

VIII-IX UNIVERSITY CHALLENGE OF NAUTIDESIGN



Notice

Version 1.0

Achievement

engenharia naval))) ufsc



Organizing Committee DUNA²
UFSC - Centro Tecnológico de Joinville

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Organizing Committee

The organizing committee of the event is arranged as follows:

- GENERAL COORDINATION

Prof. Luis Fernando Peres Calil

Caroline do Rosario Mafaldo

Mariana Rampazzo Duarte

- MARKETING / RESOURCES

Pedro Fahd

Caio Fernandes

- REGULATION / EVIDENCE

Bianca Ricarte

Luan Alves Damásio Franco

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Maria Eduarda Rossetto da Rosa

Rayana Arantes Barboza

- EVENT INFRASTRUCTURE

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1. GENERAL

The University Challenge of Nautidesign (DUNA), under the propose of a competition where competitors are encouraged to develop and build a working model, on a reduced scale, of vessels developed and designed by them, aims to promote the generation of innovations in Naval Engineering area and stimulate the interaction between engineering students, especially the naval field.

The rules in this regulation apply to the VIII University Challenge of Nautidesign - DUNA², referred to in this text as the “competition”.

All competitors should be aware of and according to the technical rules described in this regulation. The organization of the event will penalize all competitors and staff that ignore or violate these rules. Penalties may be made in the form of warning, disqualification or removal from future participation. All questions concerning the interpretation of the technical rules must be submitted by e-mail <contato.duna@gmail.com>.

The regulations of the competition, which contains more detailed information about each event will be posted on the www.oficialduna.com at pre-established date as Appendix 1. If necessary, the organization may perform amendments in the notice until the disclosure Regulation. The changes will only be considered valid if they are added to the event's official website. Information disclosed by other means are not considered official, coming from members or not members of the organizing committee. Clarifications and explanations will be considered official when performed via email.

2. CATEGORIES

The competition will be open for registration of two categories: university and open.



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On the university category, only under graduation students enrolled in the university will be able to apply. The competition understands as higher-level college students enrolled in undergraduate courses.

The open category will accept graduated students, as well as naval industry's contributors or any individual who wishes to join the competition. Tests of this category will happen simultaneously with those for the category university.

3. REGISTRATION

The application form and the form of exclusion/inclusion of team members will be available on the official website (www.oficialduna.com) and must be completed digitally. No handwritten forms will be accepted and non-standard provided by the organization.

The forms together with the documents of the team members must be attached to the entry on the competition website (www.oficialduna.com) following the schedule, Appendix 1. Teams must have a captain responsible for the team and a lieutenant. They will receive notifications of the event.

The files (application form and other solicited document according to the category) must be compressed (.rar or .zip), with the team name and university, as the examples below. No separate or different format of the specified files will be accepted.

Ex:  CATEGORIA - UNIVERSIDADE - NOME DA EQUIPE
 UNIVERSITÁRIA - UFSC - CASCA GROSSA



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In open category case, if the team doesn't belong to any university, fill the institution (company, etc.) to which is affiliated. If is not affiliated with any institution, just let a blank space. The name of the pilot should be informed by the official email of the team – who must be informed on the application form - up to 40 days before the competition. In the case of any failure, the pilot may be amended by justification in the beginning of the event or, in exceptional case, the ethics committee may allow pilot changes during the competition.

The payment for the subscription it will be done only after the approval of the subscriptions.

Payment instructions will also be sent later.

3.1. University Category

In the university category, only under graduation students enrolled in the university will be able to apply. The competition understands as higher-level college students enrolled in undergraduate courses. Due to the pandemic, only students registered in universities, till the homologation set update, available on appendix 1, can apply, considering that any institution won't be in the same semester at the same time.

Each team must enroll at least 4 members and at most 10, as set out in section 5.
RULES OF COMPETITION.

The teams in this category must inform upon registration a teacher advisor. The teacher must send a professional identification document and needs to be informed in the application form.

It must be sent via email upon registration the tuition vouchers for all team members,



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along with the application form available on the website.

This category will feature a maximum of 25 participating teams. Having available infrastructure without compromising the smooth running of the event, the organization may at its discretion increase the number of participating teams.

If the number of registrations exceeds the maximum number of teams stipulated by the organization, the following criteria will be used to determine the competitors:

1. It will be prioritized the team that comes from a university with fewer teams registered.

2. Order of registration.

3.2 Open Category

The open category will accept graduated students, as well as naval industry's contributors or any individual who wishes to join the competition.

