the seam.

Details of the track end

When folded, the edges of the track that will be in the middle (at the hinges) are very easy to damage. So I made a guard to fit over the track when folded. It is a rectangular box with a plywood side. This slips over the track when folded.

This shows the guard in place on the folded track (at the hinged end).

This shows the ripped 2 x 4 that fits into the metal stud.

This shows the wood inserted into the metal stud. I clamped the stud tight, then used a punch to dimple the stud bottom, then drilled holes through the stud and the wood. Then I pounded nails into the bottom of the stud.

I also made smaller photogate and laser holders that attach magnetically to the track.