

Engineering Design: Technical Design Report Instructions

2021 SeaPerch Season

www.seaperch.org

A Technical Design Report succinctly describes your unique SeaPerch ROV and the engineering design process, providing insight into the iterative design process and allowing for data analysis that supports the final ROV design.

This report will be one of the two *required, scored* components of the 2021 International SeaPerch Challenge and should describe the team's approach to designing a novel SeaPerch ROV designed for the **mission course** OR a **real-world application**. Teams unable to build a SeaPerch this season may describe their *planned* approach to a novel SeaPerch ROV design.

Paper Contents

The Technical Design Report consists of seven mandatory sections and two mandatory appendices. Additional sections may be included; however, all reports must be limited to 5 pages (excluding *References, Acknowledgements, and Appendices*). Sections and appendices must appear in the order listed below.

Reports must be written in English and submitted in PDF format. It is strongly suggested that papers be typed; however, *legible*, hand-written submissions will be accepted.

Please refer to the **Scoring Rubric** for more information about how each section of the Technical Design Report will be scored.

1. Abstract (1/2 page)

A well-written abstract should concisely explain the key points or essence of your paper and quickly explain to the reader what the paper is about.

2. Task Overview (1/2 page)

This section should include an overview of the task(s) your ROV will attempt and should discuss the characteristics and features of the tasks that affected the final design. Avoid directly quoting course descriptions or problem statements for real-world applications and instead use your own words to describe what your ROV will/would do within the application.

3. Design Approach (2 pages)

Given the tasks described in the previous section, describe your team's strategy and approach to developing a novel SeaPerch design. Novelty may occur at various levels of the design and build process including specific components, collections of components, or even team approaches to the process. Focus attention on the creative aspects of your system and how your team conceived of, refined, and implemented these ideas. Describe your experience in making design decisions and how prospective ideas were considered among the team. Include engineering and scientific terms and concepts to demonstrate the team's understanding of the challenges of constructing and operating an underwater ROV.

4. Experimental Results (1 page)

This section should describe various tests accomplished in-water or in simulation. What were your results? How did these tests impact your team's subsequent design(s)? Include images, charts, and figures as appropriate to demonstrate your results. If your team is unable to build or test your ROV design, discuss planned testing and how different results would affect subsequent designs.

5. Reflection & Next Steps (1 page)

Reflect on this season's experience. What did you learn? Were there aspects of the project that you particularly enjoyed or that challenged you? How do you think that your new knowledge or experience will assist you in future endeavors? Include a discussion of next steps for the team and/or the team's ROV.

6. Acknowledgements (no page limit)

Participating in the competition involves identifying resources and support beyond the efforts of individual team members. This support can take many forms, such as technical advice, labor, equipment, facilities, and monetary contributions. Acknowledging those who have supported your efforts is important.

7. References (no page limit)

As with any technical publication, original ideas and content not generated by the paper's authors should be properly cited. While there are many citation styles, the American Psychological Association (APA) style guide should be used. Use in-text citations, where appropriate.

Appendix A: Budget (required)

Include all components included in your SeaPerch design. This budget does not need to include the components included in a standard SeaPerch ROV kit. Add as many rows as necessary to complete this budget. If you are unable to build a SeaPerch ROV this year, create a budget of the materials you plan to incorporate based on your design.

This information may be utilized during compliance checks to determine appropriate competition class and should reflect the total materials cost of your ROV. Any team registered in a Stock Class Division must have a total cost of equal to or less than \$25. Teams with total costs greater than \$25 will be moved to the Open Class Division.

Component	Vendor	How was component used?	Cost (in USD)
TOTAL COST OF SEAPERCH COMPONENTS			\$

Appendix B: Fact Sheet (required)

A foundational purpose of the International SeaPerch Challenge is to showcase and engage the broad SeaPerch community. This fact sheet includes information that introduces teams and their ROV designs to the community. Submitted team fact sheets will be made available during the 2021 International SeaPerch Challenge to highlight the various designs included in the competition.

You must use the Fact Sheet template to collect points for this component.

Required information includes:

- Team Name, organization, and location
- Image or drawing of the team’s SeaPerch ROV design
- Competition Class (i.e., Middle School, High School)
- Overview of SeaPerch Design: Provide a high-level explanation of your SeaPerch design
- Number of years your team has participated in the SeaPerch program (this should include years that you have been involved in building a SeaPerch and/or competed in a SeaPerch competition)
- Number of times your team has competed at the International SeaPerch Challenge including your anticipated participation at the 2021 Challenge (i.e., Put 1 year if this is your 1st year)
- Complete the statement “Our SeaPerch is unique because...”; highlight what you think makes your design innovative
- Complete the statement “Our biggest takeaway this season is...”; focus on your team’s experience and what you learned from working together on your design

Appendix C: Engineering Notebook (optional)

Although your team’s engineering notebook will not be scored, you may include your documentation for supporting details. There are no requirements related to the format or content of an engineering notebook should you choose to include it with your Technical Design Report submission.

For guidance on maintaining an engineering notebook during your design process, please visit: seaperch.org/design-process.