Each team must enroll at least 2 members and at most 10, as set out in section 5. RULES OF COMPETITION. It must be sent via email upon registration official identity documents with photo for all team members, along with the application form available on the website.

If the team is associated with any institution (university, company, etc.), it must also send a document that proves such association.

This category will feature a maximum of 5 participating teams.

If the number of registrations exceeds the maximum number of teams stipulated by the organization, the following criteria will be used to determine the competitors:



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1. Order of registration.

3.3 Homologation

Approval of registration will take place within 7 working days after the end of registration period. The result will be announced on the official website of the event.

Entries sent inappropriately will not be approved.

Teams with irregular members will be disqualified. They are considered irregular in the academic category, competitors who do not meet the requirements to participate:

1. To be properly enrolled in college in the date of homologation.

Teams with incorrect and/or incomplete documentation can be notified via e-mail and must regularize the situation until the homologation date, otherwise, it will be disqualified.

Teams that made the inscription on the 2019 edition of DUNA and did not show up on the day only will participate in the DUNA² if there is availability. Likewise, teams that make enrollment in DUNA² do not attend, will only participate in the 2022 edition if there is availability.

3.4 Registration Fee

Homologated teams must pay an enrollment fee of **R\$ 450.00 (four hundred and fifty reais)** within the stipulated time schedule in Appendix 1.

If the deposit it is not done on time, the team will be automatically disqualified and a new team will be called to participate in the competition, this should make the payment within a new deadline stipulated in Appendix 1.



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The team that give up on participating the event after making the payment, may require the amount of **R\$ 250.00 (two hundred and fifty reais)** until the date set in the schedule, Appendix 1. After that date, you will not be refunded any amount. **The withdraw must be informed via e-mail** to the official DUNA address by the captain or lieutenant and, after notification, the team cannot ask to participate in the DUNA².

4. TECHNICAL AND SECURITY SPECIFICATIONS

Competitors will be responsible for the technical conditions of their models and the safety equipment provided by the organization throughout the competition.

In case of malfunction of the model during any of the tests - whether by electrical breakdown, water boarding, eventual fire, etc. - the ransom will be so as not to interfere with competition by prioritizing the safety of competitors, members of the organizing committee and the general public.

It is strictly forbidden, for security reasons, the entry of participants in the competition lake.

Any damage caused to the equipment and tests' material provided by Organization will be penalized, as well as any transgression of the conduct rules made by the place where the competition will be held.

The voltage of the power grid in the Joinville city, where the competition will take place, it is **220V 60Hz**.

4.1. Main Dimensions

The competition covers one template of vessel in both categories:

Tugboat: Model designed for towing and maneuvering barges and ships.

Main Characteristics:



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- Total length: 900mm to 1100mm;
- Beam: 310mm to 350mm;
- Freeboard: minimum 100mm;
- Draft: minimum 120mm;
- Trailer height: on the waterline.
- Propeller perimeter: maximum 250mm;
- Weight: minimum 18kg and maximum 25kg;

The **total length** is measured from the bow end to the deck aft end. The bulb, propeller or any other integral part of the vessel is considered in the total length. The hitch aft will not be considered in the measure, as well as any other accessories.

The **beam** will be the largest measured between the port and starboard ends of the deck, not to mention the defense, if any. However, the full width of the model (including defenses, accessories and props) may not exceed 370mm.

The **freeboard** shall be the vertical height measured at the side where the minimum value for every vessel between the upper deck boundary and the waterline.

The **draft** will be measured at midships from the hull bottom to the waterline. At vessels shall be permanently marked throughout the vessel indicating the heights of the waterline in bollard pull and war tug condition.

The **trailer height** is the vertical distance between the center of the coupling eye of stern and bow towards the waterline (more information on the hitch aft in section 4.2. Rules for the Model).

The **thrusters perimeter** shall be the length of the circumference containing the conventional or azimuth thruster propeller.

Will not be considered for measurement accessories and props.

There is a tolerance of 1% for the measurement of total length, width, draft, freeboard and thrusters perimeter.



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Further details on the measurements in section 5.2.1 Inspection Procedures.

4.2. Rules for the model

The models must necessarily possess deck and superstructure. **Such elements must be easily removable within 30 seconds** to enable inspection of the interior of the model. It is even recommended that deck is completely removed so that personnel and inspection can access all the interior of the vessel.

Models must have a switch that will act as a **general switch in the outer side of the deck** which shall be capable of turning the electrical system on or off without opening the deck.

