Sailaway Boat Designer Guide

Last edited August 31, 2024

Before you begin

Making your perfect boat sail in a virtual world is a dream for many of us. Especially if it is a boat you know very well from the real world. Everything seems so obvious and simple: Just make a 3D model, upload it in Sailaway and set sail.

But what seems obvious in the real world can be a nightmare to realize in the virtual version of the boat. Take a simple fact as this. A halyard is pulled and the loose end hangs over the cabin roof, over the bench in the cockpit and on to the cockpit floor. To establish the same thing on your virtual boat requires you to define the surface of the cockpit roof, the bench and the cockpit floor to make sure the line doesn't simply hang right through the boat towards the bottom of the sea.

Or imagine a twin rudder set up. The rudder blades are connected with a rod, they can be pulled up and each tiller has a tiller extension. This is not possible with a single mesh. The rudders need to be divided into several parts, which means several meshes. The 2 rudders, the 2 blades, the 2 tillers, the 2 tiller extensions and the connection rod. And all of those nine parts need to be configured in how they rotate and in how they behave when the rudder is operated.

On a boat everything moves and rotates and flaps around. And that means that everything needs to be configured and treated as individual components. From the rudder to the boom to the main sail to the main sheet, to the traveler. Nothing is fixed.

When visiting websites with libraries of 3D models that can be downloaded or bought, it is easy to imagine how you could download a nice looking boat model and import it in Sailaway. But unless you know how you can change the details of the model, it will be almost impossible. You will need to optimize it and to separate it into various parts that need to move independently.

Don't get scared off by this introduction. But instead learn to work with a 3D modeling program beforehand. In this document the free available program Blender is used for the examples.

Mesh complexity and performance

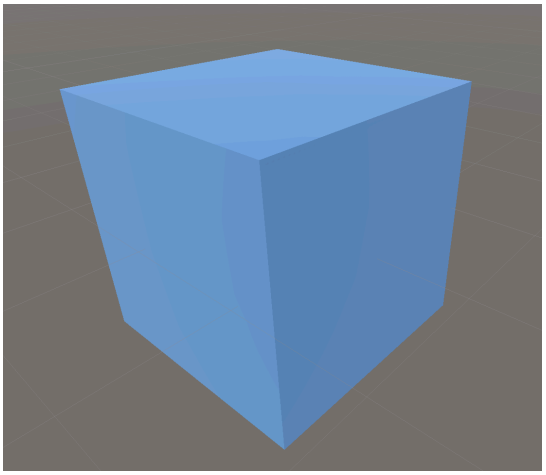
There is an enormous difference between a 3D model that looks good in a picture on a website and a 3D model that is suitable for use in a game. The difference is in the way the models are structured. You will often see that models are created via subdivision. A designer makes a rough shape of the boat and then uses subdivision and modifiers to smoothen it out. This is a highly inefficient way to design a boat for a game. The model will end up having thousands of vertices and still look poorly.
The more vertices a model has the bigger the impact on performance. This is why boat designs all receive a performance index in Sailaway. To give the potential buyer an idea of how this boat will perform on his or her computer.

Making smooth meshes

Maybe not something you'd think of when you begin shaping a 3D model of a boat, but almost all the "sharp" edges and corners are in fact rounded. When a polyester boat comes out of a mold, there is not a sharp corner to be found anywhere. The corner between the deck and the cabin, the benches, the ridge along the side of the hull to prevent your foot from slipping, everything is rounded.

One way to achieve this is by subdividing or smoothing modifiers. But as discussed earlier, this is not the way to go. I hope this paragraph helps with understanding how shading works, because this is essential if you want to make efficient and beautiful game models.

Here's a simple cube and in this example it will be given some smooth rounded edges.



This cube has 6 sides and 8 corners.
And each side has a computed normal. Think of a normal as an arrow that points away from the surface. Normals are used to compute how much light falls onto a surface. This is why you see that not all sides get the same amount of light, and are not equally bright.

So there are 8 computed normals here that all make 90 degree angles to the normals of the adjacent sides.

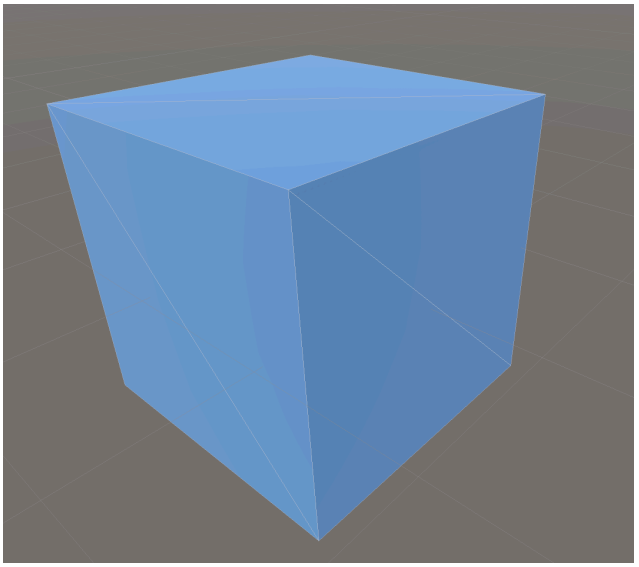
I call the normals “computed normals” because they are not part of the mesh data. You’d expect the mesh data to be like this:

- 6 faces
- 8 vertices (one for each corner)
- 6 normals

But in fact it is:

- 12 triangles
- 24 vertices
- 24 normals

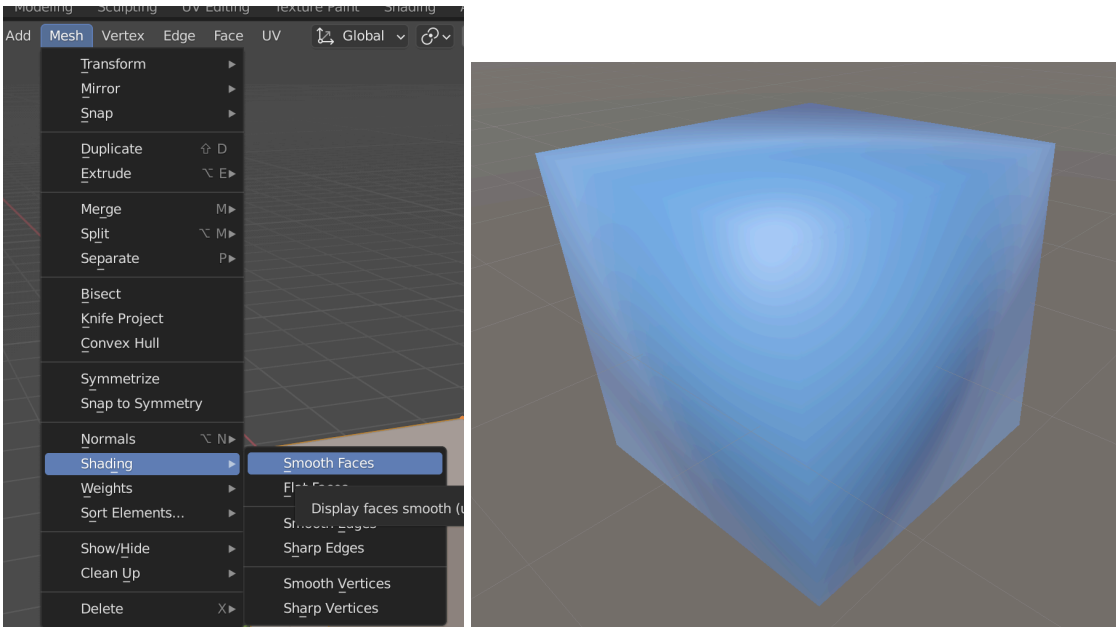
The 6 square faces are split up into 2 triangles each. This is because Sailaway always sends triangles to your graphics card for rendering. *It may sometimes be better to use the triangulate function in Blender before you export your model. This way you can control the way the faces are split into triangles yourself.*



The 6 square faces have become 12 triangles and for each pixel on these triangles a normal is computed. This is done by interpolating the normals that are stored in the mesh data for each of the 3 corners of the triangle. Since these 3 mesh data normals all point in the same direction, each pixel on the entire triangle has the same computed normal and receives the same amount of light.

This is why there are 24 vertices and 24 normals in the mesh data. Each corner is used by 3 sides. And is therefore used by 3 triangles. So it needs 3 normals in the mesh data to make sure the direction of the computed normals is like you’d expect on a cube.

Now let’s use “Smooth shading”



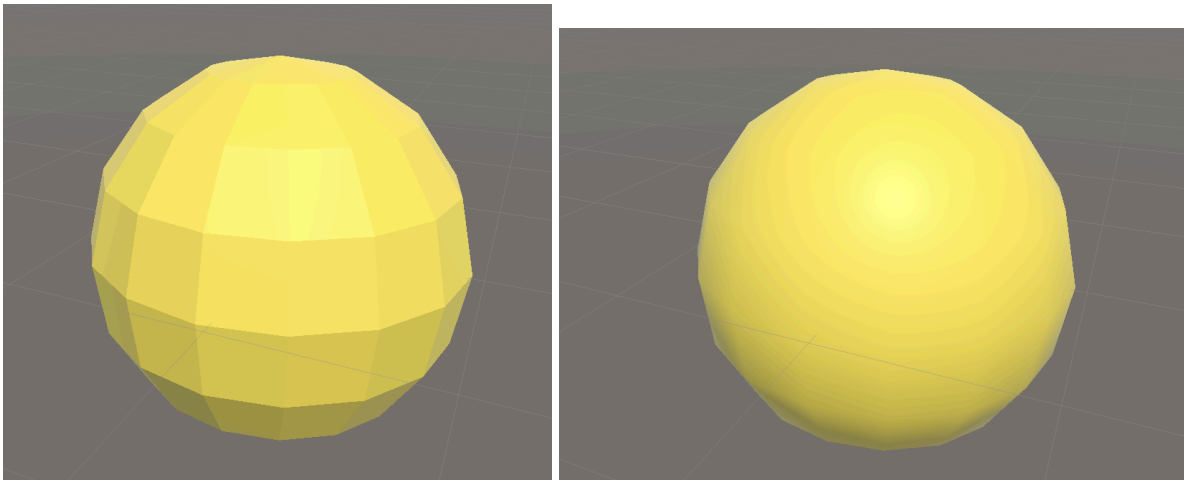
The same cube, completely different appearance.

The mesh now has:

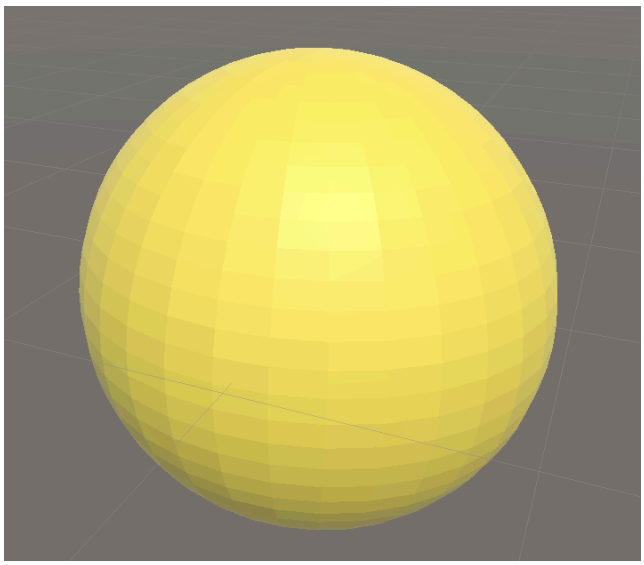
- 12 triangles
- 8 vertices
- 8 normals

Each corner only has only 1 normal in the mesh data. The 8 mesh normals all point away from the corners in a diagonal line. Just like a sphere. The triangles still compute normals for each pixel using the mesh data normals of it's 3 mesh data corners. But now these normals all point in different directions. And therefore the computed normal for each pixel is different. The cube is rendered as if it were a sphere.

For illustration, I have rendered a real sphere. Just to give an idea of what happens.

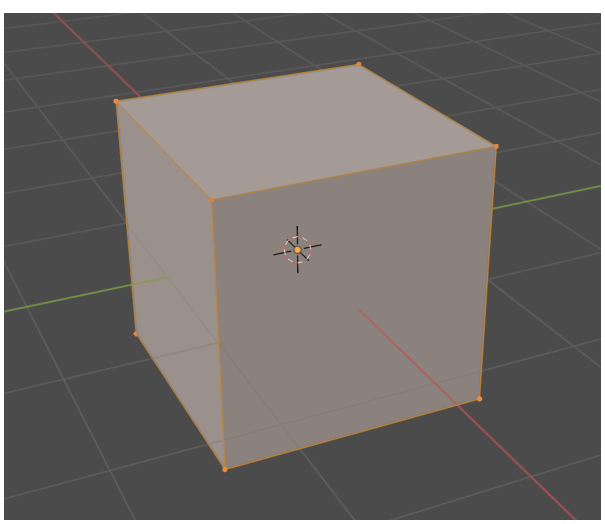


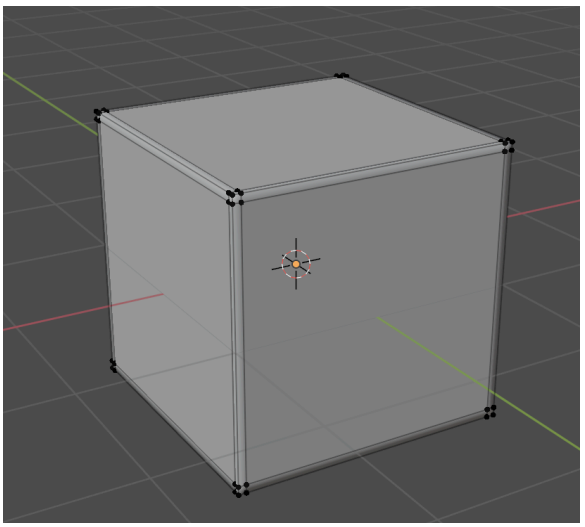
Same sphere. Flat shading on the left. Smooth shading on the right.



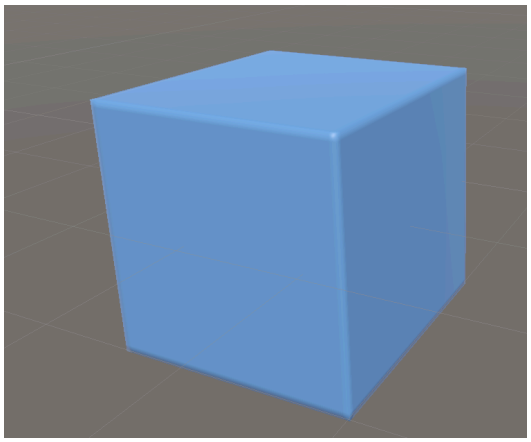
And this is the same sphere using subdivision. It has 64 times more vertices and it still doesn't look smooth.

Back to our cube now. We want it to have rounded edges. For this we will use smooth shading combined with extra rows of vertices. Like this:





And the result when imported in Sailaway:



Boat v.s Boat design

A boat design is a template from which boats can be instantiated.
When you make a boat design, the temptation of creating a boat from it while the design is not ready yet is big. Who doesn't want to walk around their own design or even try to sail on it. Sheet or no sheet.
This is all fine. But....
In the My Boats screen you can access the boat designer functions like:

- edit materials and colors
- edit hardware
- edit trim lines

These functions are accessible from the Boat and from the Boat Design. They may appear the same, but they **absolutely are not**.

Consider this scenario:
You edit your boat design and add a winch that you place on the mast.
You quit the boat designer and select your boat to see what it looks like in the simulated world.
Since you find it too small, you are not very happy with it. So you click the 'edit hardware' icon for the Boat, not for the Boat Design **(Oops)**. You delete the winch. And you add a bigger winch.
You quit the boat designer again and select your boat again to see what it looks like in the simulated world. It looks ok and you are happy with the result.

However, if you would sell your boat design to someone else and they'd instantiate a boat from it, they'd see the small winch and not the big one. This is because you edited your boat, not your boat design.

So always stay clear of the edit buttons for your boat and use the boat design edit buttons instead. It can create a very confusing situation. To solve this, delete the boat and instantiate a new one. That way the clean data from the boat design is shown in the simulated world again.

Testing a boat design

A very short and clear warning here:
Do not create a boat and try to sail it when it is not finished!
What will happen is this:

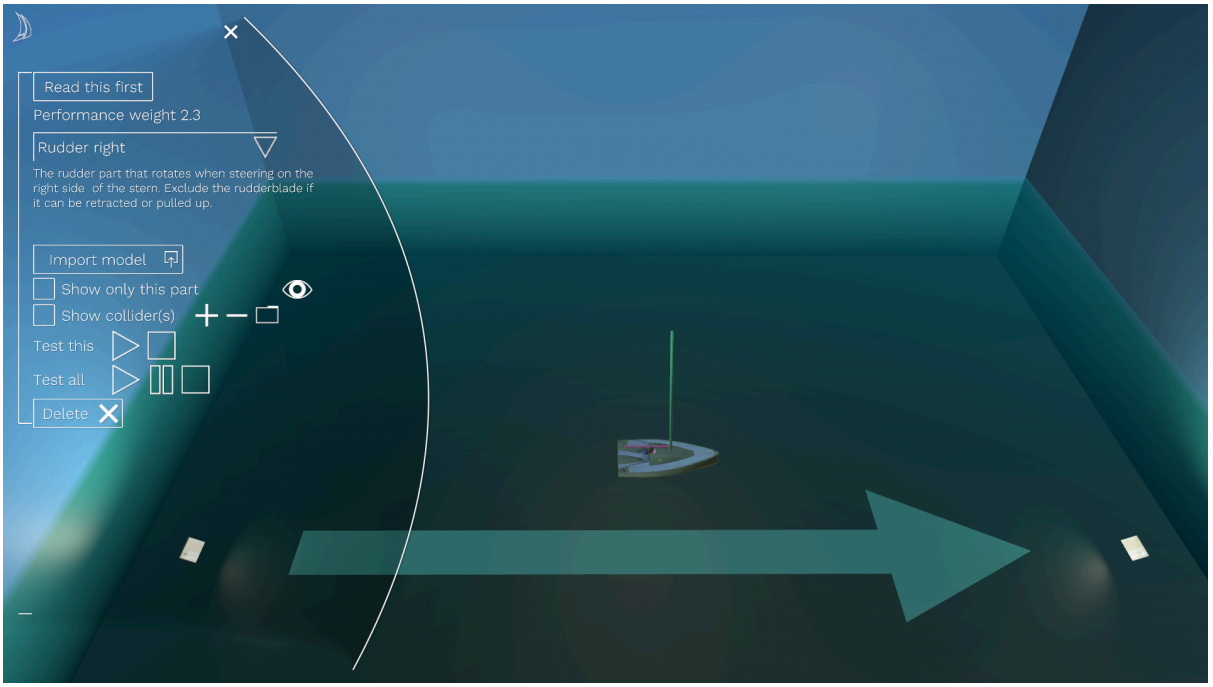
The new boat fails to load or triggers an endless flood of internal error messages. These errors prevent the application from doing anything else and you are completely stuck in a black screen or an endless loop. The only option is to close or kill Sailaway. When you try to start Sailaway again, the same boat is loaded and the mayhem starts all over again. There is currently no way to exit this loop without any support.

Always make sure your boat has a hull, that all the settings (weight, etc) are correct, that the measurements have been computed, that the water level points have been computed and are correct, that the hull, deck and foils have been traced and that the LOD levels have been generated.

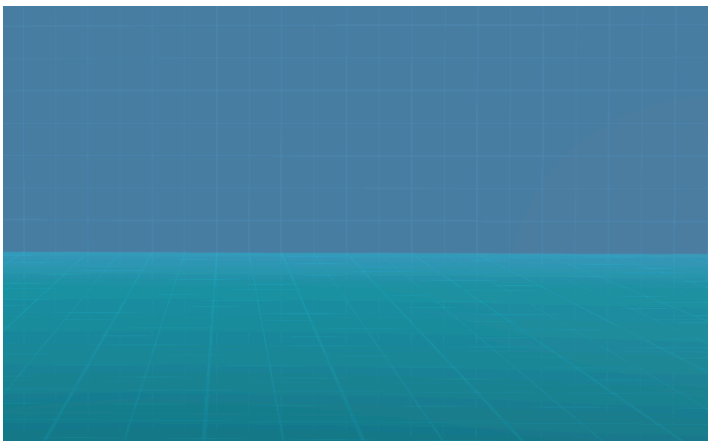
Boat designer

Environment

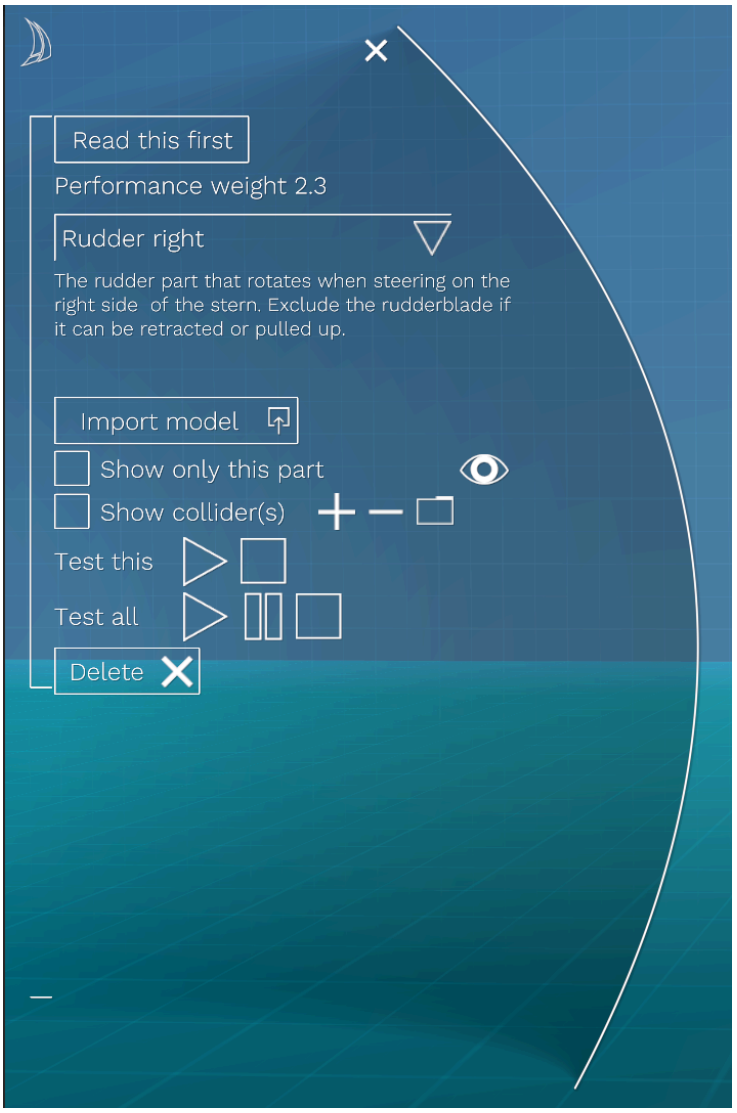
The boats are built in a separate environment with constant lighting in a square workshop box. The box is 80 x 80 meters and 60 meters high. This means that it is not suitable for mega yachts. The maximum length for a boat in Sailaway is 50 meters.



The water is at level 0, the bottom at -10 meters.
On the bottom there is a big arrow that points in the direction that the boat will be sailing.
The thin lines are all at 1 meters distance from each other.



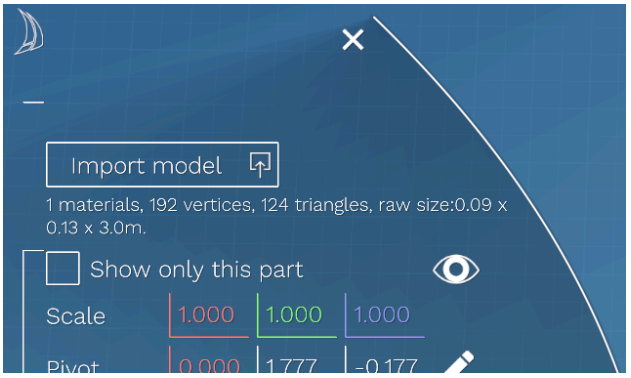
The edit controls are located on the left side of the screen and designed to be transparent and have minimal interference with the view.



To close the boat designer, you can click the X button in the top right corner of the edit controls area.

Moving around

Moving the camera in the boat designer is a bit different from the normal sailing camera.
WASD (or QZSD for an Azerty keyboard) will move the camera left, right forward and back.
The PgUp/PgDn keys will move it up and down.
By clicking and holding the left mouse button and then dragging the mouse, you can rotate the camera.
By clicking and holding the right mouse button and then dragging the mouse, you can move the camera in the same way as the WASD (or QZSD for an Azerty keyboard) keys work.
The mouse scrollwheel can also be used to move forward and back.
By clicking on the eye icon the camera will zoom in on the current selected part.



Editing existing boat designs

When you want to make changes to an existing boat design or an existing deck layout or livery, you need to be aware that all edits are saved to the existing object as well.
This means that if a sailor logs in and loads a boat that uses your boat design, deck layout or livery, the edits will immediately be visible.

The best thing to do is to test your edits on another boat design slot before you apply them to the real one.

Edit 3D model

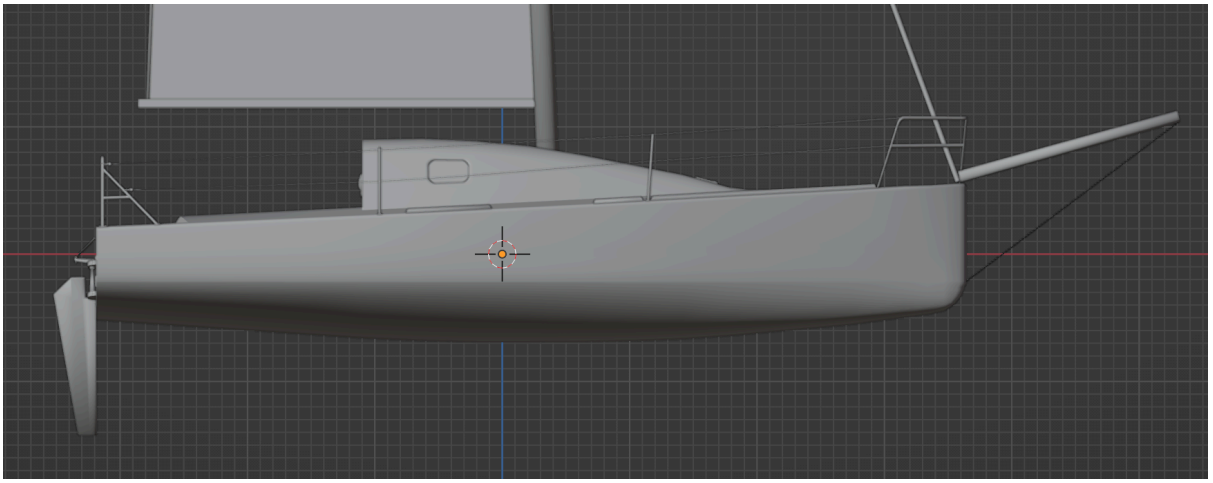
Uploading meshes

When you have your model ready in Blender or another 3D modeling app, it is time to import it into Sailaway. Don't expect this to be a single step execution. You will need to export and

import separate boat parts and it is likely that many parts will need some adjustments in the 3D modeling tool and the process needs to be repeated.

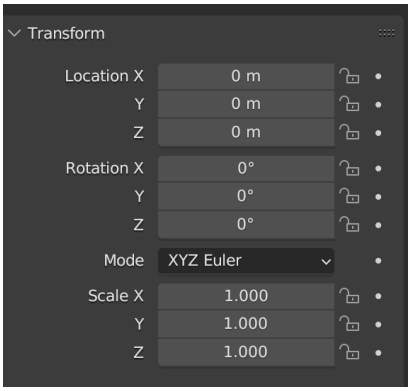
The models you upload are stored on the Sailaway servers in an encrypted proprietary format. When other users buy your boat, or encounter a boat of your model at sea, the model file will be downloaded to their local computer. It can only be opened by Sailaway, but you still have to be aware of any copyrights that might be applicable to your model.

Here's a 3D model in Blender.

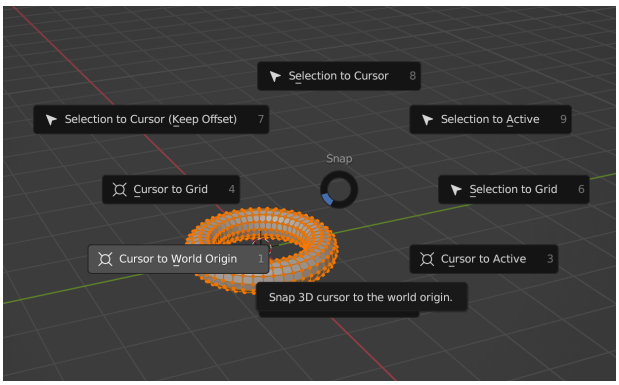


Notice that the pivot point is in the heart of the model, which is not the best practice. It is best to place the pivot on the waterline and at or near the centerboard/keel (which is absent in this picture)

Important: The pivot in Blender is affected by the transform settings in object mode. But these settings are NOT imported into Sailaway. You need to make sure the transform settings in Object mode are always set to position 0,0,0, rotation 0,0,0 scale 1,1,1. Only then can you move the object in Edit mode to the correct position so that the pivot (world origin) is at a logical place.



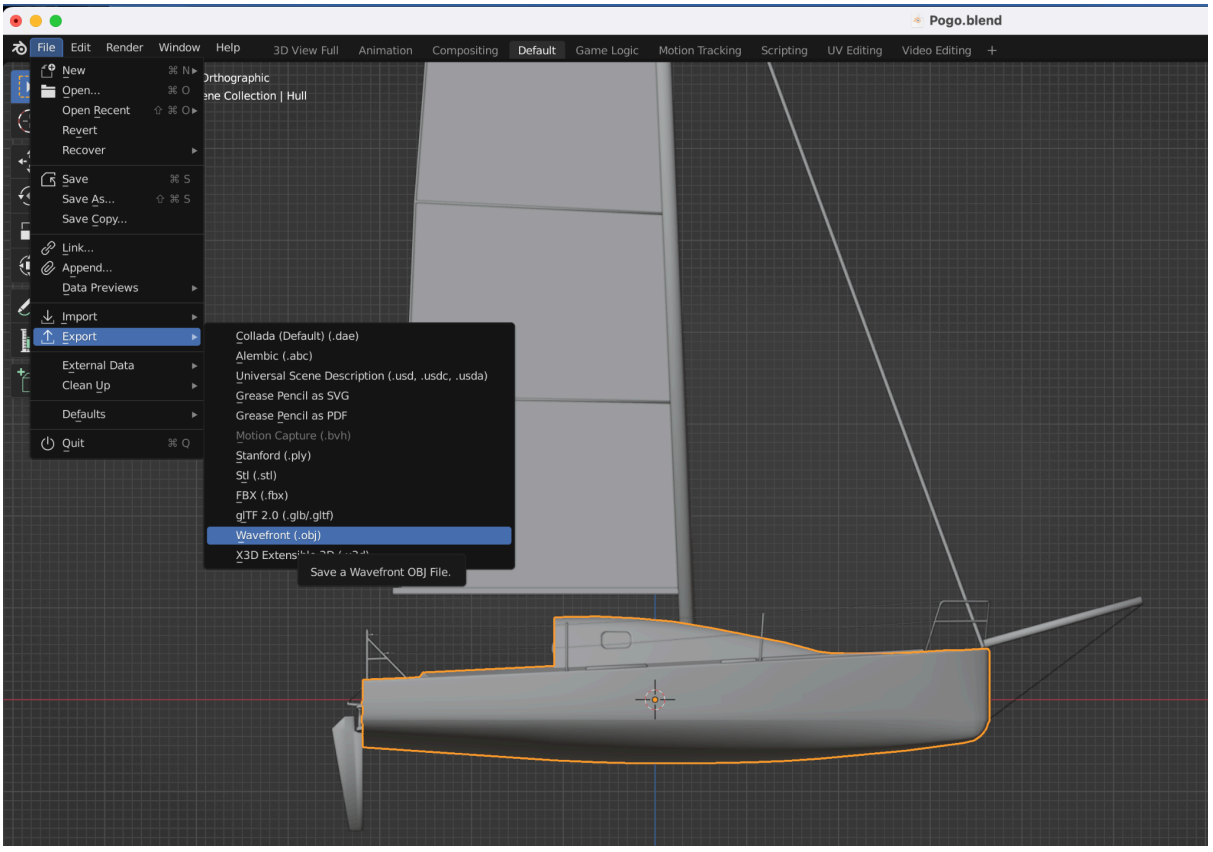
The cursor can be placed at the world origin (= pivot in Sailaway) with Shift-S.



Also notice that the model does not have any materials or textures. There is no point in creating those, because you can't import them anyway. Sailaway has its own materials system.

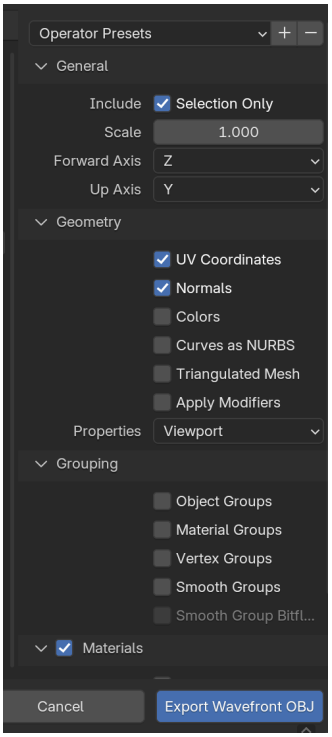
There is a maximum limit to the number of vertices you can import in Sailaway. A model can not have more than 65530 vertices. If the model is bigger than this, the import will fail. However, a good designed game model uses way less than this maximum.

Sailaway can not import Blender or FBX models directly. They need to be converted in the Wavefront .OBJ format. The materials do not have to be exported and you should always export one model per export file.



The hull of the boat is selected and about to be exported to the correct format.

