



Download kit

Free documentation & blueprints for Aquapioneers Kit v1.6
Part I - Wooden structure - The Body





VISIT:

www.aquapioneers.io

FOLLOW:

@aquapioneers (Twitter / Instagram / Youtube)

COMMENT:

<http://aquapioneers.io/community-forum/>

LIKE:

<https://www.facebook.com/aquapioneers/>

MAKE:

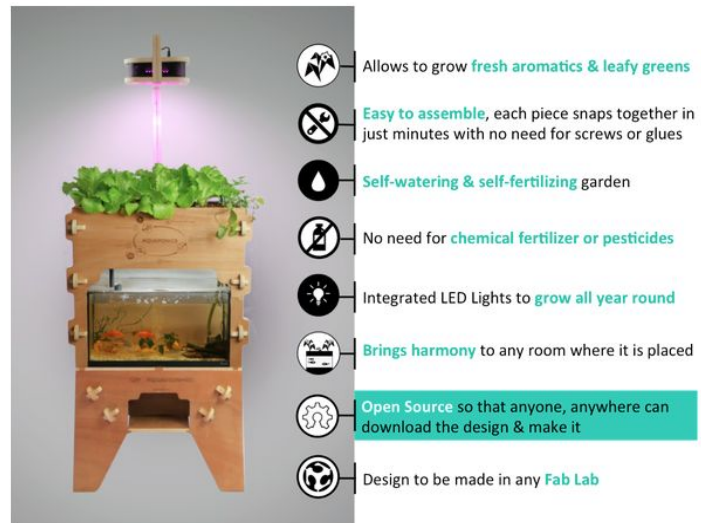
<https://github.com/aquapioneers/Aquapioneers-Kit-Barcelona-Design>



AQUAPIONEERS KIT MAIN FEATURES

The Aquapioneers Ecosystem is a thoughtfully crafted fun, educational, and rewarding experience.

At the intersection of hardware and ecology, it allows you to grow fresh and tasty food all year round. This little piece of nature, will engage and inspire you, your family and your friends.



You can watch the following 30s timelapse [Youtube video](#) that sum up the overall assembly process and show a one month growing period with lettuces.



Please note that the blueprints for Aquapioneers Kit v1.6 have been designed for a **specific aquarium dimension (60x30x30cm) which is the most common in Europe**. Please make sure you can find these dimensions in your area before you proceed. If you can not source an aquarium with these dimensions, you will have to modify the structure design to be compatible.



SOME HERBS & LEAFY GREENS YOU CAN GROW



LETTUCE



STRAWBERRY



PARSLEY



MINT



BASIL



SHIZO

SOME SPECIES OF FISH THAT CAN INHABIT YOUR ECOSYSTEM



GOLD FISH



GUPPY



HEMICHROMIS



TETRA NEON

Contents

Project Overview	6
AQUAPIONEERS - What is this ?	6
Open Source Non Commercial - Why ?	6
Project toolkit	8
Download-kit	8
Forum	8
Local Manufacturing	8
Tutorials	8
Project Goals	9
AQUAPIONEERS ECOSYSTEM ANATOMY	10
THE BODY	12
BILL OF MATERIALS	12
PROJECTION	13
STEP 1: GETTING THE FILES	14
Files Explained	14
STEP 2: BRINGING IT TO YOUR CLOSEST MAKER SPACE	15
PRICE EXPECTED	15
CNC Milling	16
STEP 3: GETTING THE WOODEN PARTS	17
CUTTING LIST	17
STEP 4: SANDING & WAXING THE WOODEN PARTS	18
STEP 5: ASSEMBLY	22
ASSEMBLY 1 : LEGS	22
ASSEMBLY 2 : AQUARIUM LEVEL	26
ASSEMBLY 3 : GROWBED	28
Thanks to all our ULULE backers that made this project possible	31



Project Overview



AQUAPIONEERS - What is this ?

AQUAPIONEERS is a Barcelona based social enterprise that aims to combine the unbeatable advantages of Aquaponics as a sustainable method of urban agriculture and the power of Digital Fabrication to unlock social innovation. Locally we develop creative services around aquaponics for schools, businesses and individuals and globally spread the word using open source tools.

The Aquapioneers Ecosystem is our first open source product. Its design and user manual documentation release has been possible thanks to our 248 backers that supported our [crowdfunding on ULULE](#) closed on July 2017.

This document contains the information you will need to download, fabricate, assemble and use the Aquapioneers ecosystem v1.6 with confidence and grow aromatics all year round.



Open Source Non Commercial - Why ?

The CC-BY-NC license we have chosen gives anyone the right to download, edit and remix their own versions of the AQUAPIONEERS ECOSYSTEM designs. We think participation in design is something to be actively encouraged. By adapting, improving and creating new variations of the ecosystem we hope to encourage research, innovation and a spirit of collaboration.

Because empowering people is one of the fundamental pillars of our project, we believe that everybody should have free access to this documentation to explore aquaponics and digital fabrication. Unfortunately in 2017 it is not yet possible to make a living out of free work.. this is why we have decided to limit the free use of our work to individuals. While we hope to inspire sustainable innovation with our work, we believe that economic value created from inventions should also benefit the inventors. This is why commercial use of this documentation will only be permitted through formal collaboration agreements. If you are interested in making commercial use of this work, please get in touch with us and we'll do our best to find a way to work together!



You are free to Under the following terms

SHARE — copy and redistribute the material in any medium or format

ATTRIBUTION— You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

ADAPT— remix, transform, and build upon the material

NON COMMERCIAL — You may not use the material for [commercial purposes](#).

The licensor cannot revoke these freedoms as long as you follow the license terms.





No additional restrictions — You may not apply legal terms or [technological measures that](#) legally restrict others from doing anything the license permits.

