Marine Autonomy Challenge (MAChallenge) Rules and Regulations 2027

12th November 2026

1. Objective

Maritime Autonomous Systems (MAS) are of increasing importance to a wide range of sectors, including marine science, offshore resource exploitation, maritime transport and defence and maritime security operations. The UK is a technology leader in this area, and the Maritime Autonomous Systems Group (MASG) Council of the Society of Maritime Industries (SMI) aims to enhance this reputation and encourage development and take-up of MAS technologies in the UK. The MASG Council sets the policy and guides the activities for this market area, utilising the extensive expertise of its council members.

A key part of the MASG Council's mission is to encourage young technologists to help them develop careers that contribute to the future of the UK's MAS industry.

MAChallenge aims to highlight the opportunities in the MAS industry and provide a focus for the future innovators that will drive the industry to the next level. MAChallenge is focussed on the autonomy of the platform (irrespective of whether it is an underwater or surface vehicle), not the platform itself, with an emphasis on the potential for remote and autonomous pollution detection operations.

The core objectives of MAChallenge are:

- To stretch the knowledge of the students and promote creative thinking.
- Encourage team working through a variety of individual skills.
- Connect the brightest young talent coming through the UK's universities with the UK's MAS Industry.

MAChallenge comprises a focused challenge, equipment, and a venue where future innovators will come together to build, share, and distribute knowledge, and collaboratively expand the envelope of their current capabilities.

The focus of the competition is the autonomous and safe operation of an uncrewed surface vehicle (USV) to map and identify pollutants in the marine environment.

The competition is a team event. Teams are to be up to five strong and must be affiliated to a UK university. Please see section 4 for full information.

2. Competition Point of Contact

Full details regarding the competition are available on the SMI website. You can also email SMI. However, please check the FAQs on the website before contacting us!

Our postal address is: Society of Maritime Industries, 28-29 Threadneedle Street, London EC2R 8AY.

3. Competition Outline

MAChallenge is focussed on the autonomous and safe operation of a USV to map and identify pollutants in the marine environment. Using a USV provided by SMI, teams will develop its autonomous capabilities to achieve the challenges given later in this document.

The competition comprises three key stages:

Stage 1: Team Video Submission

Stage 2: Intermediate Training & Down Select Gateways

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Stage 3: On-Water Final

A prize of £2,000 will be awarded to the winning team.

Key Dates are:

- **September 2026** – Call for video submissions opens
- **2nd November 2026** – Deadline for submission of videos
- **6th November 2026** – Stage 2 teams shortlisted
- **W/C 11th January 2027** – First competition gateway – down-select to a maximum of 5 teams, who will be provided with simulator
- **W/C 22nd February 2027** – Second competition gateway – down-select to final 3 teams, who will be provided with USV payloads
- **W/C 10th May 2027** – Ready for competition check
- **Date TBC June 2027** – On-water finals (2 days)

For full details and updates including FAQs, please see the SMI website.

4. Eligibility of Team Members:

Each team will consist of up to **five** people. Team members must be **full time undergraduate students** registered at a recognised UK university. A maximum of **one individual** in each team is **exempt** from this requirement and may be a postgraduate or working in other employment.

The student members of the team are expected to make significant contributions to the engineering development cycle of their solution to the challenge. University academic and technical staff may be used as advisors but cannot be team members.

For teams who are successfully invited to the challenge final, a minimum number of three on-site team members will be expected to attend.

Each team must designate a **student team member** as their team leader. The team leader is the only person allowed to speak for the team, to request USV deployment, run start, run end, or USV retrieval. All instructions and communications with the MAChallenge organisers will be in English.

5. Registration Information:

If you are interested in participating in MAChallenge, please register your interest as soon as possible by emailing info@maritimeindustries.org. Please include:

- Team name
- Team members
- Primary contact details with email and telephone number
- Host university and faculty contact

You will also find a copy of these competition rules, including details of team eligibility here. You may also find our FAQs helpful.

6. Stage 1 - Team Video Submission:

Specific requirements for the video submission can be found on the SMI website.

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To be considered for selection to compete in the remote on-water challenges, you will need to submit a video pitch, addressing ALL the items below, which will be marked as indicated:

- Introduce yourself and your team (10%).
- Outline your experience in relevant fields (20%).
- Describe relevant projects that you have worked on (10%).
- Explain what you think the key technical challenges will be and how you will overcome them (30%).
- Describe the role you see for autonomous systems in dealing with the issue of ocean plastics and chemical pollutants (20%).
- Explain what you would spend the prize money on (10%).

Videos will need to be shared with info@maritimeindustries.org via WeTransfer by 5pm on 2nd November 2026. **Videos should be around 5 mins long.**

There is no fixed limit to the number of teams that will initially selected for Stage 2, but all will be subject to further gateway selections as outlined below.