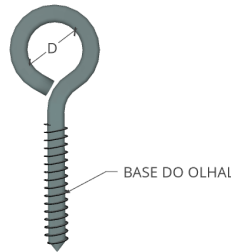
The models should be supported in a proper and mobile crib. The crib should have a base of 300mm x 300mm, handles and a minimum height at which any part of the boat is 150mm from the ground to avoid damage to the boats.

The models must have in the tip of the stern, as well as in the tip of the bow, a coupler with a width of at least 10mm in diameter. The coupler **should be closed**. The position of this accessory in the stern must respect the trailer height discussed in section 4.1. Main Dimensions. Both accessories **must be removable**.

The diameter (D) and the base of the eye are identified below:



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Do not use materials that can pollute the water and props that might come off of the models will be.

Motor, battery and other components must be fixed. Otherwise the team is suspended from competition until settlement/regularization.

The ballast (if any) of vessels should be supportive, not fixed, that is, it must be stuck in the template, it cannot be removed or added but can be positioned in different ways on different evidence. On the evidence of bollard pull and tug of war, the ballast must be positioned, so that the trailer ring is on waterline.

The models should mandatorily have forward gear and reverse at any time of the competition, without the need for reprogramming the electronic speed controller, unless it is done remotely.

It will not be allowed to exchange the following model components other than those approved by the event organization:

- Motor;
- Battery;
- Propeller;
- Rudder;

These items will only be approved in the inspection act. Will only be approved rudders and propellers identical to the ones attached to the model in the inspection act.



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The piece is considered approved if it has the seal provided by the organization.
Upon inspection, the team should take all spare parts for the verification of the same.

4.2.1. Fixation System of the Model on the Barge

Must be placed in the bow of the boat two ½ inch tubes with 80mm spaced.

It may cross the deck of the vessel and must follow the distances specified bellow.

Pipe height should vary between 10 and 15cm (± 1cm) relative to the waterline.

These pipes will be used to secure the model on the barge, it must be unobstructed and have free upper access.

4.2.2. Electronic Components in the University and Open Category

The models should use a battery with the following characteristics:

- Composition: Deep Cycle Sealed Battery
- Nominal voltage: 12V
- Capacity: maximum 6Ah

The models must have as a single energy storage source, the battery approved by the competition organizer.

There shall be no batteries association.

The battery should be easily accessible and with its original label and not violated.

It is mandatory, for propulsion, the exclusive use of the motor model specified by the Organization, may – each vessel – count with up to one motor.

All electronic systems must be in protected sites and with easy access for inspection.

The loan of batteries and motors between the teams, during the competition, only spare parts duly approved in inspection.



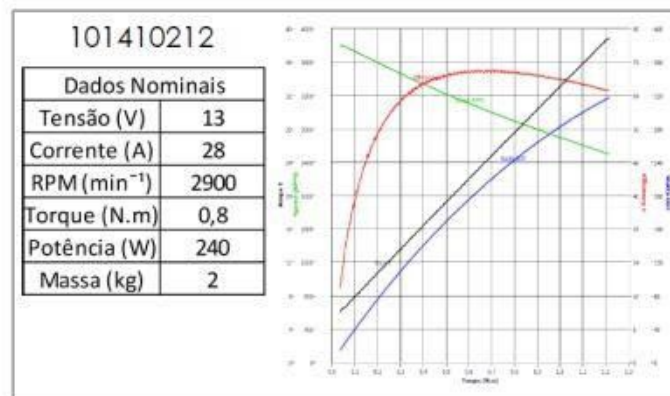
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There may be a pump for cooling of electronic components, since the source of energy is the same battery used for propulsion. The water outlet should be located in one of the model's sides. Forbidden outlet water back or forth.

The radio control must have 2.4GHz frequency.

The motor to be used have the following specification:

- Imobras 10141021



4.3. Competition

Strength:

- The strength test consists of conducting a barge in a circuit. The dimensions of the barge are in Appendix 2;
- During this test, the vessel will be fixed on the barge;
- In this test is considered the smallest travel time.

Maneuverability:

- This test consists of maneuver a barge in a route determined by the Organization;
- This test will be in couples;
- During this test, the vessel won't be fixed in the barge;
- In this test is considered the smallest travel time wins the race.



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Bollard Pull:

- Bollard Pull is a traction measure, or strength, of the vessel. It is performed with the craft at full force, pulling a fixed rope;
- The vessel will pull the equipment in reverse gear;
- The measurement will be taken by force on a permanent basis.

Speed Test:

- The speed test consists in to verify the model that has the hull-propeller assembly with better hydrodynamic efficiency through a race.

