

Build guide

Simba v.1.0



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Please go to <https://make.better.furniture/simba/guide> to download the latest version of this guide. There might be some additions and correction included in it.

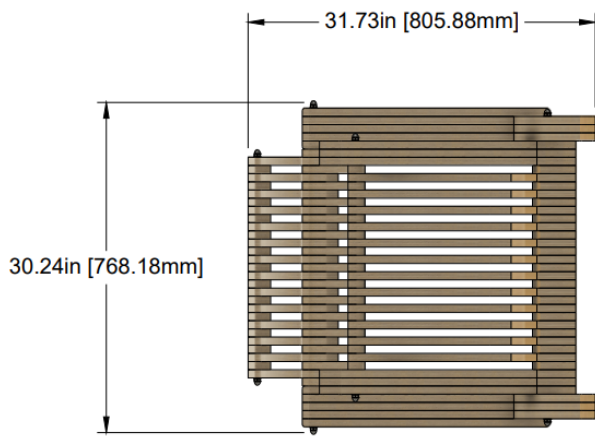
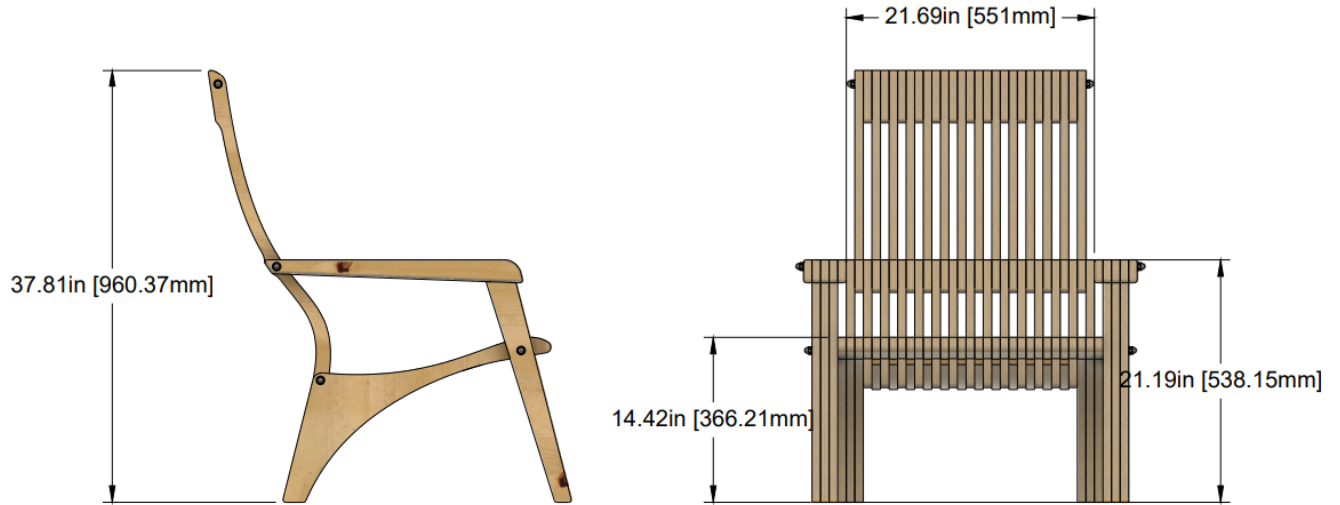
Licensing and commercial usage

As a private individual, a sole-proprietor, or a small business you can make and sell these chairs as handcrafted items without any additional license.

Larger business can email hello@better.furniture

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Chair dimensions



Note: chair width can vary due to plywood and finishing thickness.

Required materials and tools

Item	Quantity	Notes
3/4" (18mm) Plywood	One 4 by 8 ft sheet (244x122 cm)	Marine plywood with as many layers as possible.
3/8" (10mm) Full-thread rod	10 ft (3m)	You will need to cut it with a hack saw or angle grinder into smaller pieces
3/8" (10mm) Cap nuts and washers	8 sets	Definitely go for stainless

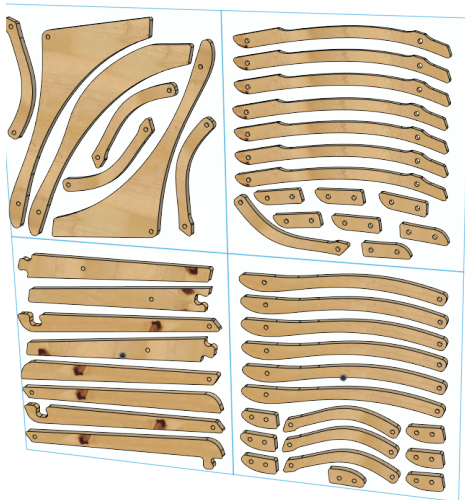
You will need as well:

- Sand paper
- Wood filler/putty
- Wood primer/sanding sealer
- Lacquer/varnish/paint
- Thinner
- Brushes/rollers/cloth
- Hacksaw or angle grinder for cutting the threaded rods
- Some ordinary 3/8" (8mm) nuts can be useful for temporary tightening.
- At least two wrenches for the nuts

1. Choosing the right files

A standard 4' by 8' plywood sheet can be effectively cut into eight 24"x24" panels or nine 16"x32" panels. Simba includes layouts for both of those sizes. Pick **one size** that works best for you and stick to it.

Because this chair is symmetrical, the layouts only contain half of the chair parts and have to be **cut twice**.



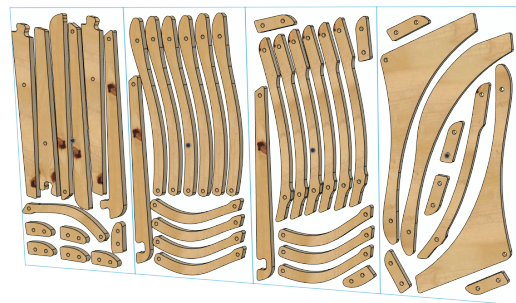
Simba 24x24 layout

Designed for machines that have 24x24, 24x48, 48x48 and larger workspaces.

You can download the files here:

make.better.furniture/simba

Or in my [patreon](#)



Simba 16x32 layout

Designed for machines that have 16x32, 32x32 larger workspaces, such as Shapeoko

For larger machines, use as many tiles as your machine can fit.

2. Cutting

After you chose the right file, you will need to create paths for your CNC machine in the software of your preference. Use the *.stp files for Fusion 360 and SVG/DXF files for other software.

- All paths in this design should be cut-through.
- It is recommended to use tabs to hold the parts.

Endmill choice, feed and spindle RPM

The design layout supports 1/8" (3.175mm), 4mm, or 1/4" (6mm) endmills. We only use 2-flute carbide compression endmills. They last forever if not overheated.

For smaller less rigid machines, go with a thinner endmill. If you are not sure about cutting settings, you will need to experiment because there are no universal settings for all machines. You can use the following settings as a starting point for your experiments:



Diameter (inches)	Diameter (mm)	Spindle RPM	Feed (ipm)	Feed (mm/min)
1/8"	3.175 mm	14 000 – 18 000	120 – 160	3000-4000
5/32"	4 mm	14 000 – 18 000	140 – 200	3600-5000
1/4"	6 mm	12 000 – 14 000	240 – 280	6000-7200

Use the endmill diameter as the initial depth of cut. Increase the depth of cut if your machine feels confident.