More info about this licence

<https://creativecommons.org/licenses/by-nc/3.0/>



Project toolkit

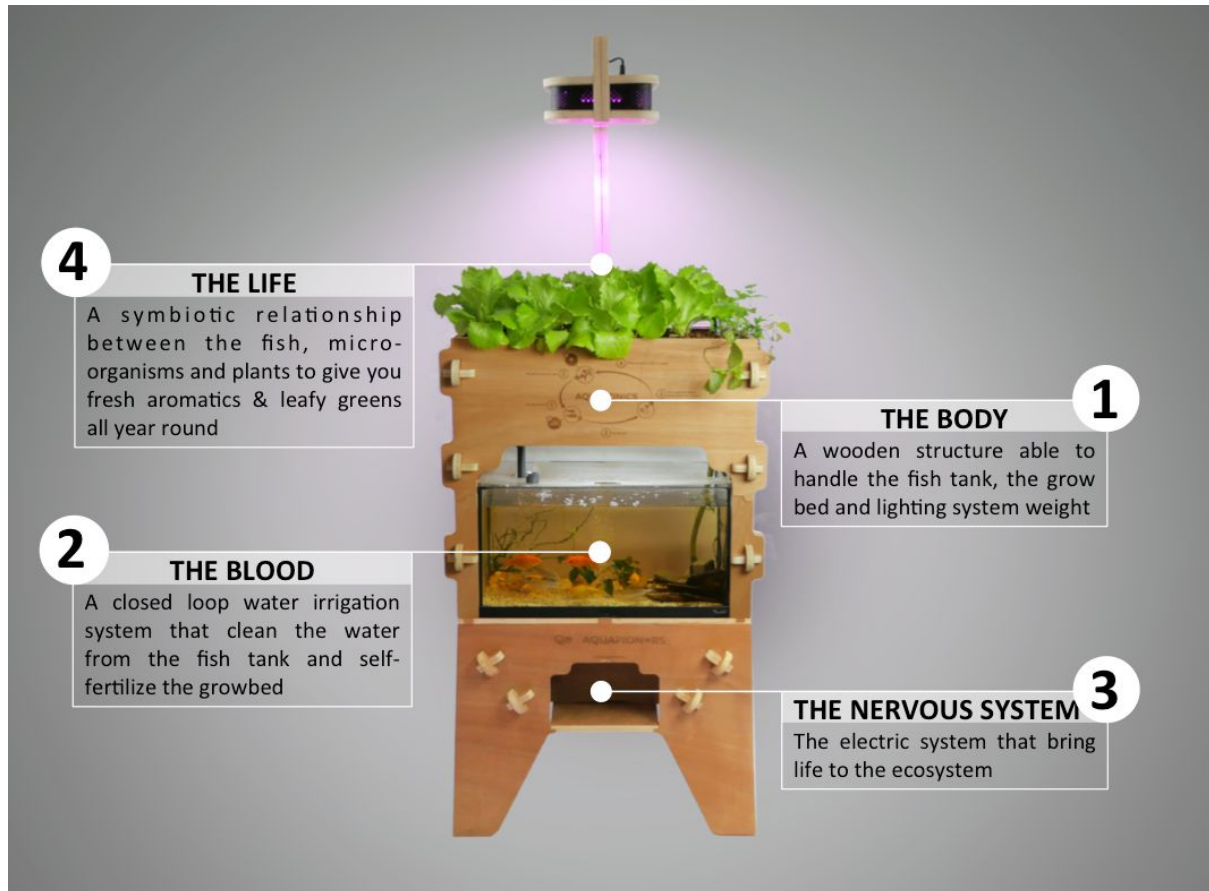
	
<h2>Download-kit</h2> <p>Free documentation & blueprints</p> <p>Starting an aquaponic system can be tricky, because quality information is rare and scattered all over the web. By open sourcing our design and its user guide, we want to break down the barriers of entry by ensuring that you work with the same system as the entire community and benefit from our collective experience.</p> <p>We use Github to host our designs and file repositories. It allows anyone access to download files, make changes, “fork” new versions and work in a distributed and networked fashion. If you’d like to contribute to the project, Github is the place to make comments and add your work: https://github.com/aquapioneers/Aquapioneers-Kit-Barcelona-Design</p>	<h2>Forum</h2> <p>A place to meet & help each other</p> <p>If we don’t share what we know, how can we learn from each other? We would like to encourage all participants to contribute what they can to improve the project. This might be peer review, debugging existing designs, creating entirely new design, sharing tips to grow amazing vegs, and collectively study the mystery of aquaponics.</p> <p>This forum is a place to share pictures, skills, knowledge and interests through ongoing conversation: http://aquapioneers.io/community-forum/</p>
	
<h2>Local Manufacturing</h2> <p>+1200 maker spaces to build your kit</p> <p>Check out these links to locate one in your city: www.themakermapping.com. The Fablabs network: www.fablabs.io and also www.fabhub.io</p>	<h2>Tutorials</h2> <p>Video tutorials to become an aquaponics hero</p> <p>This new development will come along in 2018.</p>

Project Goals

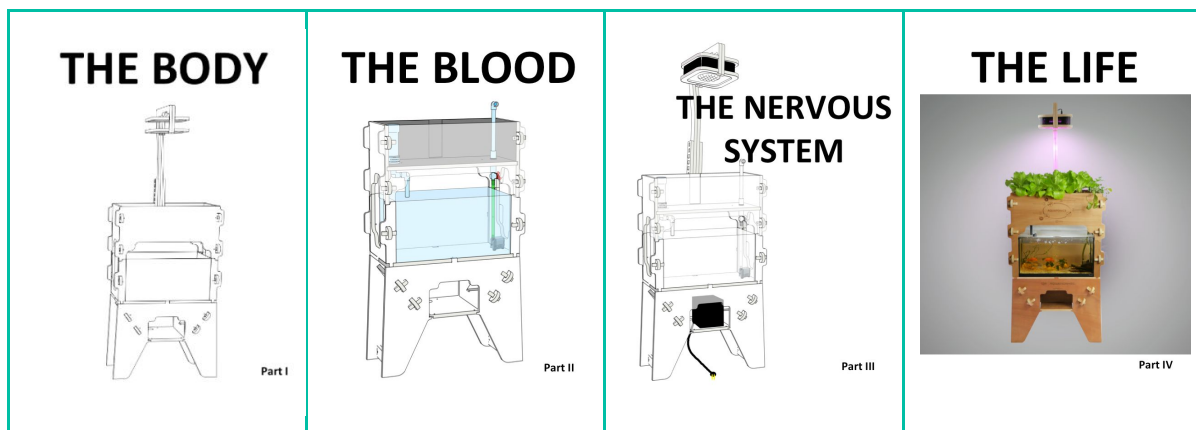
- 1 Developing open source aquaponics designs that are suitable for local and digital manufacturing and that can be optimised for locality.**
 - Developing a number of aquaponics designs that are used as a base for adaptation.
- 2 Creating a public library of aquaponic recipes through innovative forms of citizen science.**
 - Imagine a public library of aquaponic recipes, where each recipe is associated to a particular plant and tells you how to set your ecosystem (i.e. fish density, lighting and environmental conditions, etc) to suit this plant's needs. Just like a cooking book!
 - Together we are smarter! This library will be collaborative, meaning that each user will be encouraged to share his cultivation experience with the community. This way we can use our collective intelligence to figure out the best aquaponic recipes for each plant. The more the community participates, the better the recipes will be!
 - Develop protocols and pathways for 'Citizen Science'.
- 3 Bridging the information gap between aquaponics enthusiasts and maker communities**
 - Encouraging information sharing between people with differing backgrounds and expertise.
 - Developing a range of communication tools (forum, tutorials, download kit, tutorials) to facilitate innovation in local aquaponic farming.



AQUAPIONEERS ECOSYSTEM ANATOMY



The user manual has been divided into four blocks following the Aquapioneers Ecosystem anatomy to ease its construction, assembly and use.



The release of this documentation is progressive, meaning that the first release will cover “The Body”. The following parts will be published during the weeks following the first edition, and will be regularly updated as a whole to reflect the comments and questions of our community. We thus encourage you warmly to leave any comments / suggestions / questions on our forum (<http://aquapioneers.io/community-forum/>) to be part of our community-based continuous improvement!

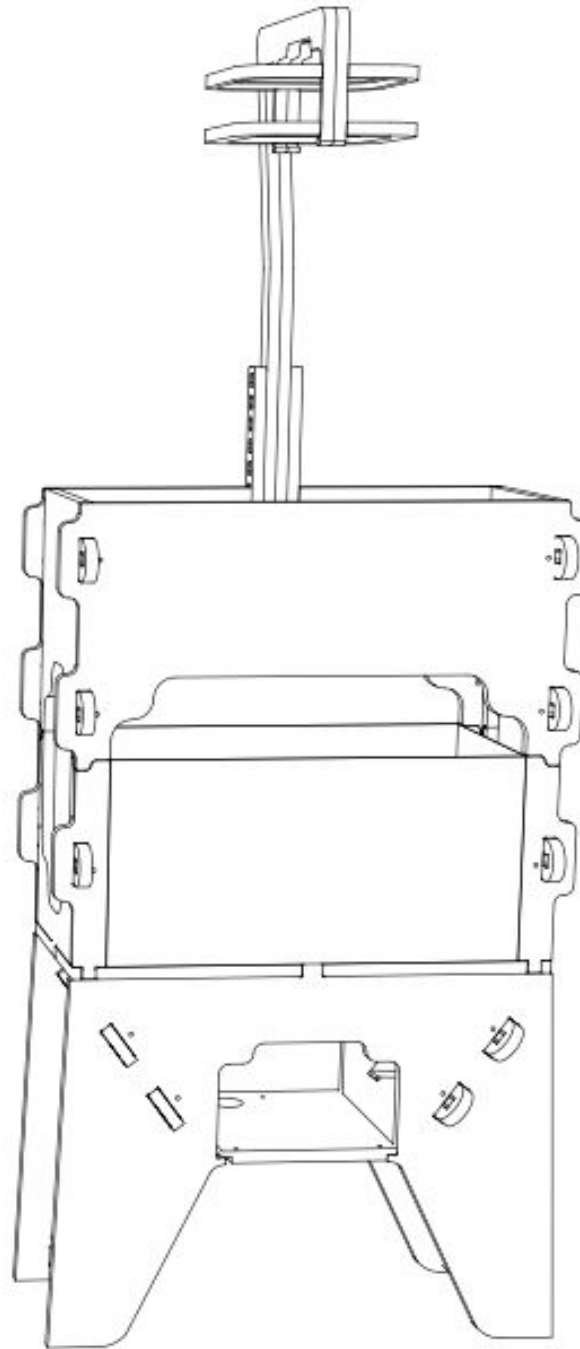
To give you a rough idea of how much it will cost you to make your kit, here is a table (based on material prices in Spain).