War Tug:

- This test, as the name suggests, consists of a tug of war between two competitors, which one get tow the other to the previously marked point.

Project:

All models will be evaluated by professionals involved in marine engineering;

- It shall be delivered to the technical committee a memorial report of calculation and technical data of up to 6 pages, besides a presentation video lasting 6 minutes, which must contain at least 1 minute showing model working;
- In the first day of competition, there will be an argument process lasting 10 minutes with the evaluators;
- The criteria that will be evaluated will be released on Competition Regulation, but involve information about coefficients of relevant forms to tugs, design methodology, materials and construction techniques, as well as hydrostatic, hydrodynamic and selected analyzes.

Surprise Test:



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- The organization reserves the right to perform surprise tests and / or insert new elements in the races before and during the competition.

Evidence Regulation:

- Both the university category and the open category will carry out the same tests during the event.
- More detailed information on each test (scores, penalties, etc.) will be disclosed in the competition regulation, which will be published on the event's website on the date determined in accordance with Appendix 1.

5. RULES OF THE COMPETITION

Each team can compete with only one (1) model throughout the competition.

The teams at university category should be formed of at least 4 students and at most 10.

The teams at open category should be formed of at least 2 students and at most 10.

Teams must provide a name upon registration. It should not contain names, titles or improper badges, as offensive names, pejorative, with prejudice and discrimination.

Teams that wish to include and/or exclude members, respecting the rules of competition, should do so by the date specified in Appendix 1 using the specific form available on the website of the competition. This form must be sent to the official competition email along with the certificate(s) for registration of new members, if any.

After the date informed in Appendix 1, the Organization will accept to include or to substitute up to two members per team on the first competition day, during the teams'



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check-in. The documents of new members must be presented during the check-in, as well as the form available in the website. The limit of 10 competitors per team must be respected.

They may only enter in the competition area the Captain, Lieutenant and Pilot. And only 2 members may remain during execution of the test.

After each test an inspection can be performed in some of the models.

During the hours of competition will not be allowed to competitors to consume alcohol and/or illegal substances. Any evidence of the consumption of alcoholic beverages or controlled substances at any time of the competition will result in disqualification of the team from the competition.

5.1. Penalties

During the competition, the organization will penalize teams that fail to comply with rules of this notice, as well as the rules presented in the rules of evidence. At penalties range from losing test scores to exclusion from university linked to the team in future editions of the event.

Details of the penalties and amounts to be discounted will be present in the evidence regulation, which shall be disclosed by the deadline in the schedule, appendix 1.

5.2. Publicity

The model should contain the team name on the hull. The model must contain an available space for the event advertising as Appendix 4, moreover, **it must contain a bar, a resistant material whose choice is the responsibility of the team, 100mm height and 5mm in diameter above the craft house.**



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Competitors should put the stickers assigned by the organization in a space above the waterline (as Appendix 4), the stickers will be provided by the DUNA Organization.

The teams can have their own sponsors. But the spaces defined in Appendix 4 will be used for DUNA sponsors.

The organization of the competition reserves the right to use for future promotion of the event, photos and videos that are made in the days of competition.

5.2.1. T-Shirts

It is not mandatory to making T-shirts to identify the teams.

It will not be allowed to wear t-shirts RED or ORANGE by the teams. These colors will be used by the event organizers. No color exclusivity for any of the teams.

The DUNA² logo will be available on the competition website.

5.3. Inspection

The technical committee will make the inspection of all models to verify compliance with the requirements before the competition. One competitor from each team must be present during the inspection process, and will be notified in advance about the time and location. All models will be photographed during the inspection, in order to register the components for future reference.

The inspection will be performed with the ballasts positioned in the same way as bollard pull and tug of war events so that the towing height is respected and the marking indicating the waterline is true.

Models that do not comply with the requirements set by the event organizers will be automatically disqualified until adjustments are made, which should be confirmed by a new inspection. All models may be subject to additional inspections without notice to



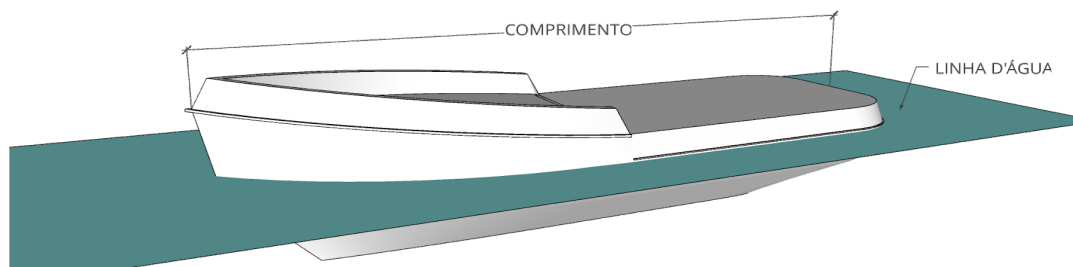
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competitors at any time of the competition. Competitors must cooperate with such inspections. Changes made after the inspection will require a new inspection.