3. Tabs

3.1 If you used tabs, cut them off using an oscillating tool, hand saw, paper knife or a chisel.



3.2 Clean the tabs off. The fastest way to do this is to use a router table with a flush trim bit that has a bearing.

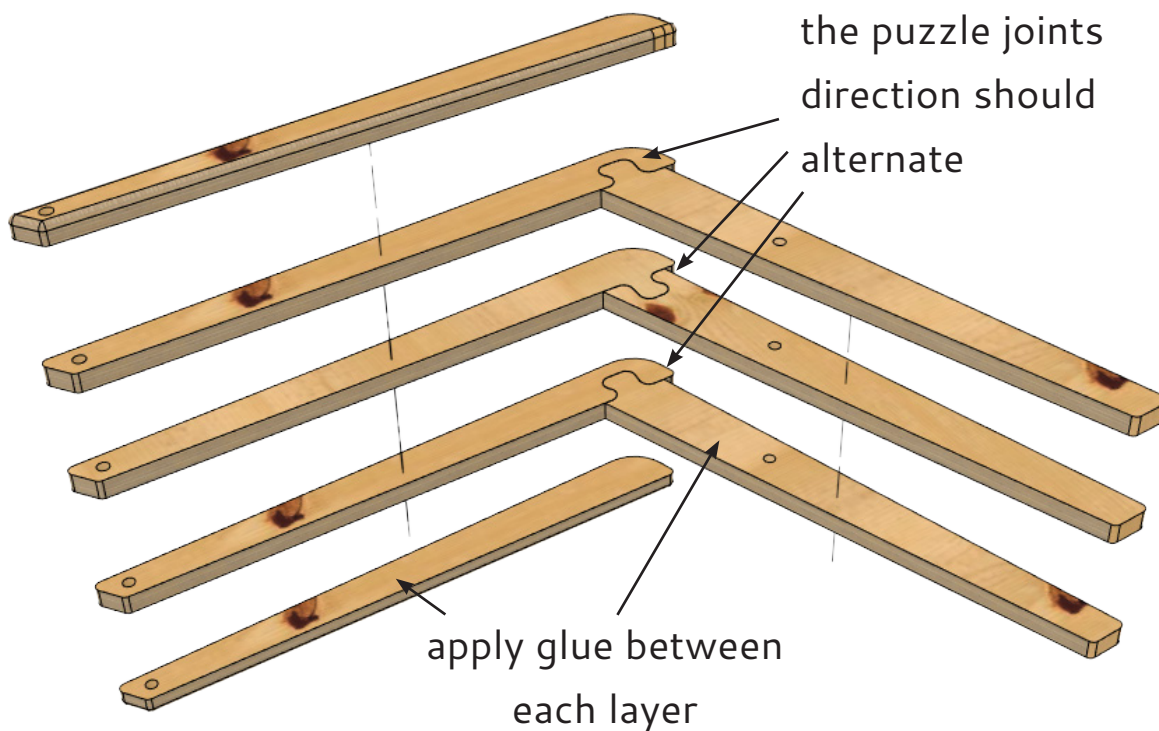
There is no need to use a template for this, just make sure the bearing travels on the top edge of the part.

Alternatively, you can sand the tabs off on an oscillating sander.

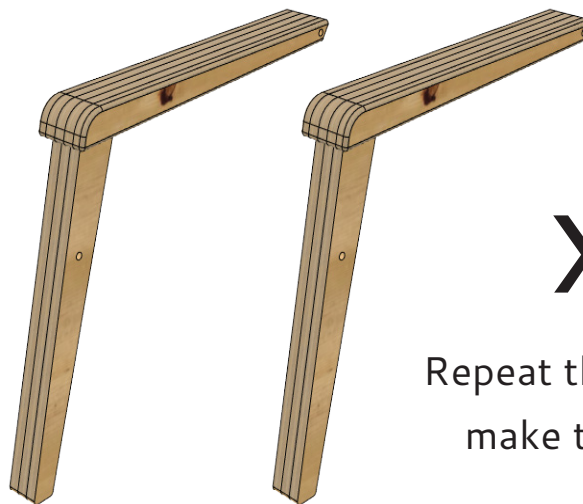


4. Arm rests

- 4.1 Pick all the straight parts
- 4.2 Slightly sand all the puzzle joints
- 4.3 Put some glue in the puzzle joints and assemble them
- 4.4 Arrange the layers so that puzzle joints direction alternate
- 4.5 Apply glue between layers