Item	Quantity	Cost	Total
Standard size wood board of 1220mm x 2440mm or 4 x 8 feet.	1	48€ - 109€ <i>depending on the type of plywood, pine being the cheapest</i>	48€ - 109€
CNC Milling <i>See next section</i>	1,5 h <i>Time needed to cut the pieces</i>	85€/h - 109€/h <i>Based on professional use of Fab Lab machinery in Barcelona. This is highly dependent on the fab lab you will work with. In some cases it might be for free.</i>	0€ - 164€
Sanding & varnishing the two faces twice*	6 m2 <i>A standard size wood board represents 6m2</i>	20€/m2 <i>You can easily do this yourself, 20€/m2 represents the cost of a professional doing it for you</i>	10€ - 145€
60 W LED grow light <i>Our design adapts to the 60W LED light module made by BCNLED. A different type of lamp may require design modifications on the light support.</i>	1	120€	120€
Acrylic aquarium cover	60 x 30 x 0.4 cm		8€
Piping & sealing			16€
Electricity			36€
Aquarium equipment			79€
Accessories			116€
TOTAL (incl. VAT)			433€ - 793€

A detailed list of materials will follow as the relevant parts of the documentation will be released.



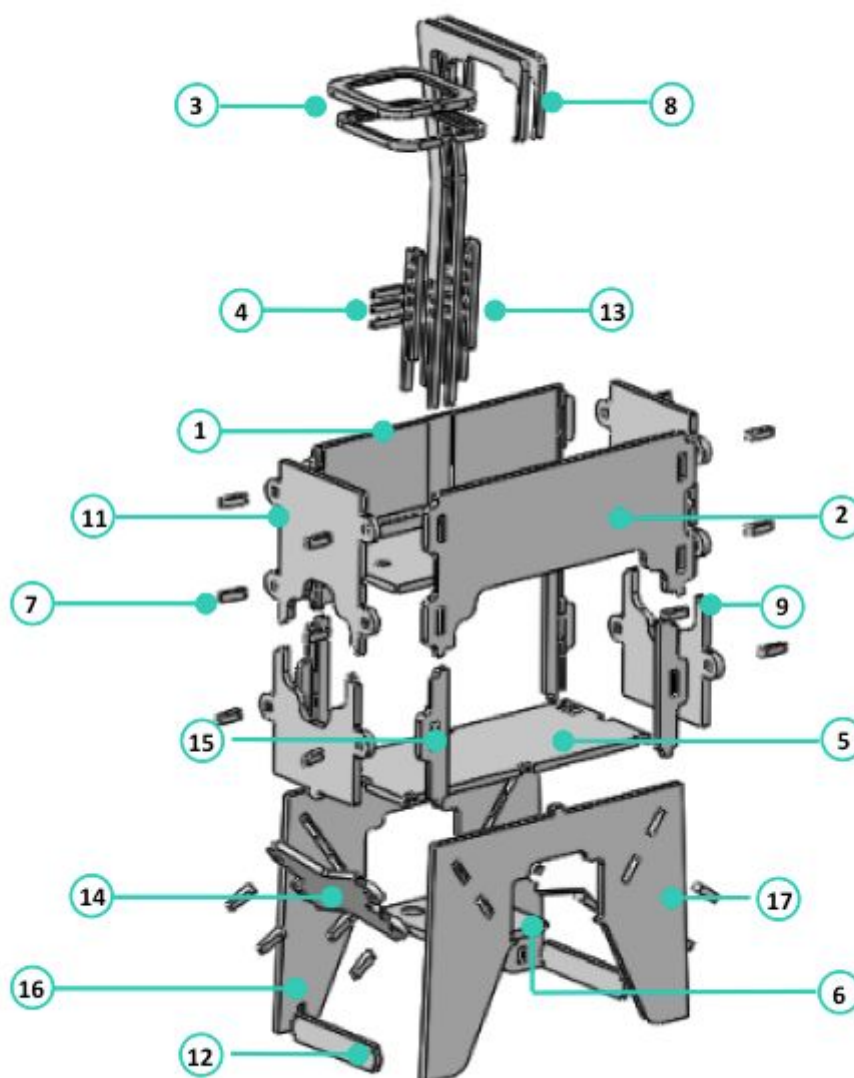
THE BODY



Part I

THE BODY

BILL OF MATERIALS

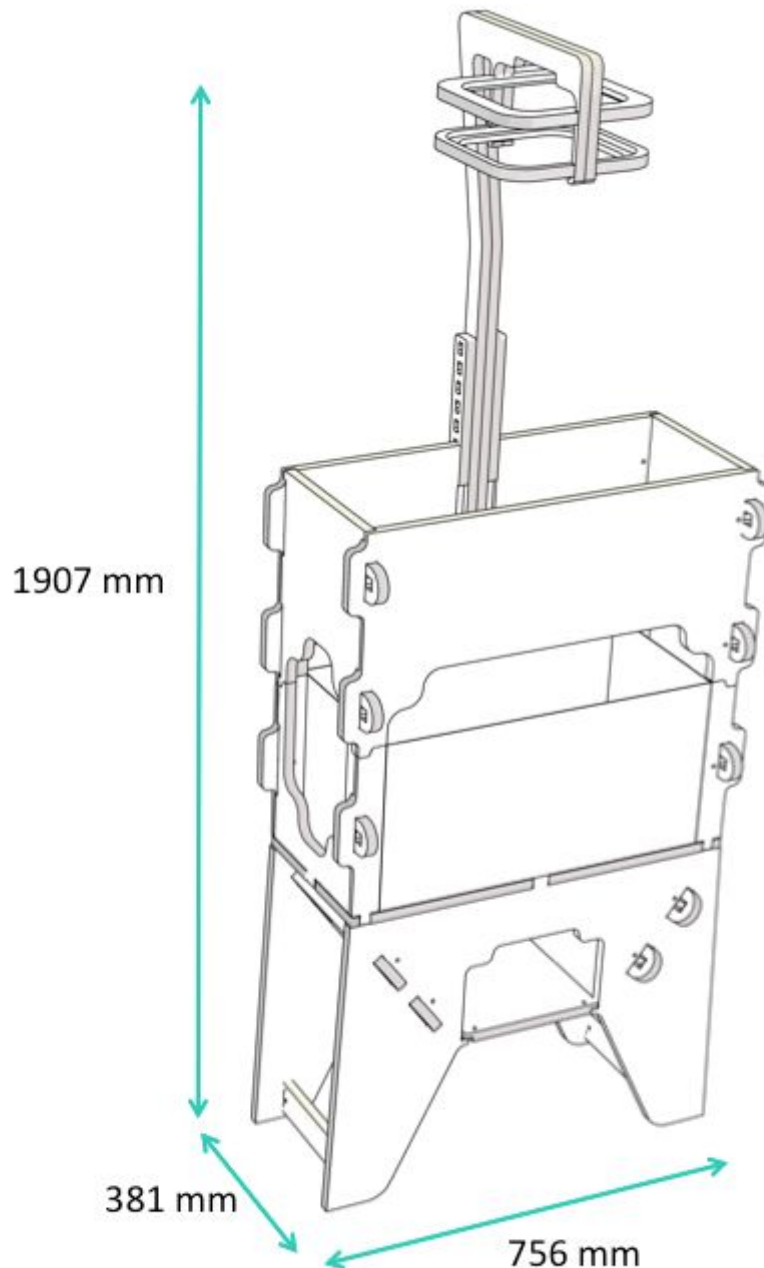


COMPONENTS

1. GROWBED BACK PANEL	x 1	7. WEDGES	x 20	13. LIGHT SUPPORT BARS	x 2
2. GROWBED FRONT PANEL	x 1	8. LIGHT SUPPORT PANELS	x 2	14. LEGS SIDE PANELS	x 2
3. LIGHT FRAME	x 2	9. AQUARIUM SIDE	x 2	15. AQUARIUM FRONT	x 4
4. LIGHT LOCKS	x 3	10. PANELS	x 1	16. PANELS	x 1
5. AQUARIUM BASE	x 1	11. GROWBED PLATE	x 2	17. BACK LEGS	x 1
6. LEGS PLATE	x 1	12. GROWBED SIDE PANELS	x 2	FRONT LEGS	x 1

Note : Numbers correspond to Cutting List (pg. 17)

PROJECTION





The Body is made of a wooden structure. This is the central piece that help you to turn a 54 L fish tank (600x300x300 mm) into an aquaponic ecosystem.