5.3.1. Inspection Procedures

Inspections will be carried out as follows:

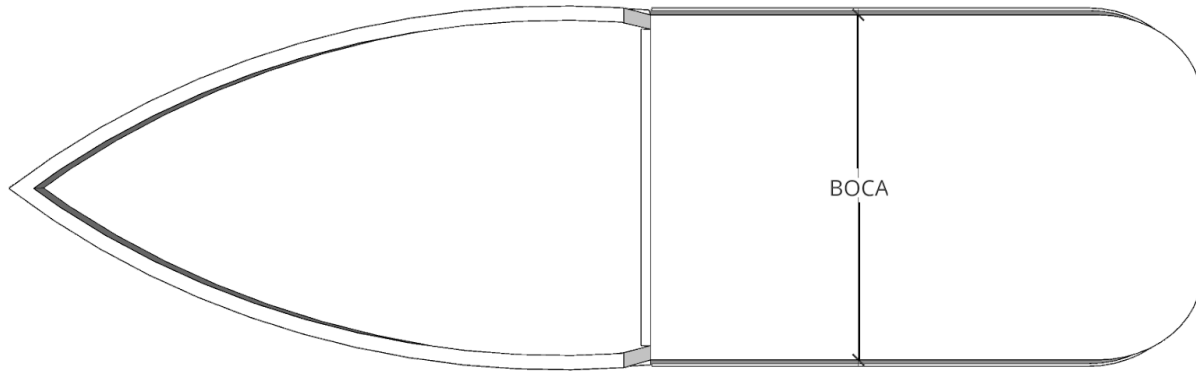
1. Total length: 900 mm to 1100 mm;



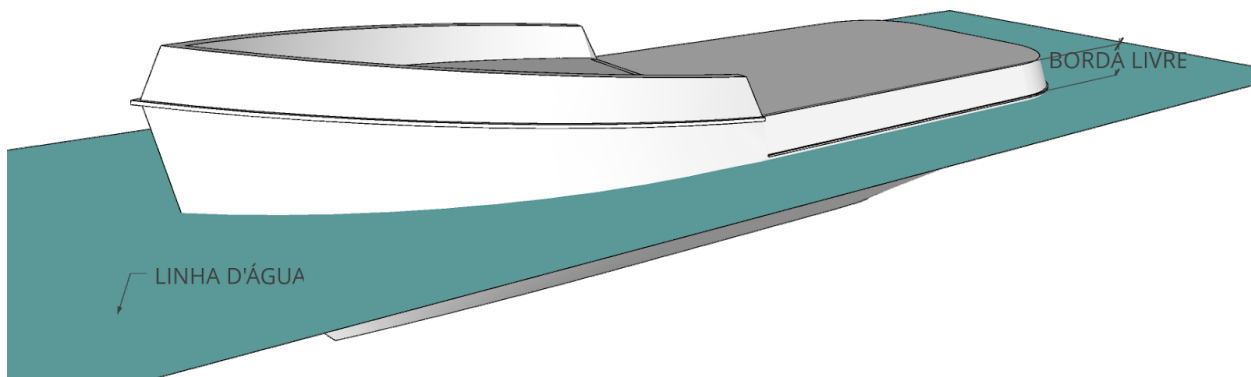
2. Beam: 310mm to 350mm, and the full width of the model (including defenses, accessories and props) may not exceed 370mm.