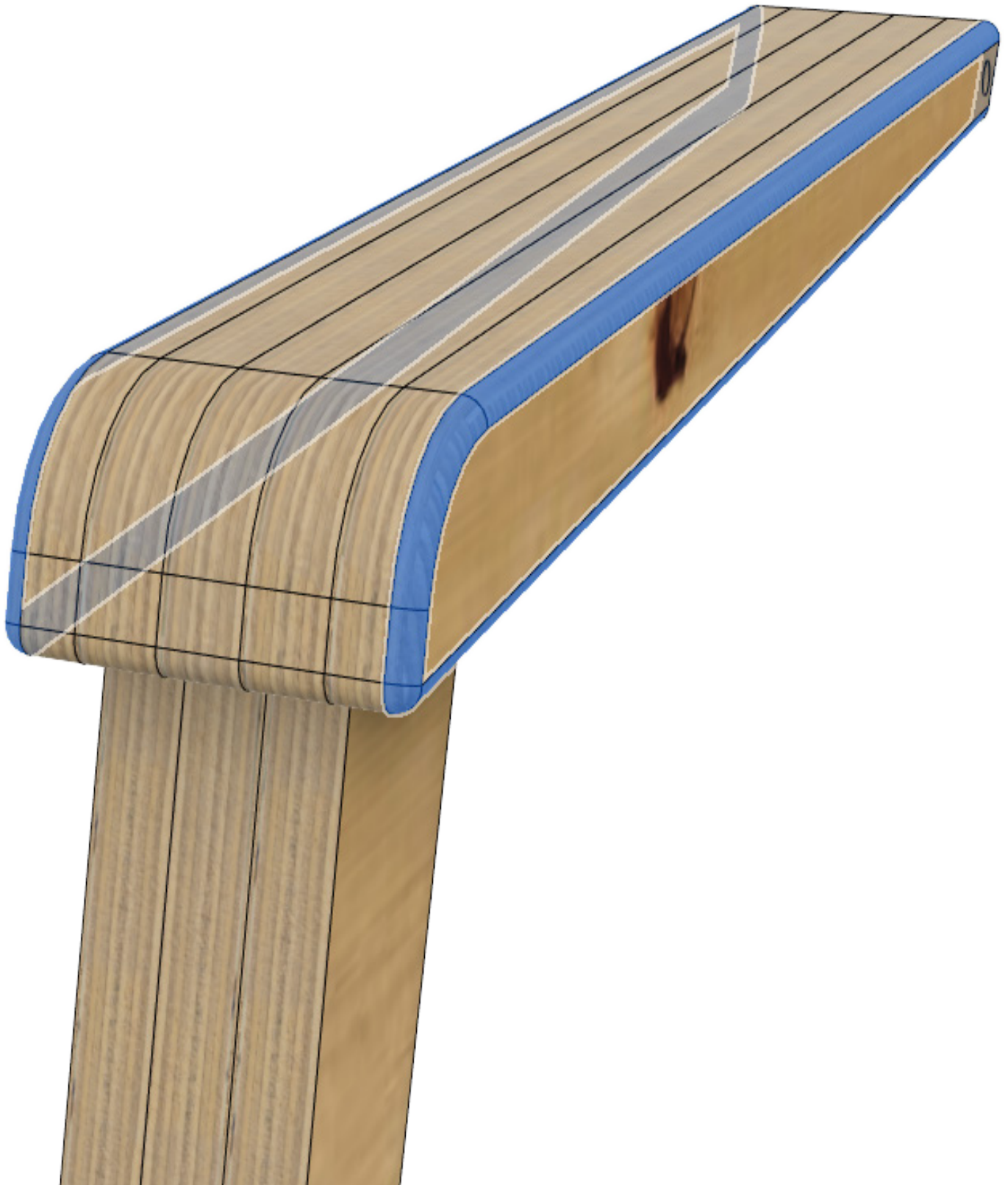
- 4.6 Clamp the parts or use brad nails to hold the layers tight while the glue is drying



x2

Repeat the procedure to make two arm rests

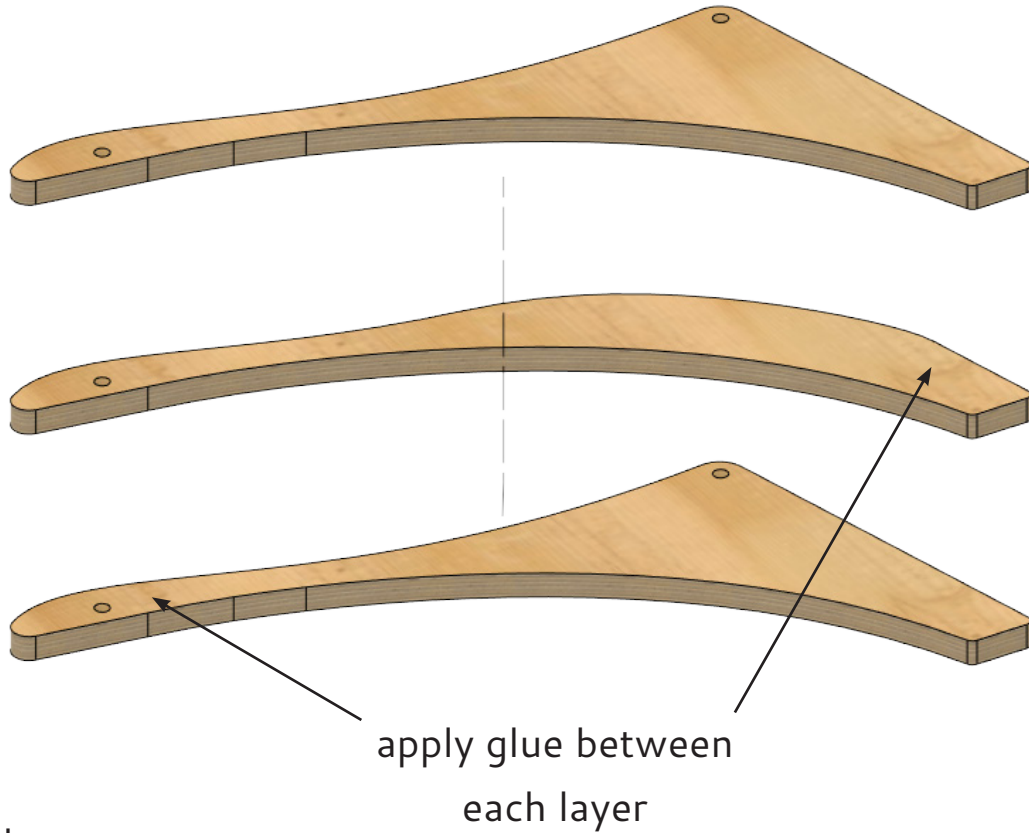
4.7 Round the arm rests corners with a trim router or sand it until smooth. 1/4" or 6mm radius looks decent on this part.