STEP 1: GETTING THE FILES

Files Explained

Source Files: <https://github.com/aquapioneers/Aquapioneers-Kit-Barcelona-Design>

	AQUAPIONEERS KIT - v1.6 - 3D Model - 18mm.3dm Rhinoceros software has been used to generate this 3D model. Here you can play and tinker with the original designs.
	AQUAPIONEERS KIT - v1.6 - Nesting - 18mm.3dm A nesting file is essentially a flat version of the design laid out to generate cutting strategies and tool paths. Adjust this file to calibrate it for different woods and machines.

STEP 2: BRINGING IT TO YOUR CLOSEST MAKER SPACE

Check out these links to locate the closest Makerspace to your city:

- www.themakermat.com.
- The Fablabs network: www.fablabs.io
- and also www.fabhub.io



PRICE EXPECTED

This section aims to give you price reference (without VTA) based on what a Barcelona based professional will charge you:

Item	Quantity	Price	Total
Standard size wood board of 1220mm x 2440mm or 4 x 8 feet.	1	48€ - 109€ <i>depending on the type of plywood, pine being the cheapest</i>	48€ - 109€
CNC Milling <i>See next section</i>	1,5 h <i>Time needed to cut the pieces</i>	85€/h - 109€/h <i>Based on professional use of Fab Lab machinery in Barcelona. This is highly dependent on the fab lab you will work with. In some cases it might be for free.</i>	0€ - 164€
Sanding & varnishing the two faces twice*	6 m2 <i>A standard size wood board represents 6m2</i>	20€/m2 <i>You can easily do this yourself, 20€/m2 represents the cost of a professional doing it for you</i>	10€ - 145€
TOTAL (incl. VAT)			58€ - 418€

* Please note that this budget can be easily drop down if you decide to do the sanding & varnishing by yourself (i.e. See Step 4 p. 18 for that).

CNC Milling

CNC MILLING*

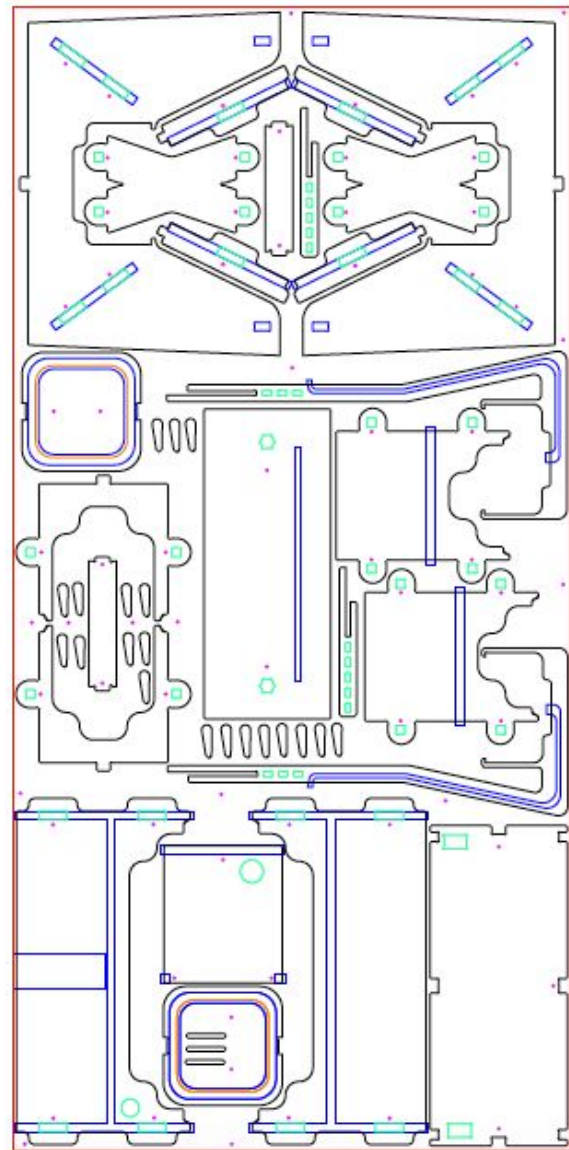
The Aquapioneers kits have been designed to be cut using one standard size wood board of 1220mm x 2440mm or 4 x 8 feet. This drawing shows the Geometry and Cut Strategies that a machine operator will need to use with their own CAM software. To help in the creation of the machine 'tool paths' we have split the strategies into colour coded layers and named them according to the strategy required. See the 'Nesting' and 'Cut Strategy' files.

CUT STRATEGIES

Name					
Pocketing_9mm	●	●	●	●	●
Pocketing_19mm	○	●	●	●	●
Profile outside	○	●	●	●	●
Profile Inside	○	●	●	●	●
Stock(2500x1250)	○	●	●	●	●
pin	○	●	●	●	●

NOTE

We have created a file for 18mm thick boards. It is common for wood boards to have slight variations, so be careful to measure your wood before selecting the files. In this design every millimetre counts.