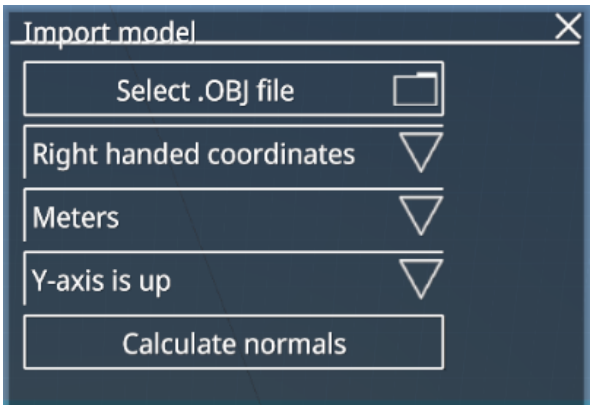
Blender will open a dialog panel. The right column of this dialog holds the export settings. Below is an example of the settings that will import correctly in Sailaway.



Limit to ... Selection Only can be switched on to make sure only the selected part is exported. If you forget this, the entire model is exported and you will not be able to separate parts laters. Like for instance the boom or rudder that will need to rotate or move.

Blender uses a coordinate system where the Z-axis is vertical. But in Sailaway Y is vertical, X is sideways and Z is forward. Make sure to include Normals and UVs and also to write the materials, even though the material specifics will not be imported by Sailaway.

Next import the model in Sailaway.



Blender uses a right handed coordinate system.
The units are meters by default.

The Z-axis is set as the up direction, because that is also what was specified in the Blender export settings. (Note that in the picture below, the coordinate system is left handed and Z-axis is up, which is incorrect for a file that is imported from Blender)

The model is imported and you can see that it is way too big. On the left side of the screen, the actual size is shown. The boat is now 68 meters long. It is possible to correct this with the scale fields on the left side of the screen. But it is better to correct it in Blender. If you don't, you will need to adjust the scale every time you import a part of the boat.

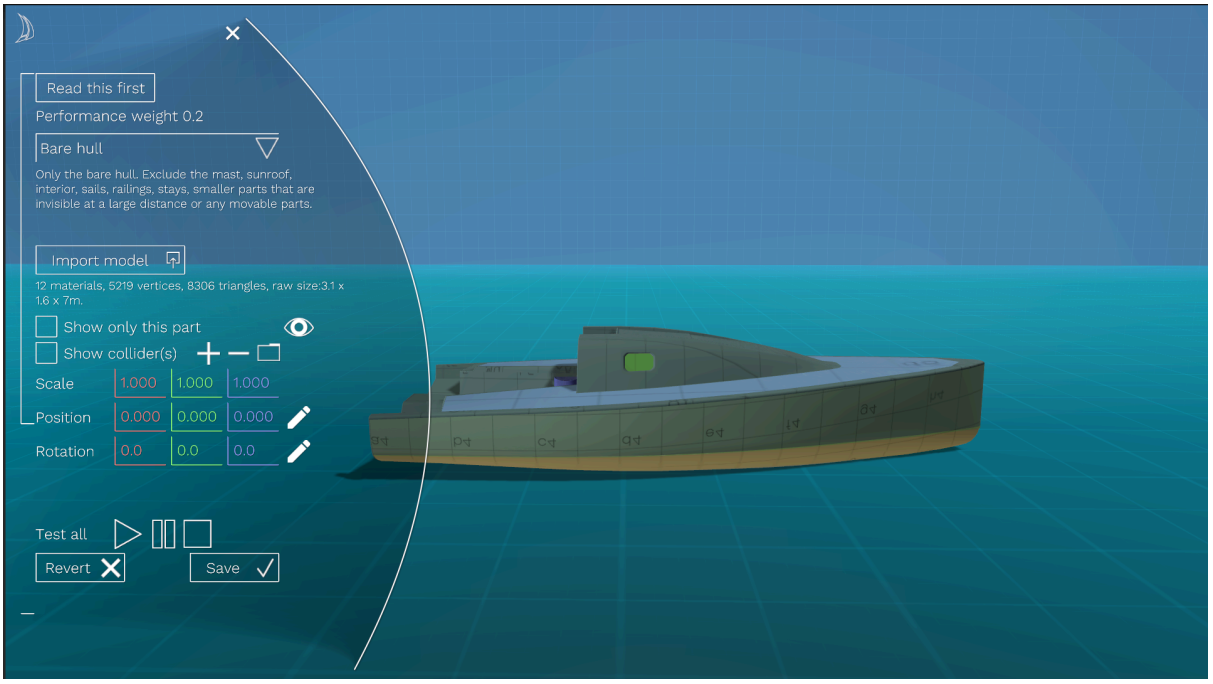
The size may be ok, but the boat lies too deep in the water. This is because the whole Blender model was not positioned correctly. Again, you can correct it in Sailaway, but it is

better to do this in Blender, to prevent having to make these adjustments with every boat part you import.

There are 2 places where you can change the position (and also the scale and rotation) of a model in Blender. In Object mode and in Edit mode. You need to make sure to change it in Edit mode. Select all the vertices and move them as needed. It's best to set the position in Object mode to 0, 0, 0 beforehand. The reason for this is that the Object Mode position is not exported by Blender and imported into Sailaway. it will therefore always be 0 after importing.

I have selected all the boat parts in Object Mode, switched to Edit Mode, selected all the vertices and moved them up, so that the bottom of the stern is just touching the water surface at Z = 0 in Blender. I also moved the model back a bit to place the pivot for rotation under the mast.

Always make sure the 0,0,0 position in Sailaway is at the waterline in Y (sailaway coordinates), the center in X and somewhere in the middle in Z. This will be the center of rotation for your boat.



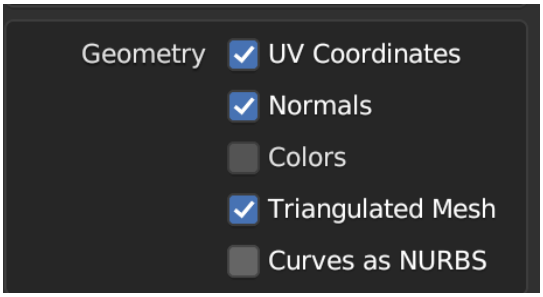
Make sure to click the Save button when you are done.

Repeat this process for the railing, mast and all the other boat parts until the model is complete.

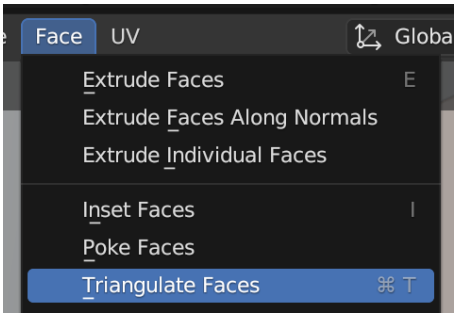
It is tempting to include the railing, mast and bowsprit in the same import file, but don't do that. Keep them separate and only import the hull in this first boat part called "Bare hull".

Triangles

Sailaway uses triangles to store and render your model. But in Blender you can use polygons with more than 2 vertices. This means that your model needs to be converted. The polygons are automatically converted to multiple triangles upon import, but this does not always give the best result. And if your model uses certain modifiers or uses booleans this info will not be included in the OBJ export file and the result will not be what you expected at all. If you're not happy with the result, make sure your model is converted to triangles upon export or before export. To convert it upon export, you can check the "Triangulate mesh" option in the export panel.



But the best result is obtained when you triangulate the polygons before export. with the "Triangulate faces" function in Blender.



You can check how the triangles are placed and if needed correct things manually.

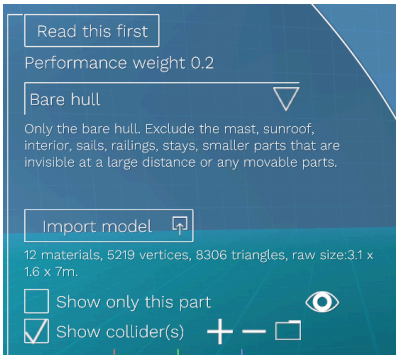
Colliders

A collider is a closed and simplified mesh that follows the contours of the original. It is used for clicking the boat when sailing, and for detecting collisions with objects and boats. These detections are done every frame and it is therefore important that a collision mesh is as simple as possible. It doesn't have to be precise. It only has to follow the shape of the original mesh.

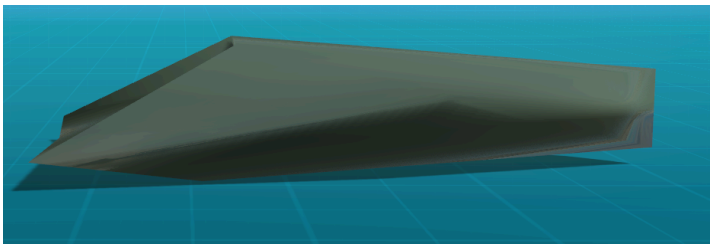
The collider mesh will be used for collisions between boats, for blocking out the sun and for measuring the focal depth when you have the "Depth of Field" camera effect switched on.

There are 2 ways of obtaining a collider mesh. You can let Sailaway generate a mesh, or you can create one in Blender and import it.

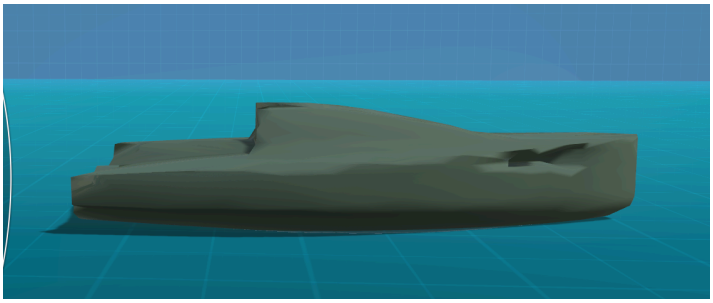
To let Sailaway generate a collider mesh, you click the checkbox and the Plus or Minus sign.



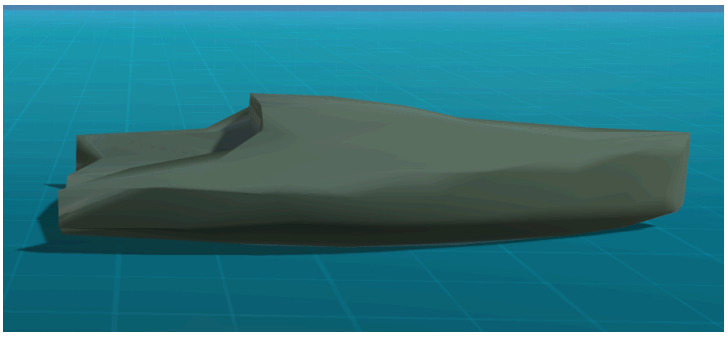
The detail level can be set with the + and - buttons.
Too little detail (use the + button to increase)



Too much detail (use the - button to decrease)

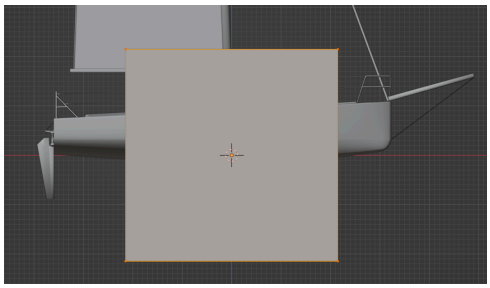


Correct amount of detail

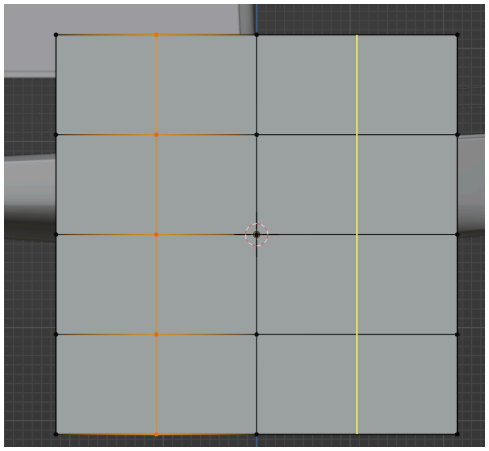


Note that the collider mesh will not be visible during sailing and will only be used to determine if a mouse click hits the boat, or the background (ocean, sky and land) And to alert when 2 boats have collided.

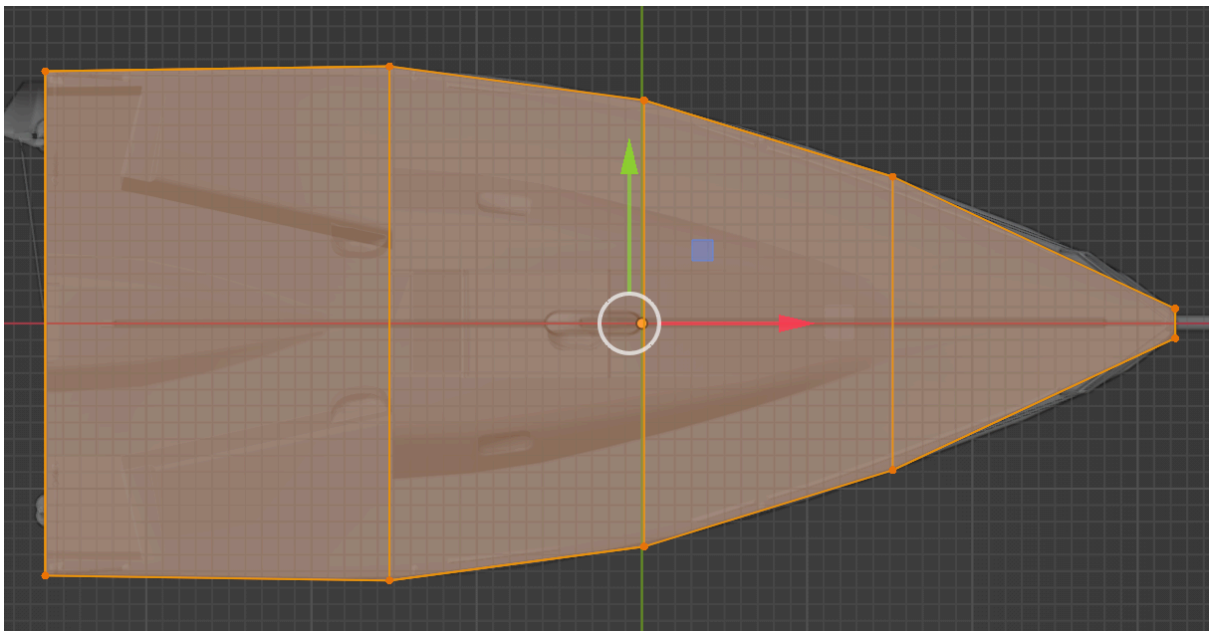
The other way is to create a collider mesh yourself in Blender or another 3D app.
It is important that the mesh is closed and continuous. That means no holes and preferably no sharp edges or multiple vertices with very small distances. The best way to do this is by starting with a basic shape like a cube or an icosphere and then adjusting it by subdivision and moving vertices. Don't delete any vertices, because that creates holes. You can merge vertices together if they are not both needed.



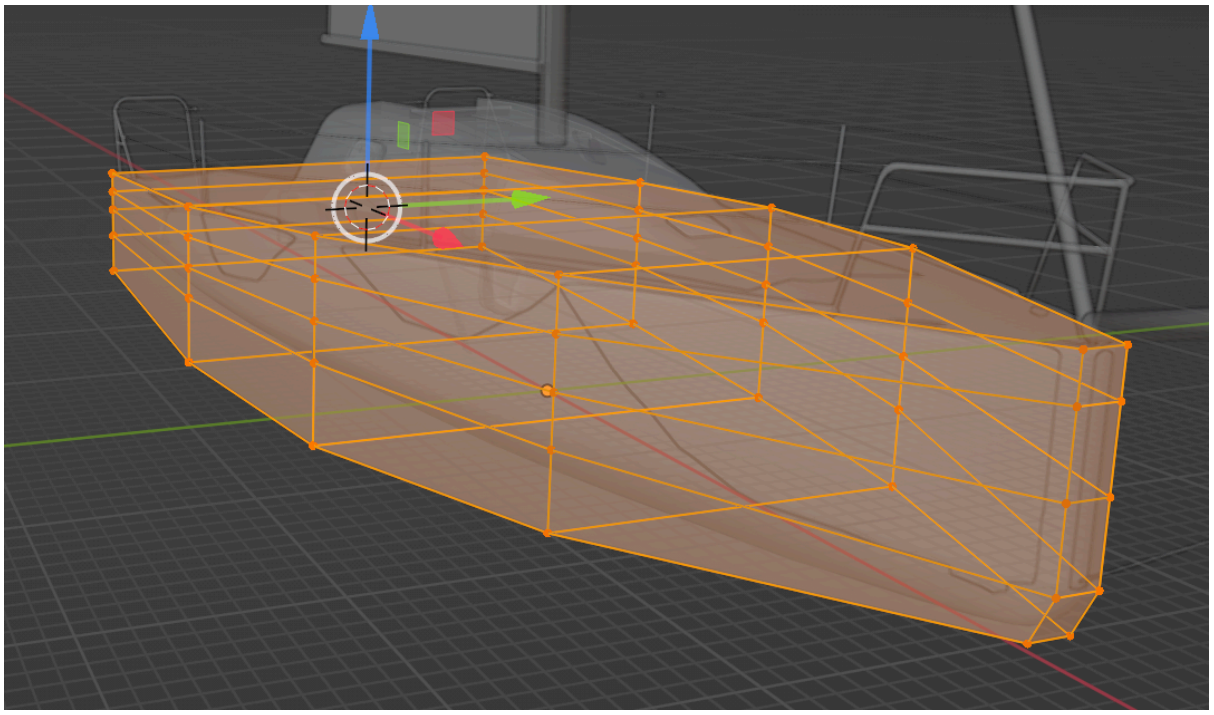
In the image below the tool "Loop Cut" is used to add loops of vertices.



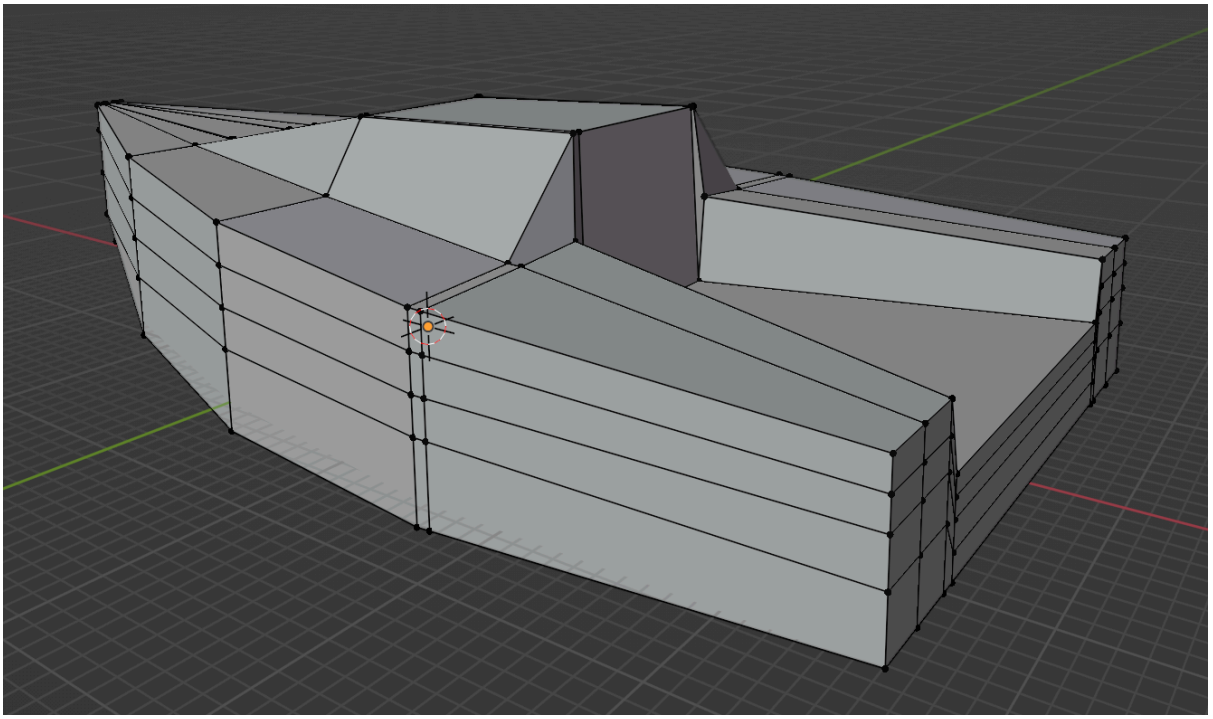
In a view from the top you can scale the vertices in Y direction to match the sides of the hull



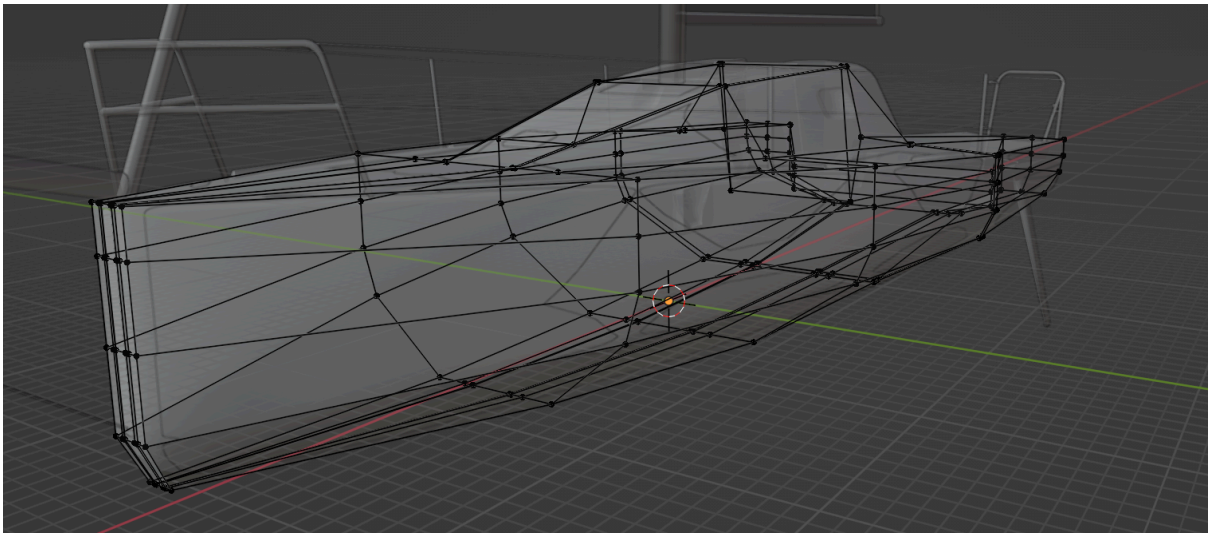
Match the vertices to the deck in Z direction



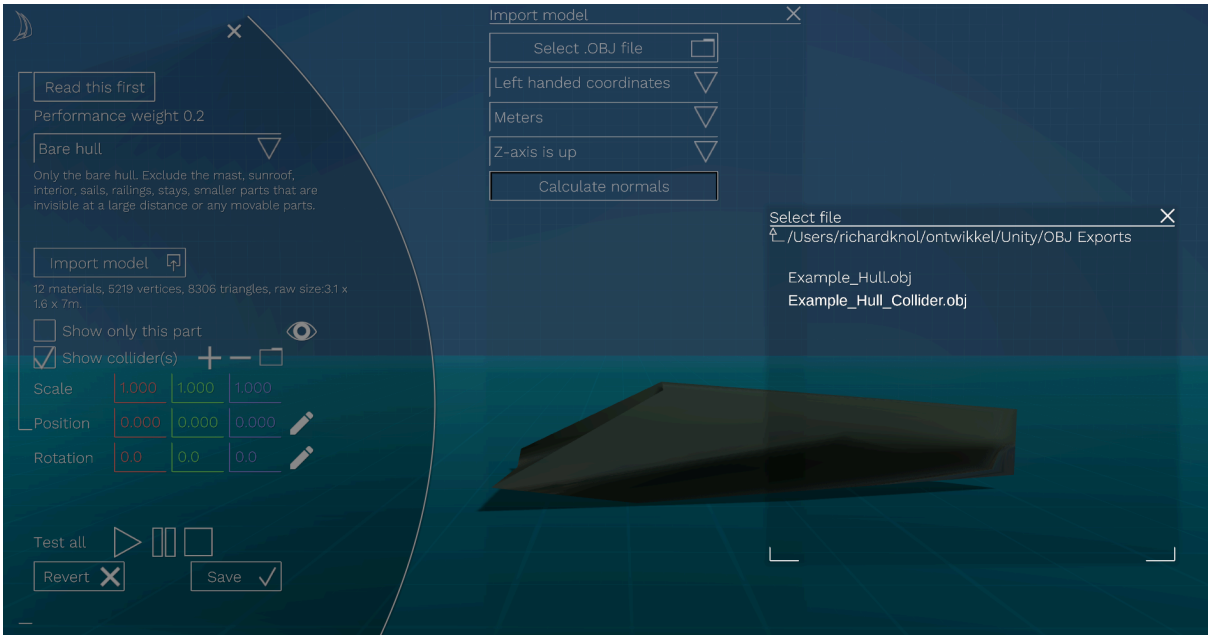
Add loop cuts for the cabin/cockpit

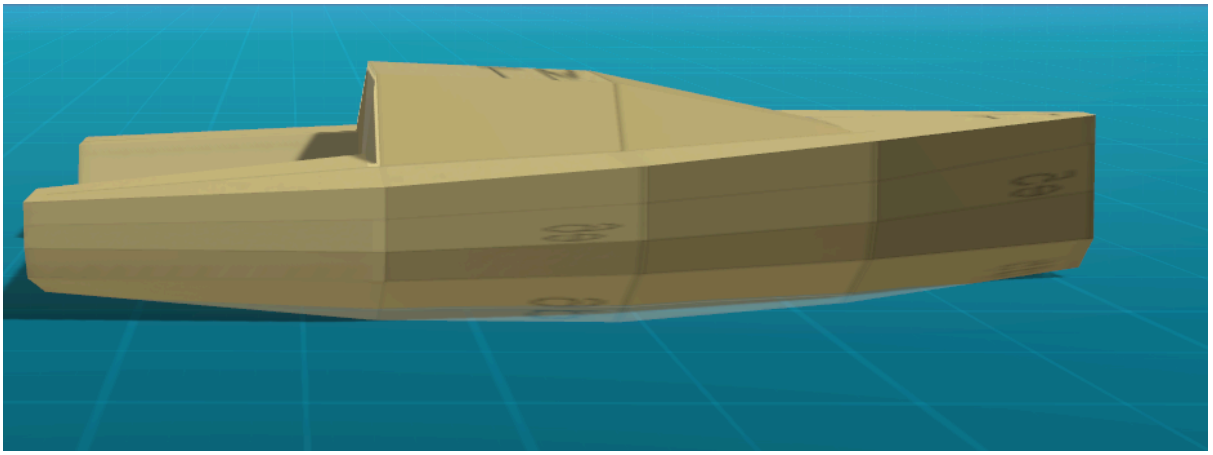


Scale the vertices in Y direction to match the curve of the hull

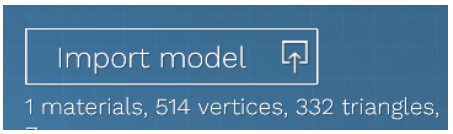


Export the model as OBJ file and import it in Sailaway.

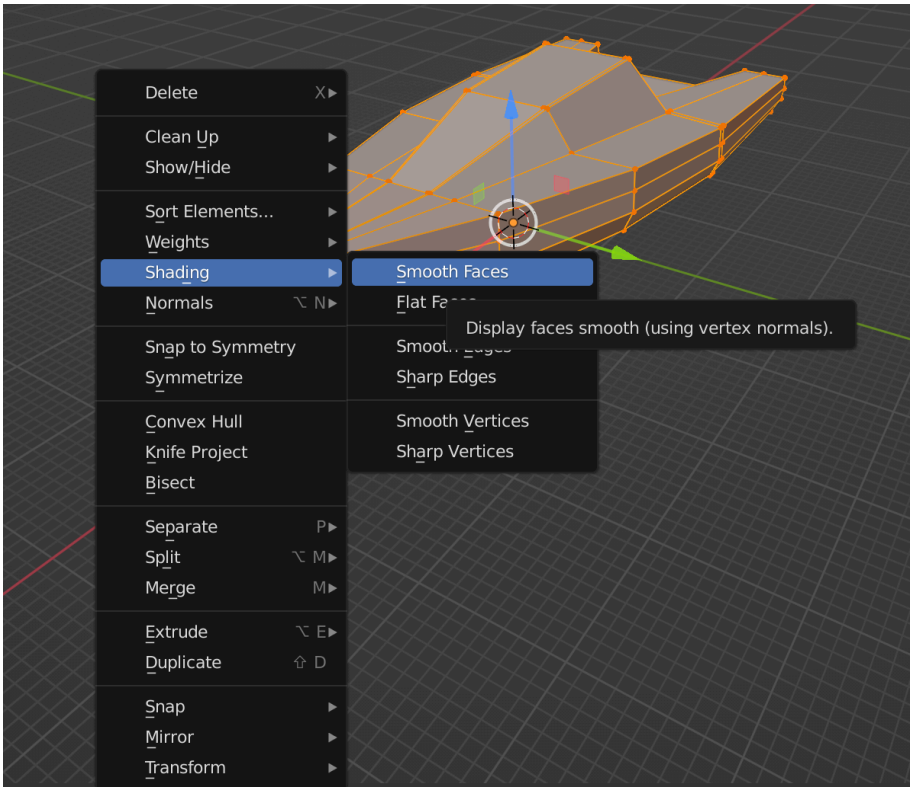




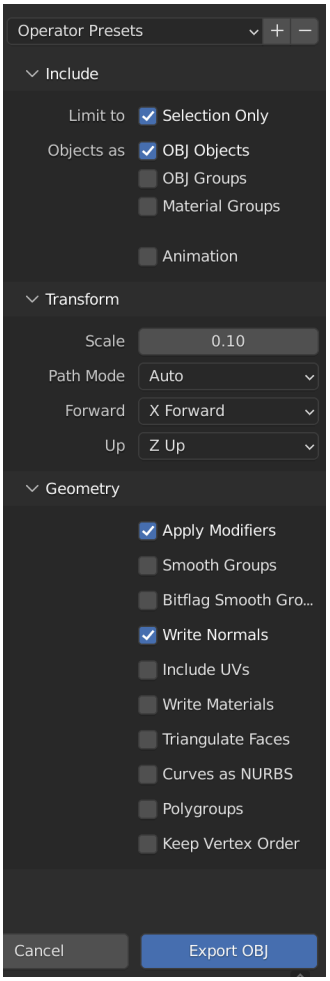
If you look at the model, you may notice it has sharp edges, whereas the generated collider mesh earlier was all smooth and shiny although not perfectly shaped.
Check out the nr of vertices

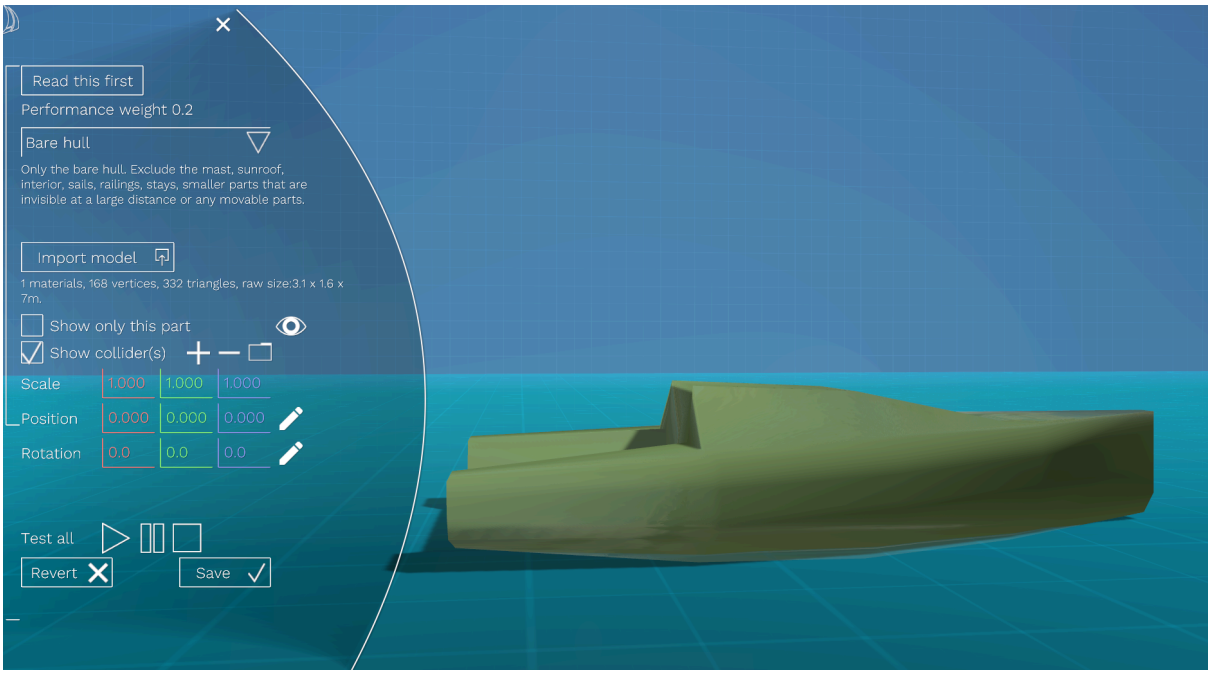


What we did wrong is we didn't set the shading to "smooth shading" in Blender (see the chapter Making smooth meshes)



Another thing you need to do is get rid of any UV maps and material info when you export the mesh.

