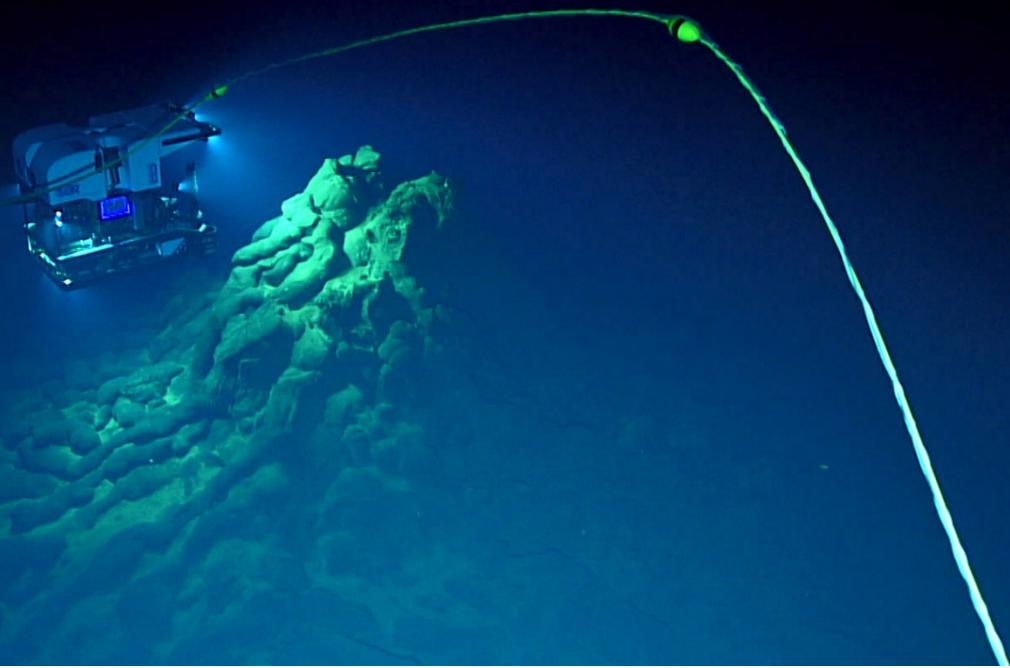


# SUBS<sup>in</sup> Schools<sup>TM</sup>

UNITED KINGDOM

## UK Development Class Competition Guidebook 2019-20



# Welcome to the inaugural Subs in Schools UK Competition.

**You have taken that first step to the Scottish Champions' final in HMNB Clyde, Faslane.**

This guidebook contains everything you need to know to design and build your Development Class remotely operated underwater vehicle (ROV) and to get you ready for the final in Faslane. Carefully read through the guidebook to make sure you understand the requirements of the challenge and what you'll need to do in order to compete. Good luck!

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## Plan of action:

### 1. READ THE RULES!

- You have your build kits and you are keen to get underway but read this guide carefully. Whilst enthusiasm, innovation and design are encouraged there are rules about what you can and can't change on your model.

### 2. Design and build your ROV.

- You have the Development Class ROV Build Manual to get you started with a basic model. The "Build Your Own Underwater Robot" book will provide you with information on different types of ROV and ideas on how you may wish to modify your model. Mentors from the Royal Navy are available to assist with your build and will be in touch with your school shortly.

### 5. Turn your ideas into a CAD drawing

- Use any CAD package you have available to turn your design into an accurate 3D model. If you do not have CAD, hand drawings are good too.

### 7. Create a 7-page Design & Engineering Portfolio

- As an engineer you must be able to produce technical documents which showcase your project. The portfolio records your technical build journey and any design decisions that you made along the way.

### 8. Create a 7-minute Verbal Presentation

- As a team you must create a 7 min presentation to accompany your engineering portfolio. You may use a PowerPoint presentation or include a video but the judges wish to hear about your journey to the final from every member of the team.
- The judges will have 3 minutes to ask questions, so think about what they may ask.

### 9. Create a table-top display

- You will have a 'Docking Area' allocated where you can hang out, make modifications to your ROV and show it off to visitors. You should create a display for this area and be prepared to brief the judges and others on your team journey and what you have learnt about ROVs.

### 10. TURN UP TO THE COMPETITION!

- There will be an optional friendly event before the final for you to pool test your ROVs and meet some of the opposition but as a sponsored entrant into the event, you must turn up to the final in Faslane. If you foresee any difficulties with this, you must inform EIM no later than 4 Dec 19.

## The Shore:

Introduction – background and useful  
information

## HISTORY OF ROVs

In the 1970s and 80s the Royal Navy used "Cutlet", a remotely operated submersible, to recover practice torpedoes and mines. Cutlet 03 was based at the submarine base on the Clyde and was operated and maintained by RN personnel. It therefore seems fitting that the Subs in Schools Scottish final will be held in the same place; HMNB Faslane.

In the 1960s the US Navy used a "Cable-Controlled Underwater Recovery Vehicle" (CURV) to perform deep-sea rescue operation and recover objects from the ocean floor. Building on this technology base; the offshore oil & gas industry created the work-class ROVs to assist in the development of offshore oil fields. Since then, technological development in the ROV industry has accelerated and today ROVs perform numerous tasks in many fields. Their tasks range from simple inspection and maintenance of subsea structures and platforms to connecting pipelines and placing underwater manifolds. Submersible ROVs have also been used to locate many historic shipwrecks, including the RMS Titanic and *the Bismark*. You are encouraged to research other uses for ROVs as part of the Subs in Schools Competition.