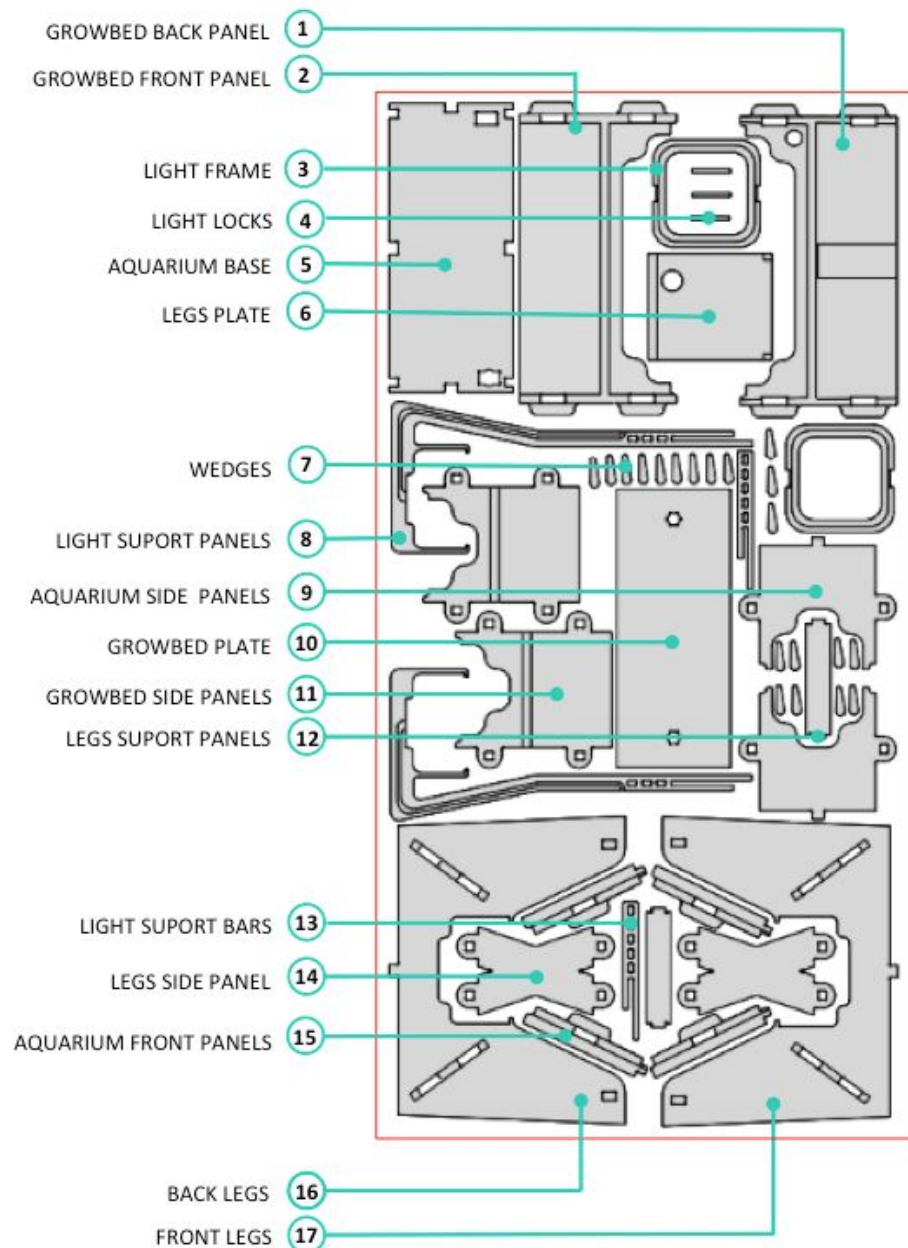


*A CNC router is a computer-controlled milling machine. They are often used to manufacture custom cabinetry and are available in most metropolitan areas. Check out these links to locate one in your city: www.themakermat.com. The Fablabs network: www.fablabs.io and also www.fabhub.io

STEP 3: GETTING THE WOODEN PARTS

CUTTING LIST

To facilitate the assembly (i.e. described in Step 5), we have named each part as described below



STEP 4: SANDING & WAXING THE WOODEN PARTS

Once your wooden parts are cut, here come the fun part: sanding and varnishing / waxing. This will give you a color change and then it leave a protective coat on the surface of the wood against the humidity generated by the aquarium and growbed, as well as giving it a much better look!

Time expected	Expected cost
6 hours	6€ for sanding paper 6€ for 750ml of Water based varnish 3,50€ for 250 ml furniture wax

For this you will need:

Electric sander	Sanding paper disc 6 of 240 grit + 6 of 1200	Polishing Pads – 3000 grit to 5000 grit	500ml of Water based varnish or Finish wax	Roller brush
				

Part by part, please follow the next steps:

1. SANDING



Sand each part, both surfaces and edges, using a 240 grit sanding paper. Once you are done, remove the dust as much as you can (the best option is to use a compressor).

2. WAXING / VARNISHING



Apply a first layer of wax finish on both faces and edges using a piece of clean cloth. You can follow this 3min video [here](#) to get the flow. As an alternative to this and the following steps you may simply apply 2 layers of varnish instead of going through the waxing process, depending on your time and personal preferences.

3. FINE SANDING



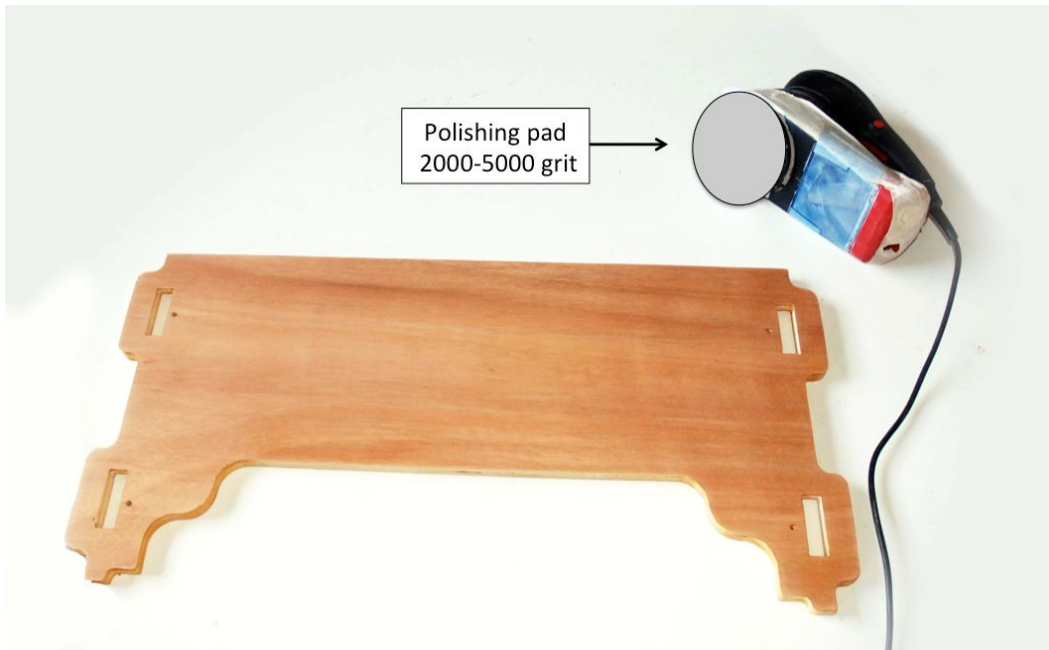
Right after applying the wax finish, re-sand the edges / both faces using this time a 1200 grit sanding paper. It will allow to stain the wood before applying the top coat.

4. WAXING FINISH



Apply a second layer of wax finish on both faces and edges using a piece of clean cloth and let it dry during few hours.

5. POLISHING



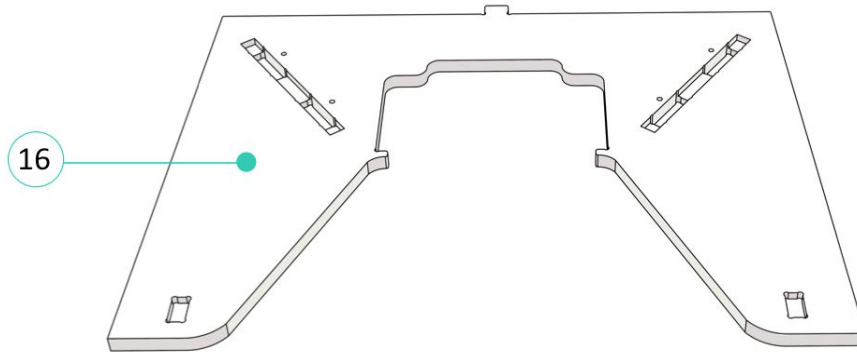
If you want a perfect finish you can go for polishing with finer abrasives. Here, the polishing system calls for dry, water-free products. Mount the polishing pad on your sander or polisher and set the speed to low and turn your machine on before touching down on the surface. Start your first pass at the left end, bottom corner and work your way to the right, keeping the machine moving at all times. When you get there, continue moving your machine to the next row, overlapping the first by approximately 50 percent, then work your way back to the left end.



