

Mini-X aka "Micro-Magic X-99"

A printable RC sailboat by YACHTPRINT, Chris Angelduro

Version 1.1 from 12/2023



The *X-99 Micro Magic* or *MMX* is the little 1:17 scale sister of the 1:10 scale one-meter X-99 3D sailboat which is also available for 3D printing. The boat is derived from the real X-99 sailing yacht by the famous Danish Yard *X-Yachts*. The original is an active racing class in Europe with >600 units built. The hull of the little MMX is a close replica of the original hull- lines of the real yacht. You can either build the boat for display or for functional RC sailing.

You can print the STL-files as often as you like for your own use. Please don't share them or spread them in the internet. Thanks! ☺ Feel free to contact me if you have suggestions or questions!

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Parts needed besides the printables:

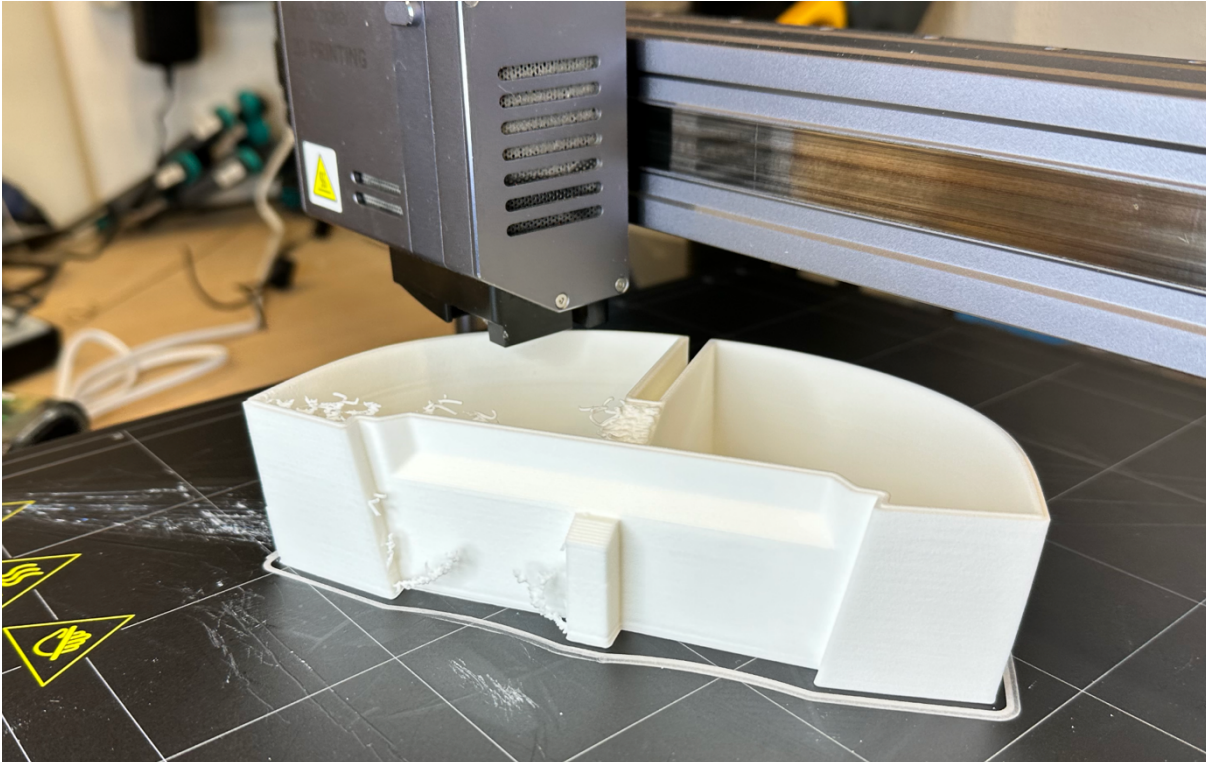
- You can use the keel, rudder and rig from the exiting RC sailboat "Micro-Magic" offered from Hacker nowadays (www.hacker-model.com) or from Graupner formerly
- 3 alu-tubes, 6mm outside diameter, approx. 1.400mm in total for mast & booms
- 1 alu-tube, 4mm outside- and 3mm inside diameter as ruder stock
- 3mm stainless steel wire as rudder axis as for reinforcement of the keel
- Sails, made from a light cloth like Icarex, you can find suitable material in kite-shops
- Sheeting- and rigging line, eg fishing lines with a diameter of approx. 0.1-0,2mm

- RC: 2-channel transmitter & receiver, MIDI sail servo and MICRO rudder servo, preferably water tight, like those from "Savöx", wire, hooks & eyebolts, M2 screws

Printing

The hull parts and the cabin can be printed in almost any material. I successfully tried regular PLA and LW-PLA. The wall thickness should be 0.8mm, so 1 perimeter with a 0.8mm nozzle or two perimeters with a 0.4mm nozzle. For top- and bottom layers you can use 3 layers of 0,32mm layer thickness. The parts print without support and with 0% infill.