## WHAT IS SUBS IN SCHOOLS?

Subs in Schools is a STEM initiative challenging teams of 3 to 6 school students in year groups S1 to S3 to build and control a remotely operated underwater vehicle (ROV). The initiative is led by Engineering in Motion (EIM), a leading global education programme provider, along with lead supporter the Royal Navy. The programme will be managed in partnership with Stirling based STEM challenge providers, ESP.

This is a Science, Technology, Engineering and Mathematics (STEM) learning programme where students have the opportunity to learn about complex engineering systems while building an ROV. In the challenge, the vehicle needs to complete a series of underwater tests including a speed challenge, object retrieval and an obstacle course.

The programme invites school teams to compete for the **SUBS in Schools Scottish Champions'** title, with the students' work judged by a panel of industry experts. Alongside the practical work of building the vehicle, students need to document their work, prepare a presentation and share their engineering knowledge with the judging panel. This cross-curricular initiative is designed to inspire a passion for STEM and marine engineering, highlighting career relevance and encouraging students to consider a STEM related career pathway.

Schools will be supported throughout the ROV build by industry partners or STEM Ambassadors.

## ROV DESIGN AND INNOVATION

### DEVELOPMENT CLASS ROV

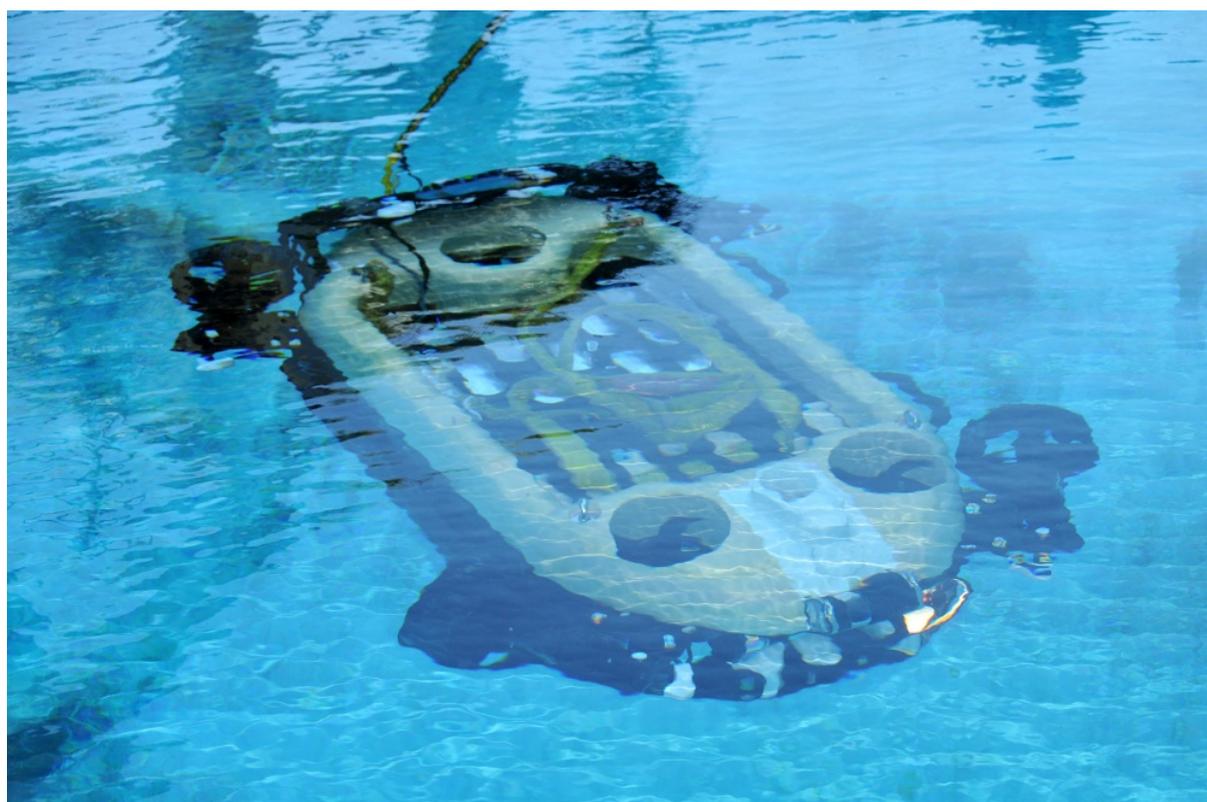
Your team has already received a build manual which gives detailed instructions on how to build all the components of your first ROV. To allow your teachers to plan lessons, estimated timings to build each component have also been included. The individual PVC pieces have been pre-cut, so this will reduce build time. Future competitions will have more advanced models to allow a progression for teams but only the Development class ROV will be used for this inaugural event.

### INNOVATION

Subs in Schools aims to help develop and inspire young engineers and therefore the judges are keen to see how you improve upon the basic model. Modifying the design is encouraged and not only will it score points, but it will give your team more to talk about in both the design presentation and engineering portfolio.

**Examples:** Below is a list of some modifications you may wish to consider. The list is not mandatory nor exhaustive; just a few ideas to inspire you:

- Add aids to improve or reduce buoyancy.
- Attach a different controller – be prepared to explain why yours is better.
- Can you figure out how to control your ROV without an umbilical cord being attached?
- Can you get pictures from your camera without removing the ROV from the pool?