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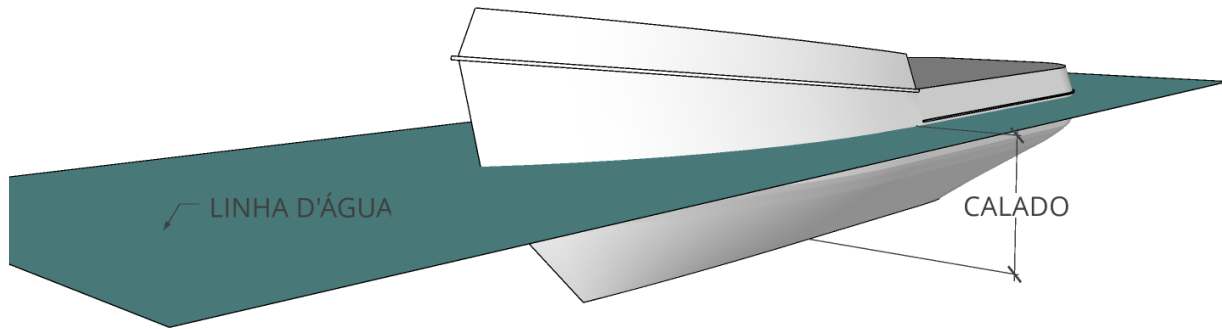
3. Freebord: minimum 100 mm;



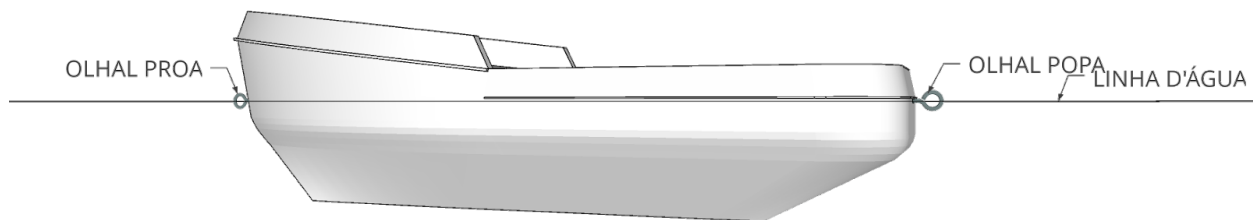
4. Minimum molded draft at midship: 120mm;



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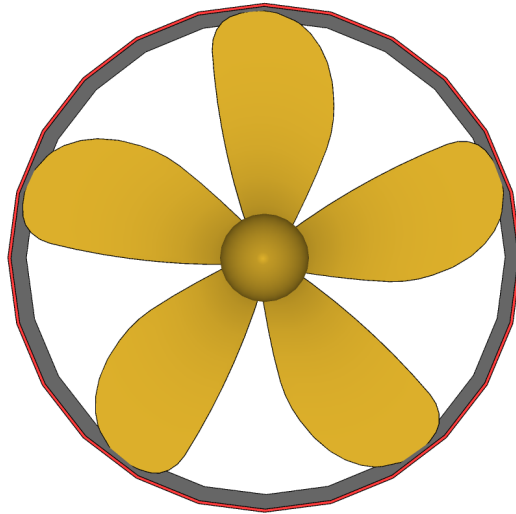
5. Trailer height: on the waterline;