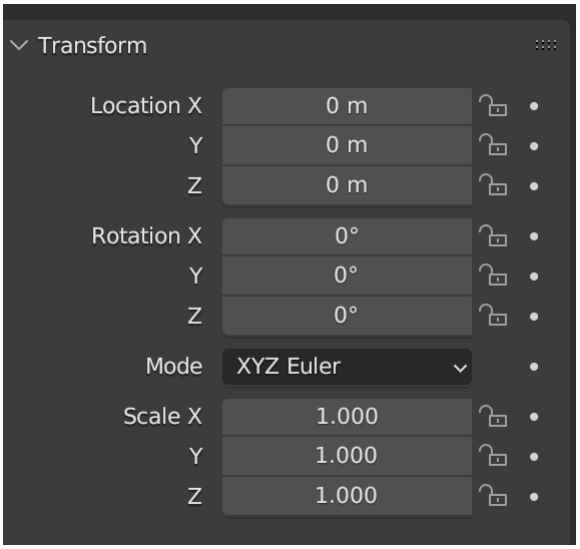




You can see that the number of vertices has gone down from 514 to 168 and the collider mesh has no unnecessary information about materials and UV coordinates and is now highly efficient.

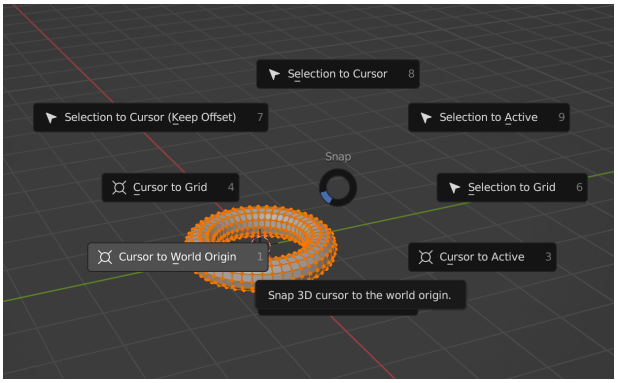
Moving parts

For any moving or rotating part, the pivot needs to be in the correct place. Otherwise the part will not rotate around the point you wanted and things will look very strange.
It is important to know that the transform settings in Blender Object mode are not imported into Sailaway. You need to make sure these are always set to position 0,0,0, rotation 0,0,0 and scale 1,1,1

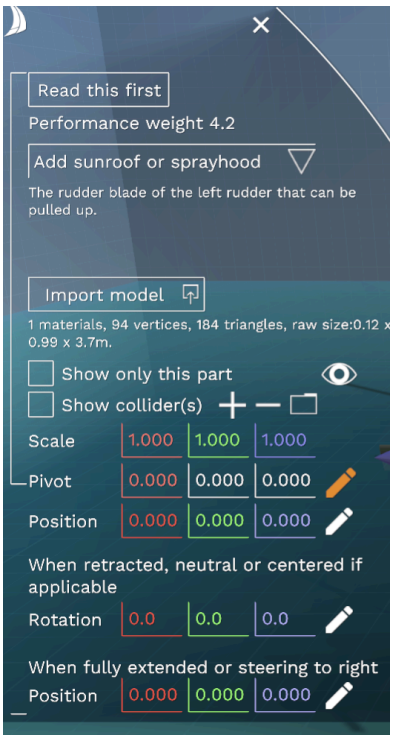


Only then should you enter Edit mode and place your model at the correct position where Blender's origin (0,0,0) will be the pivot of your object.

You can set the cursor to the world origin (= pivot in Sailaway) with Shift-S.

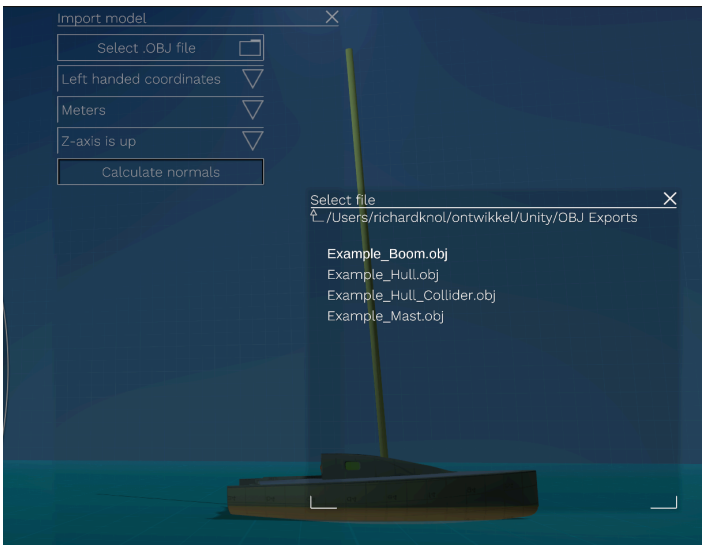


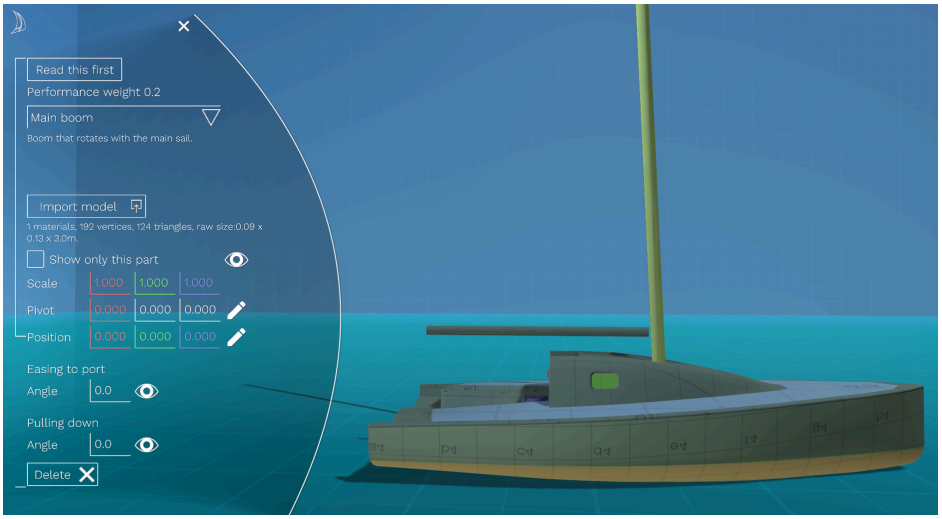
When you import the model of the Rotating or moving boat part into Sailaway it will be placed at 0,0,0 and probably be inside your boat. But just change the pivot position of the boat part in Sailaway to where the object should be and it will rotate/move from there.



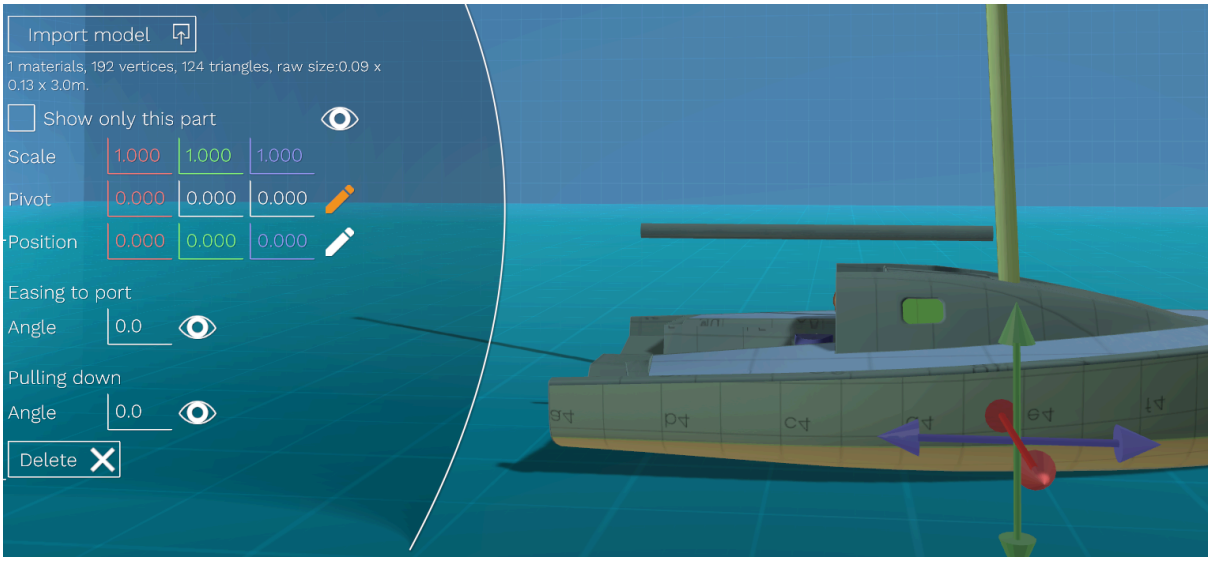
Boom

Always make sure you add the mast before you add the boom. This will make positioning everything a bit easier, because the boom is a child object of the mast. When you move the mast pivot, you also move the boom.

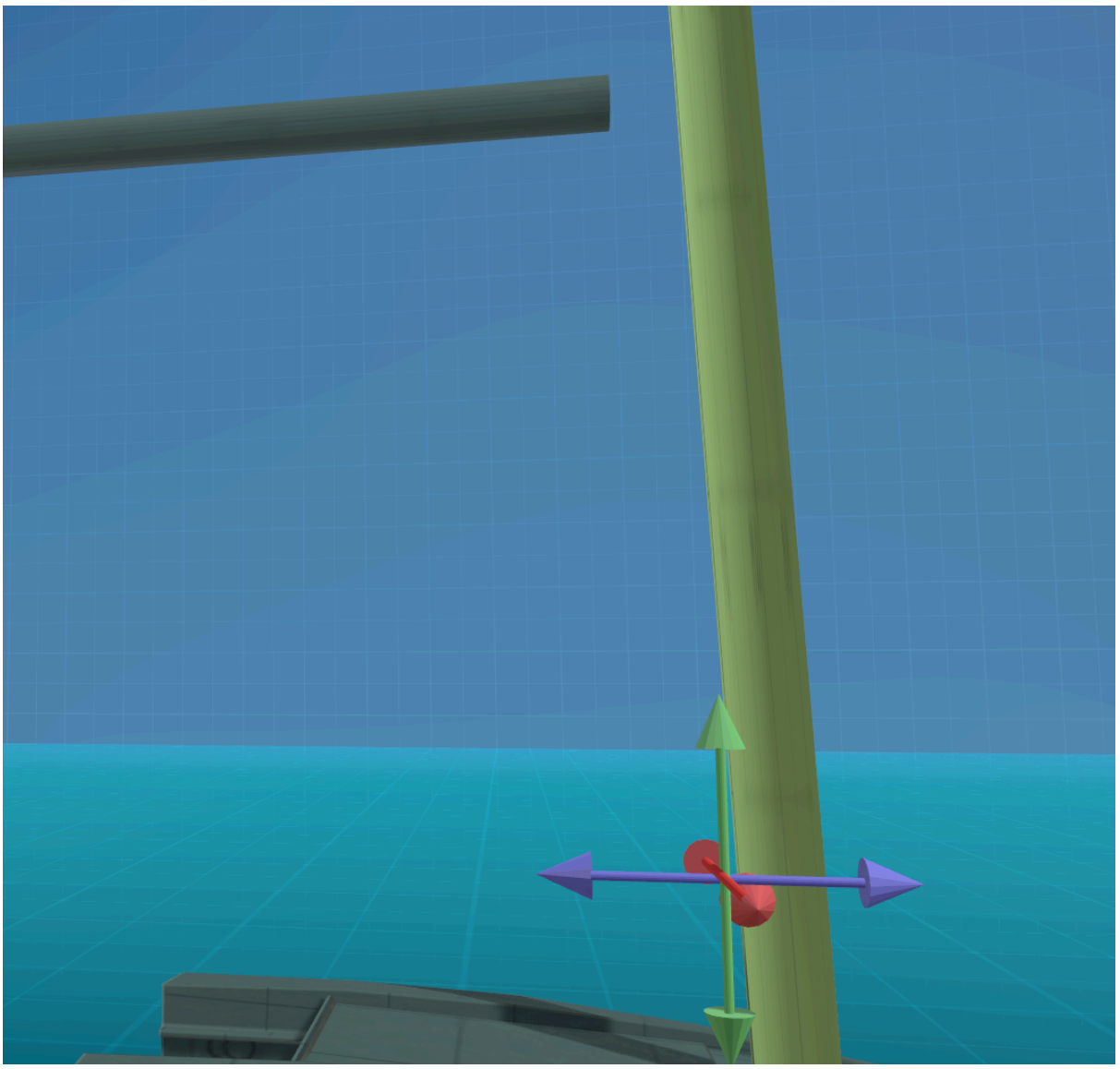




This seems ok at first glance. But when the pencil button next to the pivot input fields is clicked, it becomes clear that the pivot is not where it should be. The pivot is the center of rotation for the boom. This should always be at the back of the mast at the level of the boom.

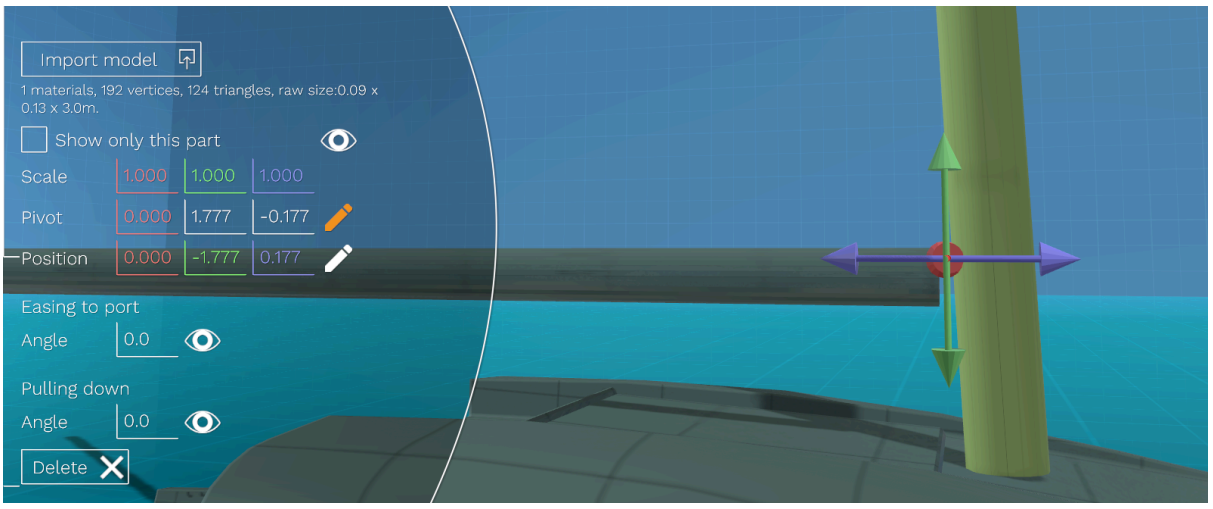


So first you need to correct this by dragging the pivot point to the correct location. Ignore the position of the visible boom.



The boom is now somewhere in the air, but the pivot is where it should be.

To correct the display of the boom, change the values of the “position” input fields to be the opposite of the pivot.

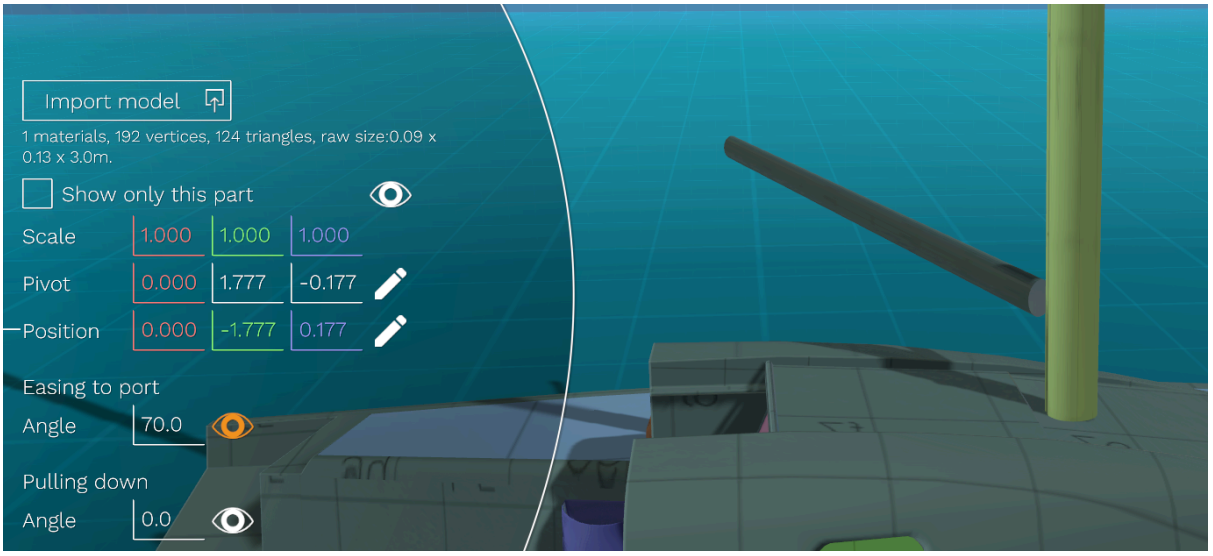


If necessary, click the pencil icon behind the “Position” input fields and drag the boom in place.

Note that the arrows now appear at the same position of the original mesh pivot.

Although this works fine. A better way is to make sure the pivot of the original mesh is at 0, 0, 0 and at the exact rotation point of the boom. This way you can drag the pivot in place in Sailaway and the boom will always show in the correct position without having to adjust the position input fields.

Next set the maximum angle for easing the boom out to port. and click the eye icon to make this visible. And do the same for pulling the boom down. A good value is 2 or 3 degrees.



Rudders

To achieve a functioning rudder you will need to use multiple boat parts that function in a specific hierarchy.
This is the hierarchy:

Rudder pivot
- **Rudder**
  - **Rudder blade**
- **Rudder connector**

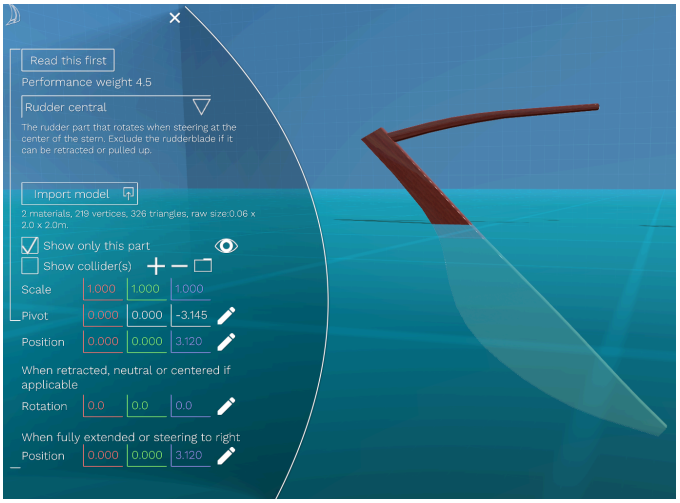
Tiller
- **Tiller extension**

Steering wheel

And each of those boat part types exists for a central rudder/tiller and for both a port and a starboard rudder/tiller. The steering wheel is an exception to this. You can set up as many steering wheels as you like in any location, because they will all operate in the same way and simultaneously..

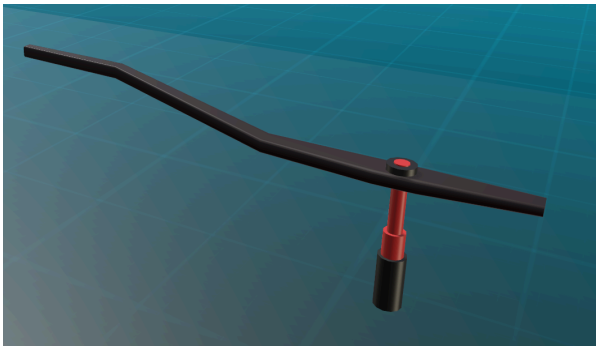
Each boat part has its own specific use:
Rudder pivot: To tilt a rudder construction upwards in order to lift a rudder out of the water
Rudder: Rotates to port and starboard when steering
Rudder blade: To slide/rotate a blade up or down through the rudder casing in order to raise/lower a rudder.
Rudder connector: A rod to connect the rudder and a central tiller or to connect 2 rudders.
Tiller: To steer manually
Tiller extension: Connected to a tiller and will always point to the camera.

In the simplest setup you need to use only a rudder boat part. This is for a rudder mesh that contains the rudder itself as well as the tiller.

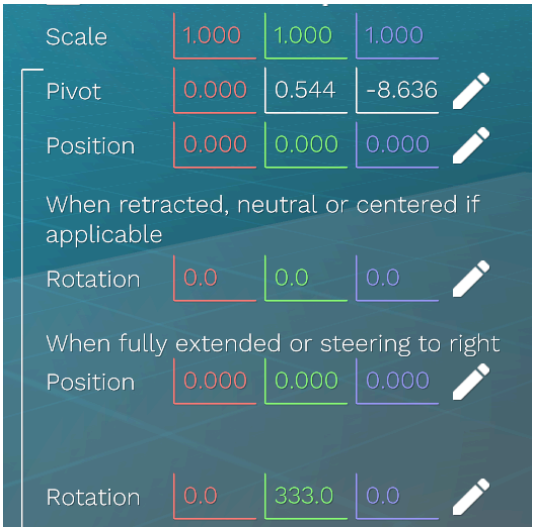


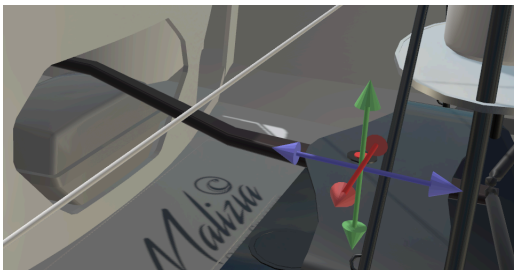
In order to understand the rudder boat parts, a more complex set up is described here.
Imagine a boat with 2 rudders.
The 2 rudders can be lifted out of the water by rotating the rudder fixation upwards. The rudders can of course also rotate to left and right in order to steer
The rudders are connected to a central tiller arm
The central tiller arm is not used for manual steering. Instead 2 tillers on the port and starboard side are used for this
The 2 tillers both have a tiller extension

First the tiller

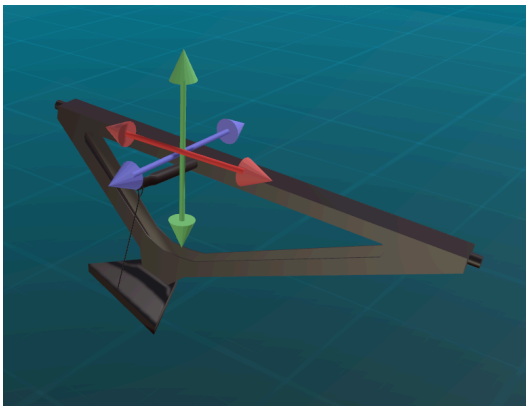


Assuming that the pivot of the model (the position 0,0,0) is in the heart of the axis, you need to place the model in the correct location using only the pivot coordinates. Not the position fields.





Next set the rotation for the tiller when it is fully steering the boat to starboard. So in this screenshot when it is pulled towards the camera.
Add the tiller extension boat part and use the pivot settings to position it on the correct point on the tiller. The tiller extension will automatically rotate towards the camera when you are sailing. For this to work, the tiller extension mesh should point towards the positive Z-axis.
Now add the 2 rudder constructions for the port and starboard rudder. Add these as “Rudder pivot” boat parts. And again make sure you position them with the pivot coordinates and make sure the pivot of the model is on the rotation axis of the construction.



Set the rotation for when the rudder is lifted in the top rotation input fields. Then set the rotation for when the rudder is lowered in the 2nd rotation input fields.

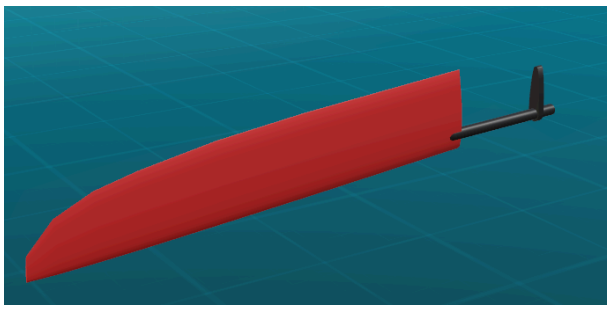
Next add the rudder boat parts. Do not use “rudder blade” because these are only for rudder blades that can slide in and out or rotate up and down inside a rudder casing.

This example from a laser might illustrate it:

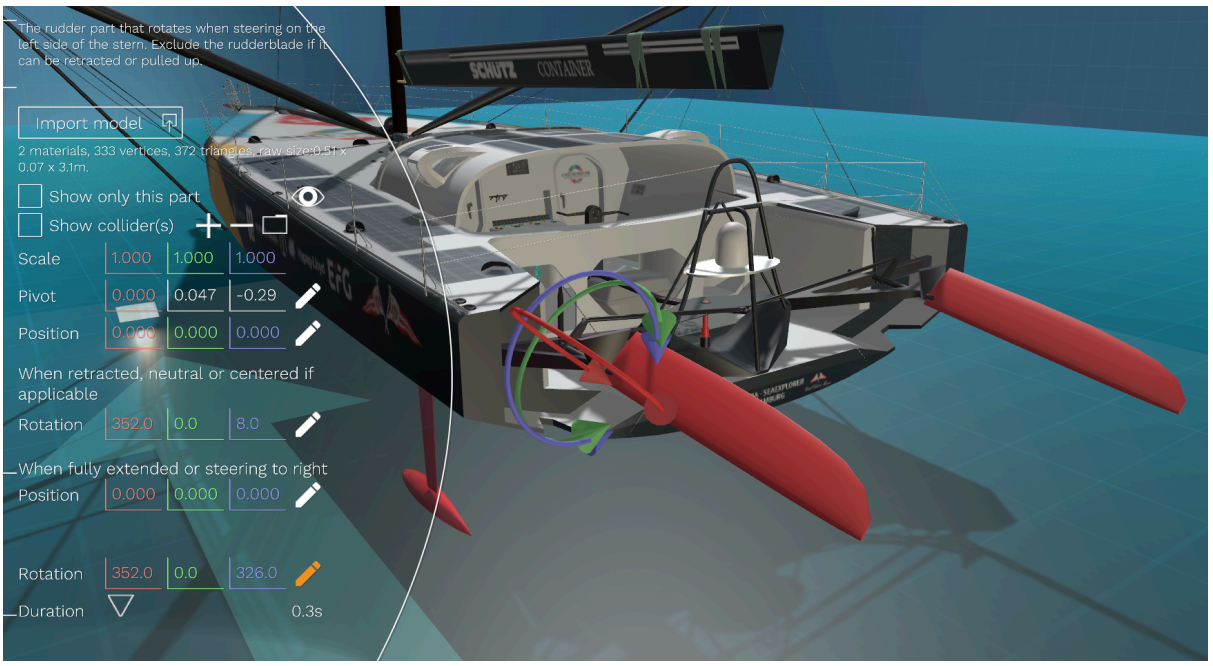
The wrong way to set up this Laser rudder is:
Use a “Rudder pivot” boat part for the aluminum part.
Use a “Rudder” boat part for the white blade.
In this case the white blade will turn to left and right, but not the aluminum part.

The correct way is:
Use a “Rudder” boat part for the aluminum part.
Use a “Rudder blade” boat part for the white blade.
Now the aluminum part will turn left and right and it will take the blade with it. Only the blade will rotate up and down.

Now add the rudder mesh in the “Rudder” boat part.



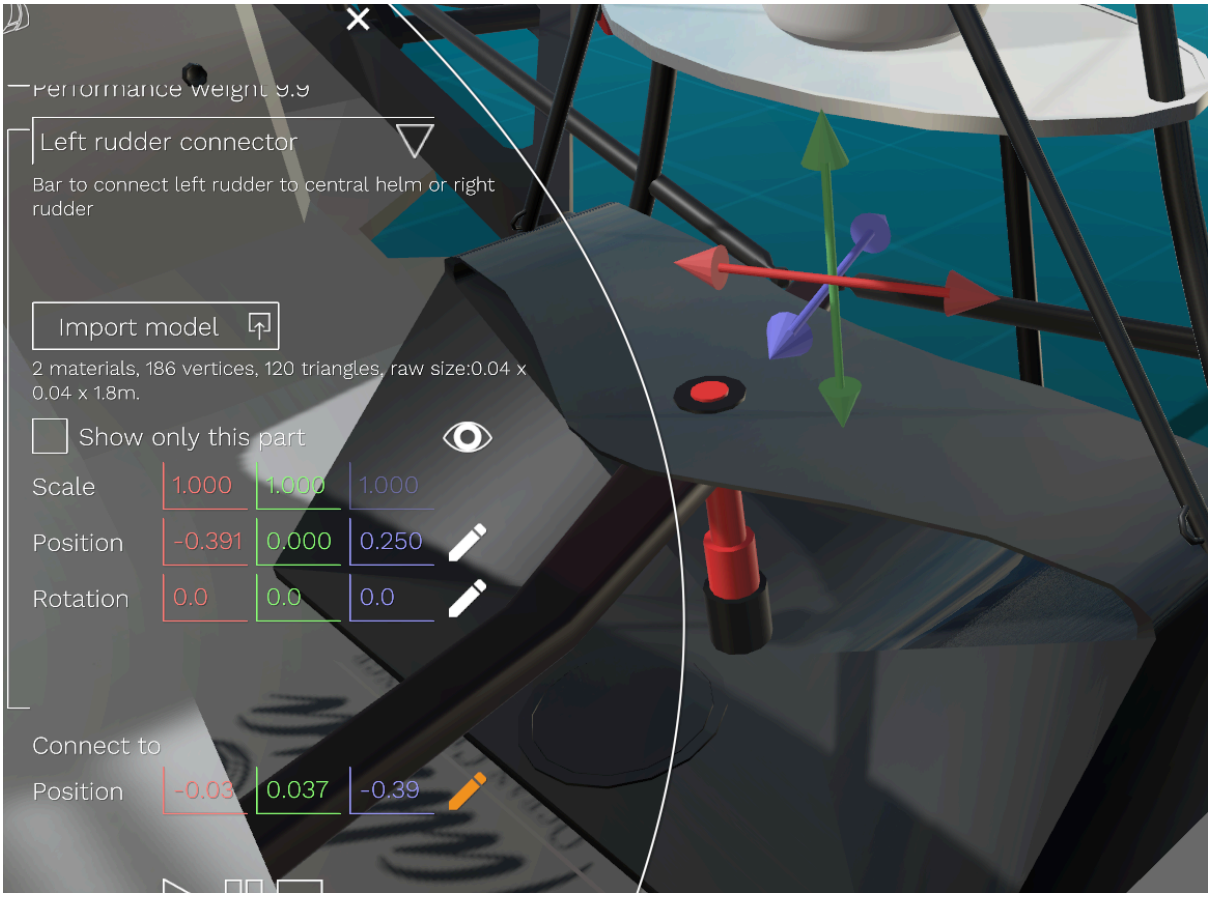
And set its rotation for when it is steering towards starboard. Again, make sure the pivot is on the rotation axis of the rudder. And make sure the transform position in Blender object mode is 0,0,0



Finally add the connection rods by adding 2 rudder connector boat parts.

Place the position (= pivot) on the rudder

And place the “Connect to” position on the central tiller.



The system will automatically decide if the connected position is on a central tiller or on the other rudder in case you have a set up where the 2 rudders are connected instead. The length and rotation of the rods is automatically adjusted.
Note that the rudders will move with the tiller or steering wheel anyway. Regardless of the existence of the connection rods. These are pure cosmetics.

Hydrofoils

If your boat has hydrofoils, you will need to add these as separate boat parts of the correct hydrofoil type.

The foils each provide an upward force at a specific point on the hull. This will result in the boat tilting forward or backward if not placed correctly. However, there is some artificial tolerance/ extra stability to this, otherwise it would be very hard to level the boat out.
Also the weight of the crew matters.

The force increases linearly with the size of the foil. The area of the foil is computed based on how much of the foil is in the water. T-foils have the disadvantage that the upward force does not decrease when the boat rises. In the real world an oversized foil (T or other shape) would make the boat bounce out of the water and plunge back again. This too is heavily damped artificially in Sailaway.

The profile and angle of attack you give your foils in the boat designer have no influence on the forces. They are computed by Sailaway while sailing.

The shape and effective area of the foils is computed automatically. When sailing, the effective area is constantly adjusted as the relative water level changes.
For this Sailaway identifies 4 types of foil shapes and each type responds different when it becomes submerged or rises partially out of the water:
T - foil
U - foil (like the Imoca's have)
V - foil (will be identified and treated as U with a sharp bottom)
C - foil (like the Beneteau Figaro 3 has)
L - foil
I - foil (straight foil placed at a angle to the hull)

If the rudder blade(s) have a T-foil attached to the bottom, this is recognized automatically. And it will also produce a little bit of lift, but it is mostly recognized as a stabilizing foil.

Note that Sailaway doesn't actually compute the forces of the waterflow like it does with the sails and the air flow along them. It simply uses the shape (U, T, etc) and the width and length of the foils to compute the wet area based on the measured water level. And it computes an angle of attack based on the trim of the boat and some compensating factors (see below). It does NOT use the actual profile of the foil, nor the angle of attack defined by how you placed or modeled it. A rectangular profile dragging through the water will have the same result as a NACA profile.

When you have a T-foil that is shaped like a V with the fins pointing back, it is still considered as a straight T-foil. Only a very wide one, because the outer dimensions are used only. Beware of that the effective area of your foil will be a lot bigger this way.

If there is no trim foil at the rudder the placement of the foil along the length of the hull matters for balance when foiling, although Sailaway is more forgiving than the real world. If you do have a trim foil at the rudder the boat is always balanced. Even if you place the foils at an illogical position.

Some foil types can produce an active counterforce for drift and even induce a negative drift. There is no setting to change or induce this behavior in the boat designer. C-foils and L-foils will produce a sideways force. U-foils will produce two opposite sideways forces that balance each other out. T-foils and I-foils can not be trimmed and will not produce an active sideways force.

However, a boat with a T-foil, L-foil or I-foil under heel may increase sideways drift, while windward heel will reduce sideways drift. This is because the force that is produced by the foil is rotated with the angle of the boat.

Some considerations:

Foiling in the real world is not just about attaching foils to a hull and going faster because of that. It is a delicate balance of placement, shape, angle of attack, and much more. Boats with T or L foils are often equipped with trim features to change the profile or the angle of attack. Sometimes this is done automatically and/or adjusted manually. Only U foils (and V foils) have a natural way of diminishing the surface area as the foil rises towards the water surface.