The Shallows:

The Technical Regulations, assessment  
and judging

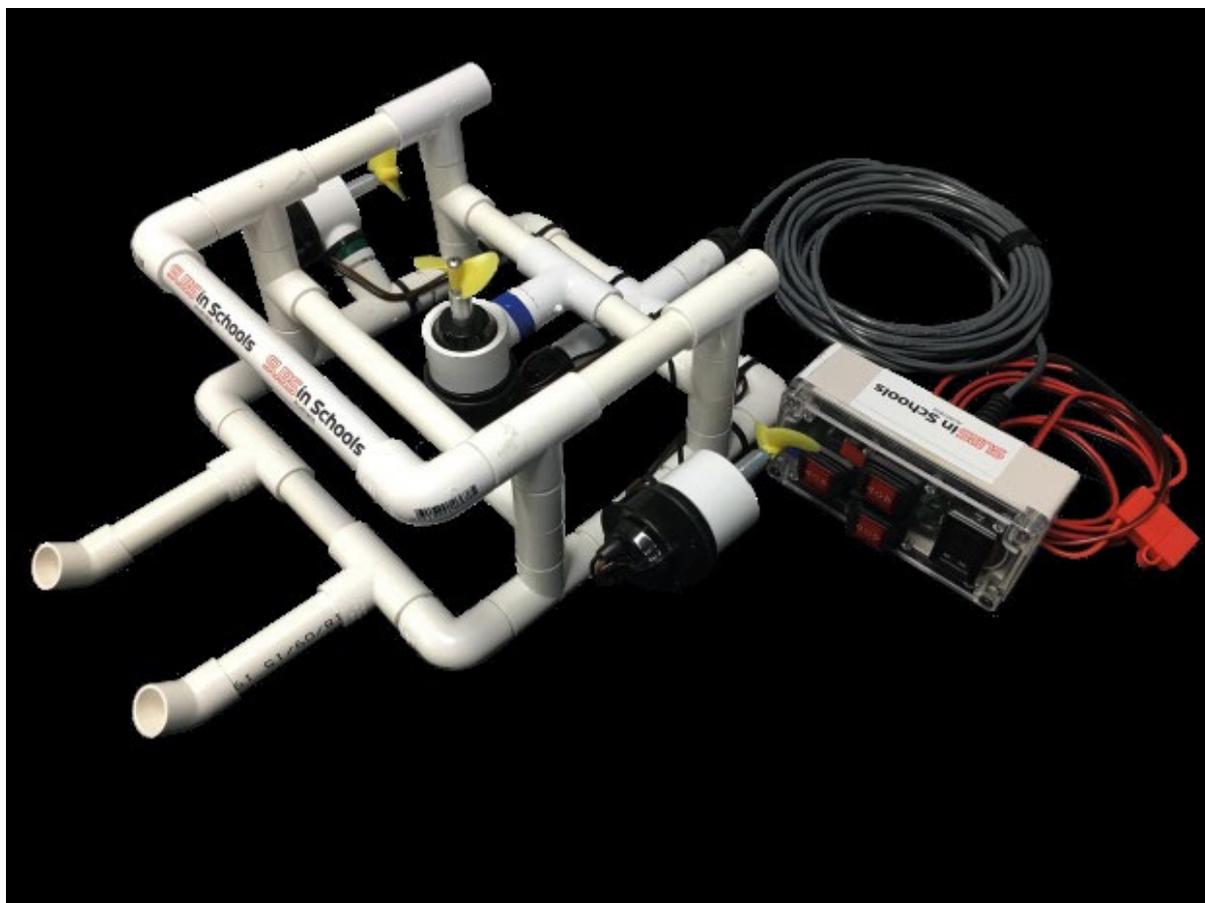


## CRITICAL TECHNICAL REGULATIONS

Though innovation is greatly encouraged, there are a few rules and guidelines, highlighted as **Critical Regulations** which you MUST adhere to. If your ROV does not comply with these Technical Regulations, it will require modification prior to entering the pool. Time has been added to the event timetable to allow you to do this. If the necessary modifications cannot be completed within the time allocated, a 60 second time penalty will be awarded for each non-compliance.

Prior to entering the pool your ROV will be held at the 'Ship Lift' where it will be checked by the judges for compliance with the technical regulations. Teams must be present at the check to handle the ROV and answer any questions. You will have 15 minutes 'tinker time' to rectify any non-compliances followed by an opportunity for a quick paddling pool test (if required) prior to starting the first pool challenge.

**Note:** You need to bring your own tools to the competition.



*Development Class ROV kit*

## TECHNICAL REGULATIONS

### T1 - Dimensions

Your ROV must fit in a box with the dimensions below, including all accessories with the exception of your underwater camera.



#### T1.1: Maximum length

500mm



#### T1.2: Maximum height

500mm



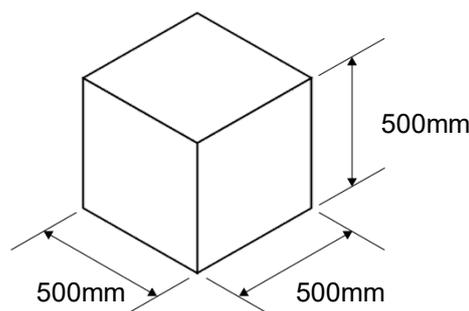
#### T1.3: Maximum width

500mm



#### T1.4: Underwater Camera

The underwater camera may be attached to the ROV after dimension scrutineering



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### T2 - Speed Challenge

You are encouraged to modify the ROV for the speed challenge to make it more streamlined. For the speed challenge only, the overall length of your ROV can be increased to allow you to add a streamlining cowl.

#### T2.1 Speed Challenge maximum length:

550mm



#### T2.2 Speed Challenge width and height

Width and height dimensions must not be altered for the speed challenge



### T3.1: Safety Requirements

**T3.1.1** Propeller guards must be fitted whenever the propellers are turning. If you add extra motors, they must also have a propeller guard fitted.