The section 2 of the hull (mid-section) can be printed in one piece if your print bed is big enough. Otherwise you can use the split-up version 2a and 2b.



Most hull sections include recesses on the top or bottom layer which serve as cutting guide for those layers. Leave a 3-4mm edge from those bottom layers so that they can serve as bulkheads and for gluing surface. You can weld the seam lines between the hull segments with a hot knife in order to increase rigidity and water tightness of the seams.

The RC-parts, bulkheads and the boat stands are printed the same way while adding 20-30% infill. The rig-parts and the fittings are printed 100% solid. The fittings, except for the toe rail, must be scaled down to 60% in the slicer. The side window and the toe rail must be mirrored for the right side. The rigging parts should be printed with a 0.4mm nozzle in order to get a more detailed and refined result.

Assembly

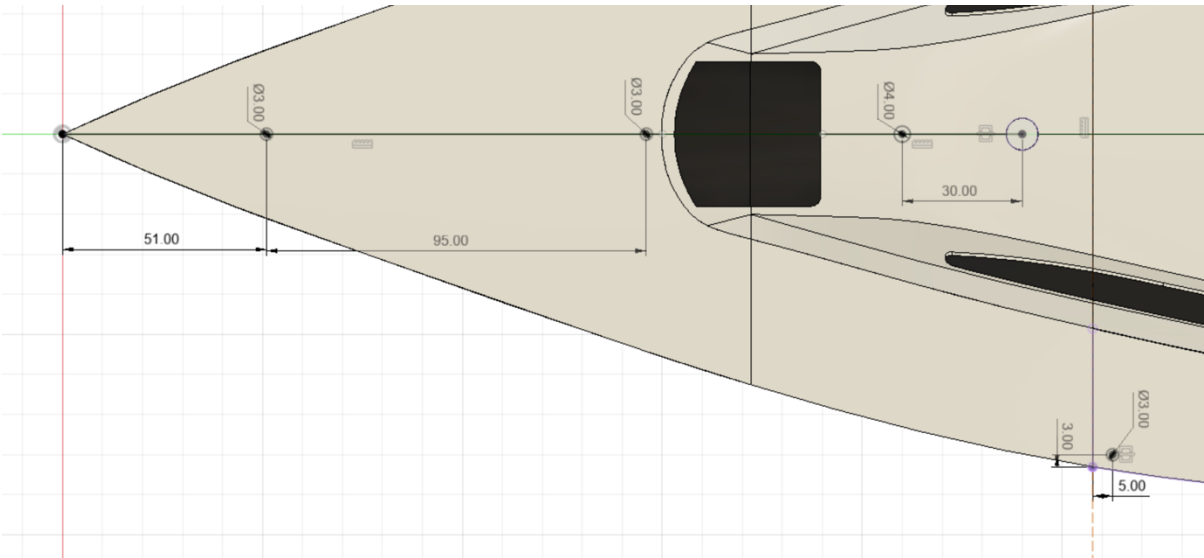
The assembly is straightforward. Cut the recesses on the gluing surfaces of the hull sections as well as the opening for the hatch under the cabin. You can do this with a sharp knife or – much better – with a hot knife.

INSTRUCTIONS MINI-X

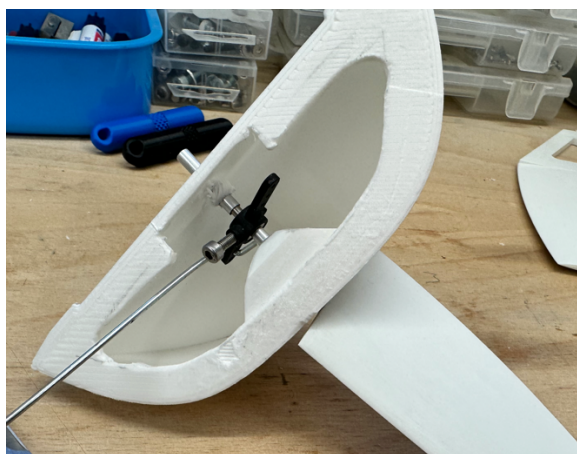
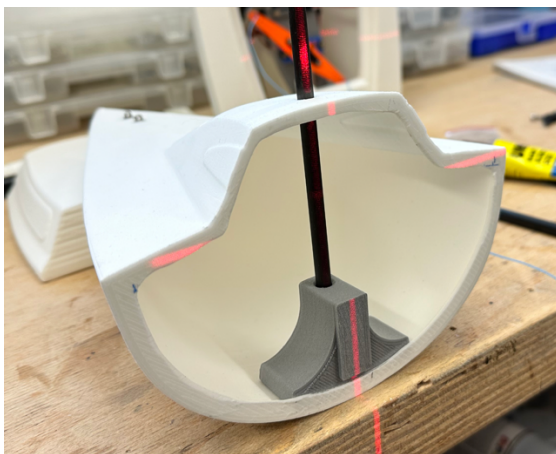