For all foils goes that a wrongly trimmed foil will make the boat rise out of the water and because of the sudden lack of foil pressure, dive down hard again. Even crashing.

The trim foil on the rudder is often adjustable as well, to manage the angle of the boat and thus the angle of attack of the main foil(s). Boats without this rudder trim foil like the Imoca tend to raise their nose up, causing the angle of attack to increase, causing the upward force

to increase, until they rise up too much, the upward force drops and they dive down again. If the foil is placed further back, the whole boat and not just the bow will rise, but it is a delicate balance that is easily disturbed, causing the boat to crash down hard.

Foiling on waves is even more complicated and depending on the type of foil and the construction it may very well damage the boat.

In Sailaway things are a lot simpler. There are no foil trim features. And so if we let the computer calculate the upward forces, the same horrible things would happen as I just described. Without the real damage.

It is therefore that several hacks had to be made in the physics of foiling in Sailaway:

- When the trim foil on the rudder is not present, and artificial stability is applied the limit the nose up/nose down effect a little.
- When the rudder does have a T-foil on it, the boat will try to level the pitch so that the T-foil is under water at a level of 2 times its width
- When the water level above the foil drops between 2.5 x width of the blade and 0.5 x width of the blade, the pressure force will be gradually reduced. For U foils these values are 1.5 and 0.25 times the width of the foil, because a U foil already reduces its area automatically. This hack comes on top of that.
- The angle of attack is artificial. it doesn't matter if you tilt your foil backwards in the boat designer or not.
- The angle of attack is determined by Sailaway and is changed with the level of the boat (nose up/down) and the speed of the water level above the foil rising or dropping divided by the speed of the boat. This may even make the angle of attack negative and pull the boat down. The latter is needed to keep the foil in the water instead on a bumpy ride or at higher speeds.
- Even if the foil is above the water, it can still create a negative force pointing down. This hack is also to prevent flying.
- A foil will never produce more lift than 1.33 times the force of gravity plus the downward force in the sail. No matter how big the foil area or the speed through the water.
- When a foil produces more lift than the sideways force in the sail, the boat will heel over to windward. This effect is reduced to make foiling easier.

All this is not very realistic. I know that. But without these hacks, your boat will sooner or later bounce over the waves at full speed with nothing to hold it back but a little wind drag and a little drag of the foil when it touches a wave tip. That sounds fantastic, but it is also unrealistic.

Hide sea inside the boat

See Invisible shader

Materials and textures

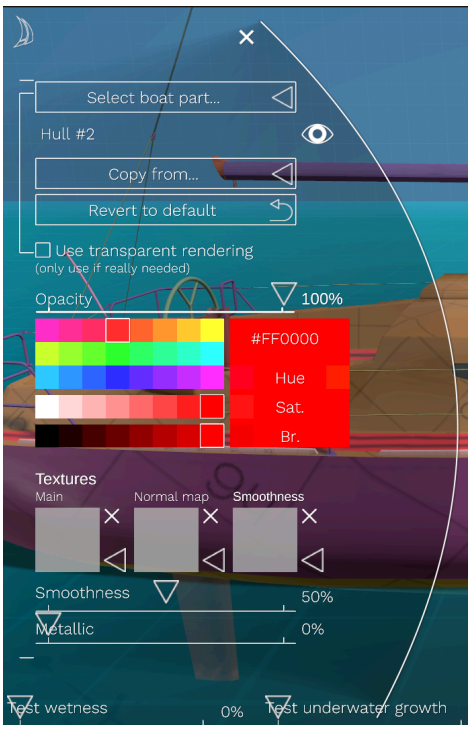
Selecting sub meshes

The boat is made up out of multiple boat parts and each boat part can have 1 or more submeshes. A submesh can define the window panes, the anti-slip deck or the cabin roof. The submeshes were defined in the 3D model of the boat part and can not be changed in the materials editor.

Each submesh will get its own material. A material defines the color, the shininess etc. of the surface of the submesh. It is also possible to show a picture on the surface. Such a picture is called a texture.

First you need to select the boat part and material you wish to define or alter the material for. This can be a little hard, because the submeshes only have numbers and no names to identify them.

If you do not know how the original mesh was set up and how the submeshes are defined, it may be easiest to select one, change the color to bright red and see which part of the boat stands out. The eye icon may also help to find it.



The sub mesh Hull #2 turns out to be the anti-slip deck, because it lights up red after setting the color.

Shader

A shader is a program that runs on the GPU and draws the pixels on the screen.

In the shader listbox you can switch between an opaque shader, a shader with transparency, a black hole shader and two invisible shaders.

Opaque is the default and this is what you will use almost always. The shader has many settings to adjust the appearance of your surface.

Transparency is what you need to be careful with. A transparency shader consumes a lot more performance than an opaque shader. So you should use it wisely.

In most cases, you will not need to use a transparency shader at all. Not even for window panes, because there is nothing to see on the other side of the window anyway. Better make windows all black and shiny and give them droplets when they are wet.

On a normal boat, only the glass panels that you can actually look out of will have transparency. The trampoline on a catamaran or a trimaran will also require transparency.

Transparency shaders can not generate shadows and they can not block the sun. Transparency shaders also can't write to the depth map, which can sometimes give unexpected results where an object that is actually behind another object is rendered in front of it.

Change the opacity slider to set the level of transparency. This will not have an effect on performance. 100% opacity is just as heavy for the graphics card as 50% opacity or as 0% opacity (invisible).

Black hole is a shader that simply makes the surface black. It generates no shadows, it reflects no light. You can use this for an open entrance or hole in the boat where no light shines out of or is reflected out of.

Invisible will not render the surface at all. As if it isn't there. You can use this to eliminate parts of the boat that you don't like without actually having to delete the parts from the mesh. Although it is always better to delete the parts from the mesh, because they still have to be downloaded and sent to the graphics card.

Invisible, hide sea is a special shader that you can use to get rid of the sea inside the boat and of water spray that blows right through the boat and shows at impossible places.. Here's an example where the sea is shown inside the Nordic Folkboat. This is because the surface of the sea is above the level of the bottom of the boat. This happens whenever you have a boat with a low floor.

To get rid of it, you need to add an extra "Fixed part" boat part with a simple mesh.

Then go to the material designer and edit the material for this new boat part.

The boat part becomes invisible and when you are sailing, the sea is no longer shown underneath that invisible boat part.

Setting color

The colors in Sailaway are defined as Hue, Saturation and Brightness. The first 3 lines show the different Hue values. You can click a tint to change the Hue.

The 4th line shows the saturation. It runs from 0 (white) to 1 full saturated color. You can click the desired value. It may be tempting to select the highest saturation value, but this is not always the most realistic value. You may end up with a boat that looks like a lollipop.

The last line shows the Brightness. It runs from 0 (black) to full brightness. You can click the desired value.

In the right box, the color is shown, but it also contains 6 buttons to fine tune the Hue Saturation and Brightness values. The left button decreases, the right button increases the value.

Lastly, you can edit the color code itself in the field at the top

Click the code and type another value. The code is made up of 3 hexadecimal values for the Red, Green and Blue component.

Some important things to consider

The bigger the total pixel size of all textures, normal maps, smooth maps and overlays used on your boat, the bigger the impact on performance.

What happens behind the scenes

- First all the textures need to be downloaded from the server. This costs time and bandwidth.
- Then the textures are unpacked and scaled to a power of 2 (64, 128, 256, 512, 1024, 2048, 4096, 8192) in both width and height. From here it doesn't matter how much compression was used to reduce the disk size of your textures. And it doesn't matter if you scale the texture down to for instance 289 x 129 pixels, it will be scaled to 512 x 256 (the next powers of 2 that are larger than 289 and 129).
- Then, the textures are stored in RAM memory. This consumes memory and when the physical RAM gets filled up, the computer will start to swap memory blocks back and forth to a swap file. This consumes a lot of time.

- Then, the textures are stored in graphics memory. When this graphics memory gets filled up, the GPU will start to swap memory blocks back and forth to RAM memory. This is done every frame and will have an enormous impact on performance. Especially non-gaming computers have very little graphics memory and will soon need to swap texture memory.

The smaller your textures are in terms of absolute pixels and the fewer textures you use the better. Always consider at what distance the user will usually view the part you are texturing. It makes no sense to texture everything at full detail for the few occasions where someone is looking at a specific part from a close distance, when this means carrying the weight of that detail along for the other 99% of the time.

Combining textures into a single atlas will only have a positive effect if all the sub meshes it is used for are on the same boat part.

Only use normal maps when truly needed. As a rule of thumb you should try to limit the width and height to 50% of the size of the base texture.

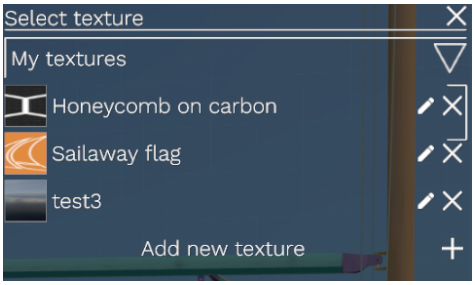
Texture

A picture that is projected on the surface of the boat is called a texture.

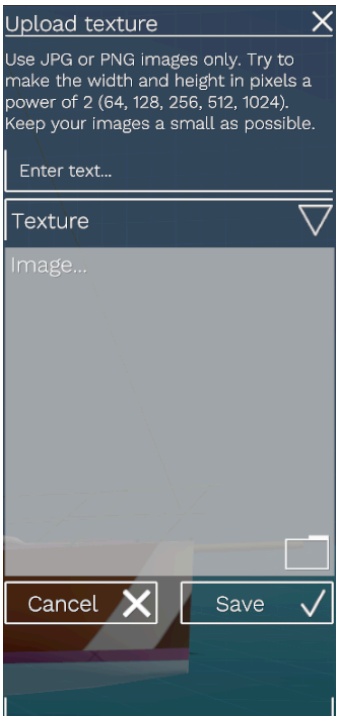
The textures you upload are stored on the Sailaway servers. When other users buy your boat, or encounter your boat at sea, the texture file will be downloaded to their local computer and is not protected against copyright infringements.

There are 3 types of overall textures that can be set per material. In addition you can apply Overlays.
The first and most basic type is a plain texture. The colors of the texture image are projected on the boat part and multiplied by the base color of the boat part. Normally that base color should be white when you apply a texture.

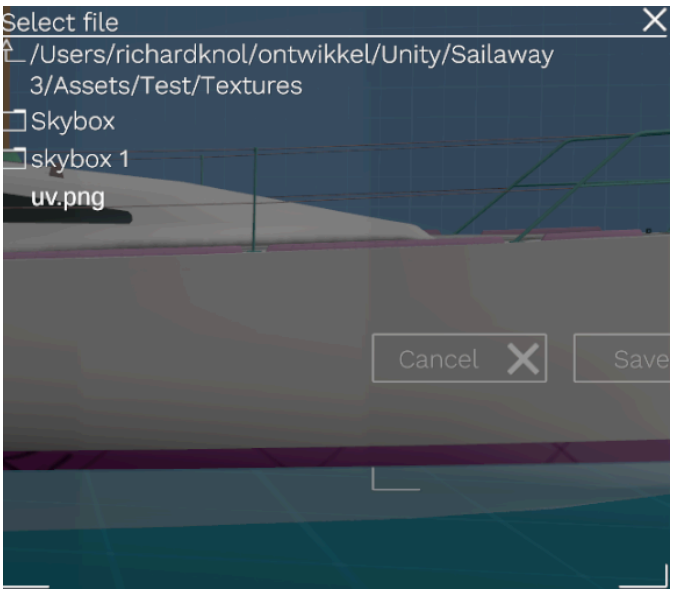
Click on the little arrow pointing left next to the Main texture input box.
A window is opened that shows the textures you have uploaded before.



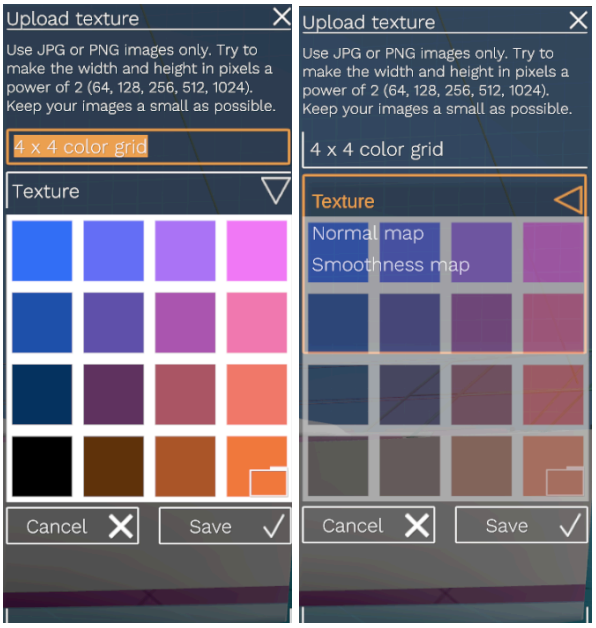
When you click on Add new texture, a window is opened where you can upload a new texture and add it to your list..



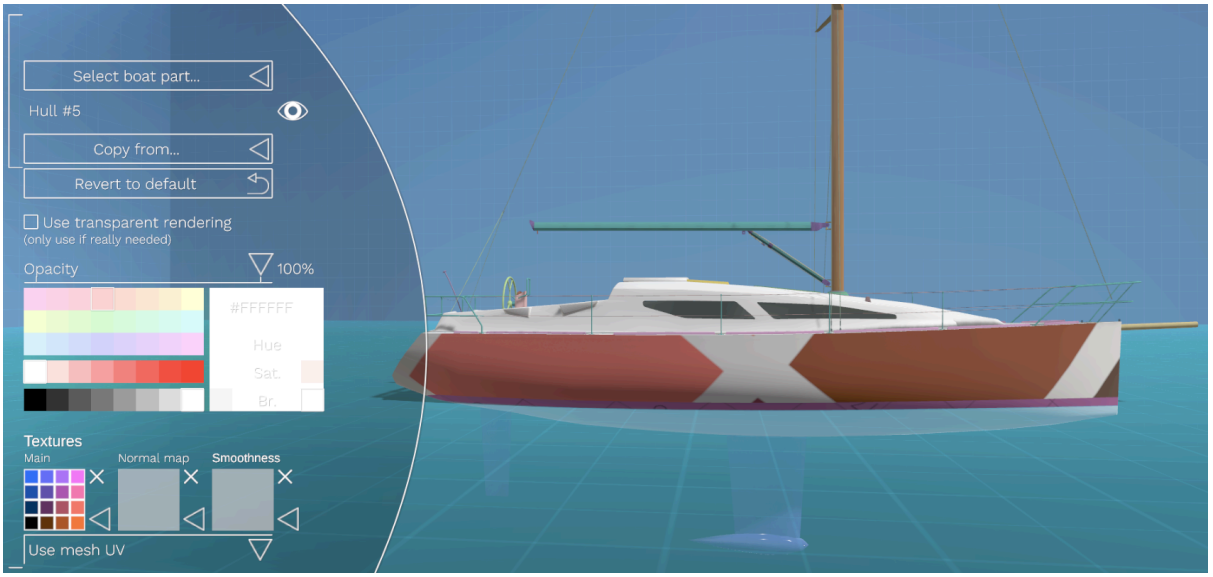
When you click on the folder icon in the bottom right corner of the gray texture box, you can select the file. This file needs to be in .JPG or .PNG format.



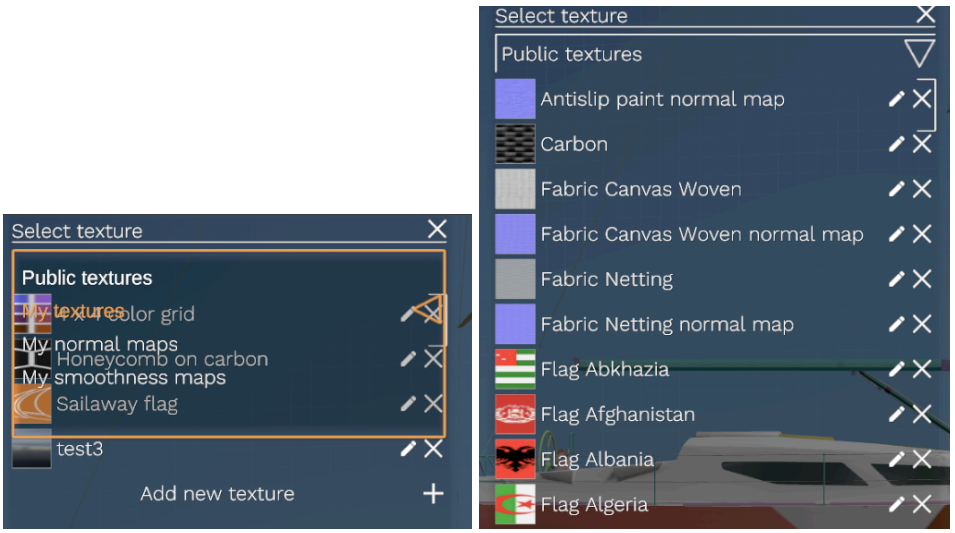
Next you can set the name and the type of the texture. In this case the type is simply “Texture”.



After you’ve saved it, it is added to the list and you can select it for your boat.

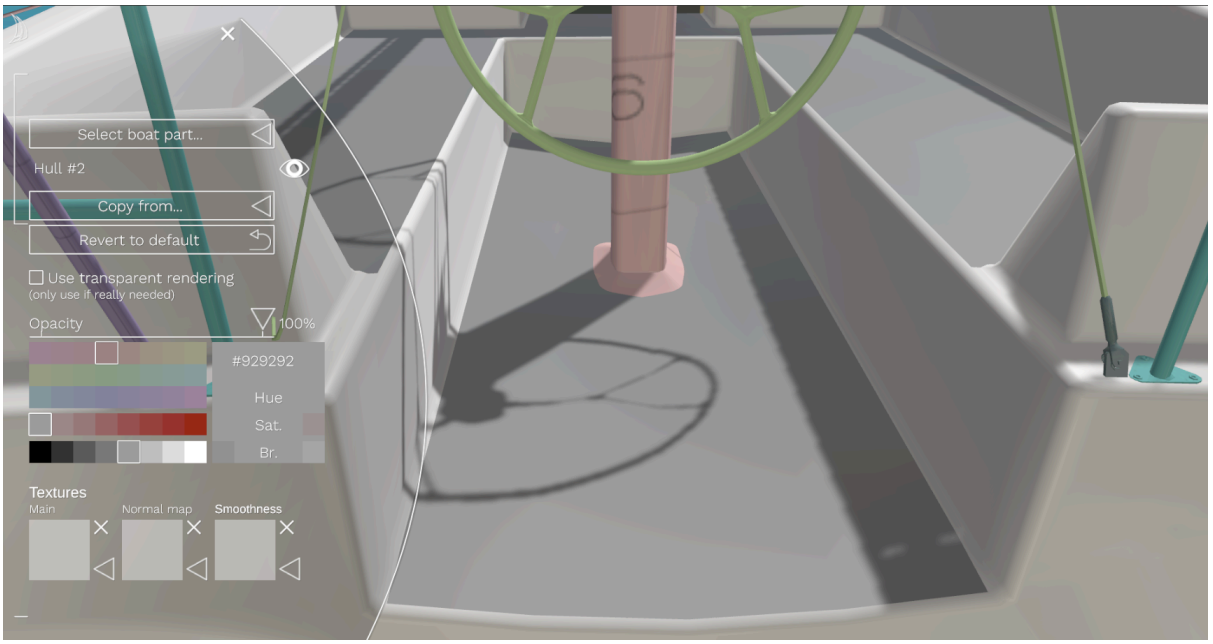


In this example a texture of your own was used, but you can also use public textures. To do this, click the arrow next to the texture box again to open the selection panel.
Open the listbox at the top of the selection panel and select “Public textures”

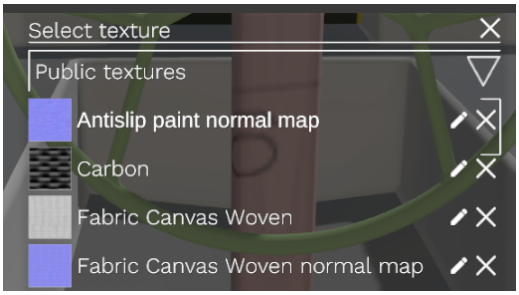


Normal map

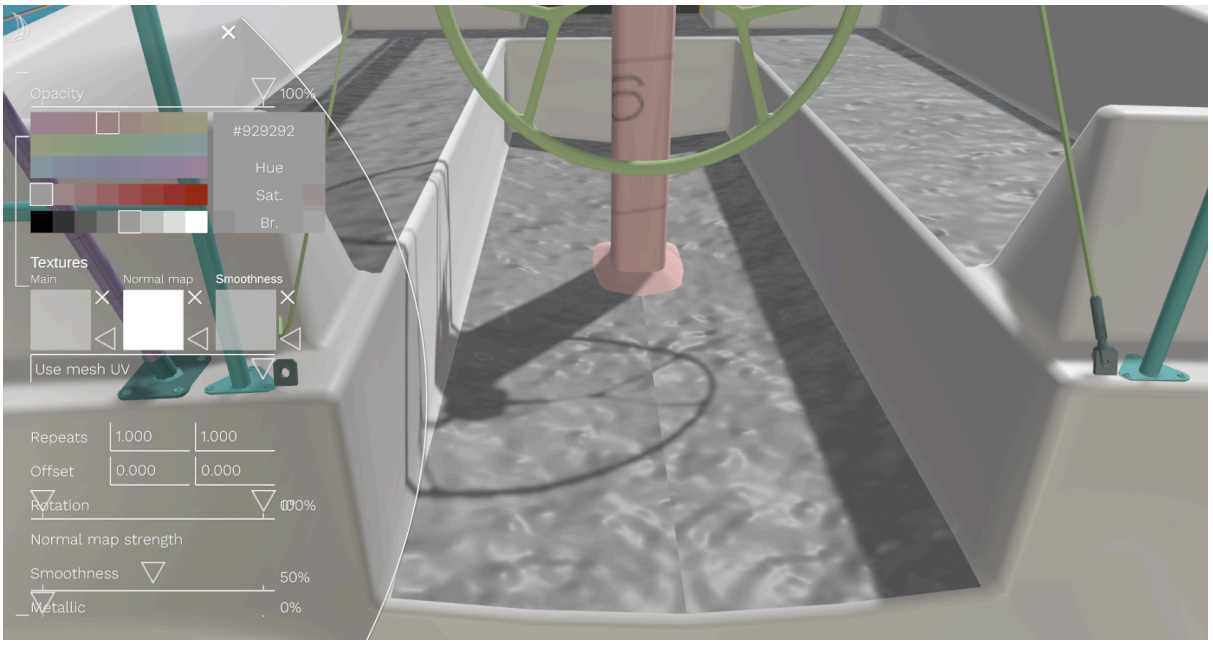
You can also apply a normal map to the boat part. A normal map is a texture where the red, green and blue components are used to alter the surface normals. This will give a surface the appearance of a non-flat surface, even though it is still as flat as it was before.
Applying a normal map will require an extra bit of graphics card power and download time, so only use it when needed.
As an example the anti-slip part of the deck is selected here and the color is set to gray.



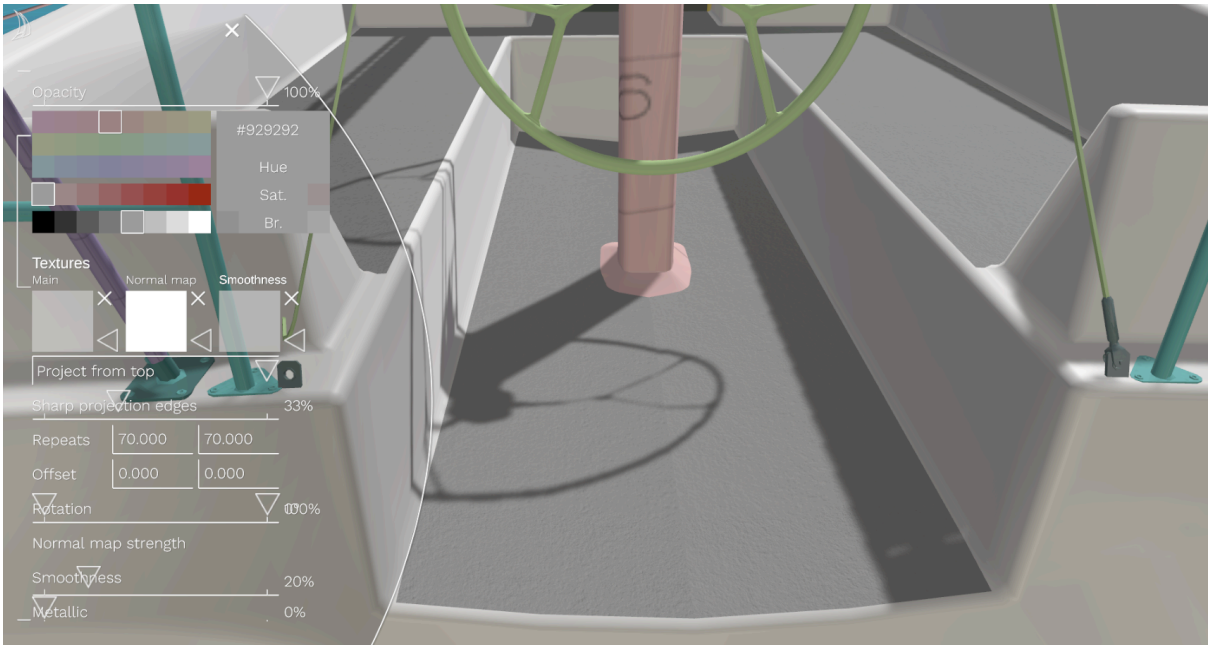
Click on the little arrow pointing left next to the Normal map input box to open the texture selection panel.
Change the listbox to “Public textures” and select the “anti-slip paint normal map”.



To upload a normal map yourself, make sure to set the texture type to normal map after you've selected the file on your computer. It will be added under the selection panel listbox option "My normal maps".



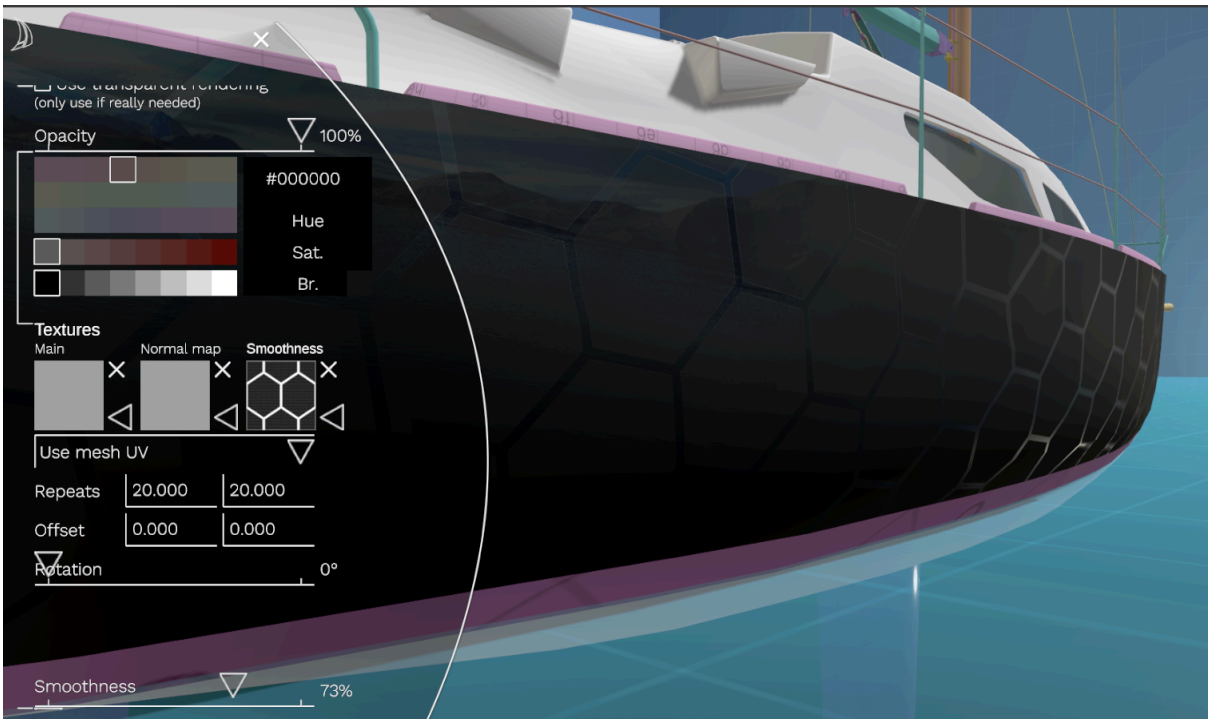
This looks awful, but that's because the texture was designed to be a repeating pattern and the repetition isn't set yet.



But when the repetition is set to 70, the projection is set to “project from top” and the smoothness is turned down, it looks a lot more like anti-slip

Smoothness map

A smoothness map is a black and white texture that tells the graphic card where the surface is smooth and shiny (white pixels in the textures) and where it is matte (black pixels in the texture). And of course everything in between.
It can be used for some cool effects or in combination with a texture to make the result more realistic.
Applying a smoothness map will require an extra bit of graphics card power and download time, so only use it when needed.

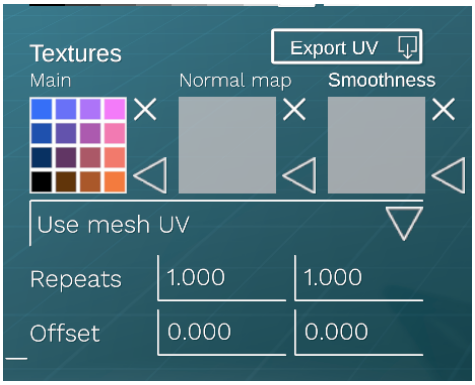


In this example the hull is painted black, and a hexagon pattern is used as a smoothness map. The white lines in the textures are smooth and shiny and the black parts in the texture are matte.

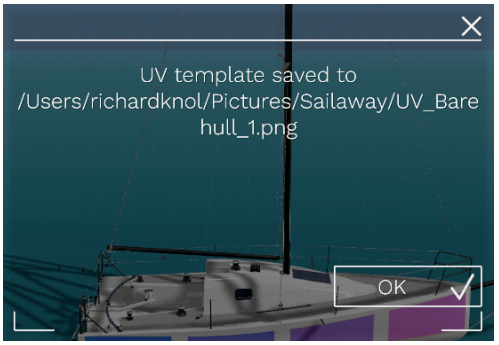
Texture projection

When a flat texture is placed on a 3D shape, the computer uses UV coordinates to know which part of the texture should end up on which point on the 3D surface. Most meshes have

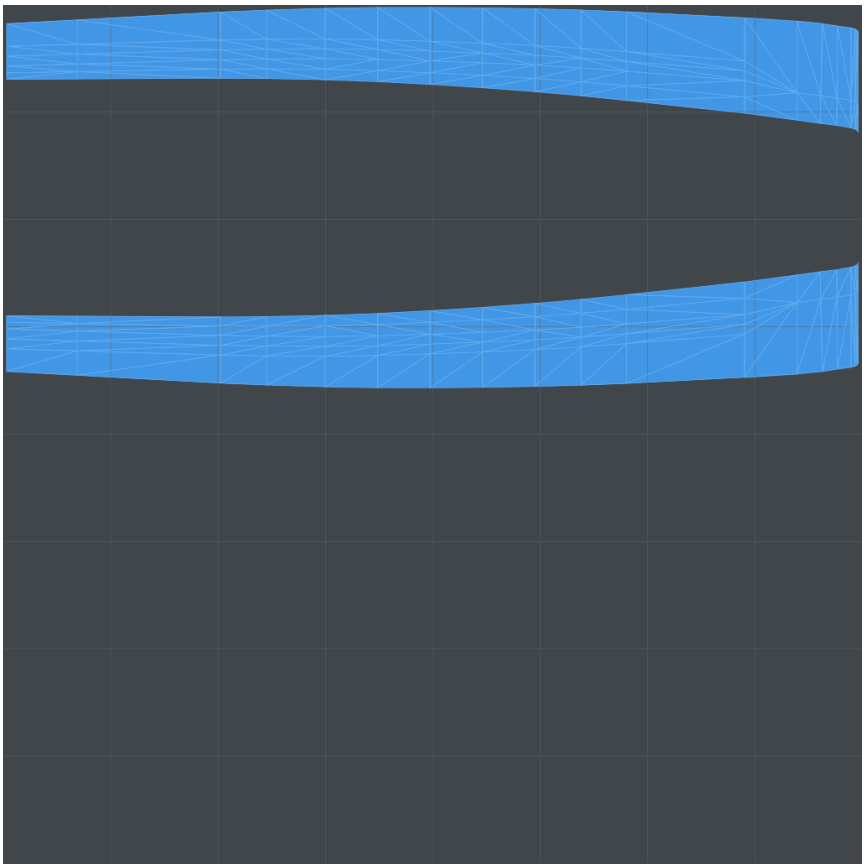
UV coordinates built in. If you do not know how the UV coordinates are mapped for the boat part or sail you are editing, you can press the “Export UV” button.