STEP 5: ASSEMBLY

ASSEMBLY 1 : LEGS

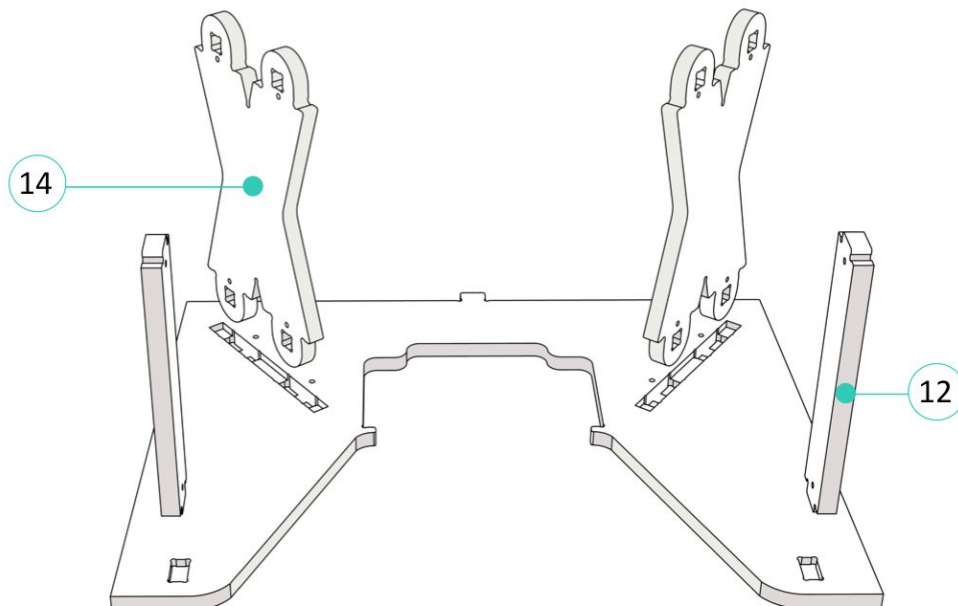
1



Lay the **Back Legs** on the floor and make sure the grooves are on the inside

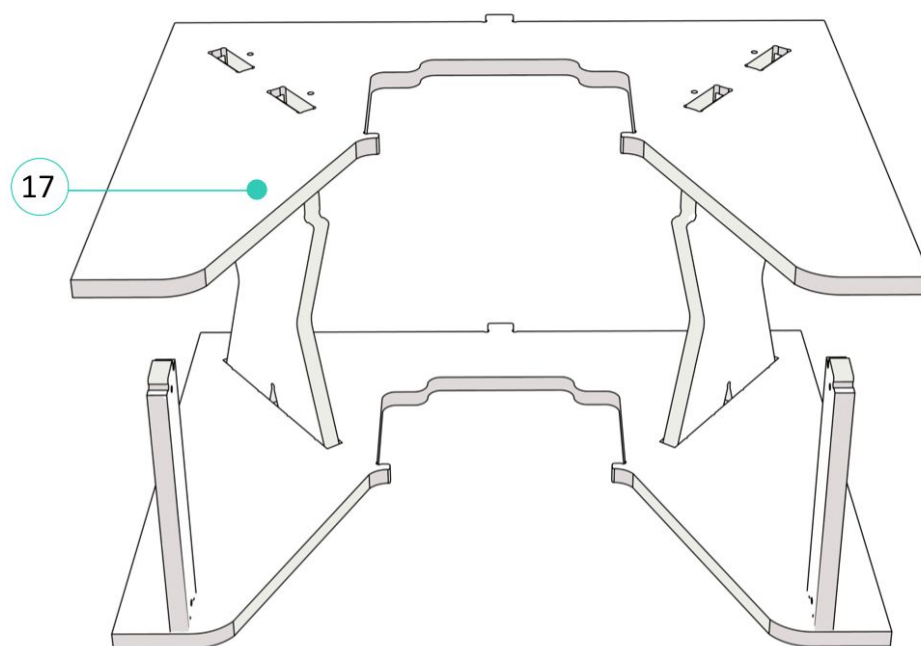
Note: Protect your wood from damage by assembling your kit on a piece of cardboard or other protective material.

2



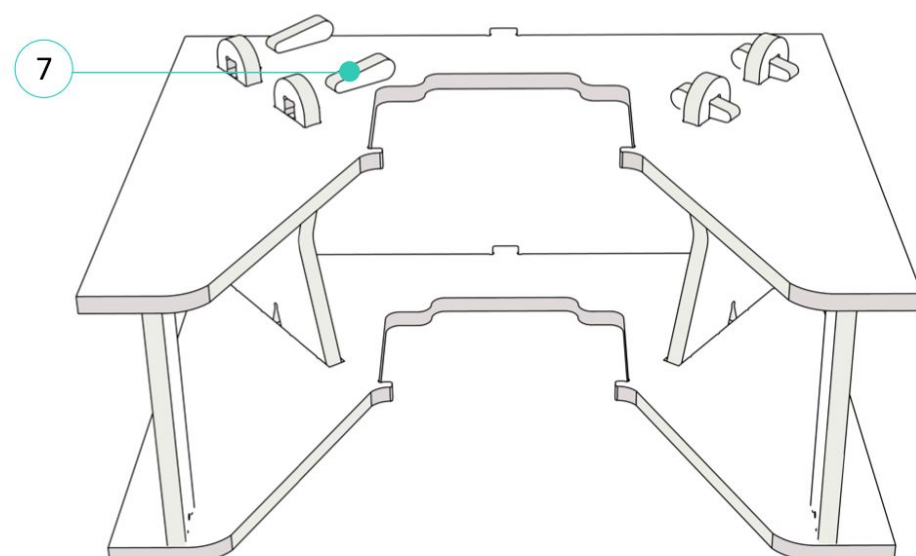
Place the two **legs side panels** and **leg support panels** into the corresponding slots.

3



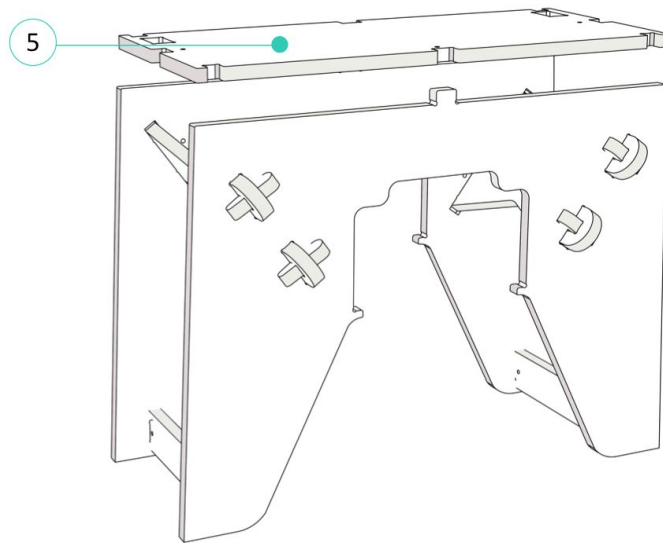
Place the **front legs** into place

4



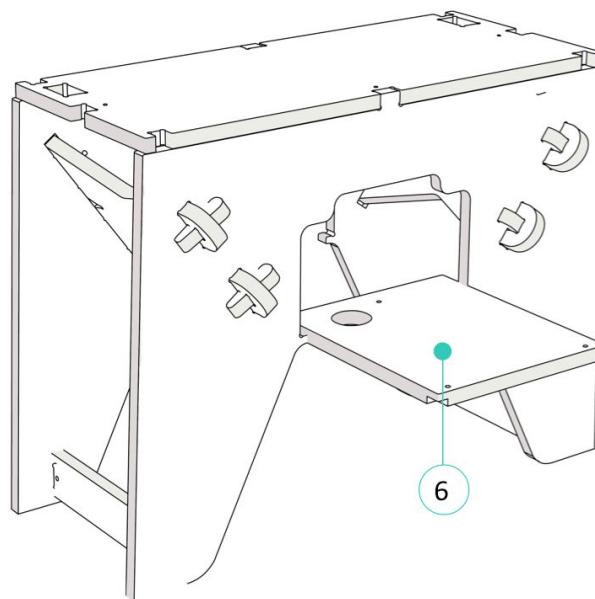
Whilst still resting on the floor, slide the **wedges** into the lock joints of **legs side panels**. Leave them loose for now.

5



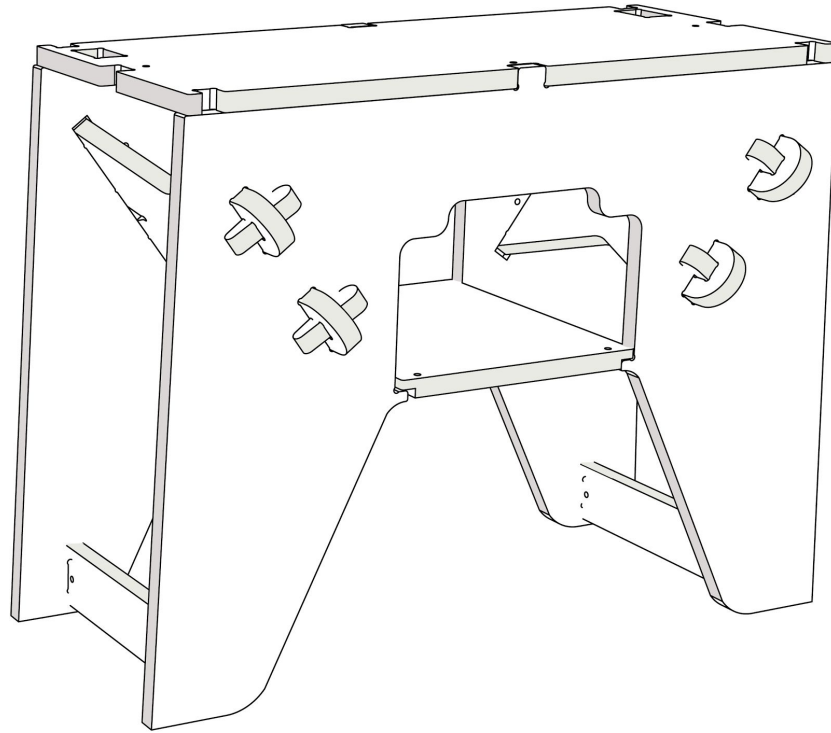
Place the aquaponics body in a vertical position and carefully place the **aquarium base** on top of the two legs making sure the two holes are facing backwards.