**T3.1.2** The power pack is not to be modified in anyway.

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### T4.1: ROV Decoration

You are encouraged to personalise and decorate your ROV if you wish – please ensure any paint used is not water soluble.

## DESIGN AND ENGINEERING PORTFOLIO

You must produce a **7-page** design and engineering portfolio to show how you designed, built, tested and modified your ROV. This must be submitted electronically to EIM 7 days prior to the final, so that the judges can read it in advance of competition day. You must bring 2 printed copies with you to the final; one for the judges and one for your Docking Area.

### Content:

The judges will be looking for evidence that you have developed the knowledge and understanding to go beyond the immediate project requirements and that you have used your initiative and the experience gained to solve problems and improve your ROV design.

The following must also be included:

- a. Show how you designed and built your ROV. If you made freehand sketches, these may be included.
- b. How the team identified problems and overcame them. For example:
  - Did you test the ROV?
  - What was your test criteria?
  - How did you document performance?
  - How did you improve performance?
- c. Any modifications to the original design.
- d. Any suggested future improvements.

### Format:

The format of your Design and Engineering Portfolio is up to you, choose between either:

- A4 landscape or portrait.
- A3 landscape or portrait.

The portfolio must be in colour and should be stapled or ring bound.

### Additional Information:

You **MUST** include the following, but they do not count towards your 7-page limit:

- Decorative front cover including your school and team name.
- Contents page.

## VERBAL PRESENTATION

You must prepare a **7-minute** verbal presentation to deliver to the judges on competition day, explaining how you designed, built and tested your ROV. You may produce an electronic presentation to accompany your verbal presentation if you wish.

## CONTENT

Your verbal presentation is your chance to tell the judges your story. It is completely up to you how you structure your presentation, but here are some suggestions to help make you stand out.

- Describe what you found the most difficult – the judges appreciate honesty!
- Tell them which bits you have enjoyed the most.
- Describe how you came up with the final design of your ROV.
- Explain how you went about manufacturing your ROV.
- Provide details of any testing you conducted and if this influenced your design.

## RESEARCH MISSION

The judges want to know how much you have learned about ROVs and their different uses. Or, have you managed to think of new ones? Please include a brief summary of this in your presentation.

There are **NO** rules about how to deliver your verbal presentation; do it standing on your head, sing the judges a song, act it out like a school play. Just do what feels most comfortable to you. All we ask is that:

- **Everyone takes part!** – make sure every member of the team has a speaking part.
- **You don't go over 7-minutes** – the judges need to ask you questions so no waffling!

**Note:** Any electronic presentations must be saved to a memory stick. **Please also bring a charged laptop to the final to run these presentations on, as we cannot provide one for you!** You will also need to bring your own HDMI connectors (or equivalent for your specific laptop).

## DOCKING AREA

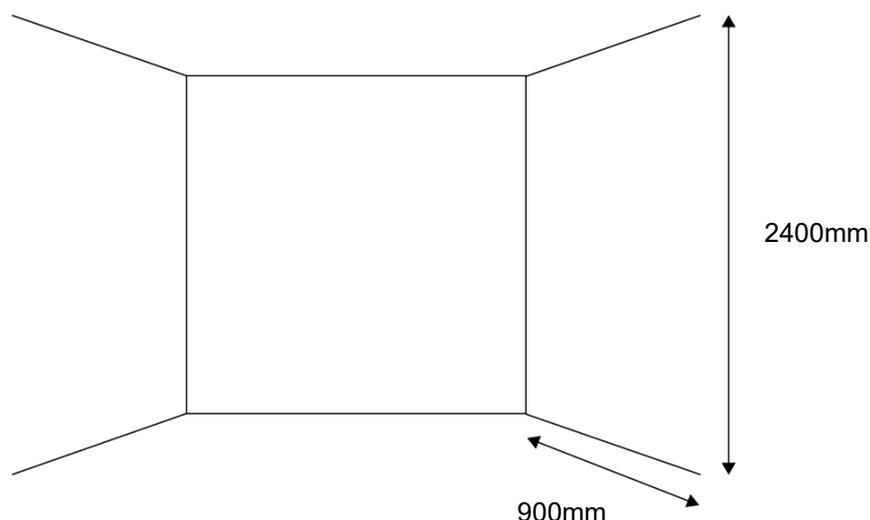
Each team is given a self-contained 'Docking Area' on competition day to display your ROV and to give the judges and visitors more information on your journey team and your ROV build.

This will be your base location for the day and you should decorate it to show your journey to the final.

- Make sure it is clear whose Docking Area it is – show clearly both your school and your team name. Devise your own branding. The judges will be keen to know how you came up with your brand.
- Have a copy of your design portfolio available.
- Show a range of 'behind the scenes' design work, not just a duplication of your design portfolio.
- An area of the display should also show your research into uses of underwater ROVs and the industries which use them. If you can think of new and novel ways an ROV can be used, this is your chance to demonstrate it.
- Power is very limited, so do not rely on being able to run a video or visual presentation.

**Note:** the walls of the booth are fabric, not pin board, so think about how you will attach any display items.

Nominal sizes of the booth are given below. dynamicism



Visitors and sponsors of the competition will also visit these stands and you should be prepared to chat to them and answer any questions they may have. There is no requirement for a formal presentation in the Docking Area but it may help to prepare a very short brief so that you can share what you have learned.