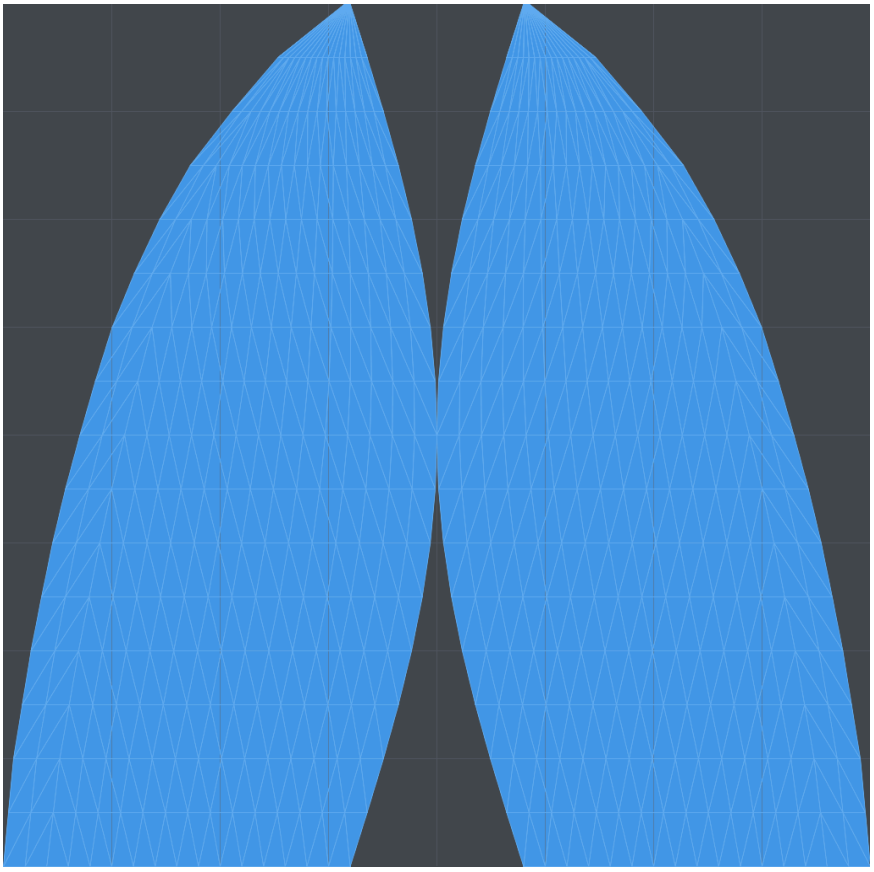
It will generate an image that you can use as a template for your texture and tell you where the image is saved.



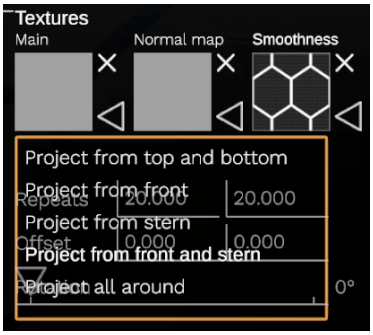
UV template of the outer hull of this boat



UV template of the gennaker of this boat

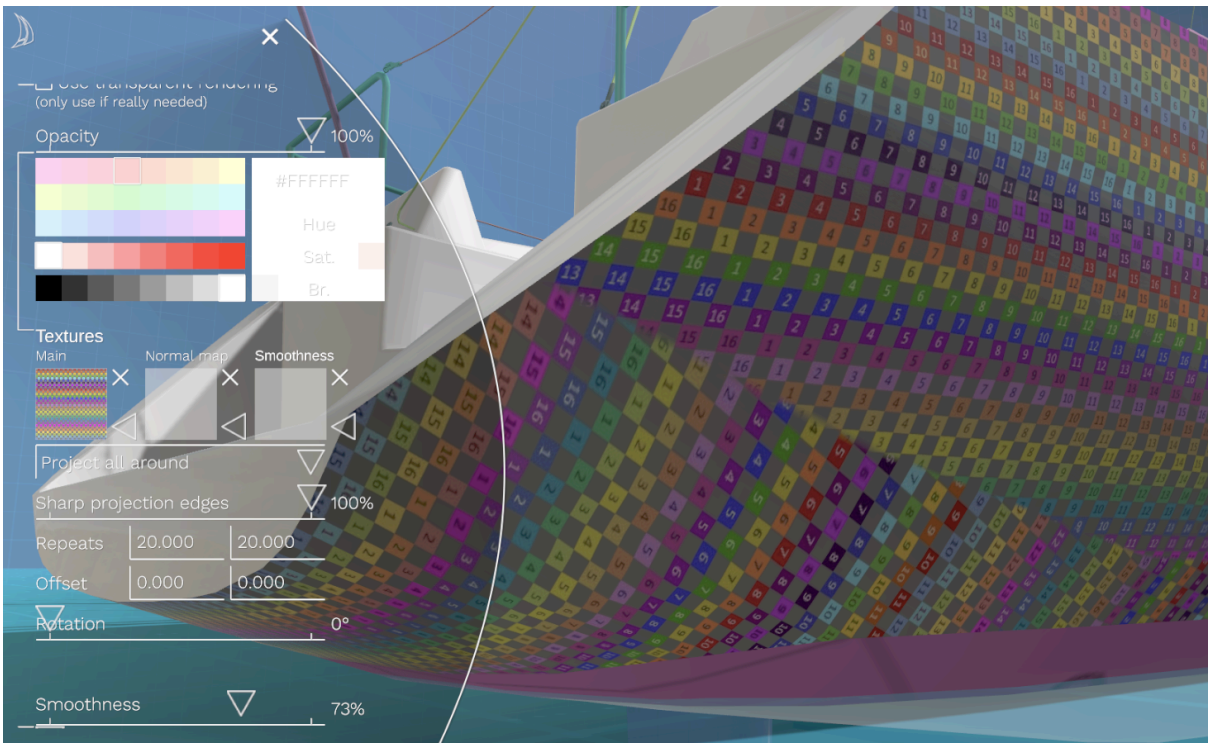


By default the UV coordinates of the mesh are used to project a texture on the surface. But it is also possible to use the built-in projection. You can change the list box to projection from various sides and a combination.

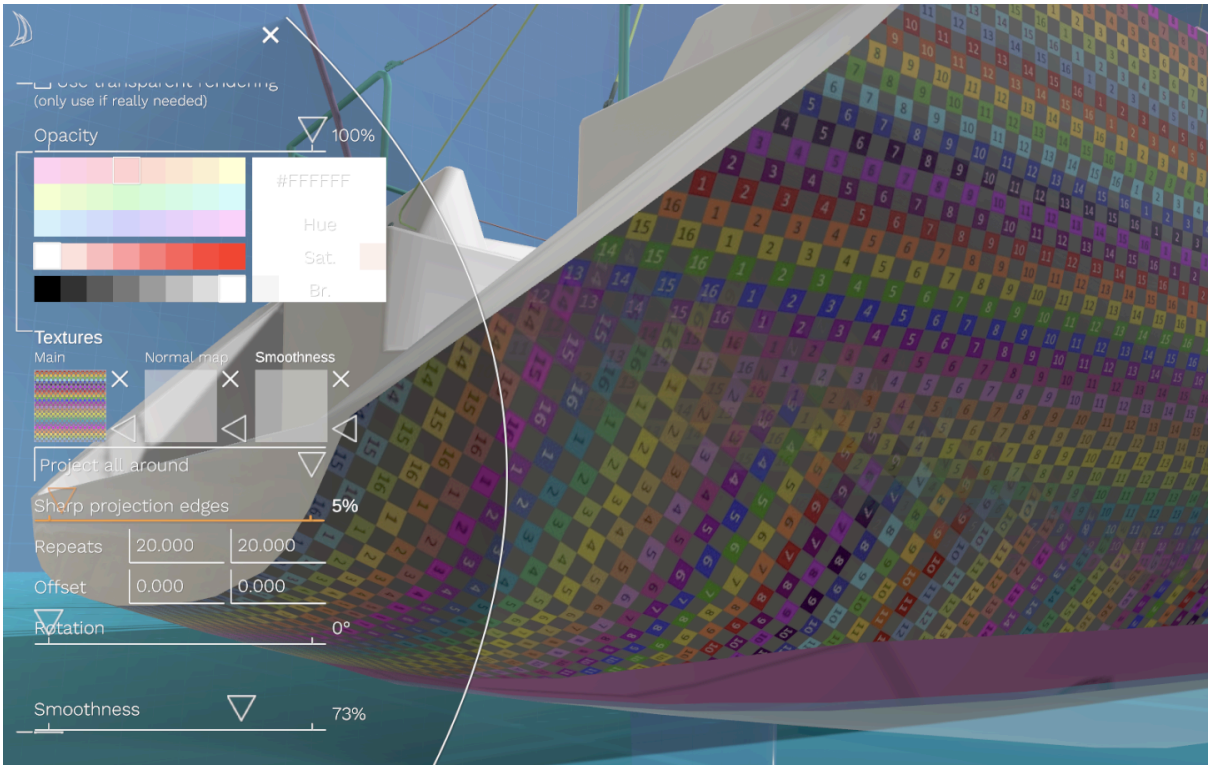


Using projection will cost a tiny bit more computing power multiplied by the number of sides. Choosing “Project all around” will be 6 times more costly than “Project from top”. But don’t worry too much. Just avoid projecting from unnecessary sides.

In this example “Project all around” is chosen. The picture shows the transom of the boat. You can see the area where the texture is projected from right and where it is projected from the bottom.



The slider “Sharp projection edges” is set to maximum.

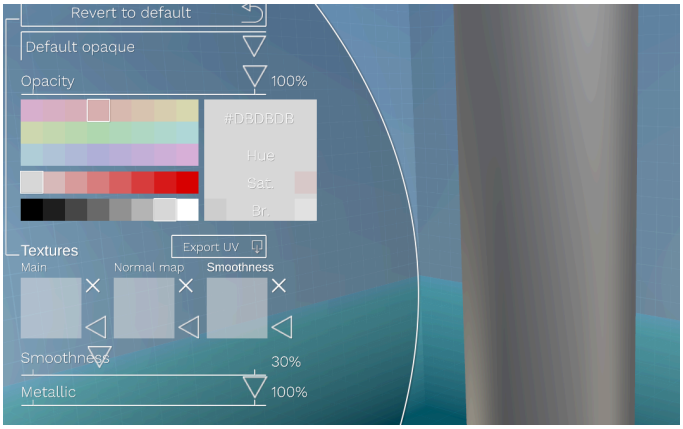


When the slider “Sharp projection edges’ is set to a lower value, the projection areas will fade into each other.

Smoothness

With this slider you can make the material appear smooth or matte. But before you drag the slider all the way to 0 or 100%, consider that no material is 100% smooth and no material is 0% smooth. In general, plastics are about 50% smooth. Metals can be 50 - 70% smooth, anodized aluminum is about 25-35% and a shiny paint can be up to 65-70% smooth. Glass is 65 - 80% smooth.

Settings for anodized aluminum



Metals

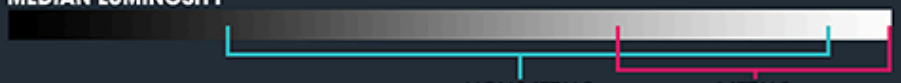
With the sliders named “Metallic” and “Smoothness” together with the base color, you can turn the appearance of a material into a metal. But for a good result, there are a few things to consider.
Metals need a “Brightness” value of 75 - 100% (brightness is set in the bottom row of the color selector).
Metals need a “Metallic” slider value of 90 - 100%.
Non-metals need a “Metallic” slider value of 0 - 10%.
You can use this chart made by Unity for reference.

SHADER CALIBRATION SCENE
METALLIC VALUE CHARTS

ALBEDO RGB

ALBEDO DEFINES THE **OVERALL COLOUR** OF AN OBJECT
VALUES USUALLY MATCH THE PERCEIVED COLOUR OF AN OBJECT

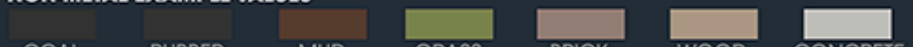
MEDIAN LUMINOSITY



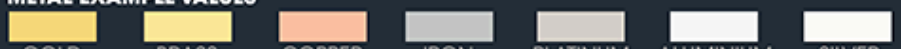
NON-METAL sRGB RANGE **50-243**

METAL sRGB RANGE **186-255**

NON-METAL EXAMPLE VALUES



METAL EXAMPLE VALUES



METALLIC R

METALLIC DEFINES WHETHER A SURFACE APPEARS TO BE **METAL** OR **NON-METAL**
WHILST PURE SURFACES WILL BE EITHER 0.0 **OR** 1.0, BEAR IN MIND FEW PURE, CLEAN, UNWEATHERED MATERIALS EXIST IN REAL LIFE
WHEN **TEXTURING** A METALLIC MAP, THIS VALUE WILL ALWAYS BE **GREYSCALE** AND IS STORED IN THE **R CHANNEL** OF AN RGB FILE

GREYSCALE

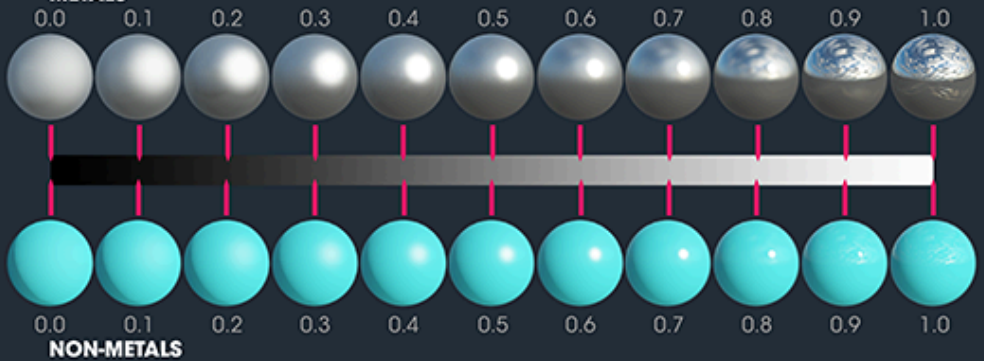
ALMOST ALL **NON-METALS** = 0.0

ALMOST ALL **METALS** = 1.0

SMOOTHNESS A

SMOOTHNESS DEFINES THE PERCEIVED **GLOSSINESS** OR **ROUGHNESS** OF A SURFACE
FOR TEXTURES, THIS IS STORED AS THE ALPHA CHANNEL OF THE **METALLIC MAP**

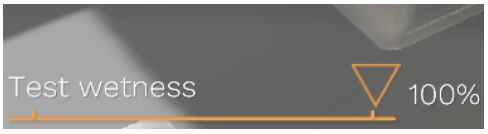
METALS



NON-METALS

Wet surface

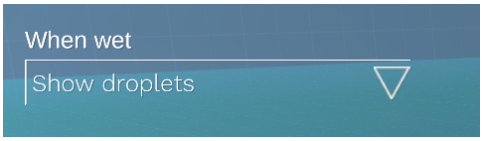
It is possible to show the influence of rain or spray on the surface. You can test this by adjusting the slider in the bottom left corner of the screen.



There are 3 options to show wetness:

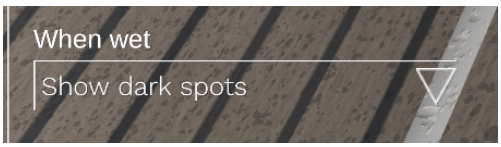
Show droplets

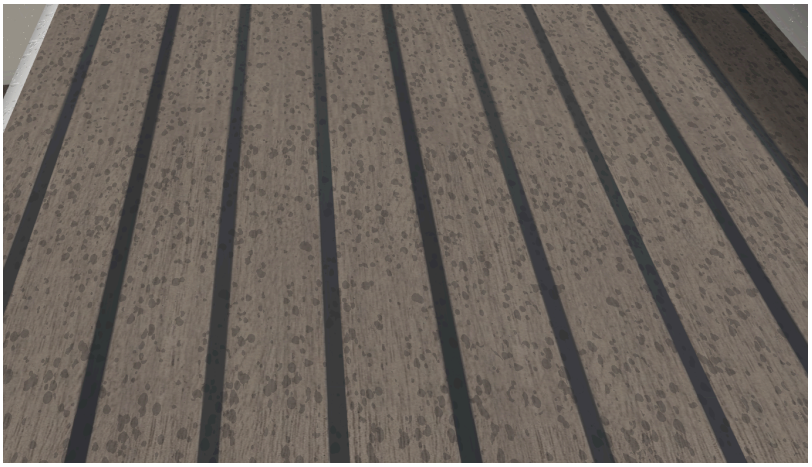
This is for smooth surfaces that don't absorb water.



Show dark spots

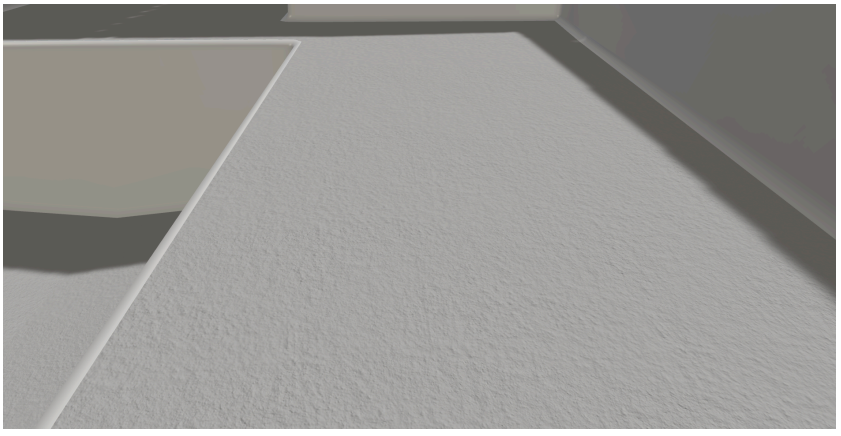
This works best for non-shiny surfaces that absorb water. Like a teak deck.

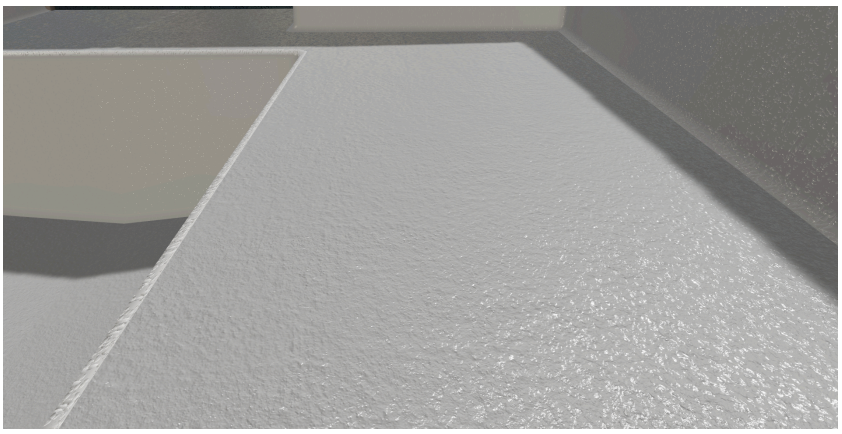




Make shiny

This works best for rough surfaces that don't absorb water. Like an anti-slip deck.





Overlays

On top of the color and texture of a surface, you can place 1 or 2 overlays. Think of it as a sticker. You can use this for instance to display the name of your boat, a sail number or sponsor stickers.

When you have an image with transparency (for instance text on a transparent background) the overlay will be shown in the opaque (non-transparent) pixels.

In this example the flag of the European Union will be placed as a sticker on the bow.
The overlay image is selected and it is displayed from the starboard and port side by default. You can change the opacity if the overlay should still show a bit of what is underneath it. This type of transparency has no extra GPU or CPU cost.

The size of the flag is 1 x 1 and the offset 0 x 0. That means it will cover the entire length and height of the boat. Including the bowsprit, the keel and the mast and possibly some invisible parts. The position 0, 0 is underneath the stern in this screenshot.

Placing it in the correct location (in this case the bow) requires some care. You have to take it step by step, otherwise the overlay is displayed where there is nothing to project it on and you will not see it anymore.

First change only the x component of the scale and do this step by step. If the overlay doesn't show anymore, increase the scale a bit until it becomes visible again. Then increase the offset to shift it further into place. Always in small steps.

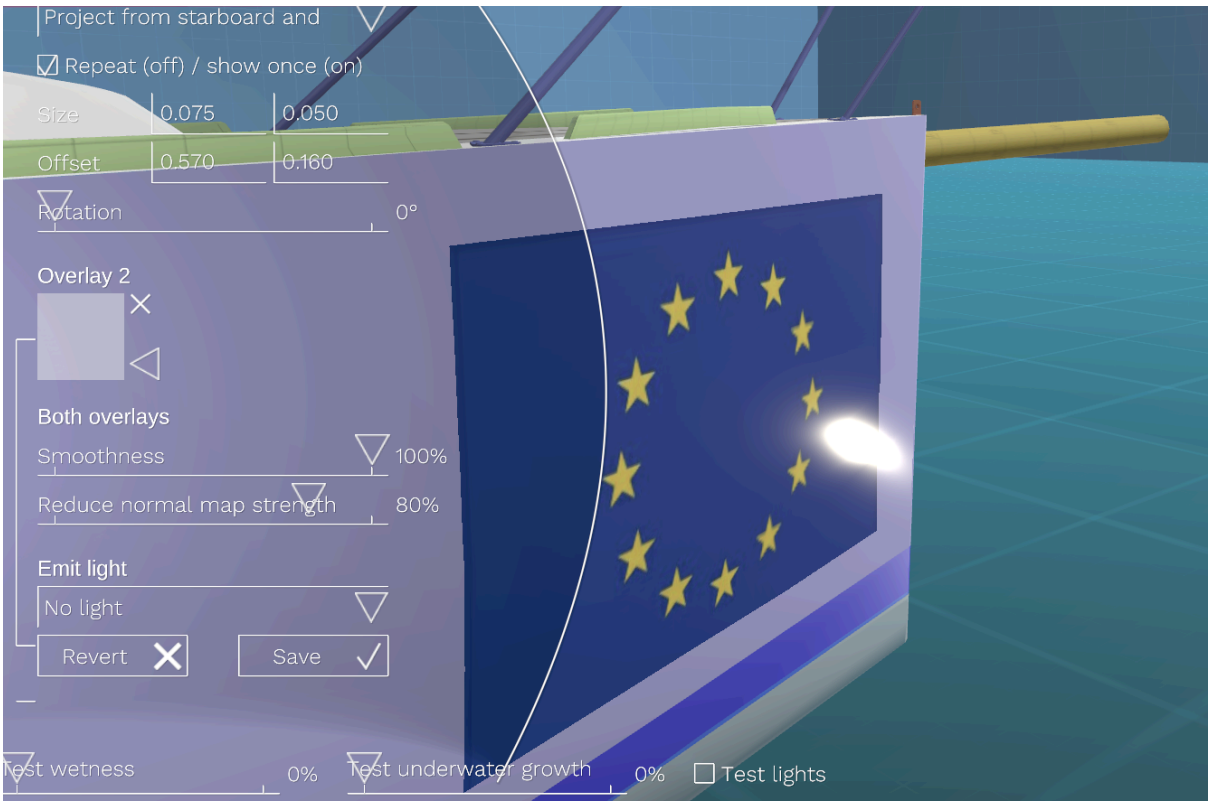
The flag now has roughly the correct size in x and the correct offset in x.

Next you do the same for the y component of the size and offset. Again, make small adjustments until the correct size and offset are reached.

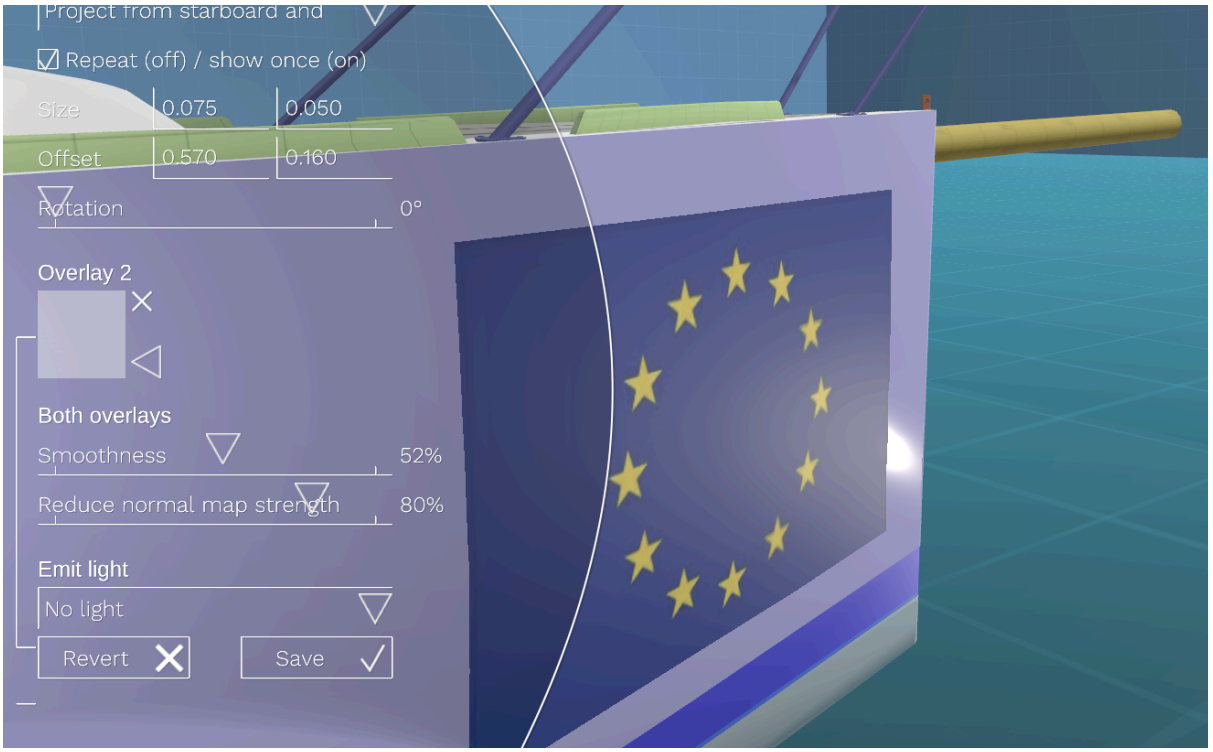
If you have another overlay, you can repeat the steps.

In order to display text that is not read as a mirror image when looking at the port side of the boat, you will need to set the projection to starboard only and use Overlay 2 for the other side.

To make the sticker look more like a sticker and less like a painted image, you can adjust the smoothness.



This overlay looks like it was painted on the hull. Smoothness = 100%



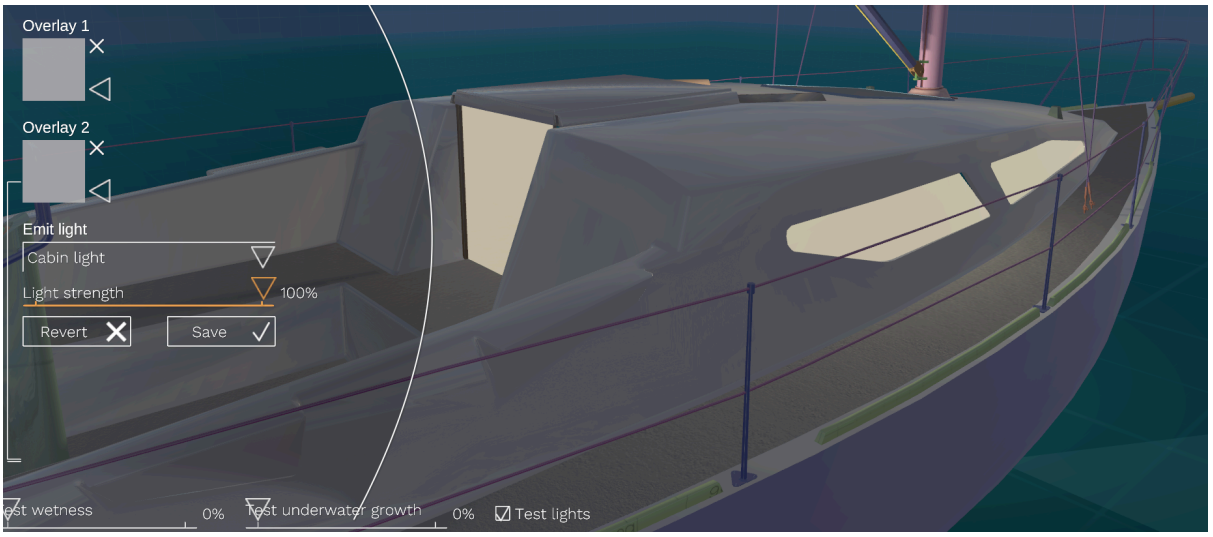
This overlay looks like a sticker. Smoothness < 100%

Lights

In the hardware settings you can select default navigation lights to mount on the boat. But if you have uploaded 3D models with your own lights, you can make the shine by selecting the type of light and setting the light strength.

The light type will determine the light color and the distance at which it will be visible based on the view direction (navigation lights shine green on starboard and red on port).

In this example the window material has been set to act as a cabin light.



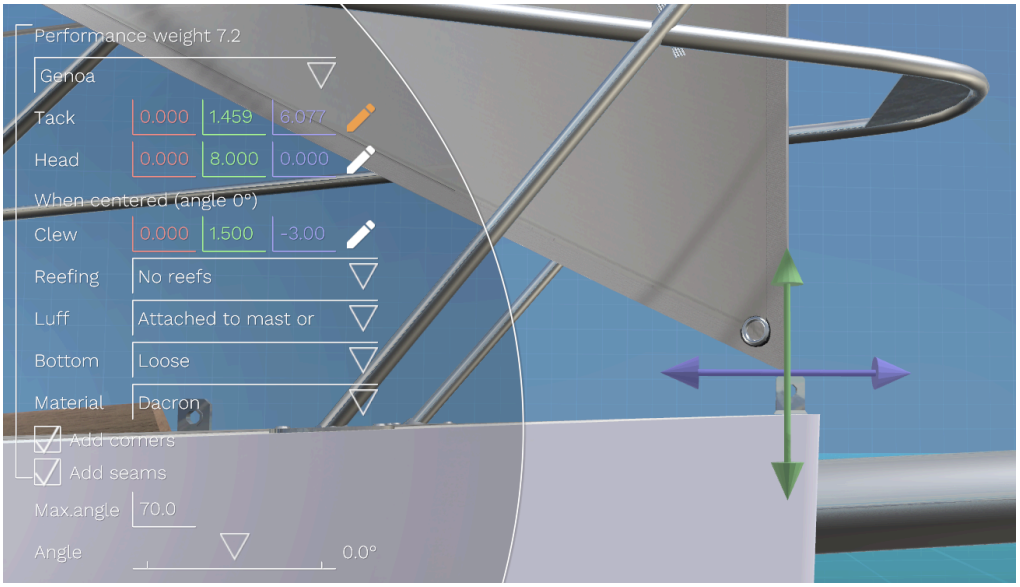
You will only see the light when it is switched on. In the boat designer you will need to set the ‘Test lights” toggle at the bottom of the screen on.

The light will shine on all surfaces, regardless if there is anything blocking the way. Note how the mast is illuminated in this picture even though the cabin roof would cast a shadow in the real world.

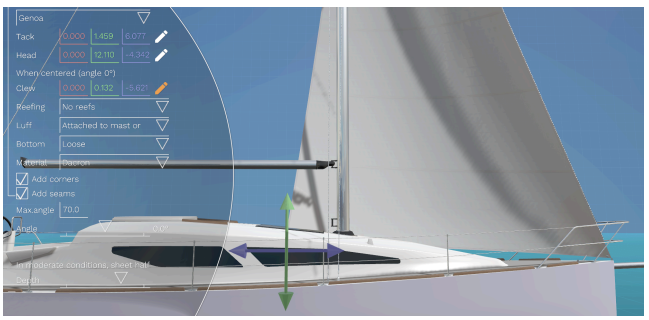
Sails

When you add a sail, a small sail of the selected type is placed at a default position on the boat.

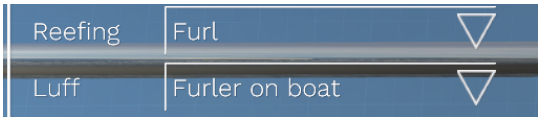
The first thing to do is to adjust the position of the tack. Dragging the tack will drag the entire sail with it.



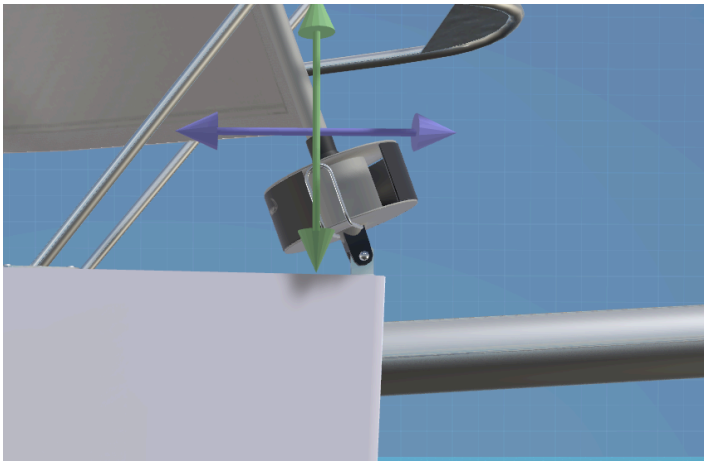
Next change the position of the head and the clew.

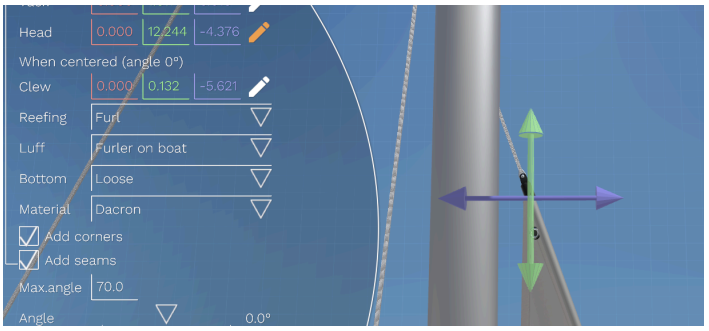


Since this will be a genoa on a furler, the value for “Reefing” is changed to “Furl” and the value for “Luff” is changed to “Furler on boat”. The type “Furler on sail” is for a lightweight variant, that is only suitable for completely furling or unfurling the sail.



The position of the tack needs to be adjusted a bit now. And since this will change the position of the entire sail, the head and clew position need to be adjusted as well.





The bottom of the sail is set to “Loose” as shown in the picture below.

