

Greater Philadelphia Sea Perch Challenge

(An International Qualifying Regional Competition)

2019 Competition General Rules

Last Updated December 4, 2018

Vehicle Compliance

Each SeaPerch ROV must complete a safety and maneuverability compliance check during check-in, and approved prior to the team competing in the pool events. (for more information see the compliance requirements section on this web site)

Your team cannot proceed to any of the follow-on events unless these requirements are fulfilled. A sticker will be issued for each of the compliance checks to show you have passed Compliance #1 and #2.

Only two team members are permitted at Compliance stations 1 and 2.

Triage

The vehicle may be worked on by the teams during the competition at the triage station.

1. The triage station is equipped with select spare parts and hand tools
2. Triage engineers are not there to build your ROV's replacement parts
3. Triage is to be utilized for repairs and not for building the ROV
4. Triage engineers are there to ensure the safety of the students and assist with minor repairs

Pool Access

Absolutely NO glass, chemicals, CO₂ Cartridges or loose materials are permitted in the pool or on the pool deck.

Only two team members are allowed on the pool deck in the competition area during an event.

Advisors are not permitted on the pool deck during competition events.

One driver and a second person on deck able to control the tether. The second person can also deploy the ROV in the pool, remove it and any other objects from the pool.

All team members must wear shoes with rubber soles on the pool deck.

Each team should bring their own charged battery to the pool. Make sure your battery is fully charged.

- The vehicle MAY NOT be dragged via the tether.
- The vehicle may be reset by the teams during the competition.
- The ROV may be worked on in triage by the teams during the competition.

Vehicle Design Rules

Teams are encouraged to think outside the box and change the shape and configuration of their SeaPerch ROV.

(High School and Middle School)

Captain Rank (Stock Class) is defined as:

- Teams may utilize materials (quantity and components) equivalent to one SeaPerch kit.
- Teams have a budget of \$20.00 in addition
 - The actual value of the modifications must be \$20 or less.
 - Donated material will be assessed at what the cost would be to procure the material.
 - The \$20 limit is for cost of the materials utilized on the final competition vehicle.
 - Reasonable spare parts (one set of thrusters (3) and one controller) are not included in this budget.
 - Proof of budget compliance should be made available to the judges upon request.
- 3D printed parts will be costed out at \$0.025 per gram.
- All motors must be waterproofed.
- Hooks and attachments **MAY NOT** be added/removed between competition rounds.
- Additional **NON**-stock motors may be utilized for actuation or other non-propulsion uses.
- Teams may only utilize stock SeaPerch motors for propulsion (Jameco Electronics P/N 232022).
- Teams may only utilize three (3) thrusters.
 - A thruster is defined as a means of propulsion for the SeaPerch, normally but not limited to a motor and propeller assembly.
- Teams will design for and utilize a 12-volt power source.
 - Power source other than the included kit battery or venue supplied power is not permitted.
 - Over charging or stacking batteries is not allowed.
- ROV thruster controls shall use simple switches only, no power conditioning or pulse-width modulation (PWM) controls are allowed in Stock Class. Use of a fixed or variable resistor to reduce voltage is acceptable.
- No dimension shall be larger than 22" (minimum obstacle diameter)

Admiral Rank (Open Class) is defined as:

Vehicles should consist of the parts and components utilized within the SeaPerch kit to the maximum extent possible and shall be subject to the following:

- Teams have no budget limit. (Budgets should be tracked for presentation to judges upon request.)
- Hooks and attachments **MAY NOT** be added/removed between competition rounds.
- Teams may only utilize stock SeaPerch motors for propulsion. (Jameco Electronics P/N 232022)
- **NON**-stock motors may be utilized for actuation or other non-propulsion uses.
- Teams will design for and utilize a 12-volt power source.
 - Power source other than the included kit battery or venue supplied power is not permitted.
 - Over charging or stacking batteries is not allowed.
- No dimension shall be larger than 22" (minimum obstacle diameter)

3-D Printing

1. Permissible as long as it is used to contact with the mission object and:
 - a. Shall provide technical advantage or innovation
 - b. Rationale documented in design notebook and presentation
 - c. Value of 3D part is based upon the value of part it replaces
 - d. Value of 3D printed parts shall not exceed \$10
 - e. Included in \$20 design improvement budget limit
 - f. 3D printed parts will be costed out at \$0.025 per gram.
 - g. Additional questions on 3-D printing may be submitted through the phillynavalstem.com web site

Redress, Challenges and Disputes

Sportsmanship is expected at all times. Should a protest or dispute occur during the competition it is the intent to resolve the grievance at the time it occurs, and the ruling by the lead Judge is final.

A team that wishes to have an issue considered shall send the student team captain and one additional student member (2) to the lead judge for discipline in question, with the inquiry or question. The lead judge will render a decision on the issue, and this decision is final. The same issue may not be brought to the judge a second time by any member of the team. Adults may not approach the lead judge on the pool deck regarding any perceived issues.

In the event that a vehicle is inadvertently interfered with during a competition, or a malfunction of a vehicle's parts (i.e., the motor) occurs that is beyond the design and construction, the lead pool judge will have the sole authority to provide the team with time to fix their vehicle and to allow them to compete later in the round. Malfunctions will be evaluated on a case-by-case basis.

Teams may not question the legality of other competing vehicles; it is the SeaPerch Technical Director's role to determine if vehicles meet the entry and compliance requirements.