If not previously provided, each team also needs to submit the information outlined in Section 5 Registration Information above

The announcement of teams selected for stage 2 will be made on 6th November 2026.

7. Stage 2 – Intermediate Training & Down Select Gateways:

While the aim of stage 2 is ultimately to down-select to the final three teams to undertake the final competition, within this stage we aim to motivate and support the teams to reach a successful outcome.

Teach-ins & Familiarisation

A number of 'teach-ins' will also be held to familiarise teams with the simulator software and hardware set-up once these are provided following the relevant gateways. Participation in the teach-ins will be mandatory and failure to participate will result in removal from the competition

Gateways

Teams will also be set tasks to prove their technical competency. Completion of these tasks will be assessed and the number of teams down-selected:

- **W/C 11th January 2027 – First competition gateway** – *Up to **five*** **teams** will be selected from this gateway. Teams will have to provide a 10-minute presentation followed by a panel Q+A. Teams will be expected to give a detailed explanation of their proposed approaches to achieving the challenges and the methodologies that they intend to utilise. The panel will specifically probe the expertise within each team to ensure that the mix of skills is sufficient to undertake the challenges. Teams passing this gateway will be provided with a licensed 'Ship Simulator' package to support development and testing of their software. Each team will be given a tutorial session on the simulator hardware.
- **W/C 22nd February 2027 – Second competition gateway** – Teams will be required to show that they can successfully engage and control the propulsion

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system and control heading, demonstrating this by driving the simulated USV on 'Ship Simulator'. Teams will also be required to show that they are able to undertake challenges 1 and 2 in the simulator environment. Navigation waypoints and the position of obstacles to be avoided will be provided on the day. ***Three*** **teams will be selected from this gateway to compete in the on-water final.**

The teams that are selected from this Gateway will be provided with hardware:

- Autopilot 'Spectre e-boat module' with GPS
- Sensor payload (camera and proximity sensor)
- Micro-PC onto which the team's software can be loaded
- Communications cables

See Appendices for further details about the hardware. **Please note that NO modifications or additions to the provided hardware will be permitted**.

- **W/C 10th May 2027 – Ready for competition check** – Teams will be expected to demonstrate challenge 3 in a simulated environment, including use of a visualisation tool.

Mentors

Teams who successfully make it through the January gateway will have at least one industry mentor appointed from an SMI member company, who will make regular contact with the team. The role of the mentor is to:

- Check on progress
- Provide guidance
- Assist in obtaining any required information from the organisers
- Ensuring that the team participates in the spirit of fair competition

8. Stage 3 – On-Water Final:

Overview

The competition will be held in the second half of June 2027 and will be split into four challenges (see below).

The competition venue is the University of Plymouth Marine Station.

Marking will be weighted towards fully autonomous solutions versus remote operation.

USV Equipment:

Each team participating in Stage 3 will be provided with a USV comprising the following for the on-water final:

- Catamaran Plastic hull (ca. 2m long)
- Propulsion system built into the USV. This will consist of two Blue Robotics T200 thrusters and associated electronic speed controller (ESC) providing differential steering.
- Battery for propulsion, control system, sensors etc.
- A fitted sensor and control payload that will exactly mirror that previously provided to the teams.