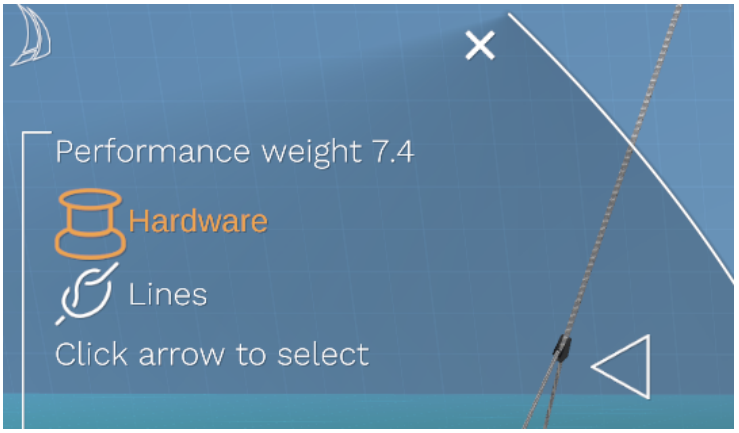
When you change it into “Loose lowered”, the cut of the sail is adjusted to be closer to the deck.

You can change the material of the sail to Canvas, Dacron or Laminate. These are not just cosmetic settings. A canvas sail will have a much different behavior and efficiency than a laminate sail, regardless of the texture that is placed on it. In the materials part of the boat designer, you could change the texture of a canvas sail to a high performance laminate sail, but this would not make the boat sail any different. However, changing the setting here will have a noticeable effect on the sailing behavior.

You can change the maximum angle and the depth of the sail with the slider.

Hardware

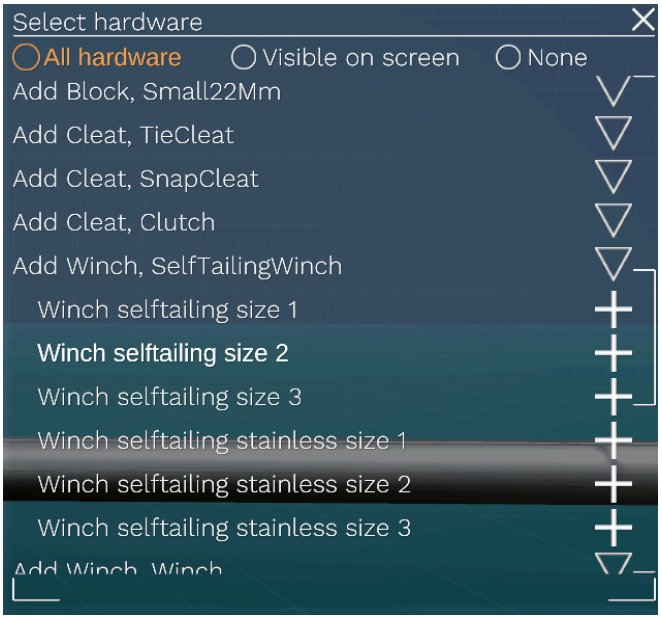
In the hardware editor of the boat designer, you can add many types of predefined hardware from a big library.



Click the arrow to select any existing hardware on your boat or to add a new item from the hardware library.

Adding winches

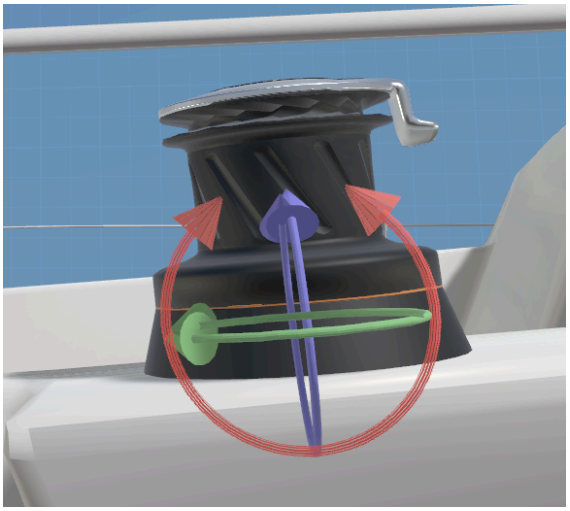
Open the “Add Winch, Self tailing winch” section.



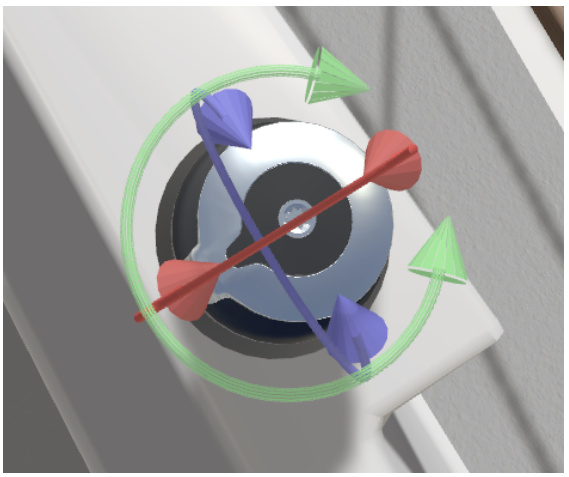
Size 2 is the default for medium sized boats like this 38’ cruiser.

The winch will be instantiated in front of the camera position and you have to drag it in place by clicking the pencil icon behind “Position”.

When it is in place, adjust the rotation over X and Z to match the surface it is mounted on

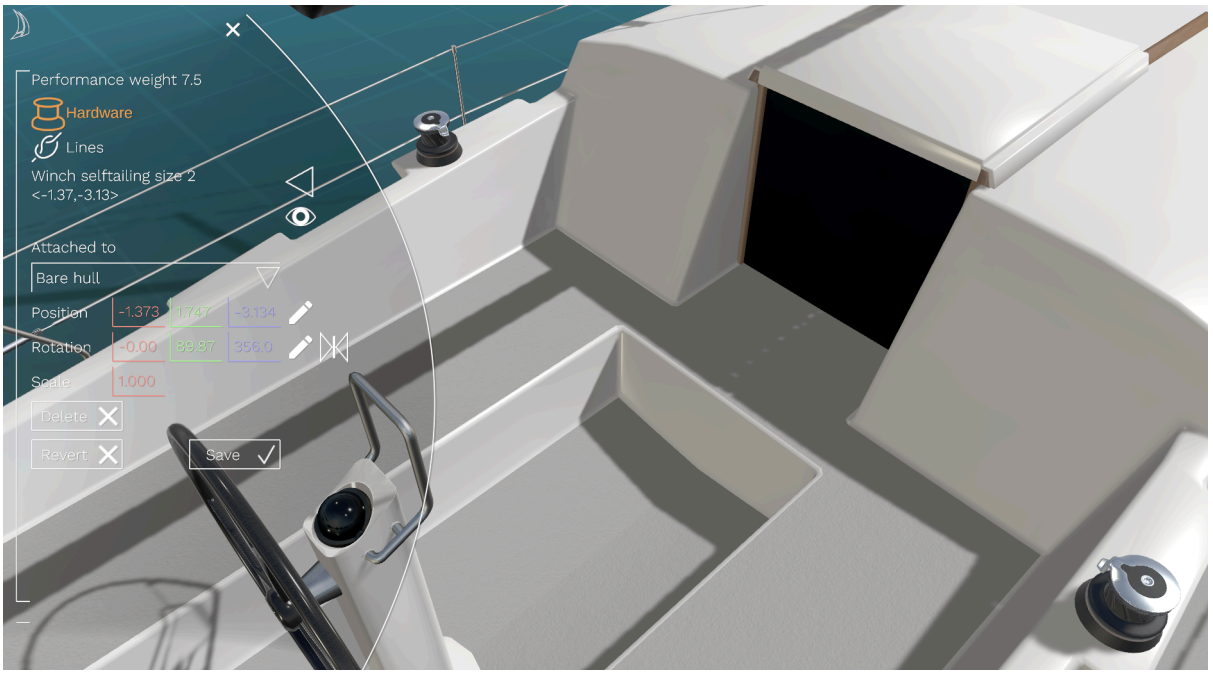


And rotate the winch over Y so that the self tailing arm is pointing towards the sailor.

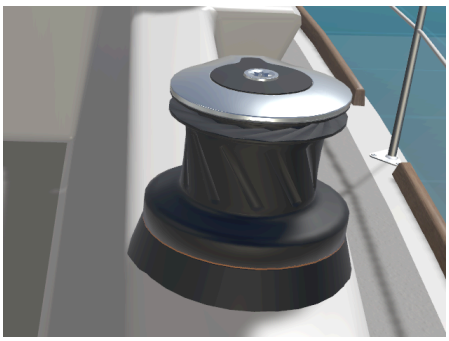


When it is placed perfectly, make sure you save it and then click the “Copy” button.

This will make a copy of the winch on the other side of the boat in mirrored position and rotation.



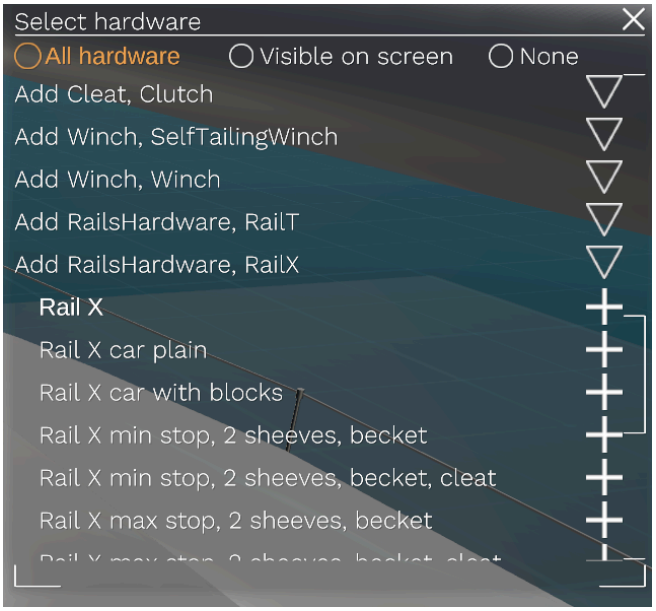
To add another winch for the gennaker the process is repeated.



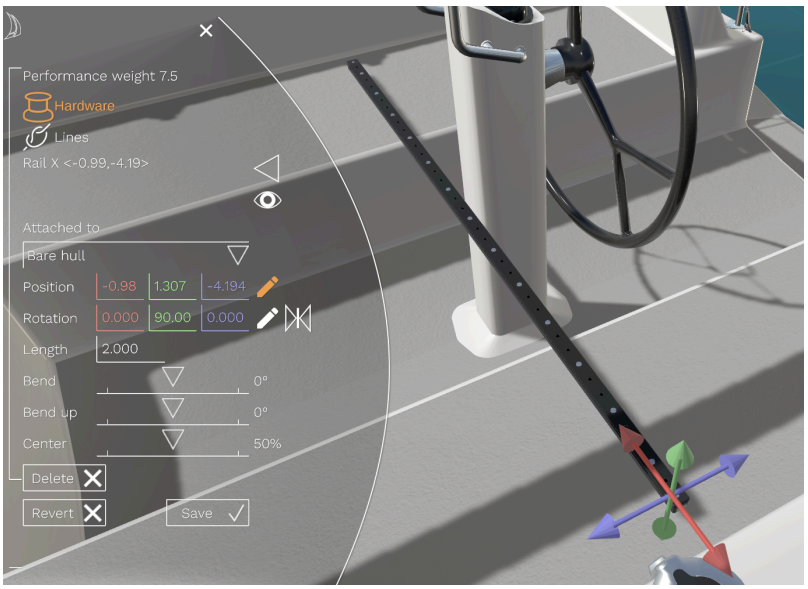
The winch seems a bit too big for the surface it is mounted on. Adding a winch of size 1 is an option, but that will give you another model. In this case the winch is scaled down to 90% of its size.

Adding a main sheet traveler

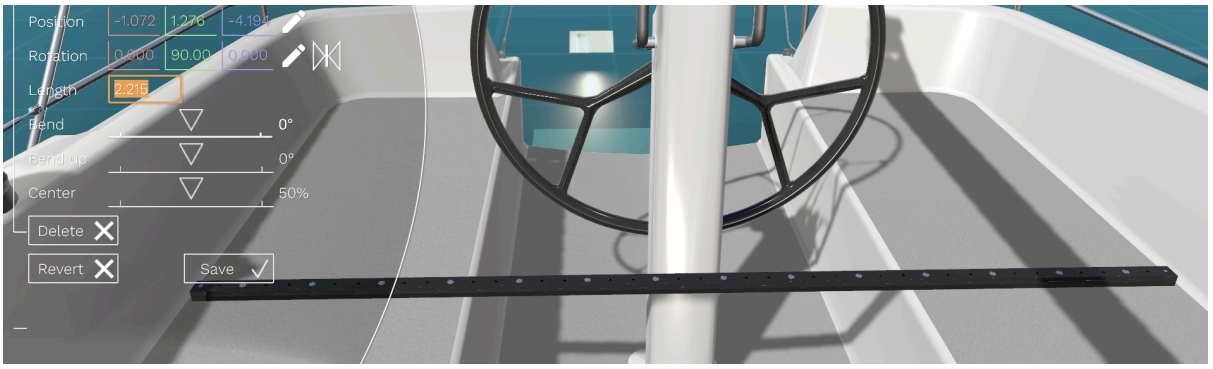
For this the X-type is used.



The pivot for the rail is at 1 end. This is not very convenient for adding it to the boat. You therefore have to place one end in the correct position and then tweak the value for “length” until the other end is in the opposite position and the rail is placed symmetrical on the boat.

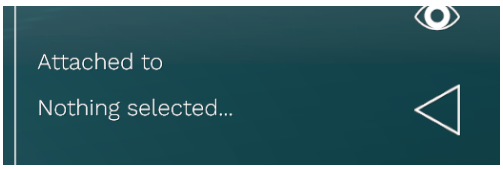


Now tweak the “Length”.

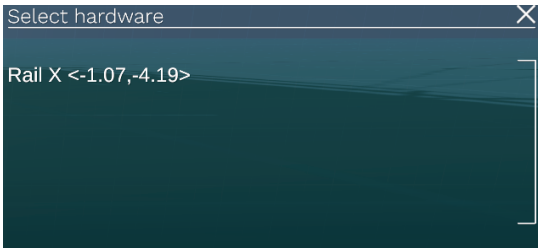


Next add the rail car.

It will float in the air in front of the camera. You will need to attach it to the rail that it will slide over. Click the arrow behind “Attached to”.

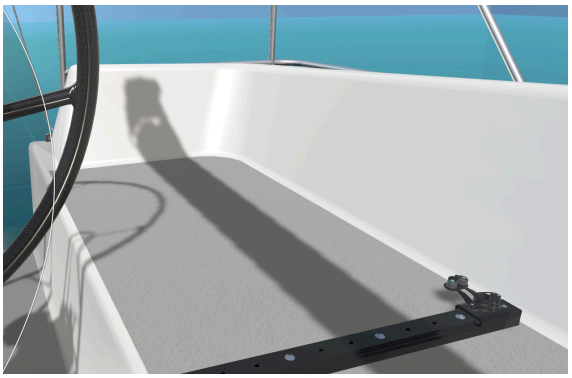


And select the rail that was just added.

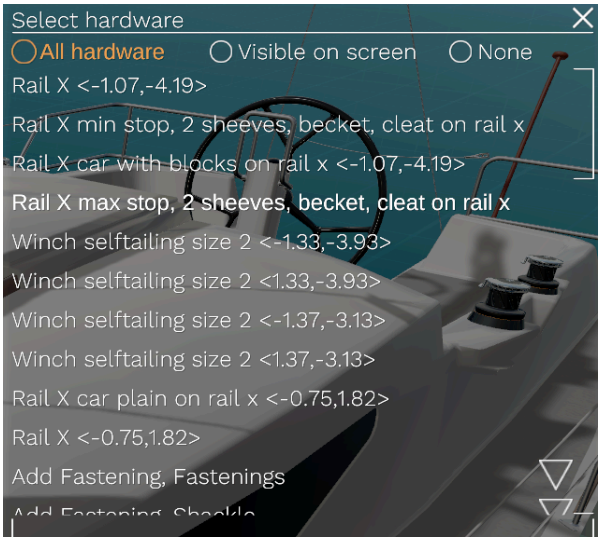


Don't forget to save.

Next add 2 end stoppers. Once attached to the rail, they will be placed in the correct location. In this case you can see that the cleat is pointed towards the helmsman. if you want it on the other side, the whole rail will have to be rotated 180 degrees.

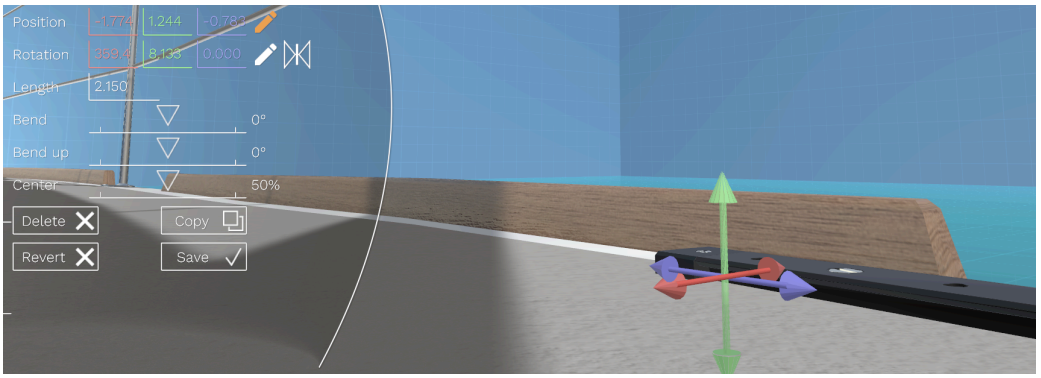


Every time you add hardware to the boat the contents of the selection panel grows. This can get overwhelming at some point, which is why there are these 3 radio buttons at the top. By default the selection panel shows all hardware you've added to the boat, but you can also switch it to show only the hardware that is currently visible on the screen. Or no hardware at all, in which case only the lines to add new hardware are shown.

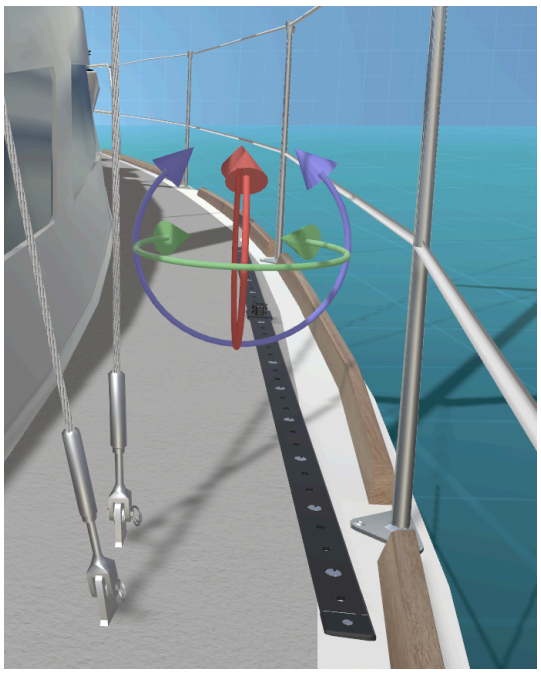


Adding a leadcar

Only look at the pivot when you place it at the correct location.

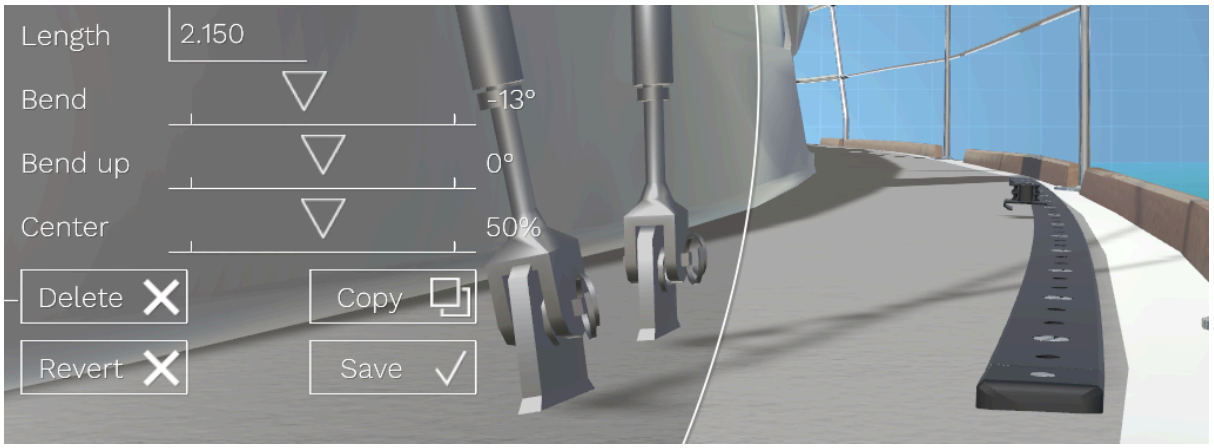


Next adjust the rotation in X and Y to position the other end of the rail. For fine tuning, it is easier to use the input fields instead of the rotation arrows.

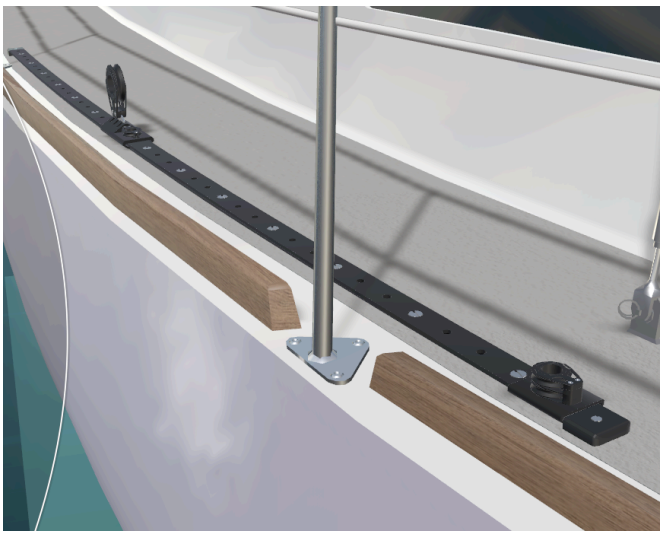


And adjust the Z rotation to match the sideways slope of the deck.

When it is placed perfectly, you can adjust the bend to make the rail match the curve of the deck.

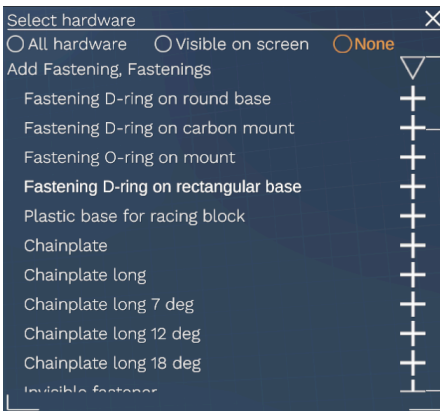


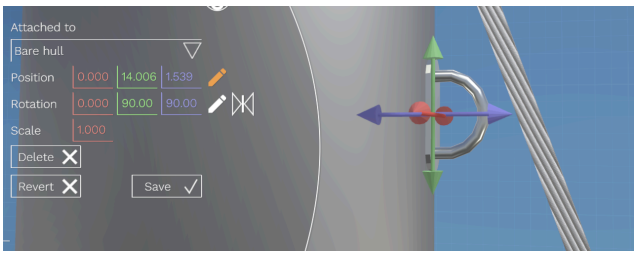
Don’t forget to save. And then click “Copy” to add a matching rail on the other side of the boat.
Finally add a max stop and a lead car to the rail.



Adding a block

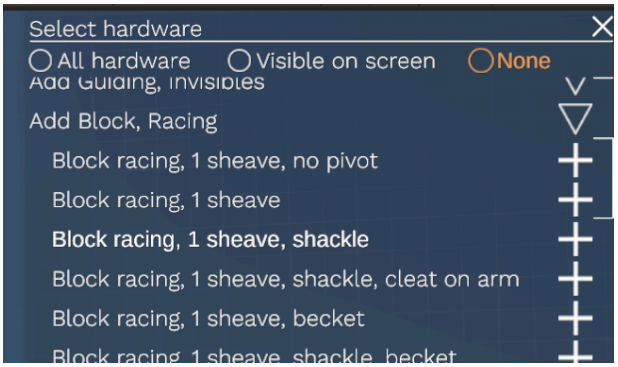
In the next example a block is added to the mast
Unless you are adding a deck mounted block, all blocks will need a fastener to attach it to. Therefore a fastener is added to the mast first.



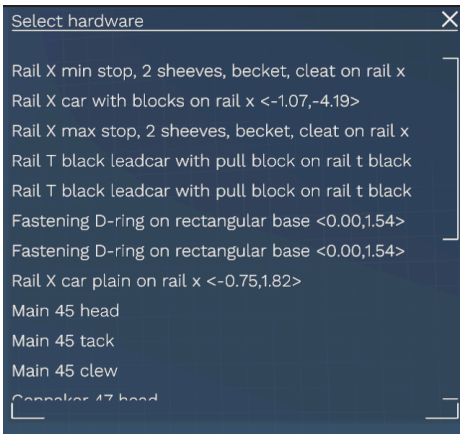


The rotation is set to 0, 90, 90 to place it vertical and facing forward. The D-ring is by default attached to the hull. This means that it will not move and it is the best option to choose because all hardware attached to the hull will be merged into a single mesh in the LOD section of the boat designer. But if you have a rotating mast, make sure to attach it to the mast instead.

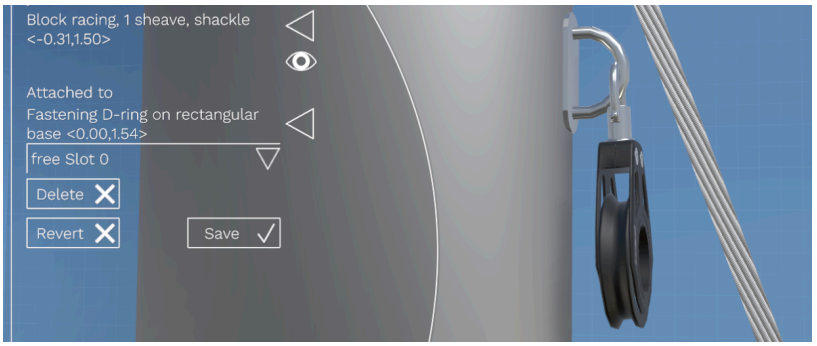
Next add the block. The easiest is to use the racing blocks for this, because you can select a model that already has a shackle attached to it.



And then click on the arrow next to “Attached to” to select the hardware that should keep the block in place. A list of all free spots is shown, including the D ring that was just added.



There are 2 free slots on this D-ring to attach 2 blocks or lines, but select the first which is slot 0.



Adding organizer blocks

When you place an organizer with multiple sheaves on the deck, you have to make sure it is pointing in the right direction. The lines will pass over the sheaves on 1 side only. When the camera is looking straight from the top of the organizer and the text ‘Sailaway” is readable and upright, the lines will pass over the tops of the sheaves.

Correct placement

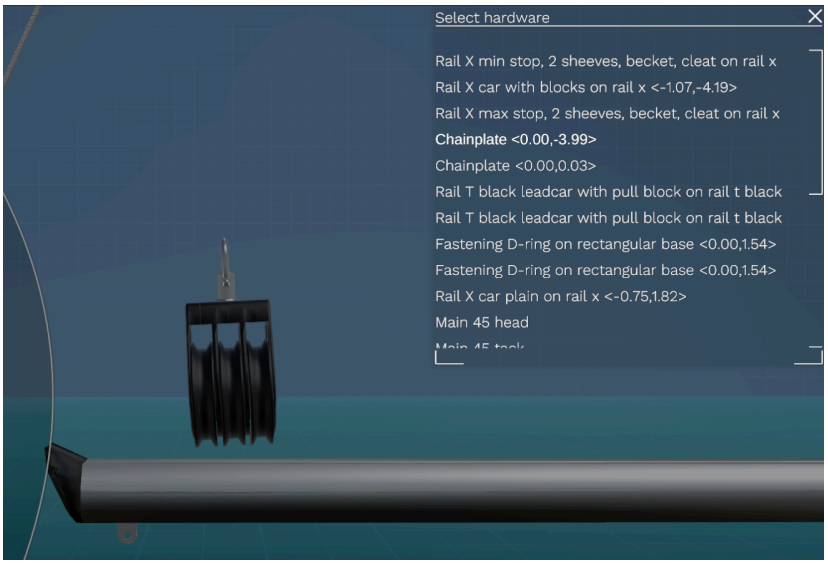
Incorrect placement

Adding a block to the boom

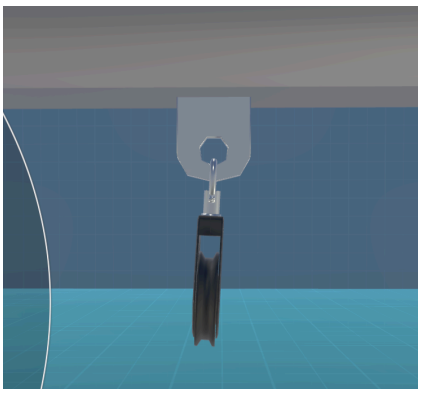
In this example a block is added for the mainsheet and the vang. But first, 2 chainplates are attached to the boom.

They can be copied once one of them is positioned and rotated correctly. It is very important to attach them to the boom (see listbox on the left side of the picture). If you forget that, the hardware will stay in the same place when the boom goes out.

And then add the block you need and attach it to the chain plate.
But that is a bit hard, because in the selection window there are 2 chainplates. The coordinates shown are <0.00, -3.99> and <0.00, 0.03> The are the X and the Z coordinate of the hardware item. Negative X is on the port side, positive X is on the starboard side. negative Z is towards the stern, positive Z is towards the bow. So in this case the first chain plate is the one for the mainsheet block.



The vang block is added and needs to be attached to the other chainplate. But instead of selecting it in the list, you can also move the camera towards the chainplate and click the chainplate itself. This only works if you activate the hardware selection panel first.



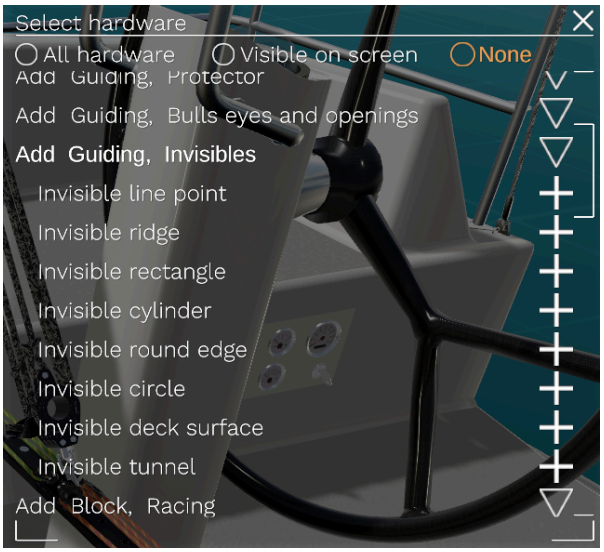
Select existing hardware

In the same manner you can select an existing hardware item to change or delete it.
Click the arrow icon next to the currently selected item to activate the selection panel. Once this panel is up you can either move the camera towards the hardware item and set the radio button to “Visible on screen” or you can click the hardware item itself on the screen.

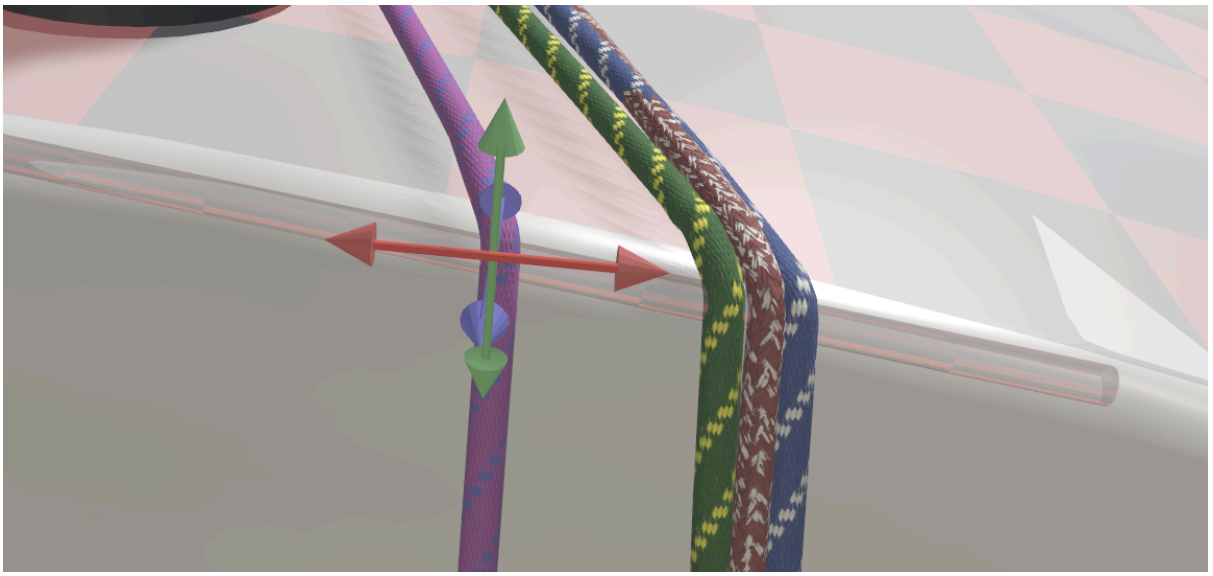
Preventing lines piercing through boat

The lines do not know what the boat looks like and if they encounter a solid wall or floor. often the most obvious things in the real world are hardest to recreate in a virtual environment. The reason for this is performance speed. Checking the vertices of the hull and other boat parts would simply cost too much computer power to do every frame.