*Cut the recesses on the gluing surfaces and for the hatch open (eg using a hot knife)
Btw: differently than shown on the right picture, you only need one eyebolt for the jib*

BEFORE you glue H3 (bow) to H2 (mid-section) you should glue in small wood pieces under the attachment points to counter the forestay (H3) and shrouds (H2). Screw in some simple eyebolts at those points. The exact positions for the eyebolts are shown below.



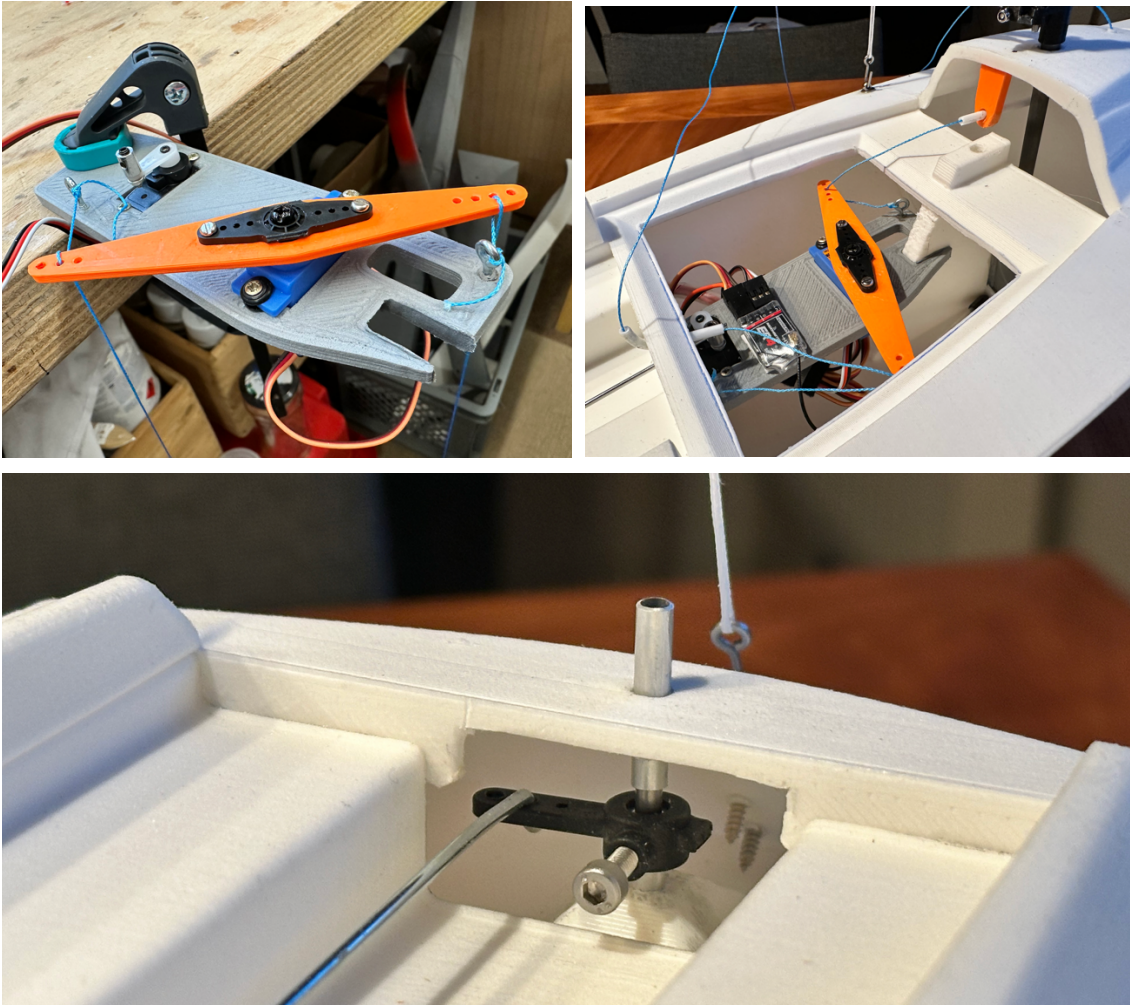
Now you can glue in the mast base in H3 and the rear bulkhead together with a 3mm (inside diameter) ruder stock in H1 (transom). Make sure both are completely straight.