A prize will be awarded for the best display area. The assessment of this will be timetabled, so that you know when you are being judged. Energy

## **POOL CHALLENGES**

You will be asked to undertake 4 practical challenges in the swimming pool.

If your ROV does not start (DNS). Don't worry; Royal Navy experts will be available to help assist with any technical difficulties, though there is a 30 second penalty for any support provided.

### **TIME PENALTIES**

5 minutes is permitted for each challenge with the winning team being the fastest team to complete all the tasks. Any physical intervention with the ROV by a judge, diver or team member will incur a 15 second time penalty on top of the total challenge completion time. If any parts fall off the ROV this will incur a 10 second penalty for each part.

### **CHALLENGE ONE – PRECISION GUIDANCE**

You will be required to manoeuvre your ROV through hoops at different levels within the pool. Time penalties will be awarded for touching the hoop.

### **CHALLENGE TWO – TARGETED LANDING**

The ROV needs to land on a platform / target in the pool. If any part of the ROV does not fully sit within the perimeter of the target, this will incur an additional 10 second penalty.

### **CHALLENGE THREE – ENVIRONMENTAL CHALLENGE**

The prongs on the ROV should be used to remove bags of contaminated waste and plastics from the sea bed (pool floor). For every bag removed – the team will have 30 seconds removed from their overall score. Interaction with the ROV (at the surface) to collect the waste bags is permitted and will not incur a time penalty.

### **CHALLENGE FOUR – ENTERING THE VOID**

The simulated void with dimensions shown in the diagram below, contains a code or additional task which is essential for completion of your mission. The ROV must enter the void and take a picture of the information inscribed inside. Your team must then decipher the code or undertake the assigned task. One interaction to remove the information on the camera is permitted. Ideally you should retrieve the information without interacting with the ROV.



***For full dimensions of the void, please see Appendix I on page 25***

## **SPEED CHALLENGE**

Competition day will end with a speed challenge. ROVs will race two at a time and the winning team will be the fastest ROV to complete a length of the pool. Each team will have two attempts at this challenge.

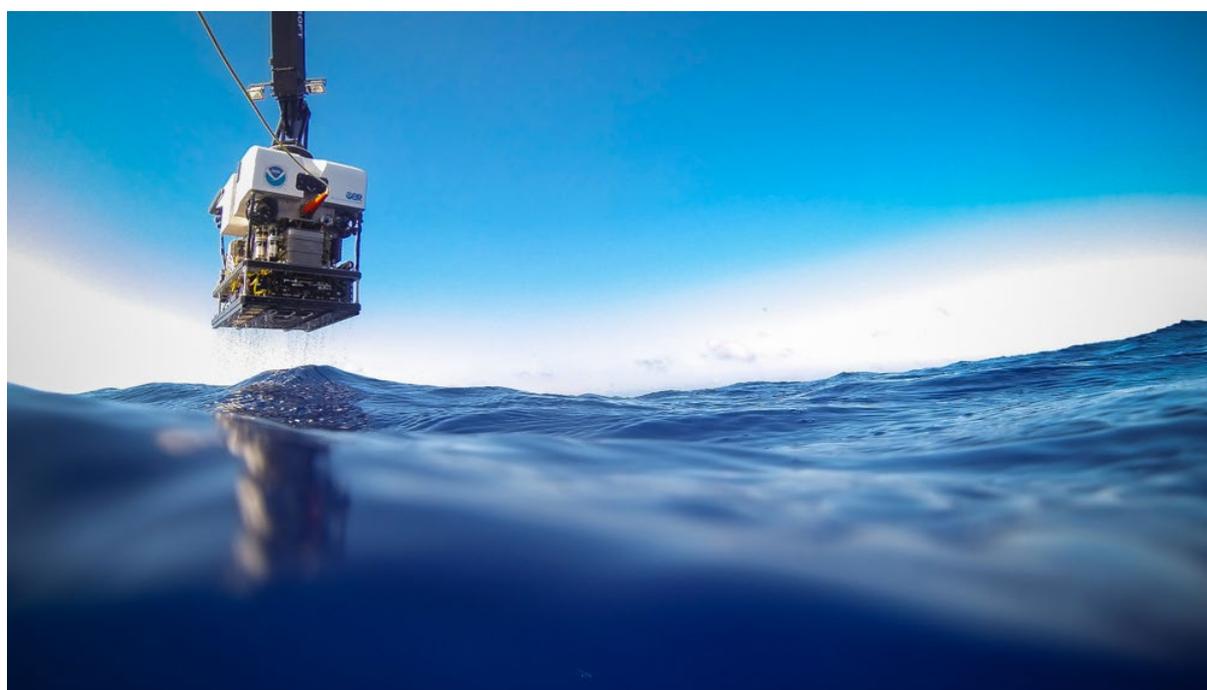
If your ROV does not start (DNS). Don't worry; Royal Navy experts will be available to help assist with any technical difficulties, though there is a 30 second penalty for any support provided.

## **MODIFICATIONS**

Modifications are encouraged prior to commencement of this stage to allow you to streamline your ROV. There are still size restrictions; for example, you may not add a 2m long nose cone in order to reach the end of the pool more quickly. For the speed challenge only, the overall length of your ROV can be increased to 550mm to allow you to add a streamlining cowl. Width and height restrictions remain the same.