6



Push the **legs plate** in through the front entrance and slide it along the grooves until it rests on the 4 slots of the leg panels.

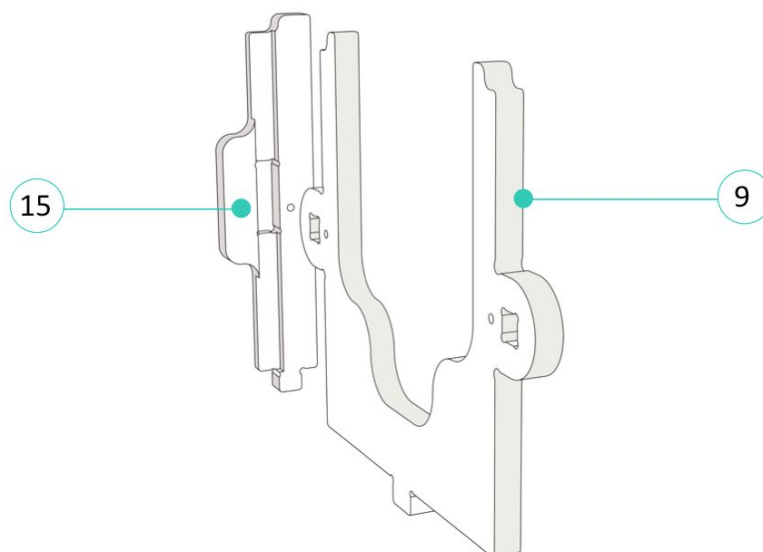
7



Legs part is done, let's get started with the aquarium level !

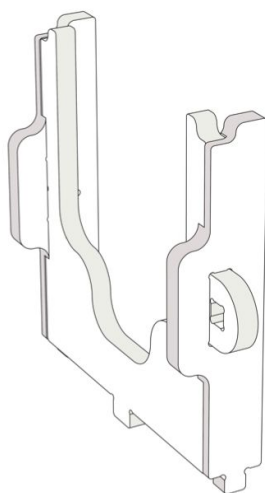
ASSEMBLY 2 : AQUARIUM LEVEL

8



Add the **aquarium side panels** into the corresponding slots.

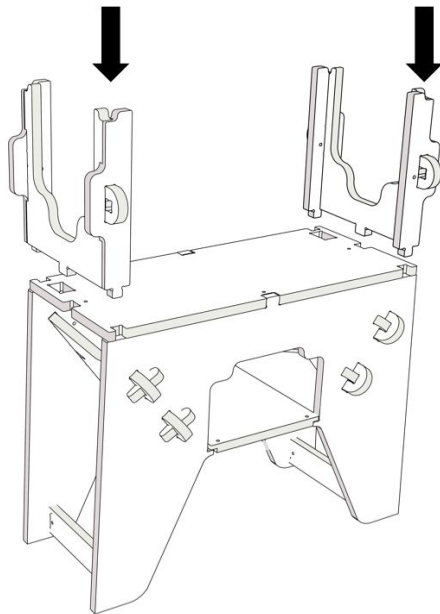
9



Make sure the handle cut into the side pieces are facing out.

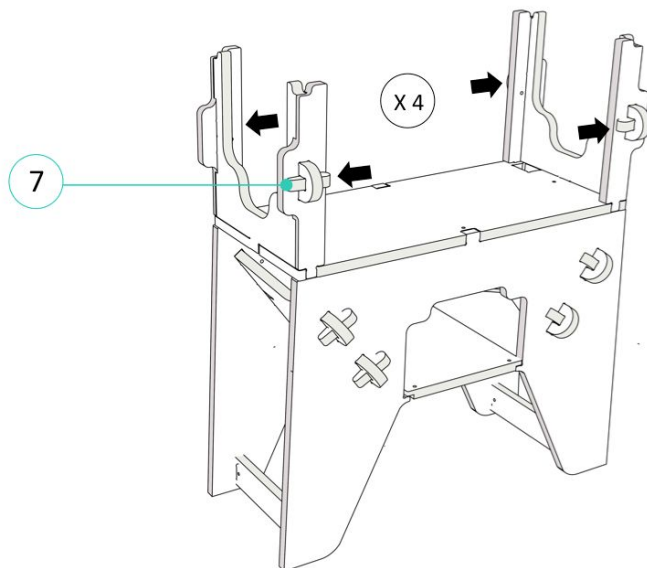
Note: All rounded pieces should be at the top, while the square edges should beat the bottom to fit into the aquarium base. Pay close attention to the details in the diagram above.

10



Then slide the aquarium **side panels** carefully into the **aquarium base**.

11

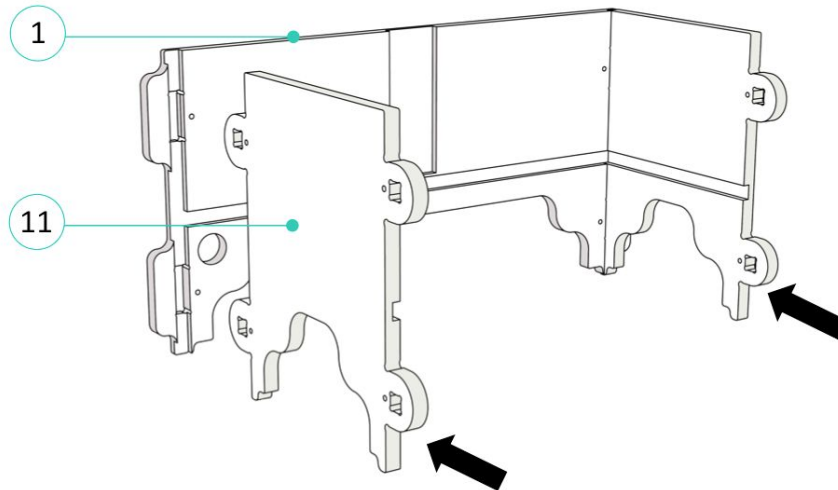


Add the **wedges** to the lock joints of **side panels**. Leave them loose for now

Now, that we have the Legs assembled, we can focus on the “growbed”.

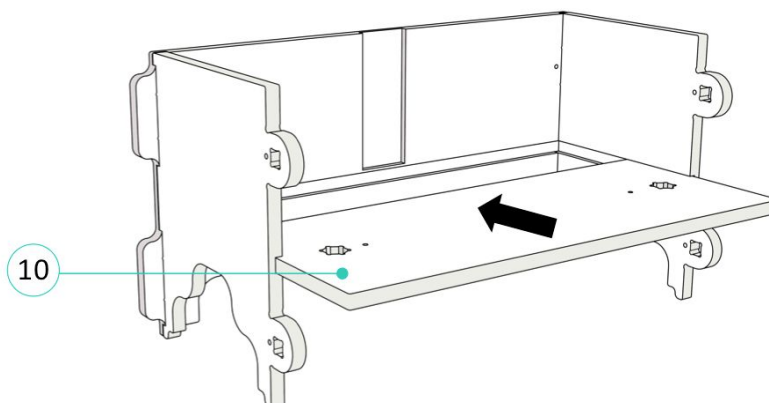
ASSEMBLY 3 : GROWBED

12



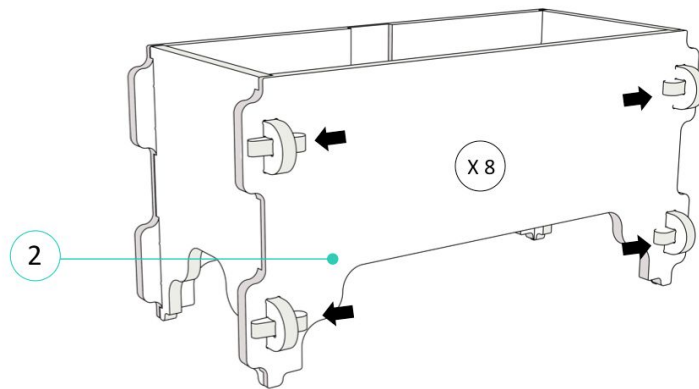
Hold the **growbed back panel** upright. Then place the two **growbed side panels** into the corresponding slots. Make sure the grooves from all panels are on the inside.