Unsportsmanlike conduct is grounds for the disqualification of a team. Team members and advisors are responsible for the conduct of all members and adults accompanying the team.

Overall Scoring

Individual Events

Each event will be scored in accordance with its published rubric. Teams will then be ranked, by their score.

Combined Scores

Overall Challenge Winners - Each team will receive a score for each of the four competition categories. Scores from all categories except Team Spirit & Sportsmanship will be combined to determine the overall GPSPC Champion. There will be one overall Middle School Champion and one High School Champion.

Trophies are awarded for first, second and third place for Engineering Design Notebook, Oral Presentation, Vehicle Performance, and Team Spirit and Sportsmanship. Vehicle Performance awards are a combined score of both pool rounds.

First place pool performance winners from each rank (Admiral & Captain) will receive an invitation to represent the Greater Philadelphia SeaPerch Region at the International Competition.

Breaking Ties

Scoring ties will only be broken where it is required to determine trophy places. (i.e., ties will not be broken when ties do not affect the top three results in any event or class overall) Pool Performance ties to the 100th of a second will be broken by the faster time.

Competition Events

Full details are located on the phillynavalstem.com web site.

Obstacle Course Round 1

1. An underwater remotely operated vehicle (ROV) must be able to maneuver successfully under its own power. If a vehicle cannot maneuver to the appropriate location to perform its task, the vehicle is of no use. In this round teams must navigate their ROV through a submerged obstacle course and make contact with the pool bulkhead (wall), regardless of depth.
2. The SeaPerch must navigate through the obstacle course, clear the furthest ring before starting its return back through the course in reverse order.
3. The clock stops once the SeaPerch reaches the pool deck wall.
4. If your team is not able to make it through a hoop, you may skip it.
5. You will be given a total of no more than 10 minutes to complete the round.
6. The vehicle cannot be dragged through the obstacle course via the tether.
7. The submerged obstacle course involves five large rings (22"–24" minimum diameter), oriented in various directions, For every hoop your team makes it through you will receive points. Scores for this round will be based on the fastest time for successfully navigating the obstacle course.
8. Consideration of optimal maneuverability, control, and speed should be given when constructing your Sea Perch (thruster placement and orientation, tether attachment, buoyancy and ballast, etc.) and control box.

For a complete description follow the Obstacle Course link at <http://www.PhillyNavalSTEM.com>

Mine Hunter Mission Round 2

Overview

Scenario: The U.S. Navy has been tasked to recover the torpedo buried in the sea floor. The Navy is searching for the best company to complete the mission. The SeaPerch (ROV) must complete the task to secure a navy contract.

Team Action:

1. Locate three mines in a straight line pattern (diagonally, vertically or horizontally) by capping three of 16 holes on a 4 X 4 grid.
2. Launch a torpedo by pushing a plunger on the mine prop.
3. Complete to sink a model air craft carrier.
4. Complete part of the International SeaPerch Challenge.

CHECK BACK IN LATE NOVEMBER FOR ADDITIONAL MISSION DETAILS

For a complete set of rules and description follow the mission link at <http://www.PhillyNavalSTEM.com>

Team Presentations

Each team will make a maximum 10-minute Power Point presentation to a panel of judges. The team should present as though they are the sales team of the company that designed and built their sea perch. The client (panel of judges) has a mission to retrieve a nuclear torpedo from the sea floor and they are screening possible companies to determine which model would be right for them. It is the sales teams' responsibility to prove to the clients that their product is the best. The formal presentation will be followed by an informal 5-minute question, answer, and discussion period. Teams that modified the original Sea Perch design should discuss their modifications, the experiments they conducted and what modifications came from them. At the conclusion judges should have a clear understanding of how students implemented their basic knowledge of fluids and propulsion.

Teams are judged in these areas:

I. PRESENTATION OF THE COMPANY

II. KNOWLEDGE OF DESIGN AND MANUFACTURING PROCESS/ENGINEERING PROCESS

IV. INNOVATIVE DESIGN INTERVIEW Q and A (5 MIN)

For a complete set of rules and description follow the presentation link at <http://www.PhillyNavalSTEM.com>

Engineering Design Notebook

The Engineering Design Notebook category measures a team's ability to document the scientific process in a meaningful and organized manner. The Engineering Design Notebook must document how teams implemented the engineering process. The Design Notebooks shall include the following sections:

- I. Front-Matter
- II. Naval Engineering Research
- III. Design, Engineering, and Manufacturing Process
- IV. Naval Scenario for SeaPerch
- V. Teamwork
- VI. Bill of Material
- VII. Supporting Documentation

For a complete guide and description follow the notebook link at <http://www.PhillyNavalSTEM.com>

Policy on Entering Multiple Teams

1. Due to capacity limitations, schools may only enter one team for each grade level of the competition. In cases where multiple teams from a particular school design and build multiple SeaPerch ROV's, a run off competition is recommended to identify which SeaPerch will be entered into competition.
2. In cases where a non-school organization sponsors multiple unrelated teams from various geographic locations, a written request can be made for more than one team to compete in the GPSPC. Based upon space availability and other factors, more than one unrelated team sponsored by a single organization may be granted permission to compete.
3. Teams that are not registered/qualified to participate in GPSPC may be permitted to complete the obstacle course and/or mission after the official competition is over if time allows as determined by the lead pool judge. Requests shall be made at intermission and a determination of availability will be made by the lead pool judge at the end of competition.