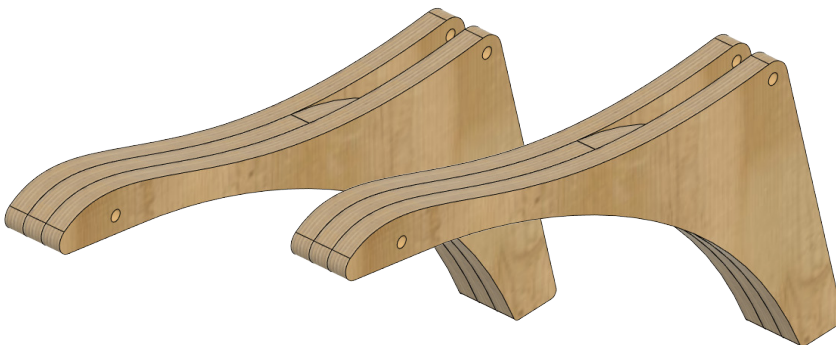
5. Legs

5.1 Find the large curved parts

5.2 Apply glue between layers



5.3 Clamp the parts or use brad nails to hold the layers tight while the glue is drying



x2

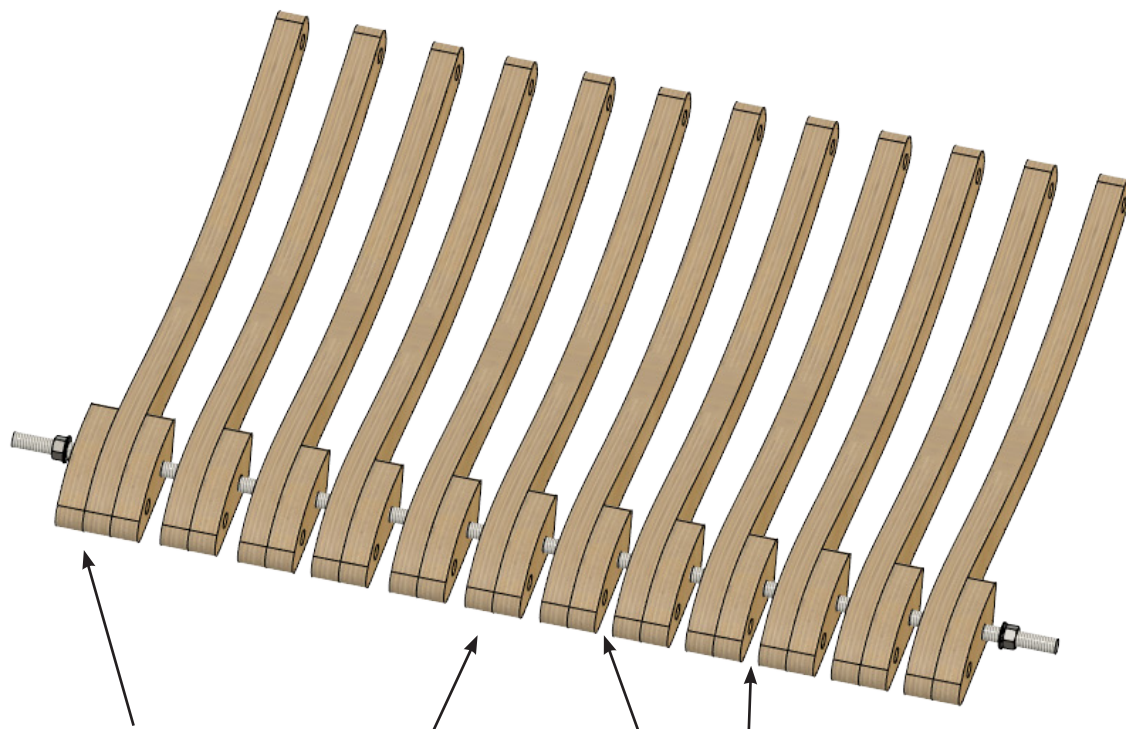