13



Carefully push the **growbed plate** in through the front entrance and be sure that it slides along the grooves and into the slot on the inside of the **growbed back panel**.

14



Whilst still resting on the floor add the **wedges** to the lock joints of front and back panels. Leave them loose for now.

We will focus on the “lighting system” later in the part IV “The nervous system”.



Once assembled, the wooden structure looks like this.

Thanks to all our ULULE backers that made this project possible



<https://www.ulule.com/aquapioneers/>

Dinis Mendes	Miren Garrido	'Marco Sanalidro	Benny Krimeur	Pascale TEYSSIE
Miriam Hernandez	Thomas Jourdan	J Armand Figeac	Adriana Alvarez Caballero	Albert Siurana Saumell
Linda Sunnen	Kathleen Stewart	Anouk Le goueff	michaelboeckle3	Marcio Barrios
ginnygin	Diana Moret	Gaby Xocolata	Mayo Fuster Morell	David Castillo Santander
Gabi Masfarre Pinto	Thiebault Mura	Romain Flattet	Felipe Agudelo Jaramillo	Visual Cabin
Marlene Clement	Glaucia Loebmann	Pierre Gachet	David Centeno	David Gomez Fontanills



Pablo Castellano	Anna Serena	Laurent Dussart	Jason Renoux	Fundacion Uxio Novoneyra
Lorenzi Nathalie	Mara Balestrini	Hong Park	Martine Neyen	Masanet Patrick
Anne Guimonnet	Aude Omerin	Isabel Wiseler-Lima	Mathieu Geiler	Goran Blazic
Helena Lahellen	Alexandre Benassar	Farrah Baut-Carlier	Albert Neyen	Vanessa Martnez
Pierre Tabary	Naoise Golden	Alexandre Curtelin	Kostia Belkin	Juan Manuel Umber rossello
Javier Verba	Roque Federico Dorfman	Gabriel Samso	Josh Edler	Robert Guia
Eva Miguelez Ortiz	Raf Sasan	Guillaume Teyssie	PATRICIA BASSE	Eileen Arnold
Patrice Boimond	Constance Dangy	Hugo Cabos	Charbel Aoun	julien bonnaud
Andrea Barbiero	AMPA La Sagrera AMPA La Sagrera	Olgui Fuertes	Mariana Quintero	Tania Sande
nith nith	Pierre Jean Nedergaard	Sergio Gutierrez	Alessio Verdolino	Walter D. Michaels
Anne Delacour	Anna Dalmases Trias	Yola Perez	Jose Francisco Pelaez	Jeanne Streng
CoworkingLille	Bruno Le Hen Ortega	Yola Perez	Muriel Chevallet	Oriol Cela
Alexia Mellor	Bruno Le Hen Ortega	Lydia Fraga	Roci,Silvia, Rocio SAN, Inigo,Guillem	Simon Burin des Roziers
Kevin Tang	Bruno Le Hen Ortega	Eduard Hernandez	Julia Cruz	Beryl Navarro
Yoshi Yasu Hirano	Marion Schuppe	Emilia Caba	Charles Labatut	Loic Fievet
ANDREW GREGSON	Josep Carrizo	Eva Del Barrio	Paul VERZY	Raquel Jimenez
Alberto Perez	Marie Tavera	Simon Malfiarge	Igor Garcia Barbero	Etienne Guyon
Elena Canas	noemie rousselet	Martin Gutmann	Agustin Vargas	Xavier Dominguez Aparicio
Daniel Carbonell Rubio	Isaac pierre racine	Katherine Woodhouse	Edmond Capart	lolilola50
Miren Garrido	Anna Garrofe	Fra Mousel	Bobby Marchand	Quentin Govignon
Guillaume & Loic	Gerard Chatelier	Justo Fab	Ivn Gutierrez	Francois DESORMEAU

Yasmine Abdelaziz	Gai Boro	Jaume Miro	Jean-Marie Guyon	acanigueral
Benjamin Whipker	Thomas Zannoni	Marie Scheid	Daniel Reznikov	Valentin Albinet
Michel Coqblin	Paul-Henri Petit	Dimitrios Savvopoulos	margaux tiberghien	Jean Christophe THUAN
Yee man annie Leung	Murielle Baugniet	Cales Laure	Cloud Coworking	Cecile Delacour Delhay
Julien Morey	PaCha	Tristan Copley Smith	Vicente Guallart	jordivalsfoix
Pierre Willieme	Constance Martel	Stef Denamps Gomez	Vicente Guallart	Ricardo Iglesias Meijome
Keith Anderle	Renee Teyssie	Laura Dayan	Joaquin Baraibar	Julius Brenn
jeremy Lizandier	Nicole Dorrell	marcel kellner	Emi_ouiwin	Anya Popova
Bea Nina Tartaruga	Pierre Paslier	Constance Dangy	Claudine Perla	philippa young
Matthieu Napoli	Arnau Arn	v25a	Adria Casas Gimeno	Martine Neyen
Harvey Dunham	Roger Delacour	Regis Decleire	Luciana Asinari	Maxime Le Goueff
clem sayyeah	Paul Deshayes	Breny Aceituno	Jesus Badenas	Martine Neyen
Amaya Pou	jean louis teyssie	Pierre-Francois Delacour	Guillaume Dardelin	Ivan Loza
Pauline Grenier	Johanne Greenwood	Mathieu PAUWELS	Maria Serrano Basterra	Guillaume & Loic
Andrea Ruani	Ana maria Gibert	Shai Erev Levi	Jean-marc Streng	Gerard Llorach
Jose Ivan Gonzalez Estrada	stephan le goueff	Gabriel Dulac-Arnold	Areti Markopoulou	javier baraibar molina
L.J. Eiben	simona-1	samantha raez	Linda Carlson	Thomas GAUTHIER
marcin wolynski	Stephanie Ah Tchou	Antoine Desjonqueres	Silvia Brandi	Aude Omerin
Regis Largillier	Pascual Llanes	Corey Ellis	Lucas Cappelli	Jonathan Minchin
David Bertet	Angeles Ribes	Anahi Lacanna	Ana Vida	Alexandre Dubor
codeman	Tim Willemen	Charly Goerend	Gregoire Durrens	Helena Gibert
Adria Garcia I Mateu	Anaick Crozon	rieultecher	Naiara Chaler	Gaby Xocolata
Ricard Jornet	Caro Vignoli			

This Publication accompanies the Barcelona Aquapioneers ecosystem files and Assembly kit. It was designed and tested by the Aquapioneers team at Valldaura Labs in Barcelona, Spain, with the generous support of Valldaura Labs, IAAC and Fab Lab Barcelona.



Iaac | **FAB LAB**
BARCELONA



CONTACT:

info@aquapioneers.io

VISIT:

www.aquapioneers.io

FOLLOW:

@aquapioneers (Twitter/Instagram/Youtube/Linkedin)

COMMENT:

<http://aquapioneers.io/community-forum/>

LIKE:

<https://www.facebook.com/aquapioneers/>

MAKE:

<https://github.com/aquapioneers/Aquapioneers-Kit-Barcelona-Design>