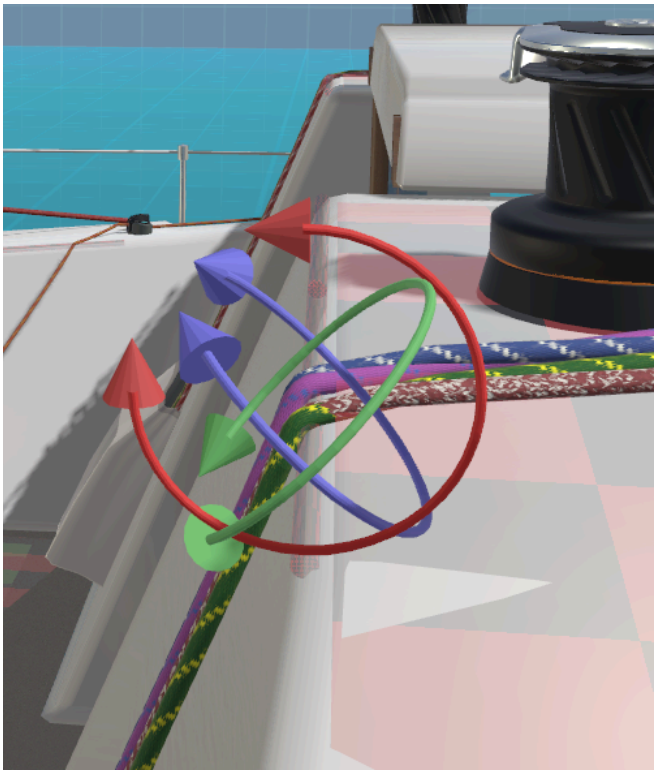
As an alternative there are several invisible objects that will tell the lines where to go. They can be found under “Guiding, invisibles”.



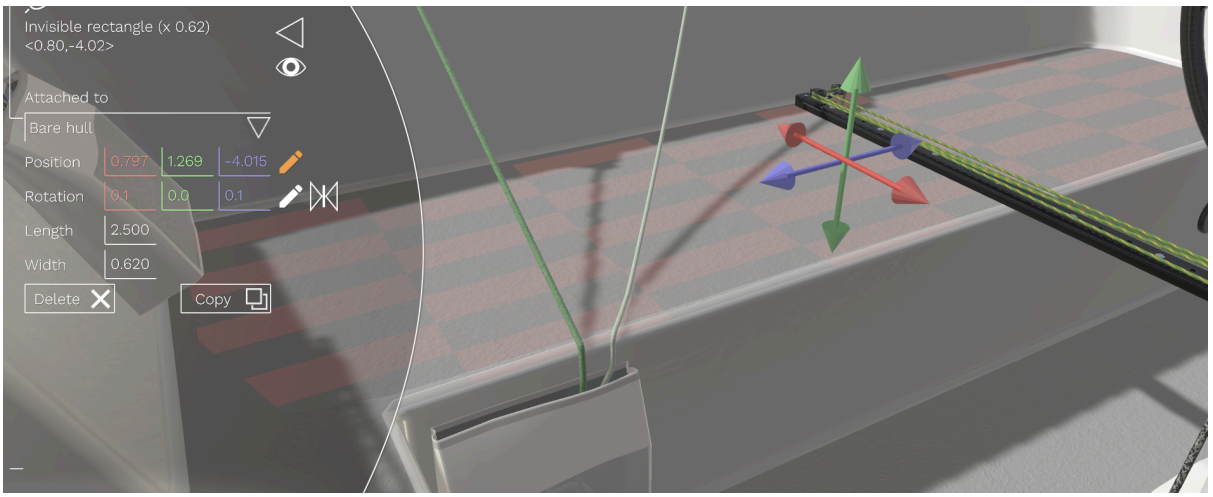
An “invisible line point” is a single point for a line. It is handy to use as a connection point inside a mast or boom. Or as a guiding point to prevent a line from piercing through the hollow mast or boom.
An “Invisible ridge” can be used to drape lines over an edge on the boat.



Always rotate an “Invisible ridge” to form a 45 degree angle with the lines. Beware that the blue and red arrows are pointing away from the ridge. This is because the ridge will only pick up lines that would otherwise pass within a limited range under the ridge (viewed from the rotated perspective of the ridge). In the picture below, lines will be picked up if they pass within 0.1 meter in the opposite direction of the blue arrows.

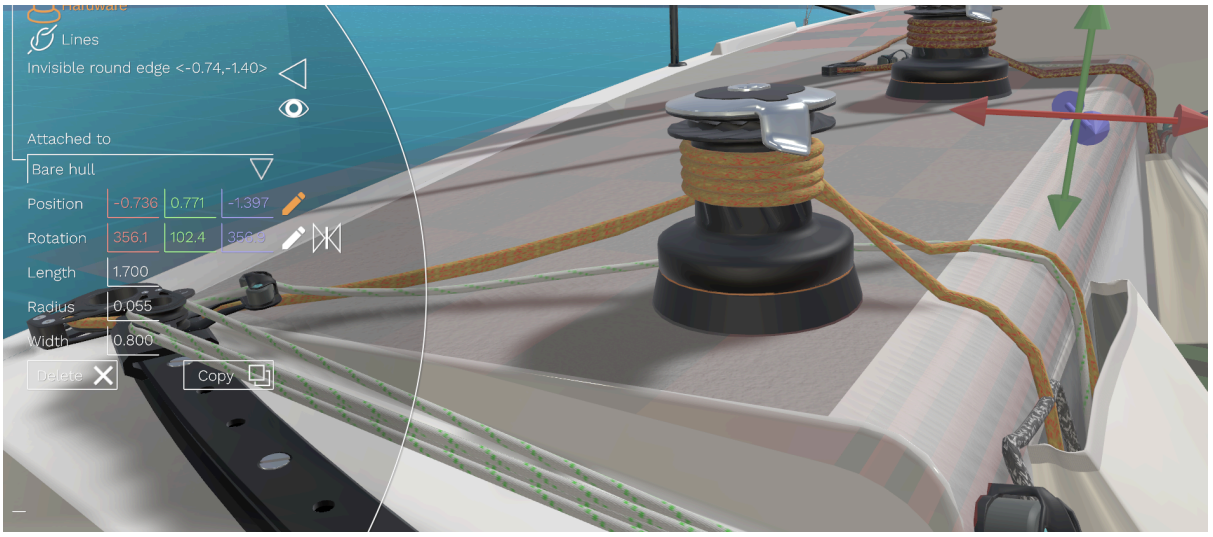


An “Invisible rectangle” can be used to prevent lines from piercing through a flat surface



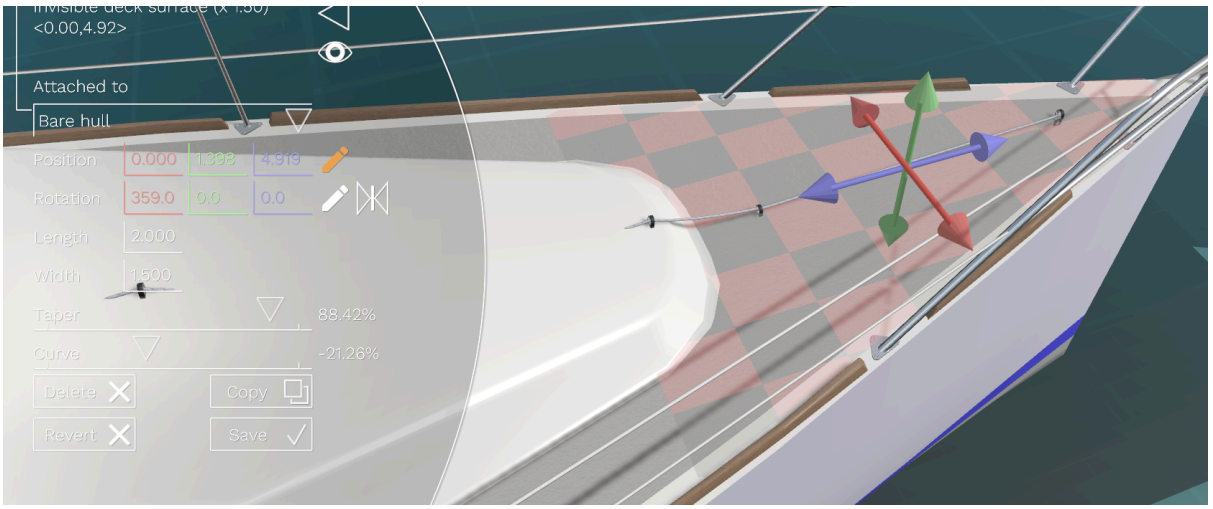
An “Invisible cylinder” could be used to guide lines around the mast or any other vertical object. Note that all winches already have a built-in “Invisible cylinder” to guide lines along them.

An “Invisible round edge” consists of 2 parts. A rectangle and a quart round cylinder. It can be used for benches with a smooth round edge.



An “Invisible circle” is like the “Invisible rectangle” and is used for a flat surface.

An “Invisible deck surface” is a shape that can be modified to match the deck. It can be tapered to fit on the bow and it can be curved to match the curve of the deck.



An “Invisible tunnel” can be used for lines that run through a chute.
Important: Don’t use an “Invisible tunnel” for lines in the mast or boom! See this chapter instead. The reason is that whenever one of these “Invisibles” moves, all lines will have to be recomputed. And a boom changes constantly when the sheet is pulled or when the boat is in irons.

It is important to use these components only when absolutely necessary and use as few of them as possible, because they slow performance down.

Lights

You can add navigation lights, deck lights and cabin lights to your boat design. But before you turn it into a christmas tree, know that lights are costly. Not in bubbles but in performance.

When Sailaway (or any game) renders your screen it computes the amount of light that falls on any surface and adjusts the color and brightness of that surface. When there are multiple lights this process is repeated for every light. There are some clever algorithms in use to make this process smarter, but it still remains costly in terms of performance.

Other games solve this by using light maps that are precomputed.By using these, the effect of the light emissions doesn’t have to be computed at runtime and can simply be read from the lightmap. But this requires the objects in the scene to be static. And there is nothing static in Sailaway. Everything moves, so light maps are not an option.

The only remaining option is to limit the nr of lights.

To keep things workable, lights on boats around you are switched off if there are 2 or more of those boats.

That doesn't mean the lights become fully invisible. You still need to see them otherwise navigation lights would lose their purpose.

There are 3 types of visualizations for a light in Sailaway:

- a light in the true sense, with reflections and affecting the surfaces it shines on
- an unlit surface that assumes the color of the light no matter what the rest of the illumination data says (this is used to give the glass of the light the illusion of emitting light in the dark)
- an artificial light beam, rendered in the same way as the previous.

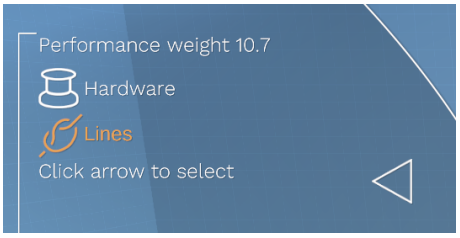
Visualization 1 has been described above.

Visualizations 2 and 3 always work on all lights, because they have no impact on performance.

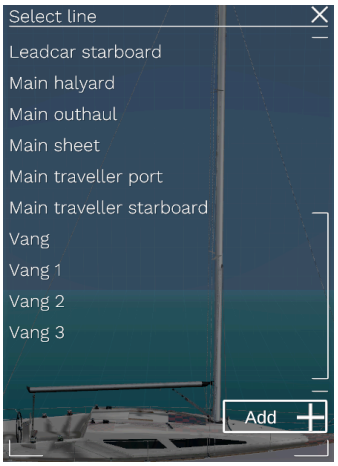
Trim lines

Adding a line

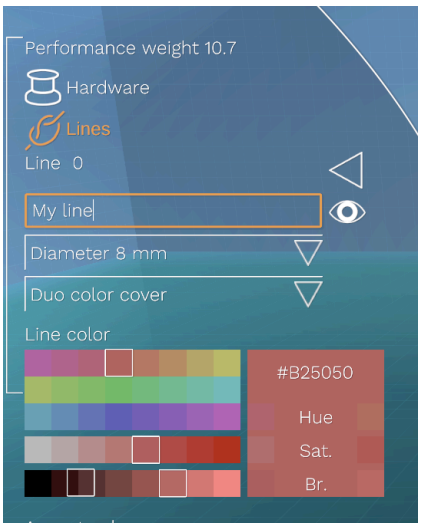
Click the arrow button to open the select line panel



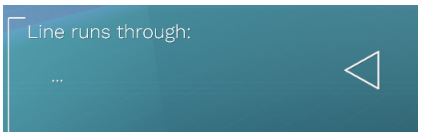
Click the Add + button to add a new line.



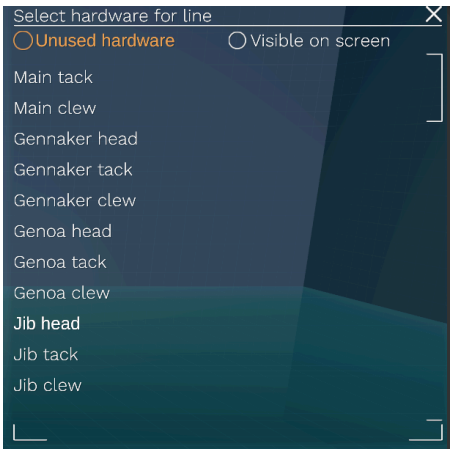
Enter a name for the new line.



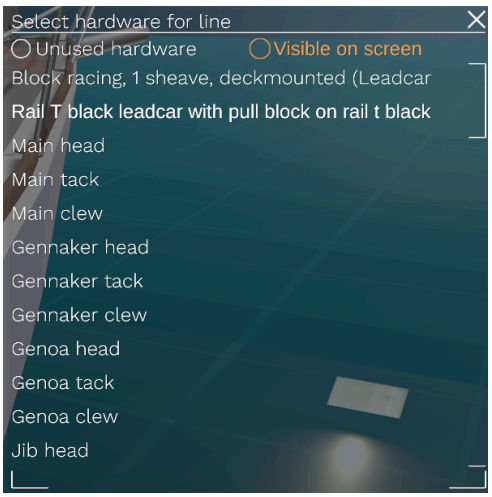
At this point there is no line visible anywhere. This is because a line needs at least 2 points to run through.



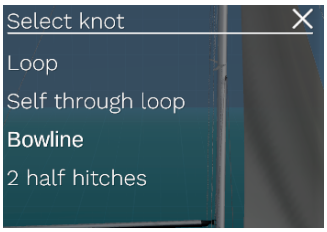
When you click the arrow you can select hardware including sail corners to run the line through.



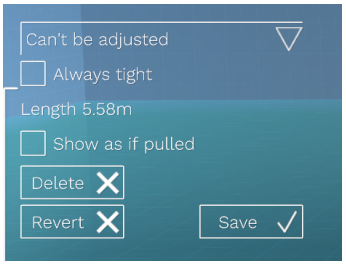
The list can be quite long and it can be hard to select the correct item. But when you change the radio button to ‘Visible on screen” and zoom in on the item that you are looking for, the list will become a lot smaller.



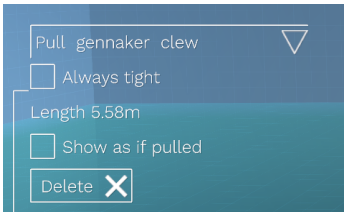
For some types of hardware you can select a knot or a terminal to connect the line.



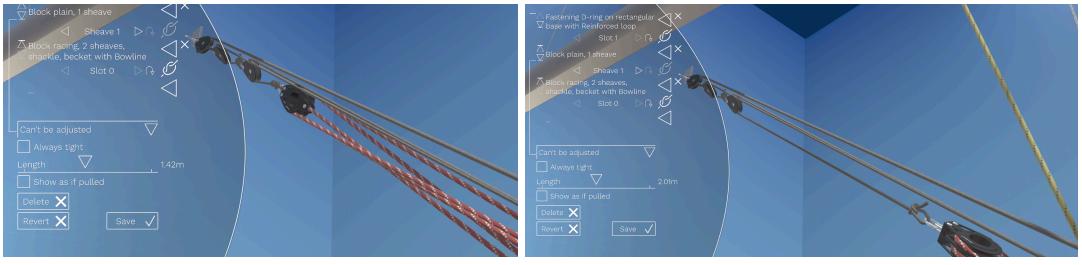
When the whole line path is set up, do not forget to select the purpose of the line. By default the line is set to “Can’t be adjusted”



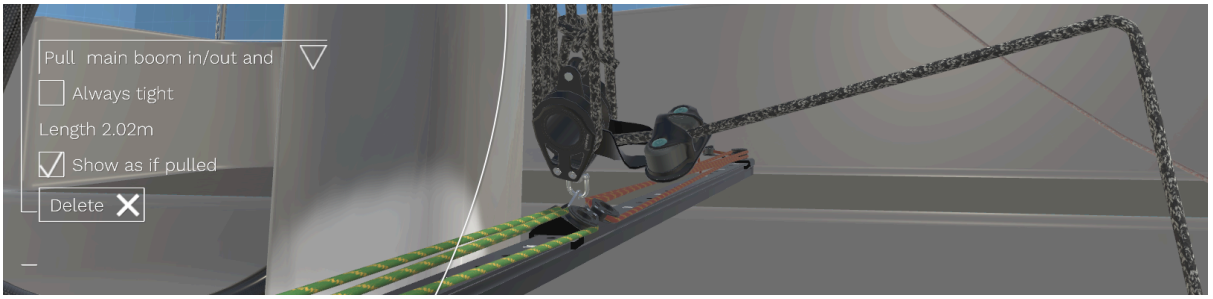
Depending on the path of the line the listbox will be filled with different options. For a sheet the correct option would be “Pull <sail> clew” or ‘Pull boom in/out and up/down”



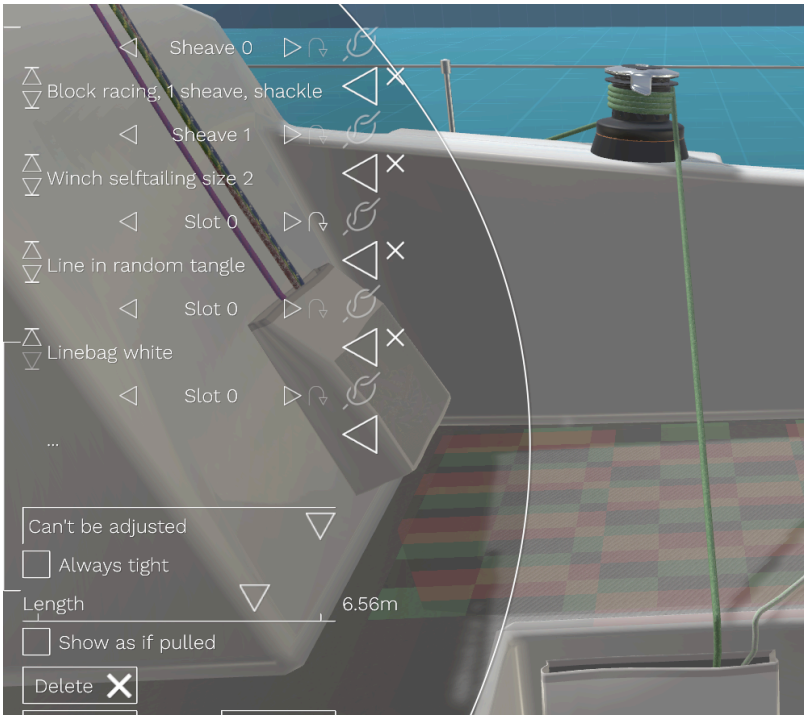
For some lines the length can be adjusted. Like for this 3rd part of a stacked vang line.

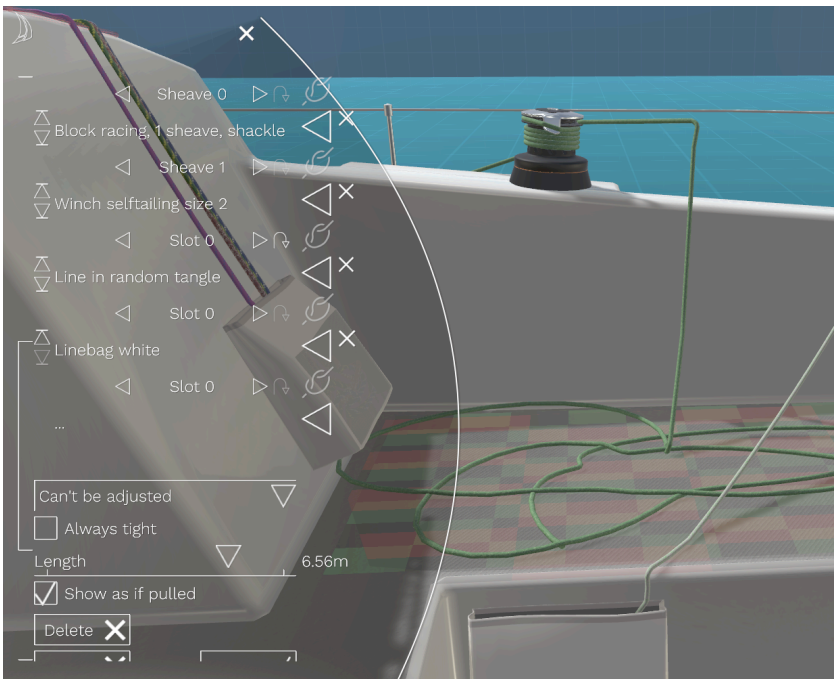


When the line does run through a cleat you can show what happens when the line is pulled.



In this example it isn't very spectacular.
But consider this genoa sheet. When it is not pulled it runs from the winch to the line bag. When it is pulled it forms a tangle on the bench and ignores the line bag. Then when it is no longer pulled, it is tidied again and goes to the line bag. This behavior is automatic when you respect the correct order of the line hardware items in the list. First the tangle, then the line bag.





The checkbox “Always tight” is convenient for lines inside a boom. When the line is eased it will normally hang down. But when it is guided through the boom, the line will pierce through it. The easiest way to prevent this is to make it “Always tight”, which will prevent this behavior.

Conflicting slots

The path of the line is set by selecting the hardware items one by one and setting the slot/sheave. It is possible with changing/deleting items and switching between lines, that 2 lines occupy the same slot on the same hardware item. If it is also the hardware item that is adjusted, this is bound to give problems when sailing. It pays off to double check this manually. Especially with the 2 sheets of a foresail. If boat sheets are connected to the same slot on the clew of the sail, they will not function properly. A good practice may be to connect the port sheet always to slot 0 and the starboard sheet always to slot 1.

Select existing line

To select an existing line item in order to change or delete it, you can click the arrow icon next to the currently selected line (if any) to activate the selection panel. Once this panel is up you can select the line from the list or you can click it on the boat. But beware that you can only click the line in the area where you would normally grab it to adjust. That’s behind the cleat or winch..

Line inside boom/mast or along rail

If your line should run through the hollow mast or boom, do not add a tube collider. These are very expensive in terms of performance. Instead, use 1 to 8 invisible line points. These can be placed inside the tube and will bend along with the mast.

A line inside a boom brings an extra complexity. When the line hangs loose, it will drape over the invisible points and no matter how many points you add, the line will eventually always pierce through the boom. The trick here is to switch on “Always tight”. This will prevent the line from hanging through. Do not use an “Invisible tunnel”, because whenever one of these “Invisibles” moves, all lines will have to be recomputed. And a boom changes constantly when the sheet is pulled or when the boat is in irons.

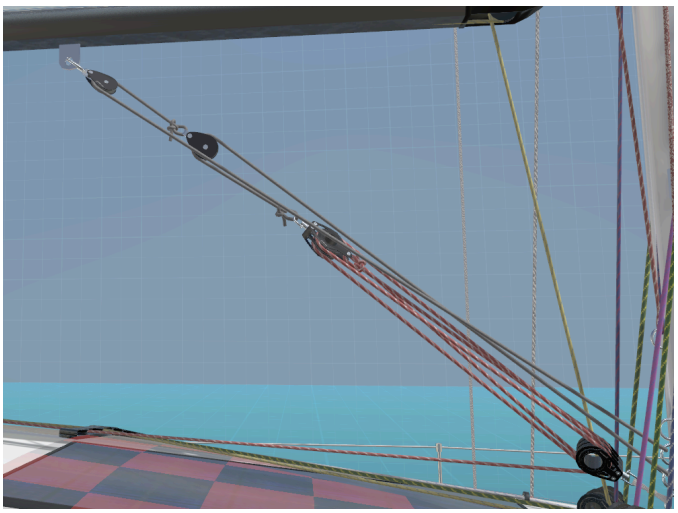
A non-tight line that controls a traveler car or a lead car will inevitably touch the rail at some point. The simulator doesn’t recognize this and the line will pass right through the solid rail. There is no good way to prevent this. The best option is therefore to mark the line as always tight.

Reef lines

The reef lines that you add in the boat designer are for decoration only. It is currently not possible to use these lines for actually reefing/furling the sail. This is because on a sail with 3 reefs, you easily need 6 lines or more. There is not 1 single line that reefs the sail. And on top of that you’d have to deal with a lot of loose hanging lines. There is no option to apply the lines for the next reef during sailing. They would all have to be present from the start even if there is hardly any wind.
This is why reefing is done by selecting the reef option with the Q/E keys instead. You can still show reef lines, but these will not have an actual effect, nor will you be able to select them while sailing.

Stacked line

Stacking lines is a good way to quickly increase the pull strength, because with each line, this strength is multiplied by 2.



When setting up such a system, work from the line that is pulled by hand towards the line that actually does the work.
In this example the red line is controlled by hand. It has a 1:4 gear. The length of the line is set to pull the double sheave block roughly to the middle of the area between the boom and the mast. When you first set it up, move the free block to that position manually. Make sure to set the free block as the hardware that is pulled by this line with the listbox.

Next the middle line is added with a gear of 1:2, the entire system now has a gear of 1:8. The pulled free block is placed at roughly 2/3rd of the distance between the previous free moving block (the double block) and the boom. Move the block to that position by hand and adjust the line length to be tight and almost hang through. Make sure to set the free moving block as the hardware that is pulled by this line with the listbox.

Lastly, the top line is added. The entire system now has a gear of 1:16 (4 x 2 x 2). The block is attached to the boom. Make sure to connect it to either a fastener that is connected to the boom or to the boom itself. By default it moves with the hull of the boat and not with the boom. Set this last line to “Pull the boom up and down” with the listbox. And adjust the length just beyond the balance point of hanging through and being tight.

Adding more lines will make setting it up more complex. Also you may run into the problem that the distance between the boom and the mast is not wide enough to pull the boom all the way down. Keep in the back of your head the info that for each stacked line in this system, the routines of adjusting the blocks and boom to the length of the lines needs to be repeated. This means that a system with 4 lines will take 4 times more computing power than a single line with a lot of sheaves to reach the same gear.

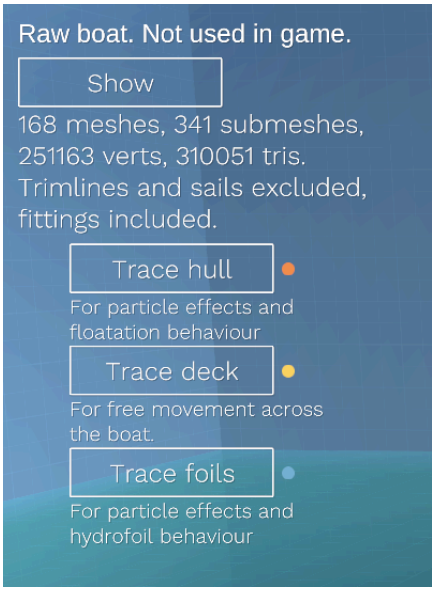
LOD levels

Trace boat shape

When the camera moves over the deck, or when the sea is split by the hull and causes water splashing up, or when the lift of the foils is computed, the game needs to have a rough understanding of the shape of the hull, the deck and the foils.
It is possible to let it use the meshes you've uploaded directly, but depending on the size of those meshes in vertices, this can soon become a heavy task. Especially since many of these look ups need to be done per frame.

It is therefore much more efficient if this information is stored in a rudimentary form, just complex enough for an acceptable understanding of the shape of the deck, hull and foils.

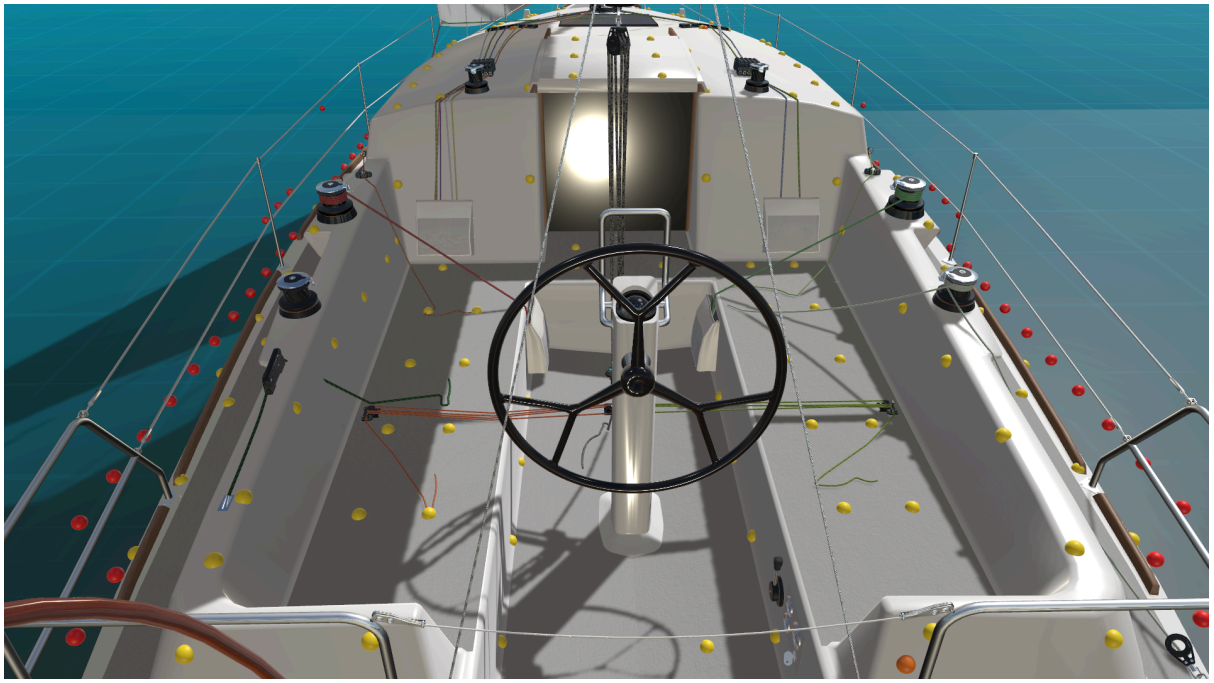
To generate this info, you need to press the button "Trace hull".



When the computations are ready, a series of orange points is shown on the boat. Check these points for any irregularities. These can for instance be caused by protruding beams that are part of the boat part "Main hull". If this is the case, go back to the 3D editor and upload the beams in an extra boat part and remove them from the main hull.

These points will be used to determine the positions of water spray emitters and the overall behavior of the boat in the water.

Next do the same by clicking the button “Trace deck”.
When the computations are ready, a series of yellow dots and red dots are shown. The yellow dots show the very rough outline of the deck and the red dots indicate the area where the deck is a prohibited area. The last will also be used on multihulls to mark the area between the hulls that has no trampoline to trod on.



If the points are not positioned correctly, you need to go back to the 3D editor. A trampoline should be imported as boat part type “Trampoline” and any protruding parts of the hull should be imported as separate boat parts.

Next click the button “Trace foils”. Even if the boat has no foils. It is likely to at least have a rudder and maybe a centerboard. These also count as foils in this case.

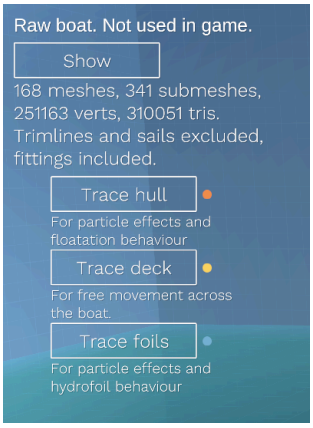
Blue points should appear at the contour of the rudder/centerboard/foil areas. If not, make sure you have uploaded the meshes as the correct type of boat part.

LOD level 0

LOD is short for Level Of Detail. It is a system that shows models at full complexity when the camera is nearby, but at a reduced complexity when the camera is further away. This increases performance.

All the boat parts, hardware items, trim lines and sails are instantiated as individual objects and together form what is perceived as the boat. But in fact it is no more than a collection of individual objects.

When you look in the top left corner it says that the “Raw boat. Not used in game.” is currently visible.



It also shows:

- the number of meshes (boat parts and hardware)
- the number of submeshes (a mesh with multiple materials has multiple submeshes. For instance a block with a stainless steel casing and a black plastic sheave has 2 submeshes)
- the number of vertices (the coordinates of the corners of all triangles that together make up the shapes)
- the number of triangles (a 3D shape is always defined as multiple triangles, that can be rendered by the GPU)

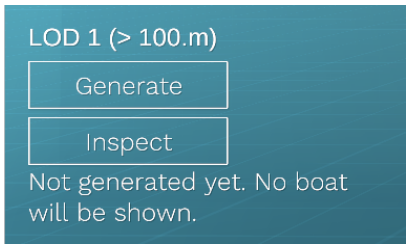
When you press the button “Show” or “Generate” underneath “LOD 0 (operational boat)” the meshes are combined and merged as much as possible and the result is shown. If all goes well you should not notice any visual difference. However, when you look at the specification on the left side, the number of meshes and submeshes will have gone down significantly.

In this example from 341 submeshes to 139 submeshes. The GPU will be called for each submesh, so this step saves two thirds of those draw calls.

The boat you see in the screen is also the boat that will be used when sailing. As long as the camera is close enough to the boat, this is what will be used.

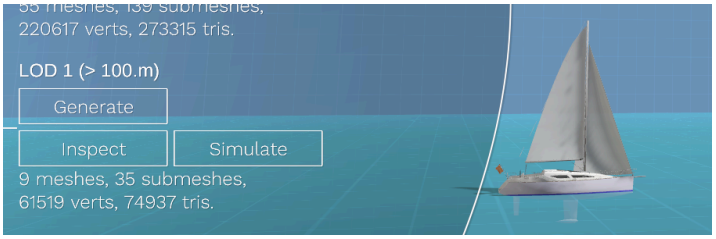
LOD level 1

When the camera is further away, the game will no longer show the detailed boat. You will not see a shackle of a small detail at that distance anyway. The computer will switch to LOD level 1. But first you will need to generate it by pressing the button ‘Generate underneath the title “LOD 1”.



From up close the boat will look less detailed and maybe even a tiny bit distorted.