The eyebolts and the "MAST FOOT" go in H3 (left pic) and the "BULK rear" in H1 (right)

RC-installation

All RC components except for the battery are mounted on a servo tray that fits on the keel case and beneath the cockpit. The sail control is done by a MIDI size servo and the respective servo arm. Different to the pictures below, you should use small pulleys to reduce friction of the sheet in the servo arm (orange) The rudder is controlled by a wire push-rod (or similar). For that you have to leave some openings next to the servo and at the rudder steering rod.



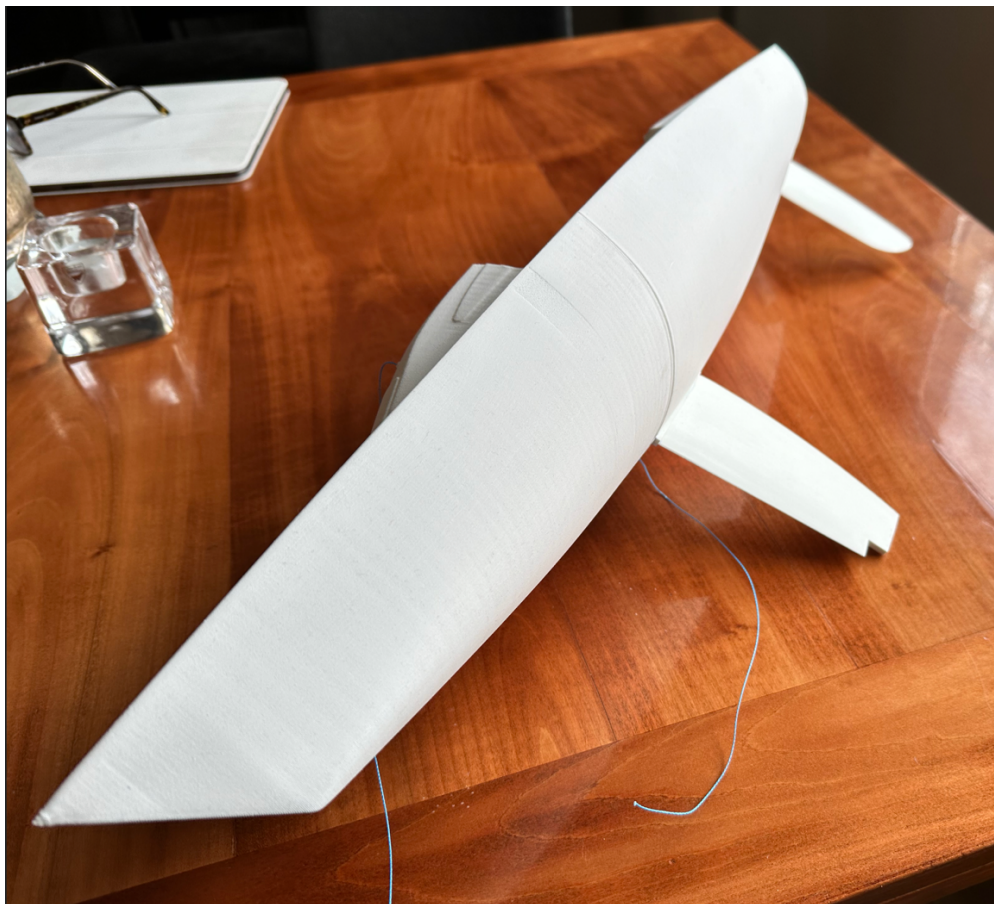
RC installation with two servos on a tray with the battery sitting below the cockpit

There are holes in the transom and on the opposite side to lead through the rudder steering wire. You can use a steel wire or better a carbon rod for that.

While installing RC components, you should pay attention to allocate the weight and thus e.g. the location of the battery in the rear half of the boat. The boat is very sensitive to weight on the bow.

Appendages

A scale-keel is part of the file package and can be fitted for display. For actual RC sailing however, you need bigger appendages like the ones from the Micro Magic. The keel of the MM fits into the keel box, such as the ruder in the 3mm ruder stock. I recommend this solution but you can of course use other components, e.g. from a DF 65.



Appendages from the Micro Magic (MM, here w/o the bulb still) fit right away

Alternatively to the MM-parts, you can use the keel and rudder from the file package. I had good results printing them on their flat faces (upright). The keel and the flange are glued together and reinforced with two 3mm steel rods. You still need some kind of lead bomb.