6. Propeller perimeter: maximum 250mm;

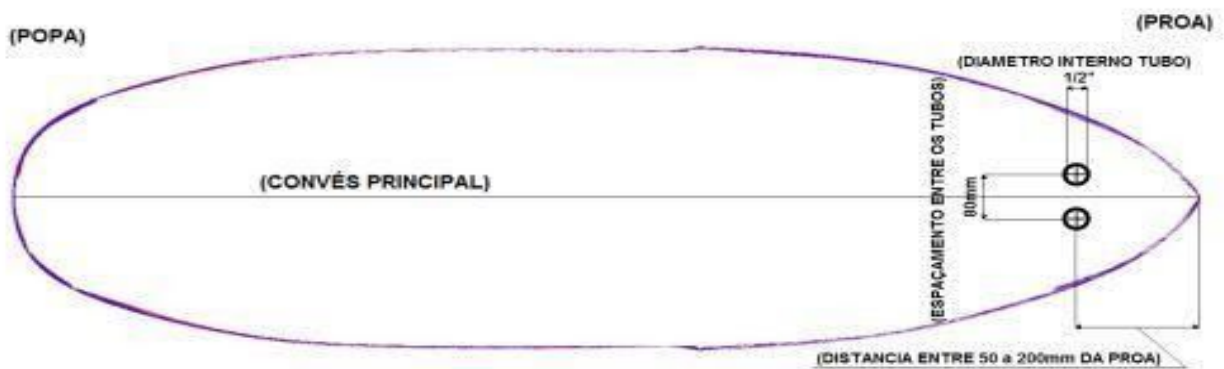


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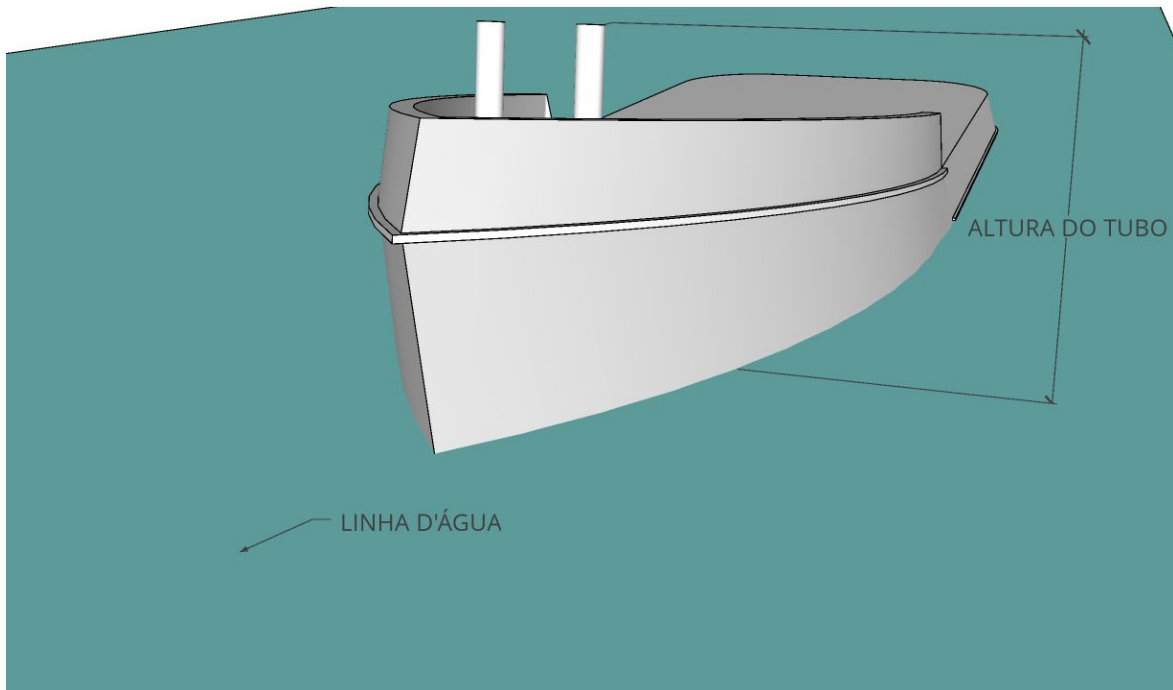
The impeller perimeter shall be the length of the circumference highlighted in red.

7. Dimensions of barge mounting system: the two ½ pipes inches spaced 80mm apart should be positioned at the bow of the vessel between 10 and 15cm (± 1 cm) relative to the waterline and clear and with free top access;





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8. Minimum weight: 18kg, maximum 25kg;
9. Waterline: must be permanent throughout the vessel, indicating live works in the condition of bollard pull and tug of war;
10. Verification of model barge attachment system according to Appendix 3;
- 11. Deck opening time: 30 seconds maximum.**
12. Verification of the fixed components: all of the components must be fixed at the vessel;
13. Verification of electronic components (motor and battery): components as specified;
14. Photograph of the model and its components.

If any of the requirements is not met, the team will be prevented from competing



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until the model meets the standards. If the model presented by the team is not approved in the initial inspection, you may request a second inspection. If the model is not approved this second inspection, the team will be disqualified and cannot participate in the competition.

6. PROTESTS

All teams can protest irregularities of other teams at any time during the competition by filling in a specific form.

All teams can protest about testing situations where the test situation is dubious or decisions taken by the direction of the test.

Any claim or complaint related to something that happened in a particular test should be done within 30 minutes after the end of it.

It will be only analyzed the protests that are made in writing (through the form available with the organizing team of the event).

The form must be signed by the captain of the informer team and delivered to a member of the competition ethics committee.

If the complaint protest directed to another team dismiss, the informer team will be penalized each complaint.

The committee's decision will be final and irrevocable, which will be written and disclosed during the competition.

Any argument with the organizing committee or the ethics committee after the decision has been declared can result in the loss points for the team.



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Any action by the team (or team member) made in an unsportsmanlike manner (ex.: verbal assaults to anyone in the competition) may result in the prohibition of the team's participation in the subsequent competition.

Protests made verbally and directed to any member of the organizing committee or the ethics committee may result in severe penalties to the team.

The forms will be available in the organization's tent during the competition.