But remember that this is for showing the boat at a distance. By pressing the button “Simulate” you can see what it looks like at the minimum distance at which this LOD level will be shown.

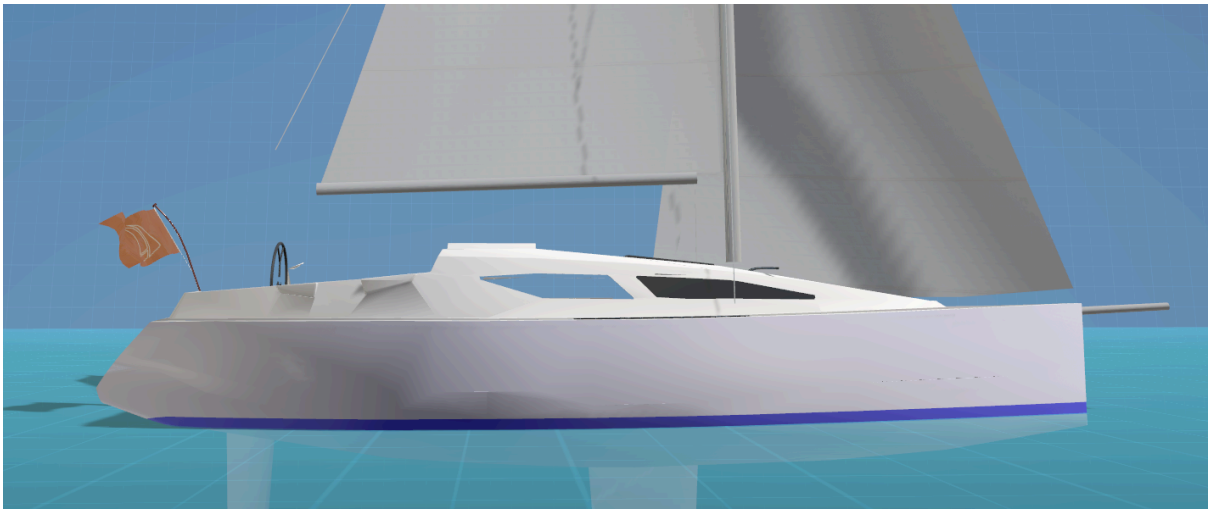


The number of meshes, submeshes, vertices and triangles has gone down significantly. In this example they are reduced by about 75%.

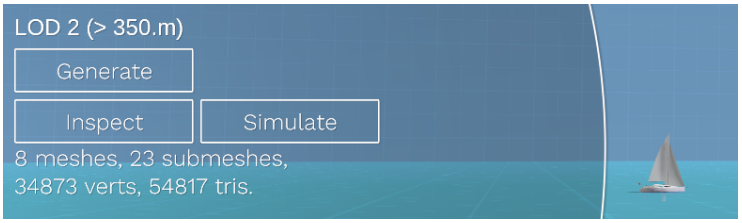
LOD level 2

When the boat is even further away, the computer will switch to LOD level 2.

Large parts have been removed already and the boat may show quite a bit of distortion in its normals.



When you press “Simulate” you can see what it will look like in the game.



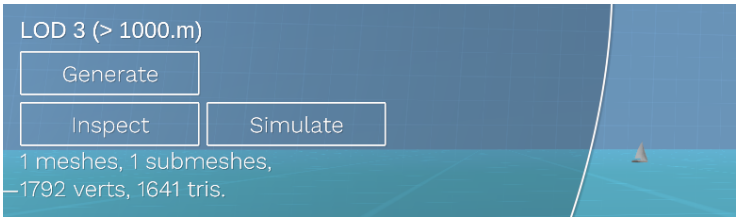
The meshes have been further reduced as you can see in the left side underneath the buttons.

LOD level 3

When the boat is even further away, the computer will switch to LOD level 4.

When you generate the mesh for LOD 3, only the base shape is still visible and the whole boat has the same gray color. This is because at that distance, you won't be able to see color anyway and it is therefore unnecessary to draw multiple submeshes with different materials. This is why the whole boat has become only 1 (sub)mesh.

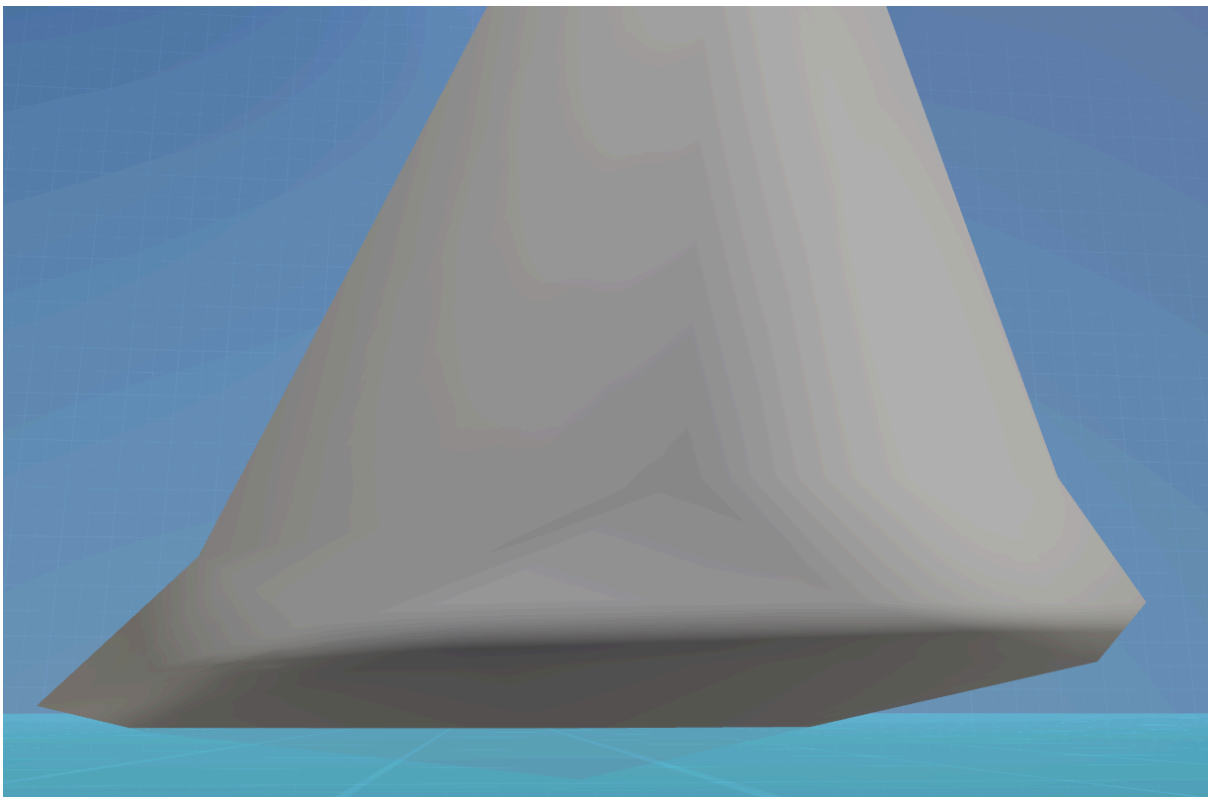
When you press "Simulate" you can watch the boat at its minimum distance for this LOD level.



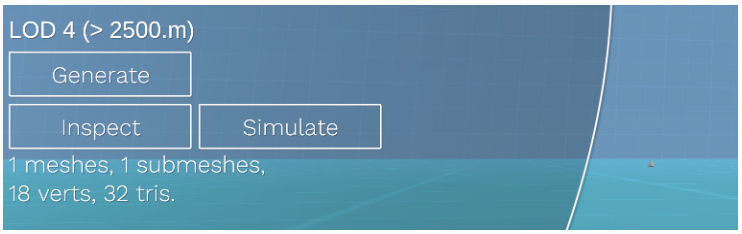
LOD level 4

When the boat is at a really big distance and only barely visible, LOD 4 will be used.

When you generate it, the whole boat is reduced to an ugly, abstract shape.



When you press “Simulate” you can see what this looks like at the minimum distance just before the computer switches back to LOD 3.



When the boat is even further away, there is no LOD level 5. It will not be rendered at all anymore. At some point the boat will not be rendered at all anymore. This distance is currently set to 10,000 meters. At this distance the hull will be well beneath the horizon and mist just above the water surface will make it very hard to see it anyway. It will probably be 1 pixel or less on the screen. The resolution of a computer screen would dramatically fall short when compared to the human eye on a clear day.

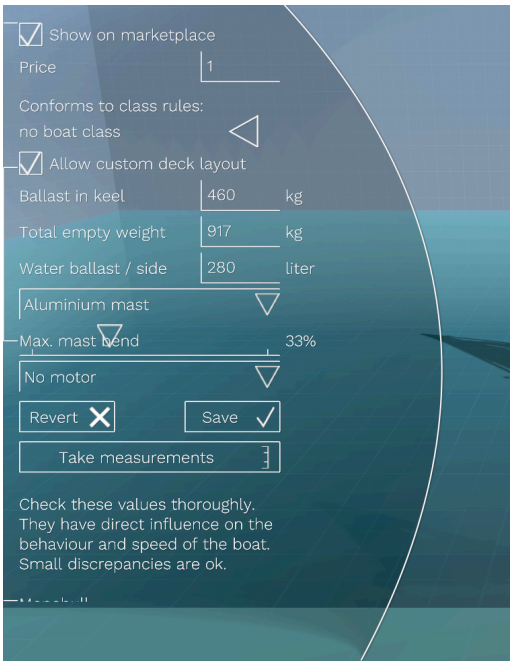
Overall settings

Class rules

It is possible to race with multiple boat designs together that all comply with the same class rules. The Imoca class is a good example. If your boat design should comply with one of these classes, you can select the class by clicking the arrow pointing left below “Conforms to class rules”. The window should show you whether or not the boat complies with these rules. However, it is important that the boat is measured first. For this, see Measurements

Weights

There are 3 input fields and a listbox to set the weight of the boat.
The ballast is the weight of the keel in kilograms.
The total empty weight is the weight of the boat including the ballast in kilograms and the weight of the mast and sails.
And there is the optional field to set the size of the water ballast tanks per side in liters.
It may be tempting to make the boat a bit lighter and the ballast a bit heavier, in order to artificially boost performance. But better not do that. The values are public and anyone can see what you did.
With the listbox you can set the material of the mast and by that you indirectly also set the weight of the mast.



Mast bend

In the Settings inspector you can use the slider to set the maximum mast bend. This will only be reached when sailing with sufficient wind and sufficient tension on the luff and leach. When there is no wind and no tension on the sail, the mast bend will always be zero.
The back stays have no effect on mast bend at the moment. This is because there is no way to set whether the back stay(s) attach above the shrouds or not.

Visualization works by moving ALL mesh vertices along the boat's z-axis above the base of the mast + 0.30 meters. So this also means that if you have a cruiser with a high sunroof or sprayhood that exceeds this level, it will be bent as well. In this case, reduce the maximum mast bend, or set it to zero.

The base of the mast is measured by using the yellow deck surface points that you can find in the LOD settings screen of your boat design.

If you have a mast with vertices at the bottom and at the top, only the vertices at the top will move. The result will be a tilt of the mast instead of a bend. For a mast to be able to bend, it needs multiple rings of vertices along its length. The image below shows what happens when the mast has only 1 extra ring of vertices.

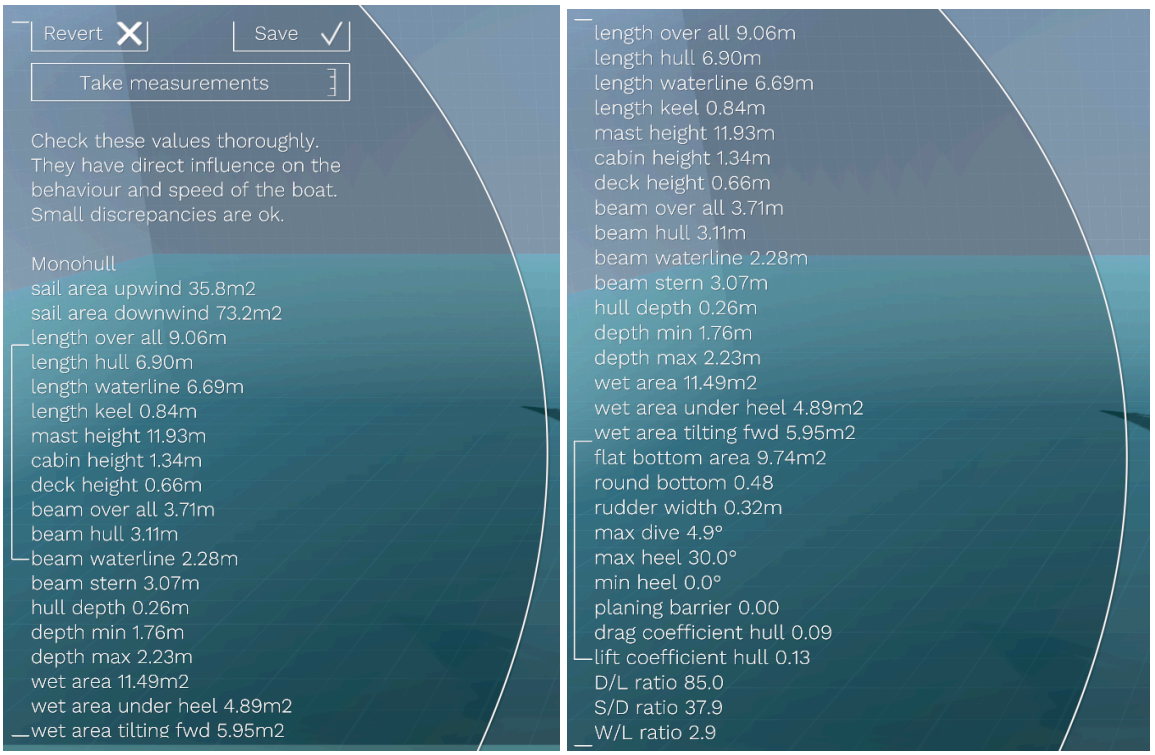
This effect can however be useful for stays. These should obviously not bend, but tilt instead. Therefore stays that are part of your mesh should only have vertices at the beginning and the end. This way they will remain in a straight line.

When you want the halyard to stay inside the mast while it bends, add invisible line points along its length.

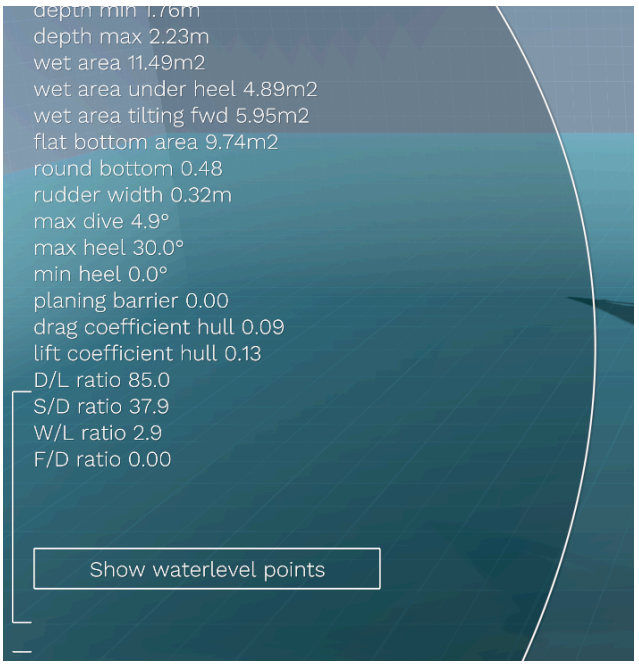
Measurements

When you are done with the boat 3D model and the sails of the boat, you can press the “Take measurements” button. This is a very important step, because the measurements taken here will determine the behavior of the boat. You need to check them thoroughly. There may be some small discrepancies, because the measurements aren’t super precise. If a value is incorrect, the most likely reason is that you have included sections of the 3D model of the boat in boat parts that were meant for something else. For instance: if you include a bowsprit in the hull boat part, the length of the hull will be too long. Each of these values has an effect on performance even though some of them may seem unimportant like the cabin height. But imagine a cruising catamaran with a big cockpit and you can imagine that the wind drag when sailing upwind will be huge.

There are a few values that you can see in these screenshots that will not appear in your own screen. The drag coefficient and lift coefficient for instance. These don’t show because it would be too tempting to adjust the boat design until all values are optimal. This would result in a possibly weird boat shape optimized according to the simplified physics of Sailaway, and may not be so optimal in the real world. The object of Sailaway is to simulate real sailing as much as we can.



Underneath the measurements is another button called “Show waterlevel points”. Use this to see how Sailaway identified the various boat parts. They will be used at runtime to measure the water level at these points. For instance if the bottom of the rudder blade is out of the water, this blade will not steer the boat anymore.

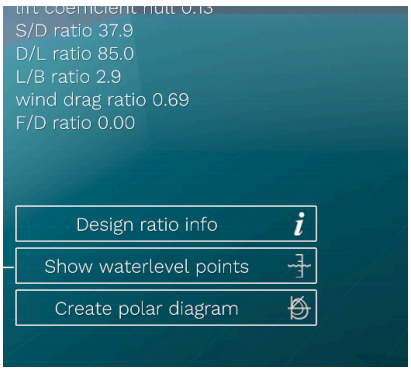


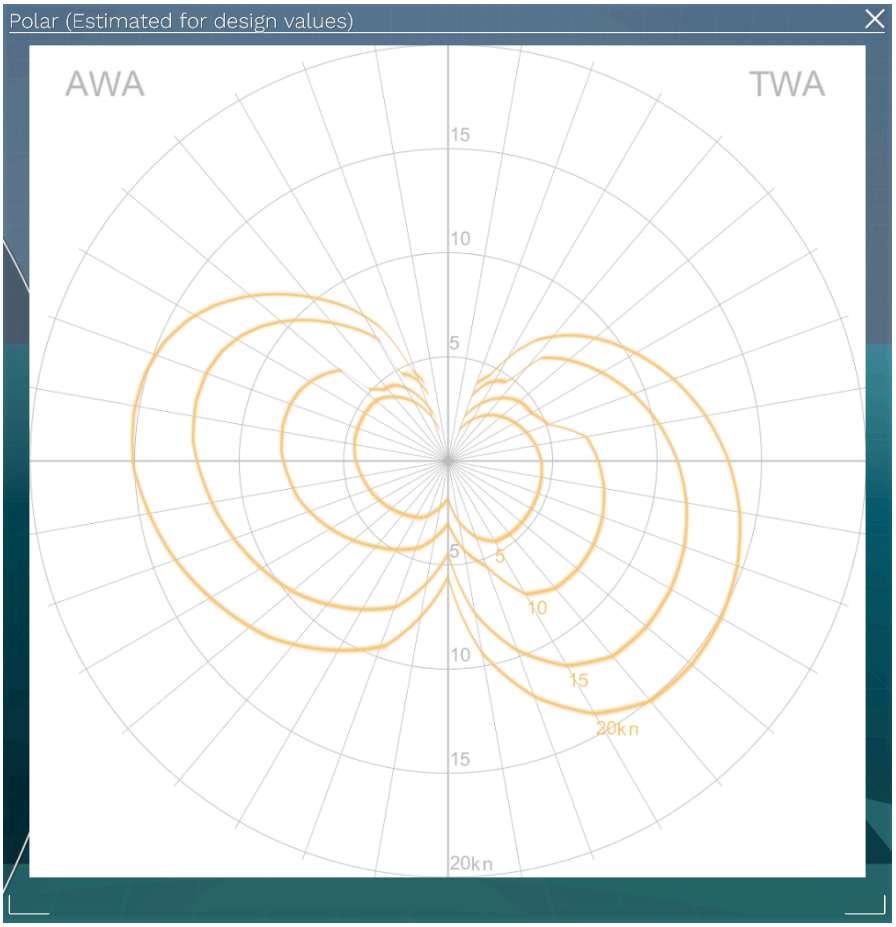
Check the position of the following measurement points:

- at the bow of the boat (and side hulls), preferably at the waterline
- at the center of the boat (and side hulls) in the bottom of the hull (not the bottom of the keel)
- at the center bottom of the stern of the boat (and side hulls)
- at the center left and right side of a monohull on the waterline
- at the stern left and right side of a monohull on or above the waterline
- at the bottom of the keel
- at the bottom of any centerboards
- at the bottom of all rudder blades
- at the center bottom, center top and side bottom of T-foils
- at the center bottom, outside (semi)horizontal point and outside (semi)vertical point of U-foils
- at the furthest (semi)horizontal outside point, furthest inside point and outside vertical point of C-foils
- at the bottom and top of straight I-foils

Polar diagram

When you click the button “Create polar diagram”, a speed prediction is made for your boat based on the measurement data. This polar is then shown on screen and saved in the database as the default polar for all boats of this design.





Polar diagrams are not used for online sailing. All speed, heel, drift, computations are made in real time with the forces that work on the hull and the sails.
However, when the sailor logs off and the boat continues to sail offline, these computations can no longer be made and the polar diagram is used instead. That means the polar diagram is only used for offline sailing.

Sailaway hase 3 levels of polar diagrams.
0. The prediction made here in the boat designer
1. The actual polar for all boats of this boat design
2. The actual polar for a specific boat

It will try to use the most specific polar available for your boat. But when you've just instantiated your boat, the level 2 polar can not be used. The level 1 polar will be used instead. When the boat design is new and the level 1 polar is unavailable as well and the level 0 polar will be used.

Switching between polar levels is not done by on/off switching but by gradual overruling the previous level. The more miles sailed the less weight the previous level will have.

When sailing in all manual mode, the boat's speed, drift and sail airflow efficiency is sent to the server on a regular basis. But only when the boat has had the same heading for a longer period of time.

The sail airflow efficiency is used to filter out the results when the skipper is not trying to sail as fast as possible. It is therefore safe to ignore this mechanism all together and just sail however you want to sail. In the end the level 2 polar of your boat will only improve as only the best results are used.

The level 1 polar is updated in the same way, but using all measurements from all boats of the same design.

You can view the combined level 0 + level 1 polar by clicking the small polar icon below the boat design in the "My boats" screen.
You can view the combined level 0 + level 1 + level 2 polar by clicking the small polar icon below any boat in the "My boats" screen.

Adjusting behaviour

When this project was started the idea was to compute all the forces that work on the boat, apply them and a realistic boat speed and boat behaviour would result from that. That was in theory. The reality turns out to be a little different.

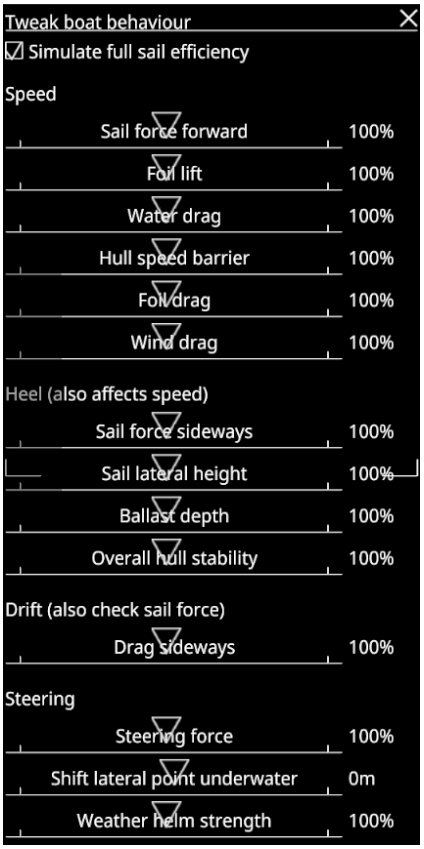
In total there are about 40 different forces implemented. Each of them is updated in strength, direction and origin each frame. But none of them are exact. They're all estimations of reality. And on a real boat there are not 40 forces active but millions. And these forces are not applied 50 times per seconds but infinite times per second. It turned out to be a sheer impossible nightmare configuring the forces to come up with a realistic behavior that ranges from a small Laser or Optimist Dinghy, to a heavy Dutch barge, to a Maxi, to an Ultim 3, to a J-class long keel, etc.

You as a boat designer may not know how the speed and behavior of your boat is calculated, but you probably do know how fast it should sail, how much it should heel over and how it should behave in general.

The computations in Sailaway III are not 100% spot on for each boat design. But they do change constantly depending on the waves, the wind, the boat, the rudder, etc. This makes for a very lively feel and a direct response to the environment

So the best compromise here is to use the force computations, combine the most important forces together and let you, the boat designer, apply a multiplier on them. This will make them smaller or bigger, but not less responsive.

Go to your boat design and open the Settings editor. At the very bottom of the list is a button entitled “Tweak behaviour”. Clicking it will open this window:



Now leave the window open, but close the boat designer. On the “My boats” screen, select a boat of your design, so you can sail with it. The “Tweak boat behaviour” window is still open.

Now adjust the sailing conditions by clicking in the sky and opening the window ‘Adjust conditions”. It may be handy to set your boat’s sail mode to “Sunbathing”. This mode will

however not set the ideal sail trim. Just a simple approximation of what it thinks is a proper sail trim. So if you want to test the boat's speed at a perfect sail trim, you should check the box "Enable full sail efficiency". But beware that this isn't perfect either. If the sails have a deep curve, they produce a lot of power. Best use sails with a curve that matches the wind if you want to be precise.

The sliders are pretty much self-explanatory. They are multipliers. So if the forward force in the sail is 10,000 N at some point, Sailaway will make this 12,000 N if you set the slider to 120%.

One important tip if your boat seems too slow: **Check the weatherhelm**
The rudder has a huge impact on the speed of the boat and if it is constantly at an angle, it is useless to start tweaking the other forces before you have the lateral points in balance. This is not always visible, especially on a boat with a steering wheel, because Sailaway compensates it automatically by turning the rudder. And even if your rudder blade is underwater and you didn't bother to make it a moving part, the drag is still applied!

Some sliders will seem to have the same effect. Setting the forward sail force to 120% will roughly be the same as adjusting the drag to 80%. You'd think. But the catch is in the details. First of all, the sail force is exponential with the apparent wind speed, but since the sail will have to be flatter in strong winds, this force will also become smaller. The water drag is exponential with the speed of the boat. But if the lift increases, the wet area becomes smaller and when the heel increases the drag becomes larger again. And on top of that, there is another force that quickly rises when the boat reaches hull speed. If you increase the sail force, the boat may start planing easier. if you reduce the drag instead the boat will still be faster but the moment it starts planing will be affected less.

Some sliders affect more than just the header they are under. For instance: If you increase the sail force sideways, the boat will heel over more and also drift sideways faster. If you increase sideways drag, the boat will also heel more, because the drag force pushes against the keel below the boat. A good way to increase or reduce the heel without affecting the drift is to artificially lower or raise the lateral point of the force in the sails.

Adjusting the overall stability of the boat is also effective to adjust heel, but this also affects the behaviour of the boat in the waves.

Adjusting the lateral point in the sails to less than 100% will lower it (bring it closer to the waterline), more that 100% will raise it. Adjusting the 'Ballast depth' to less than 100% will raise it (bring it closer to the waterline). more than 100% will lower it.

If the steering is not balanced you can adjust the lateral point under water. This is not a percentage, but meters towards the bow (+) or towards the stern (-)

There is no slider for water friction, which increases as the growth of mussels and seaweed increases.

In general, be aware that changing 1 slider may (or probably will) have an effect on other aspects as well. For instance, if the speed increases, the upwards force of the water against the hull increases, if the hull has a flat bottom, the stability increases as well. Everything affects everything, that's what makes this so complex and why it is impossible to find the right balance for all types of boats. But it also makes sailing so much fun.

The bottom line is: **Think before you slide**.
You have to have some understanding of the forces that work on your boat, before you adjust anything.

And don't try to fix things by adjusting one slider and then compensating an unwanted effect with another, and so forth. Before you know it all of the sliders are adjusted and very little is left of the natural behaviour of your boat. 1 or 2 well chosen adjustments should do the trick.

All changes are automatically saved and also affect all boats of this design as soon as they log on, not while they are being sailed. When someone logs on, or switches boat, the values for that boat design are retrieved from the server and are not changed until the next time they log on.

Boat class

If the boat design matches a boat class, it would be unfair to simply change the sliders and produce a faster boat. I trust in the power of the community here. The slider values will be public on the webpage of the boat design.

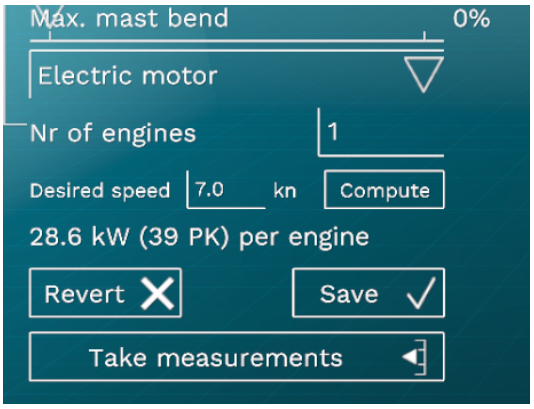
The slider values of all the boats of the class are averaged daily, based on the number of boats per boat design. These weighted averages are stored in the boat class. When a boat of your boat design sails, it will use the slider setting as follows:
67% average value from the boat class
33% your design specific setting
Except for the steering adjustments, they are always 100% of what you set them to be.

When you are adjusting the sliders with the Tweak window, the average values are not used. Instead the boat will respond to 100% of the values you set with the sliders while the

window is open. As soon as you close the window it falls back to the 67/33 ratio for the non-steering parameters.

Engine(s)

If your boat has an engine to maneuver in a port or sail when there is no wind, you can specify the type of engine and the nr. of engines.



The power of the engine can be computed by Sailaway. Just type the desired speed at full throttle with no wind, then press the “Compute” button and the system will compute the engine that would be required based on all the specifications of your boat.
However: You need to have taken the Measurements before you do this. Otherwise the system has no data to perform the computations on and you will get bad results.
Also note that outside this lab environment the boatspeed is also impacted by headwind or tailwind.

This can also be used as a handy tool to check the performance of your boat design, because the computations used are identical to those made in real-time when the boat is actually sailing.

Selling your boat design

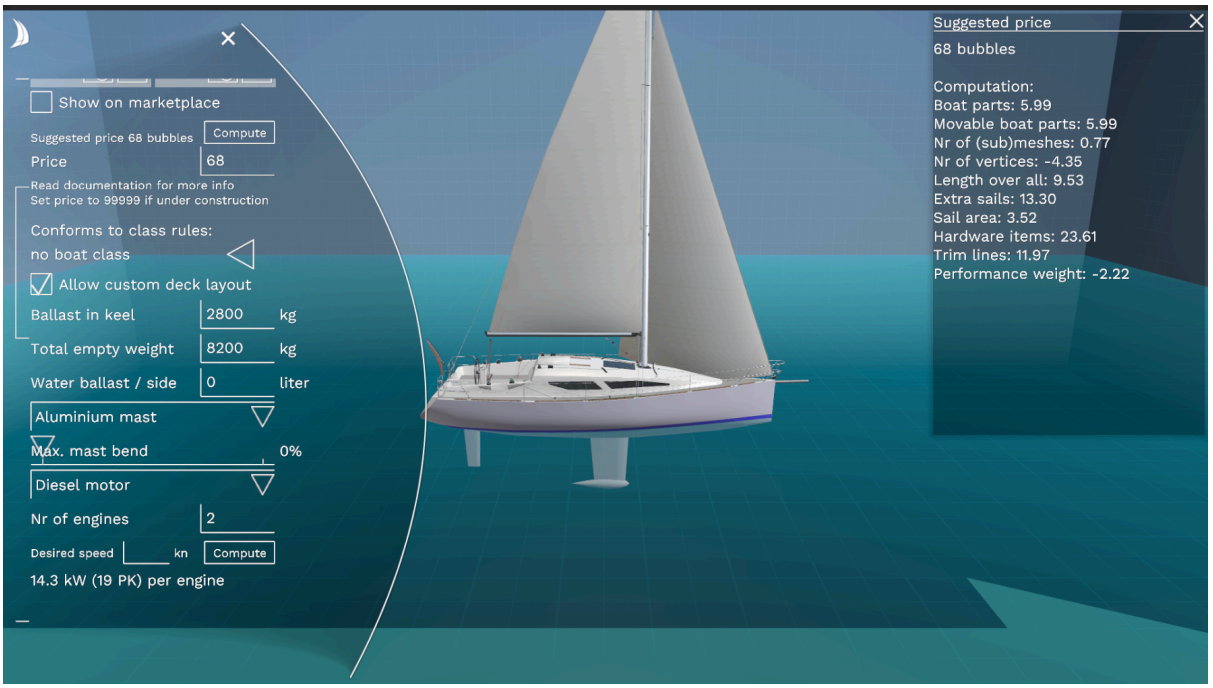
After you have tested and sailed the boat yourself, you are ready to make your boat design public. To do this, switch on the checkbox “Show on marketplace”. And don’t forget to promote your creation inside Sailaway with a good description and nice pictures. And even more important: outside Sailaway on social media and other websites. Maybe make a nice video of the boat in action, highlighting the visual details or sailing performance.

Setting a price

It is always difficult to determine a fair price for your hard work. To help you out a bit there is a builtin computation method that may give you an idea. Just underneath the “Sell on

marketplace” checkbox you can press the button “Compute” to compute a price for your boat based on the complexity, size and features of your design.

A window will be opened that shows how the computation was done and if you didn’t have a price before, it is set for you. Of course this is only a rough computation based on some criteria that are highly disputable.



As a rule of thumb, it would be good to sell a well made boat design between 50 and 100 bubbles. Maybe up to 200 for very high detailed or very exclusive boats.

Some of you may think: “Oh well, I just want people to have fun. I don’t need any bubbles for my work.” However noble that might be, there are several downsides to that thought:

1. Other boat designers may be less motivated to create good boats if people can “buy” almost the same thing for zero or just a handful of bubbles. Ultimately this will reduce the total offer of good boat designs.
2. Many MMO games finance their investment, server hosting, operational cost and maintenance with subscriptions. Just like these games Sailaway also has substantial development cost, continuous hosting cost and ongoing support and maintenance work. But the sailing audience is small, the purchase price is kept low and the development, server hosting, maintenance and support is primarily financed by a well running in-game economy. Low priced boats will have a negative impact on the health of this economy. As a result this may have a negative impact on long-term continuity.