## **PENALTIES**

- Royal Navy technical assistance prior to commencing the speed challenge – 30 second time penalty on top of the total challenge completion time
- Any physical intervention with the ROV by a judge, diver or team member will incur a 15 second penalty.
- Parts falling off the ROV – 10 second penalty per part.
- Failure to stay in your designated lane – 10 second penalty for each incursion.
- Failure to resurface when required – 30 second penalty for each incursion





Deep Water:

Competition Scorecards,  
teamwork and prizes

## Engineering Portfolio Scorecard

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 -7	8 - 10	/10
Production Quality of Materials	Low grade paper or materials.	Basic printing and binding	Quality printed document on quality paper in appropriately durable binding.	
Production Quality of Content Referencing / Is content original?	Missing documentation or contents page. No referencing or errors in referencing documentation. Content has been 'Cut and paste' from an uncredited online source.	Basic documentation provided. Some attempt at referencing.	Correct number of pages. All required documentation included and professionally presented. No detected plagiarism with excellent use of referencing for author's written word, graphics/photos and video sources etc	
Content Organisation / Layout	Unsystematic content or layout. Limited or no graphics included.	Some content organisation and layout design format attempted	Highly organised and managed portfolio content with logical structure and flow of information. Consistent application of margins, alignment. Uncluttered.	
Photos & Images / Visual Effects	Limited use of images or graphics or use of unclear images. No decorative front cover.	Basic quality and use of images. Graphics attempted with some success.	Justified use of excellent, un-pixelated, clear, photos. Coloured and integrated with text to illustrate key messages.	
Writing & Readability	Greater clarity required.	Does not sustain reading or interest. Does not 'flow'	Concise, appropriate, grammatically correct text, captions, and headlines. Inviting and engaging. Sustains the reader's interest.	
<b>SUB TOTAL</b>				<b>/50</b>

## ROV Design and Build Scorecard

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 - 7	8 - 10	/10
Design and Build	Basic model built with no modifications.	Evidence that there were attempts to improve on the basic design.	Evidence that they have used engineering knowledge and understanding to go beyond the basic requirements.	
CAD / Design Drawings	Little or no evidence of design drawings.	Use of the technical drawing process but with obvious errors.	Clear understanding of the technical drawing process; well presented with no obvious errors.	
Testing and Evaluation	Little or no evidence of testing.	Evidence of testing but no or limited collation of results.	Evidence of a detailed testing process and collation of results.	
Modifications / Problem Solving	No modifications implemented.	Modifications attempted but require further refinement.	Evidence of problem solving and identification of appropriate modifications following the testing process.	
Future Improvements	Little or no consideration of how to improve their existing model.	Some ideas considered but no plan of implementation.	Detailed plan of improvement including timelines and actions required.	
<b>GRAND TOTAL</b>				<b>/50</b>

## Verbal Presentation Scorecard

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 -7	8 - 10	/10
Presentation Energy	Artificial and /or low energy	Speakers generally enthusiastic with lively delivery	Passionate with effective and appropriate levels of liveliness	
Team Contribution	Not all team members participated in presentation	Good contributions from most team members.	Excellent team work with all members participating effectively.	
Visual Aids	Limited or no use of visual aids	Some aids used effectively	Well produced, highly relevant and integrated aids effectively	
Articulation	Presenters quietly spoken	Inconsistent speaking ability	Excellent articulation, use of language and voice projection by all members throughout the assessment	
Structure	Limited structure to presentation, difficult to follow	A basic structure outline to presentation which could be followed by audience	Clear presentation outline / overview. Excellent connections between topics and easy for audience to follow	
Use of Time	Too fast or ran out of time	Good timing. Balanced topic depth and pace	Ran on time or just under. Excellent balance of depth for each topic	
<b>SUB TOTAL</b>				<b>/60</b>

## Design and Innovation Scorecard

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 - 7	8 - 10	/10
Team Objectives	Limited or no mention of objectives	Some evidence that objectives were set	Clear evidence that objectives were set and achieved or amended as the project progressed	
Description of ROV	Basic description provided	Discussion on the ROV, its components and features	Excellent discussion on the ROV, its components features and design decisions	
Innovation	Little or no mention of innovation	Innovation described and justified	Originality, evidence of clever innovations with high positive project impact	
Testing	Little or no mention of ROV testing	Testing explained but limited interpretation of results	Excellent discussion on testing and clear evidence that results were incorporated into the final ROV design	
Modifications / Refinement	No or limited modification or refinement following testing	Evidence that test results were used to modify the ROV	Clear detail provided on modifications and any subsequent testing	
Collaboration	No credit given to mentors	Mentor support discussed	Impact and benefits of mentor support discussed	
Learning Outcomes	Limited reflection on learning outcomes	Good evidence of the team's development throughout the build	The team are keen to talk about their learning journey and what they have learned	
Research	Limited or no evidence of wider research	Evidence of basic research. Information briefed directly from source	Evidence of extensive research. Research presented in an easy to understand format.	
Overall Clarity	Limited clarification of the project	Clear and appropriate concept explanations	Everything presented was clearly understood through excellent explanations	

## Design and Innovation Scorecard Continued

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 - 7	8 - 10	/10
Critical Dimensions	ROV did not fit in the 'go – no go' box without significant adjustment.	ROV fits in the 'go – no go' box with minor adjustments.	ROV fits in in the 'go – no go' box without any adjustments.	
Innovation	Only the basic model has been constructed.	Improvement on the basic model.	Strong evidence that alternative designs have been considered prior to selecting the improved model.	
Streamlining	No attempts to streamline the model for the Speed challenge.	Attempts to streamline the ROV or design a cowl attachment.	Clear evidence that streamlining has been incorporated into the design of the ROV.	
Branding	Little attempt to decorate or brand the ROV.	Attempts to decorate or brand the ROV.	Strong team branding with clear consideration of the marketing of their team.	
Simplicity	Design is overly complicated or access to areas which may require maintenance eg motors is blocked.	No unnecessary attachments. Access to areas which may require maintenance is not blocked.	Consideration has been given to ease of repair, maintenance and / or further product improvement.	
			<b>Grand Total</b>	<b>/ 140</b>