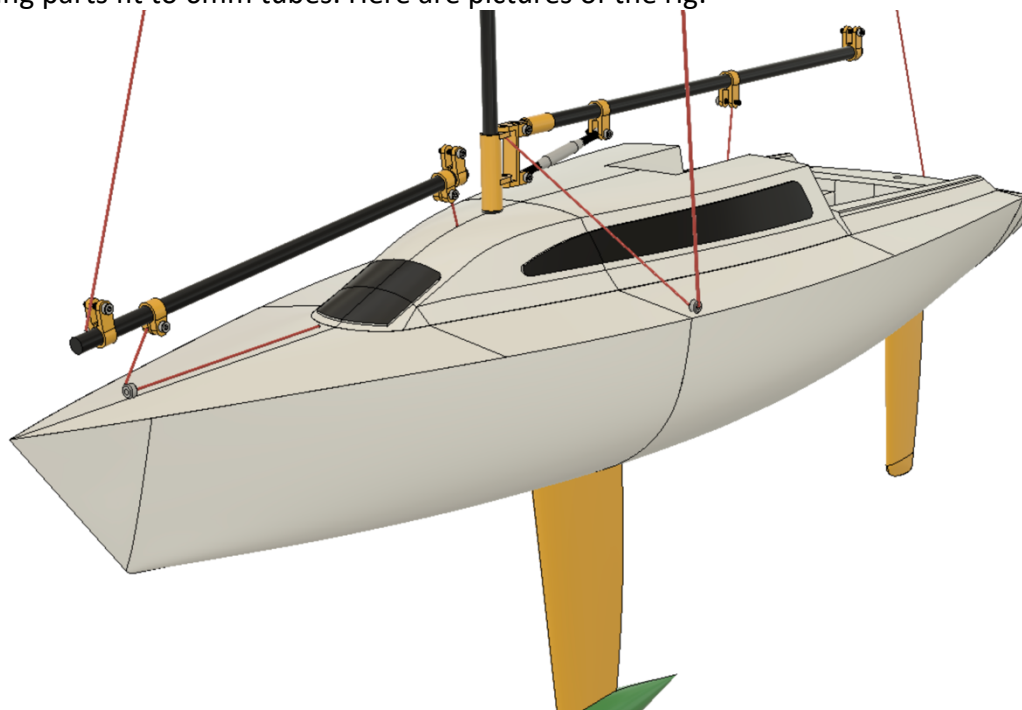


Appendages from the file package, printed in PLA. They have enough rigidity

Rig & Sails

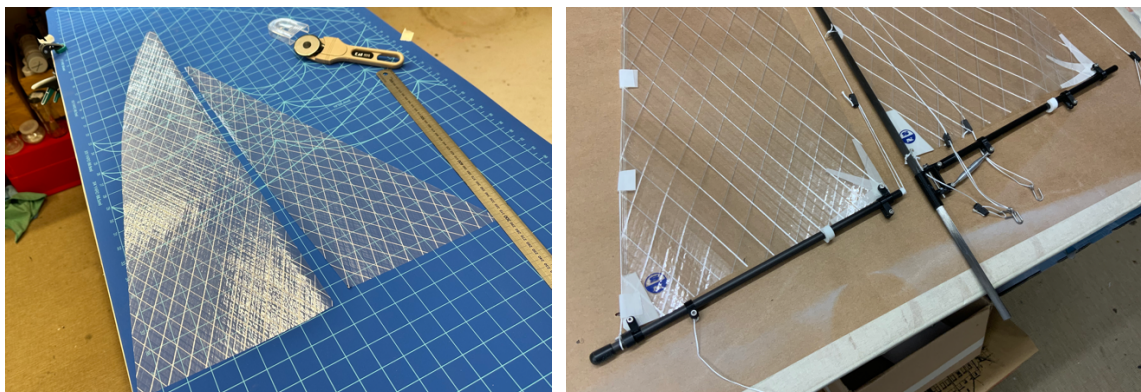
INSTRUCTIONS MINI-X

The rig is a standard configuration with a round aluminum- or carbon mast and a self-tacking (pendulum) jib. You can either use a MM rig or build a - slightly bigger - scale rig using the parts from the file package. The rigging parts fit to 6mm tubes. Here are pictures of the rig:

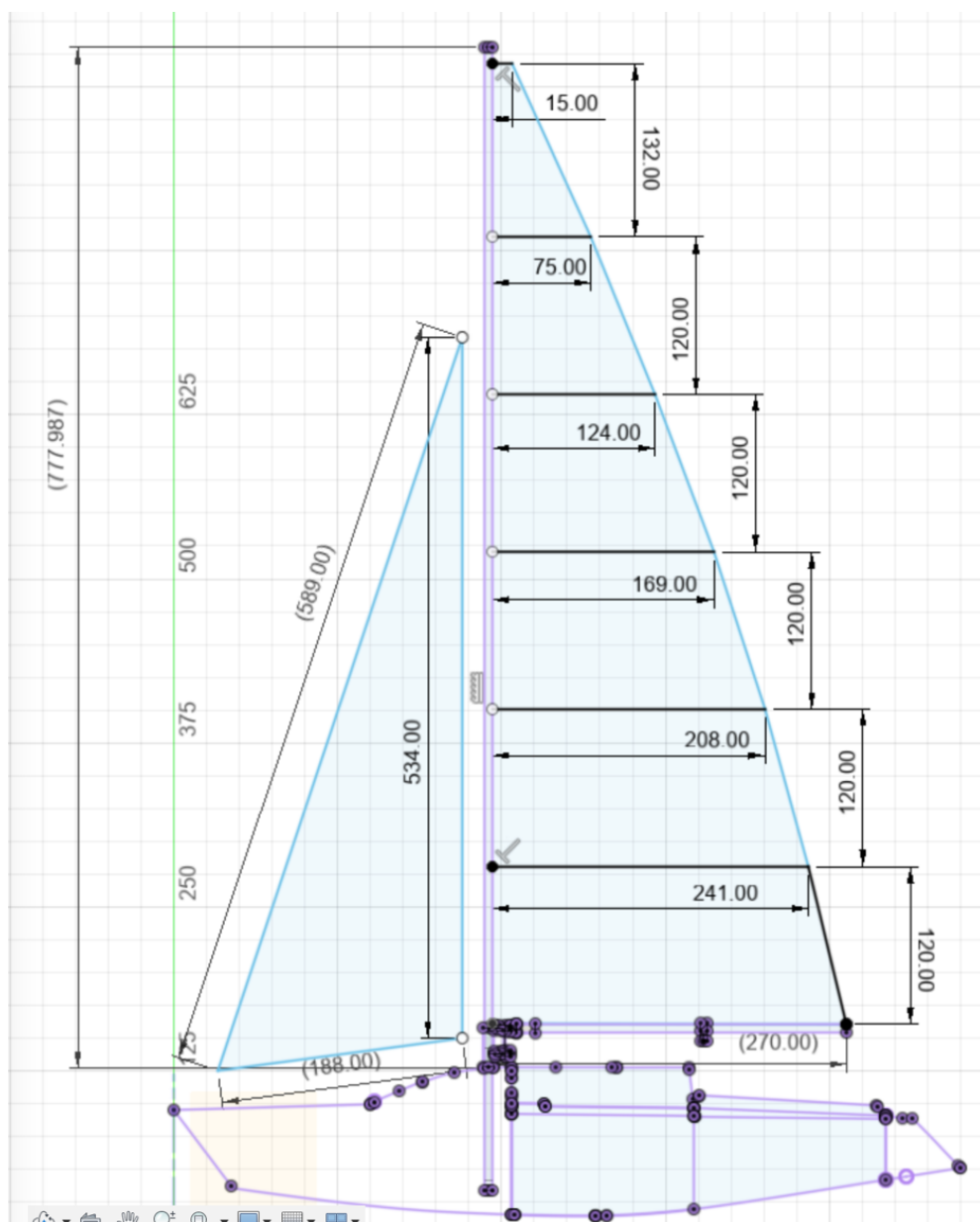


INSTRUCTIONS MINI-X

As for the sails you can build more sophisticated profiled sails with sections or use sails from one sheet which have a luff curve with 3-4mm max deflection from a straight line. In racing, those sails have proven to be very competitive. Use a light weight sail material.



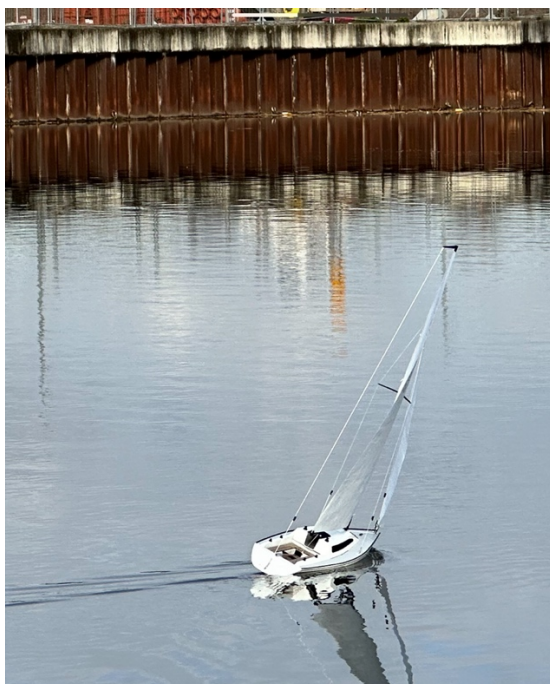
Scale sail plan as alternative to a rig from the Micro Magic (which is slightly smaller):