Further details are on the MAChallenge website

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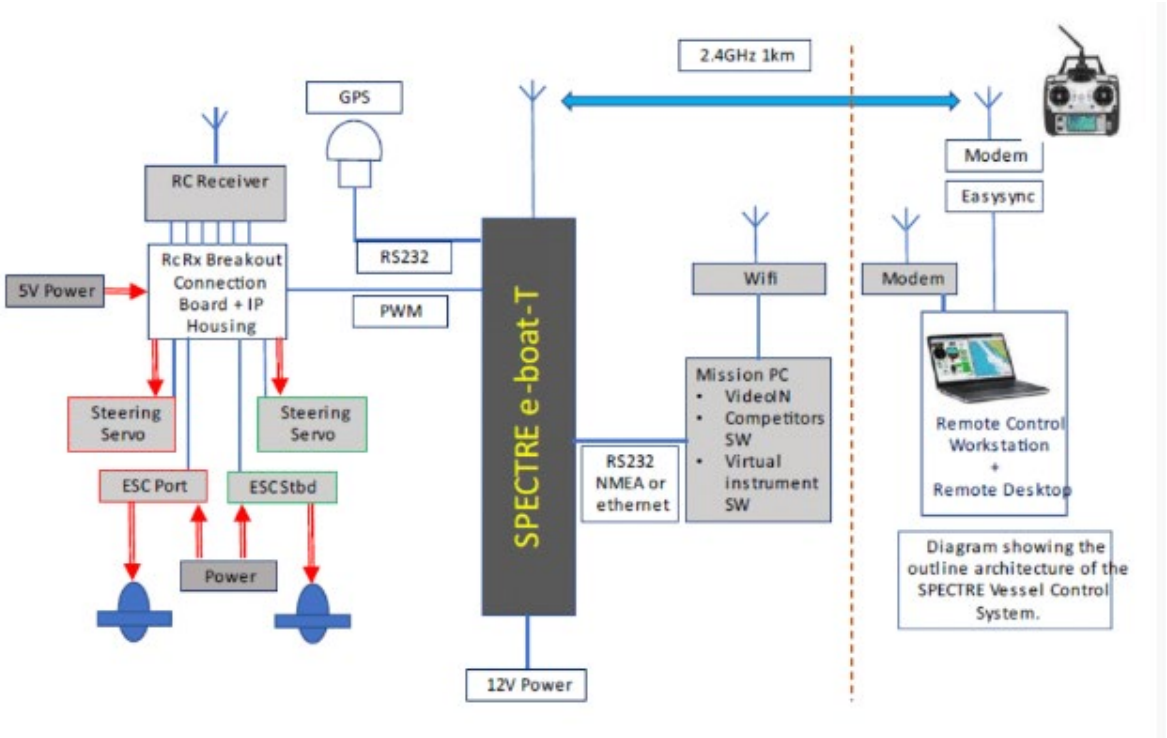

NB – We are currently implementing a minor modification to this configuration, and a new schematic will be provided in due course.

Teams will access the on-board Mission PC via Wi-Fi, using TeamViewer. This will give them remote control over the platform and their own software functionality in the Micro-PC onboard via the comms link modem.

Required Capabilities from the teams:

Teams will be required to develop their own software packages to make use of the designated sensor outputs, send control messages to the autopilot and use the Ship Simulator package to model the USV's response to control commands. Teams will need to develop an ability to display information, live and historical tracks, and map data from the provided systems. Teams should not hard code details such as navigation waypoints or obstructions into their codes as these are subject to change by the organising committee.

9. Mission Challenges:

Main Challenges:

All teams will need to undertake the following challenges. Teams may use remote control or full autonomy to undertake the challenges with scoring awarded appropriately by the judging panel. Teams will be asked to show the required capabilities including the display of live and historical tracks of the USV for each challenge.

The organisers reserve the right to amend the challenges in the light of conditions on the day.

There will be a maximum of 100 points available; however, teams that do not complete a challenge autonomously will have their points reduced by 50% for that challenge. There will also be penalties for collisions with buoys and/or other objects. Exceptionally the judges may decide to award bonus points for some challenges.

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All teams will have to complete challenges 1 and 2 before moving on to the final two challenges.

Challenge 1: Navigate a waypoint track (10 points)

The USV will be required to navigate smoothly around a loop track using a series of GPS waypoints to test manoeuvring control. The USV should pass close to each GPS waypoint, taking into account the need to make a radiused turn, and should maintain as small as possible average cross-track error on the straight legs.

Challenge 2: Obstacle avoidance (20 points)

The USV will be required to follow a loop track (similar to challenge 1. above) and reactively avoid stationary obstructions detected by a virtual sensor. The avoiding action should be a smooth manoeuvre, which minimises deviation from the track, while passing the obstruction at a safe distance, and returning to the track as quickly and smoothly as possible. The position of obstacles will not be published in advance but will be provided during the run, in the form of a feed of NMEA TTM messages, with target range and bearing.

Challenge 3: Searching for pollution (30 points)

The USV will be required to autonomously undertake a search for, and map, an area of pollution within given co-ordinates. Concentration of the pollutant at the position of the USV will be output by a virtual sensor. The pollution will be a 2-dimensional ‘plume’, which must be mapped in near real-time in order to identify the maximum values that indicate the source. It is possible that there will be sensor noise as well as localised maxima that need to be distinguished from the main maximum values. The output of the challenge should be a geographical representation of the extent and maximum values of the plume.

Challenge 4: Mapping and Identifying surface ‘targets’ (40 points)

The USV will be required to automatically search a specified area for a number of physical objects (e.g. rubber duck, plastic milk bottles, buoys), comprising no more than five different types. All targets must be identified, located and mapped using an algorithm to be run on the supplied hardware. The USV should avoid colliding with the objects, which means that they must be positioned remotely. Collision avoidance must be undertaken using the onboard sensors as NO TTM feed will be provided. Sample images of the types of objects will be provided in order to train AI image recognition algorithms.

Judging

Judging for all stages of the competition will be done by the MAChallenge organising committee. Judges’ decisions are final.

10. Appendices

Manuals to follow

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