## Docking Area Scorecard

	LOW	MEDIUM	ADVANCED	SCORE
CRITERIA	1 - 3	4 -7	8 - 10	/10
Team Name	Irrelevant choice or no name chosen.	Name not aligned with branding and logo.	Clear consideration of the name. An inspired choice in line with the Team branding and logo.	
Product Display	ROV and /or portfolio not featured within the display. Limited planning of display area. No or poor images used.	Display is a reproduction of portfolio with little original work. Images or information not all relevant.	ROV and portfolio showcased to good effect within the display. Layout of display clearly planned. Effective display of information. Team and school ownership is clear.	
Team Branding	Limited originality. Logo absent or confusing.	Clear thought behind the brand development but limited wider appeal.	Evidence of team development of the branding. Appeal of the logo to a wider audience considered.	
Visual Design and Impact of Docking Area	Impact is limited. Limited personalisation.	Clear planning of layout. Not all images relevant or displayed to best effect.	Eye catching display. Captures the journey to the competition. Images are relevant to the project.	
Team Briefing	Team reticent to discuss their journey. Brief not fully planned.	Relevant brief but limited content. Disjointed or undynamic.	Dynamic, planned, rehearsed brief. Relevant content.	
Wider ROV Research	Limited research. Research not incorporated into the display.	Research evident but limited. Information not displayed to full potential.	Research clearly evident. Clear forethought of how information can best be incorporated into the display.	
Team Dynamism	Lacking in enthusiasm.	Not all team members fully engaged.	Infectious enthusiasm from all team members.	
Response to Questions	Questions not fully answered. Only 1 or 2 members answering questions.	Most of the team keen to answer questions. Wider knowledge evident but limited. Information had to be prompted.	Questions answered well with limited prompting. A wider understanding of the project is evident. All of the team answering questions.	
<b>Grand Total</b>				<b>/ 80</b>

## Pool Challenges Scorecard

POOL CHALLENGES – Max 6 Minutes per Activity			
Activity 1	PRECISION GUIDANCE	TASK TIME	
		PENALTIES: 10 seconds for each hoop touch.	
		<b>TOTAL TIME FOR TASK</b>	
Activity 2	TARGETED LANDING	TASK TIME	
		PENALTIES: 15 seconds if not fully within target.	
		<b>TOTAL TIME FOR TASK</b>	
Activity 3	ENVIRONMENTAL CHALLENGE	TASK TIME	
		BONUS: 30 seconds removed for each retrieval (max of 3)	
		PENALTIES: 10 seconds for items falling out of bag (max 1 penalty per bag)	
		<b>TOTAL TIME FOR TASK</b>	
Activity 4	ENTERING THE VOID	TASK TIME	
		BONUS: 60 seconds removed for solving puzzle	
		PENALTIES: 10 seconds for each bin touch.	
		<b>TOTAL TIME FOR TASK</b>	
		<b>SUB TOTAL</b>	
		<b>ADDITIONAL PENALTIES*</b>	
		<b>TOTAL</b>	

### \*ADDITIONAL PENALTIES

Action	Penalty Awarded
Royal Navy intervention prior to event	30 seconds
Team or a diver interaction with the ROV	15 seconds (per interaction)
Poor conduct ( judges' discretionary penalty)	30 seconds
Failure to rectify a non-compliance	60 seconds
Failure to resurface when required	30 seconds

## Speed Challenge Scorecard

<b>SPEED CHALLENGE</b>	<b>TASK TIME</b>	
	<b>ADDITIONAL PENALTIES*</b>	
		<b>TOTAL</b>

**\*ADDITIONAL PENALTIES**

Action	Penalty Awarded
Royal Navy intervention prior to event	30 seconds
Team or a diver interaction with the ROV	15 seconds (per interaction)
Poor conduct ( judges' discretionary penalty)	30 seconds
Failure to rectify a non-compliance	60 seconds
ROV breaking the surface during the race	10 seconds

## **INTEGRITY AND TEAMWORK**

Engineering is a collaborative process and it requires strong teamwork and camaraderie. Everyone in the team should have a role and all team members need to demonstrate their contribution to the project, even if it is just making the tea!

This is a competition, but it is also a learning journey and it is important that you enjoy the day. Some teams will have more experience than others and if you see that you can assist another team in anyway, then offers of support or advice are greatly encouraged.

You are encouraged to chat with other teams about your designs – you may just pick up a few nuggets of information which will improve the efficiency of your ROV. Always treat other teams with respect and conduct yourselves in a manner which makes your school proud to have you representing it.

Though the judges will decide the overall winner of this prize, each team will be asked to nominate another team for this award – you may not nominate yourselves.