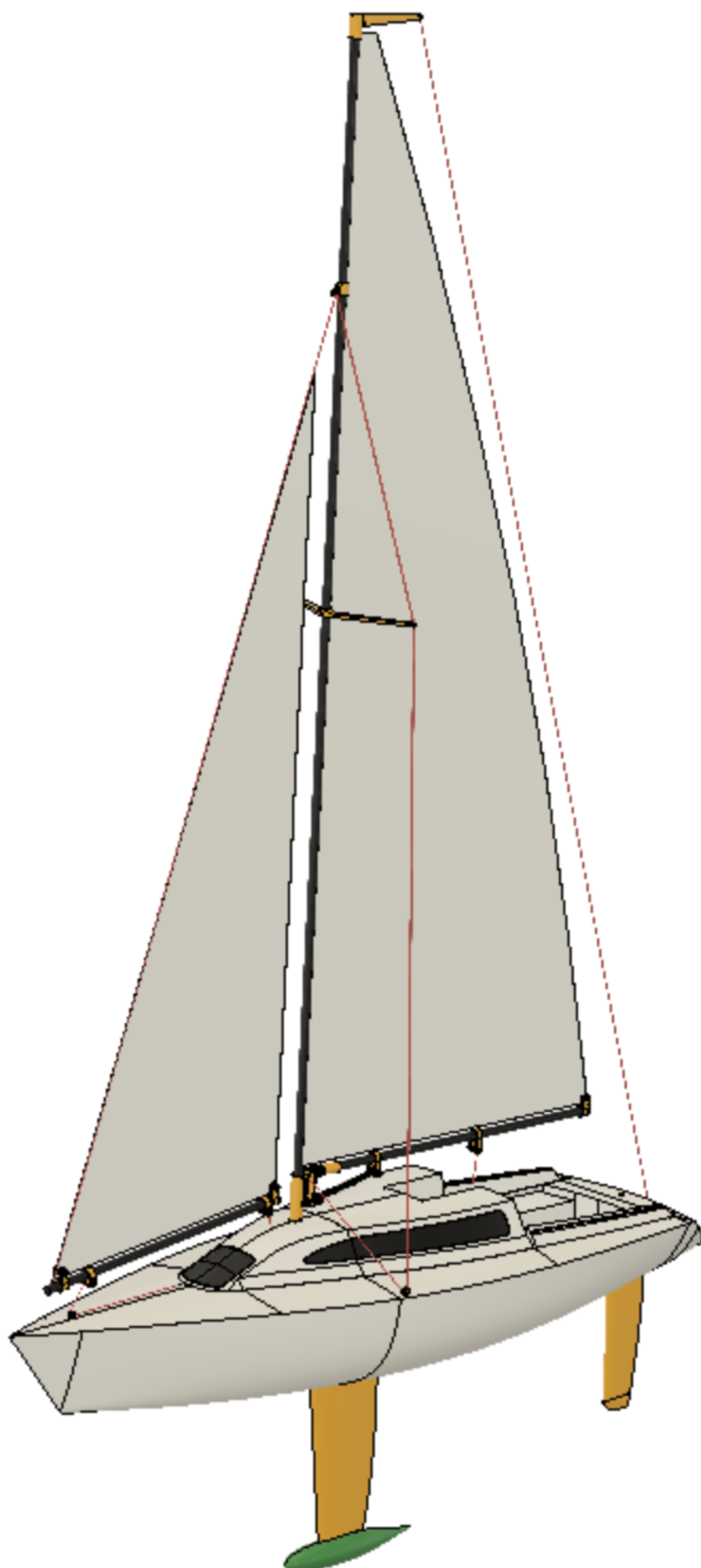
RC Sailing

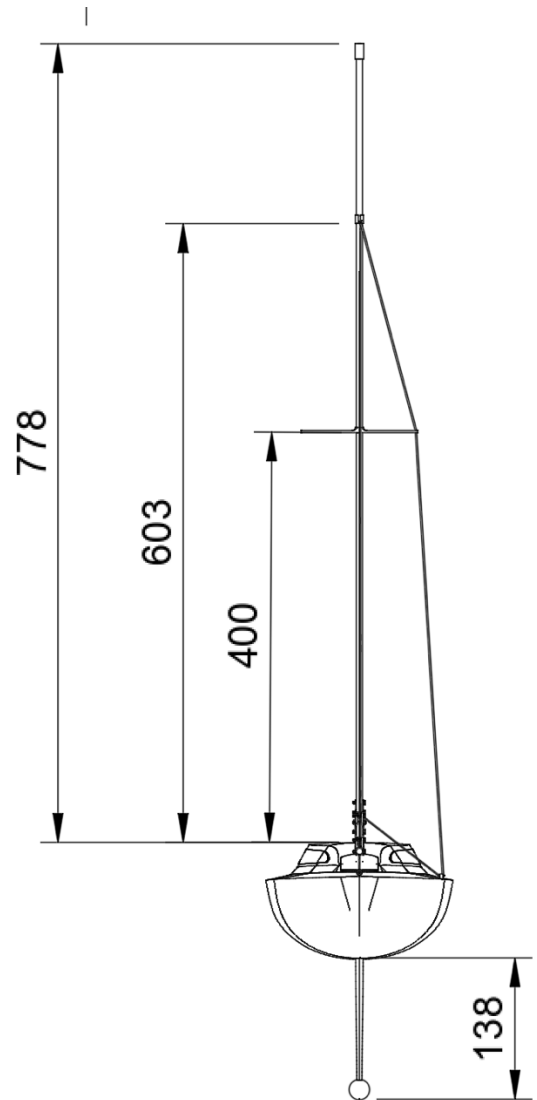
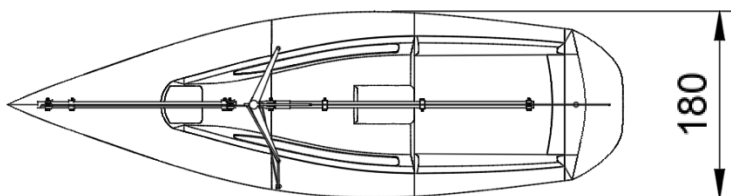
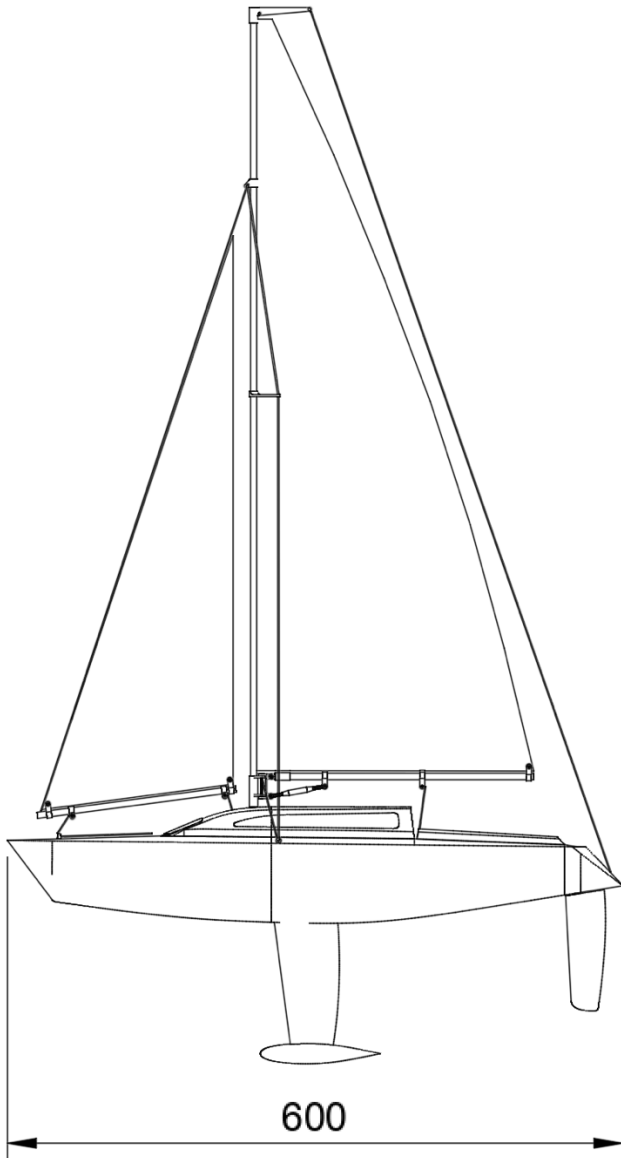
First thing is to check the boat's waterline. The battery should be behind the servo tray post. Fully sheeted in the main should open 3-5 degrees while the jib booms points to the shroud.

You will see that the MMX sails like the big one. Meaning you have to control rudder pressure with the sails in gusts. Or putting it differently: steer with the sails as much as you use the rudder. Keep in mind that the real boat uses 6 people in the cockpit and on the rail, something that is missing on the RC boat.



HAVE FUN! KEEP ME POSTED on your building status, PLS. 😊





GENERAL REMARKS

PLEASE DON'T SHARE THE FILES. A lot of genuine work went into it and there are hundreds of scammers selling other people's intellectual property. As I cannot secure this technically, I depend on you.

You purchased a license to print as many boats and parts as you wish for YOUR OWN PERSONAL USAGE.

When you sell a boat, THE LICENSE GOES WITH IT. Please purchase a new license if you have another boat in use or if you want to build another one. If in doubt, just contact me at info@yachtprint.de

You can use third party printing services but PLEASE MAKE SURE THEY DELETE THE FILES after printing.

If you consider building up a fleet, e.g. for club racing, ask me for a VOLUME DISCOUNT starting at 3 units.

If you run into problems, have any questions or If you wish changes to certain parts PLS CONTACT ME.

ACTIVELY post about your project in the Facebook community. I love discussing and gathering new views.

PRINT IT, BUILD IT, SAIL IT and HAVE FUN!

Your

Chris Angelduro
YACHTPRINT