6.1. Ethics Committee

All complaints and reports will be evaluated by the ethics committee of the competition, which will consist of professors related to Naval Engineering. The committee shall determine whether or not the content of the protests is valid and, if checked the veracity, the attitudes proposed by the regulation will be taken. Omissions will be evaluated and judged by the Commission without appeal.

7. OVERALL CLASSIFICATION AND AWARDS

At the end of the competition, an awards ceremony will be held. The winning teams in each test will be awarded. There will also be an award for the overall competition, which will be considered all the tests, the three teams best placed will then be awarded.

8. INVITED TEAMS

The Organization Committee reserves itself the right to invite teams of international institutions, as well as the Champion of the previous edition, to participate the VI Academic Challenge of Nautidesign. These teams may confirm their participation up to April 10th, 2020.



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International teams exclusively composed by under graduation students and the DUNA2019 champion will participate the competition in the university category and won't have to pay the registration fee. Other invited teams will participate in the open category.

During the competition, invited teams must follow all the rules presented in this document.



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APPENDIX 1 - CALENDAR

The organization reserves the right to change the date of the event **until the April 30th, 2021.**

Registration start	01/12/2020
Registration ending	01/03/2021
Deadline for team approval	08/03/2021
Deadline for registration payment	05/04/2021
Team Approval - Second call for entries (if any)	10/04/2021
Deadline for payment of second teams call	15/04/2021
Granting of second call teams	19/04/2021
Invite teams confirmation deadline	26/04/2021
Deadline for disclosure of evidence regulation	10/04/2021
Team members exchange Deadline	26/06/2021
Deadline for withdrawal with partial refund *	03/07/2021
Deadline for entering pilot name	16/07/2021
Deadline to report any changes to competition regulations	10/08/2021
Event date	23, 24, 25, 26 and 27/08/2021

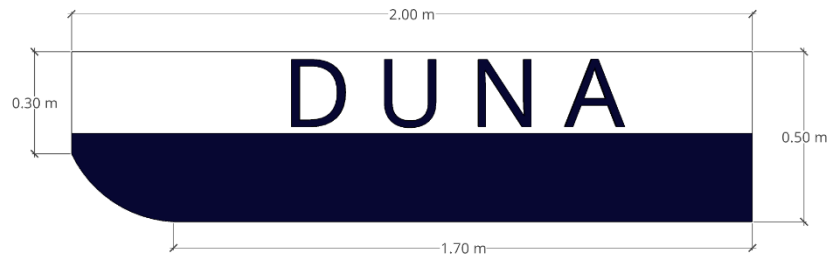
* According to section 3.4



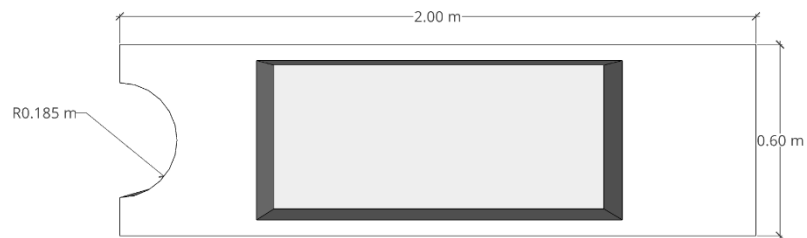
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APPENDIX 2 - BOAT

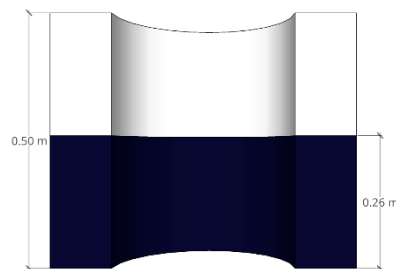
- Side view:



- Upper view:



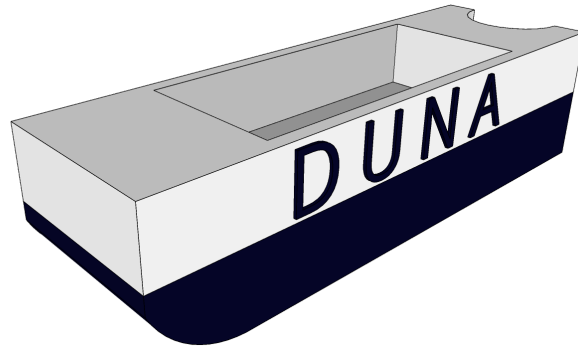
- Stern view:



- Perspective:



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APPENDIX 3 - FIXATION SYSTEM OF THE MODEL ON THE BARGE

Described with more details in the regulation..



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APPENDIX 4 - ADHESIVE SPACE ON BOATS