## **PRIZES**

The following prizes are up for grabs on competition day:

- **Overall Scottish Champions Award.**
- **Scottish Runners Up.**
- **Scottish 3<sup>rd</sup> Placed Team.**
- **Award for Innovation.**
- **Verbal Presentation.**
- **Engineering and Design Portfolio.**
- **Docking Area.**
- **Fastest Completion of Pool Challenges.**
- **Fastest ROV in the Speed Challenge.**
- **Integrity and Teamwork.**

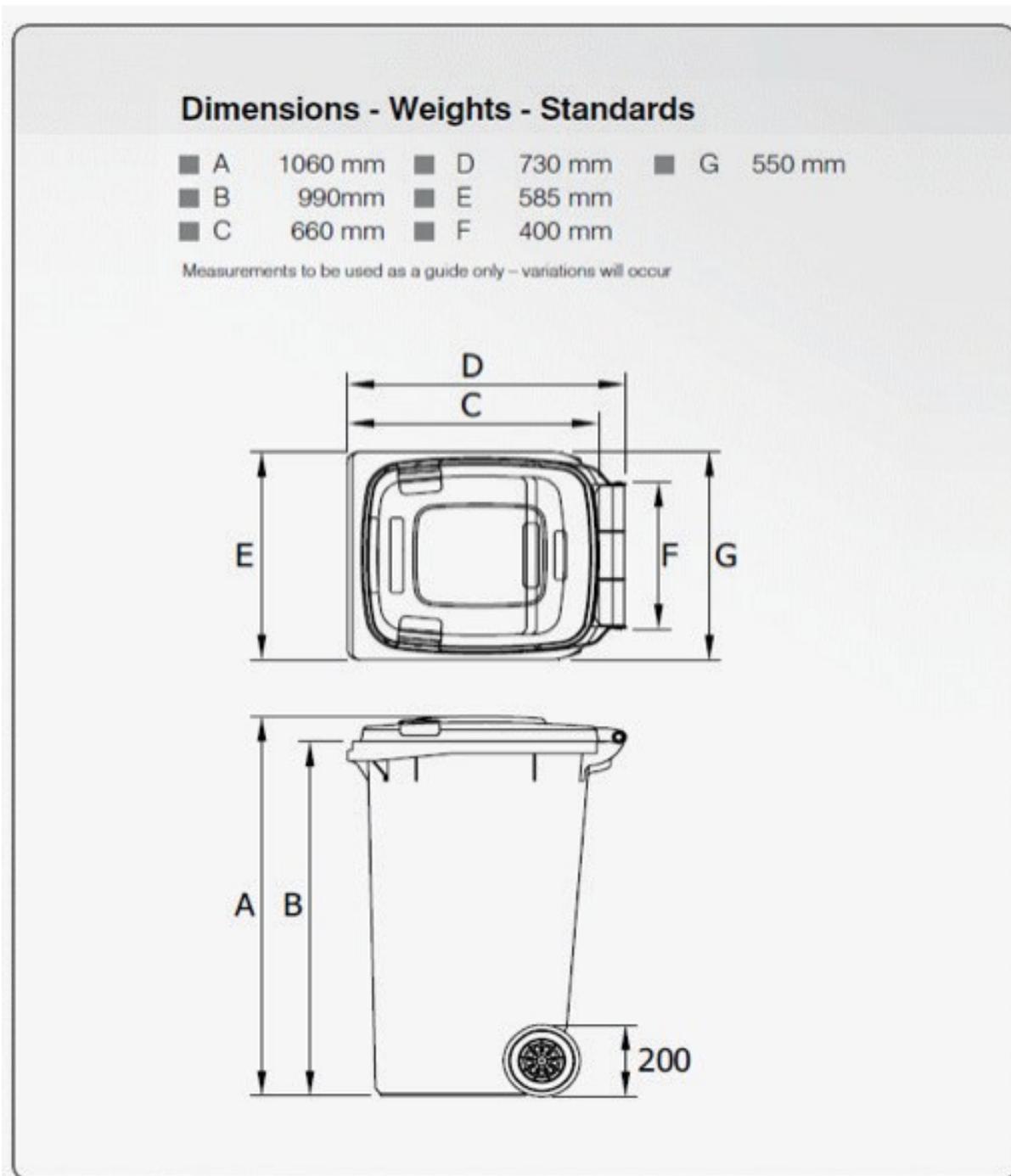
The overall Scottish Champions will receive a bespoke trophy to keep plus a unique Royal Navy Experience day at Faslane; details of which will be confirmed closer to the competition date.



Resurfacing:

Appendices and contact  
information

## APPENDIX I – ‘Entering The Void’ dimensions



## APPENDIX ii – INTEGRITY AND TEAMWORK – TEAM NOMINATIONS

Engineering is a collaborative process and it requires strong teamwork and the ability to work within a supportive community. Everyone in the team will have different skills and for a project to be a success, every team member must feel valued and that they have contributed to the project.

You need to nominate another team for the Integrity and Teamwork Award. Please write your nomination in the box below. A judge will collect it from you before the Speed Challenge event:

Your Team Name:	
Your Nomination:	
Reasons for Your Nomination:	

Whilst this is a competition, it is also a learning journey. Some teams will have more experience than others and if you see that you can assist another team in anyway, then offers of support or advice are greatly encouraged.

You are encouraged to chat with other teams about your designs – you may just pick up a few nuggets of information which will improve the efficiency of your ROV. Always treat other teams with respect and conduct yourselves in a manner which makes your school proud to have you representing it.

The judges will be watching you throughout the day to see how you work as a team and how you interact with others, so do what you can to keep up morale and remember to enjoy yourselves.

This is an award for the team who best demonstrates, team work, friendship and who has interacted well with other teams. Watch the other teams throughout the day and see if you can identify one which may deserve this award. Below are some things to think about which might help you decide:

- Did someone help you throughout the day?
- Was there a team which was infectiously enthusiastic?
- Did you hear about a team which overcame significant challenges to get to the competition?
- Was there a team which was happy to share their design secrets?

## Contact Information



### **SUBS in Schools STEM Challenge**

Engineering in Motion

[www.subsinschools.co.uk](http://www.subsinschools.co.uk)

If you need any help at all, just get in touch with us:

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