Repeat the procedure to make two legs

6. Cushion

6.1 Find 12 cushion parts and 13 matching spacers:



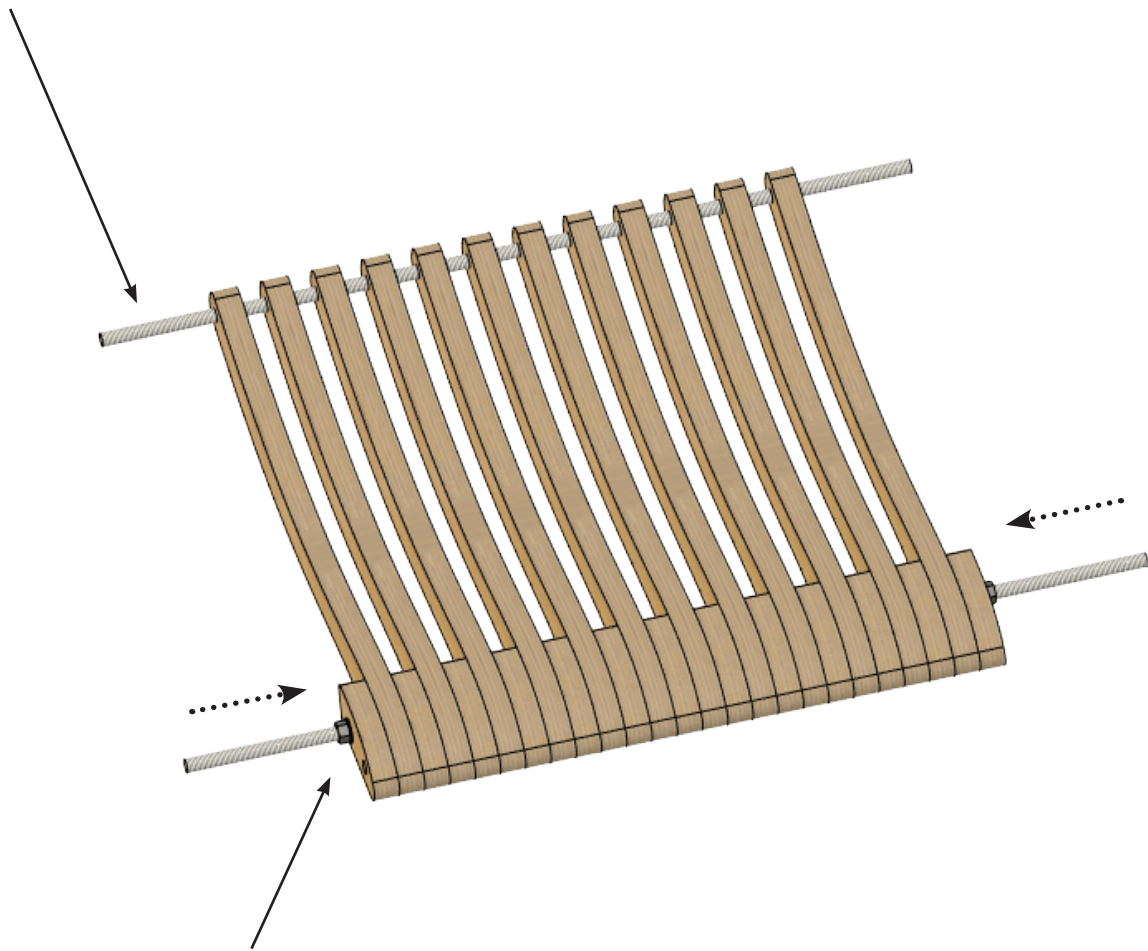
6.2 Arrange the parts on a piece of a threaded rod in this order:



Glue each spacer
to a longer part

Do not add glue here, so
we can process these parts
separately later

6.3 Add another threaded rod to make sure all the parts are aligned properly

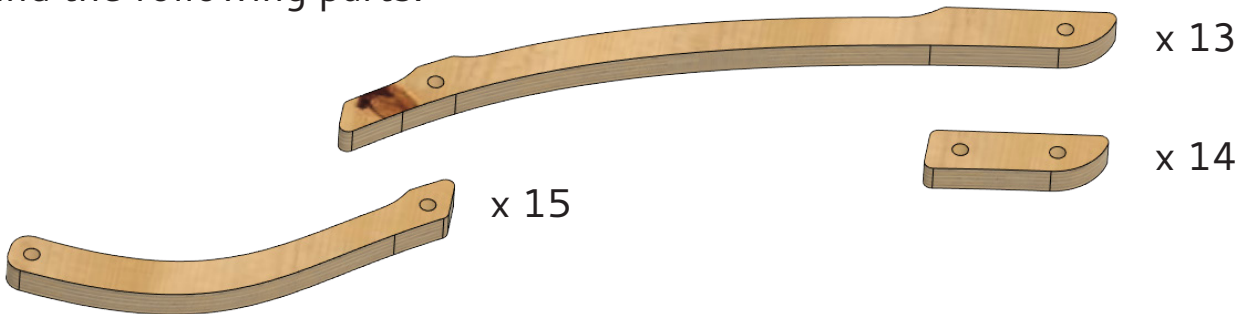


6.4 Align all the parts and tighten the nuts to clamp all the parts together

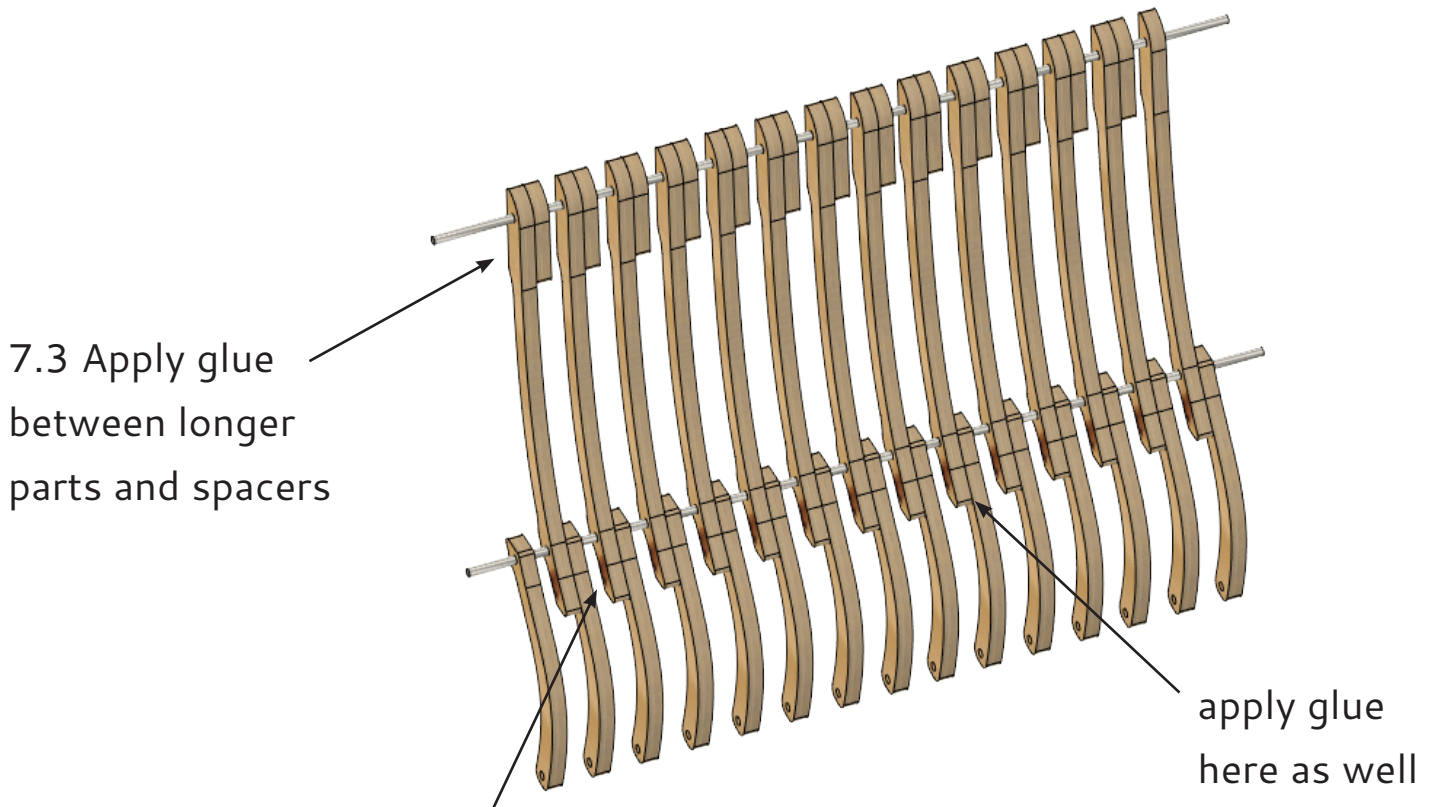
6.5 Leave over night to dry

7. Back rest

7.1 Find the following parts:

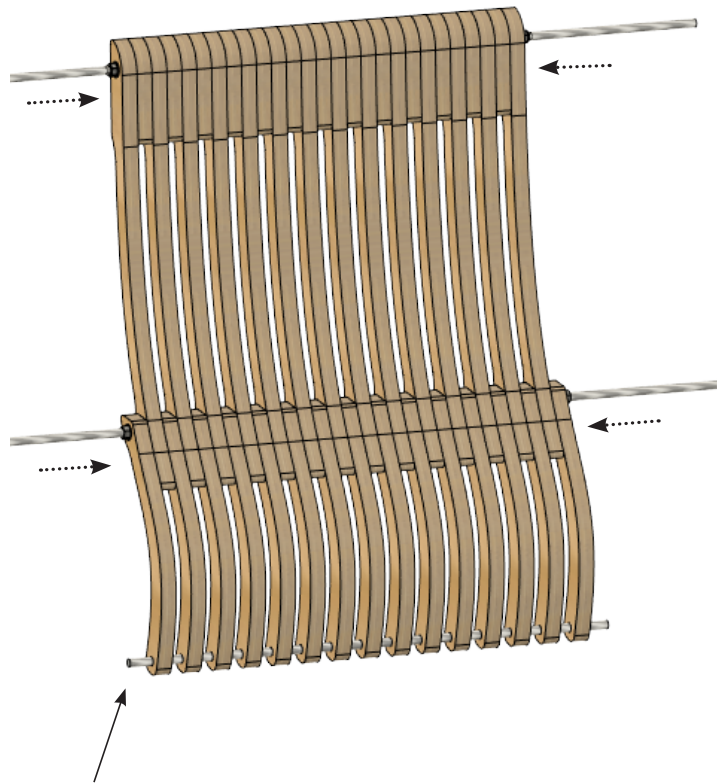


7.2 Arrange the parts on two pieces of rod in this order:



We keep each second layer separate so we can process smaller parts separately later. If you glue all the layers together, the chair will be tough to assemble.

However, feel free to experiment with the process to make it **better** :)

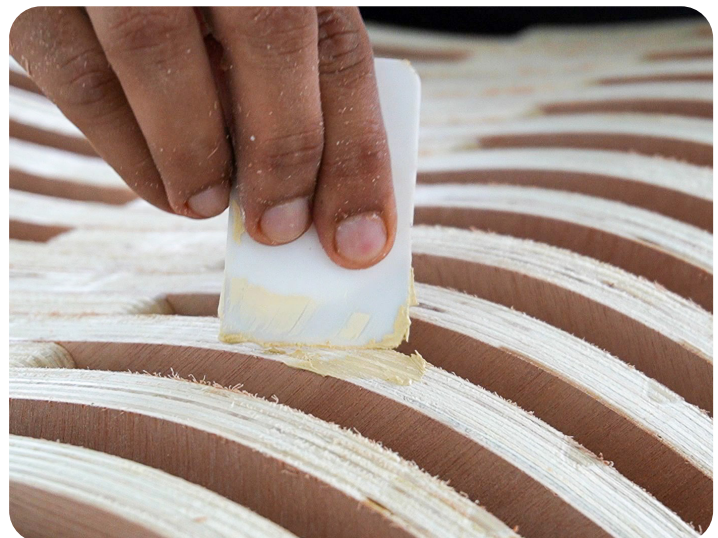


7.4 Add another threaded rod to make sure all the parts are aligned

7.5 Align all the layers and tighten the nuts to clamp all the layers together

8. Wood filler

8.1 Apply wood filler to any voids or imperfections that needs to be fixed. Do this to all the parts of the chair



9. Sanding

- 9.1 After the glue has dried, you can start sanding the plywood edges while the parts are still tightened with rods
- 9.2 Start with a 80–100 grit (or even 60 if you are confident)
- 9.3 Sand all the parts until all the surfaces are flat and even, there should be no plywood seems or burr left after this operation
- 9.4 Apply wood filler again if any new voids were exposed during the sanding
- 9.5 Move up to 150–180 grit and sand all the parts until they are smooth to touch
- 9.6 Undo all the nuts and sand the rest of surfaces of the parts
- 9.7 Apply any wood preservatives that are required in your area and dry overnight



10. Varnishing

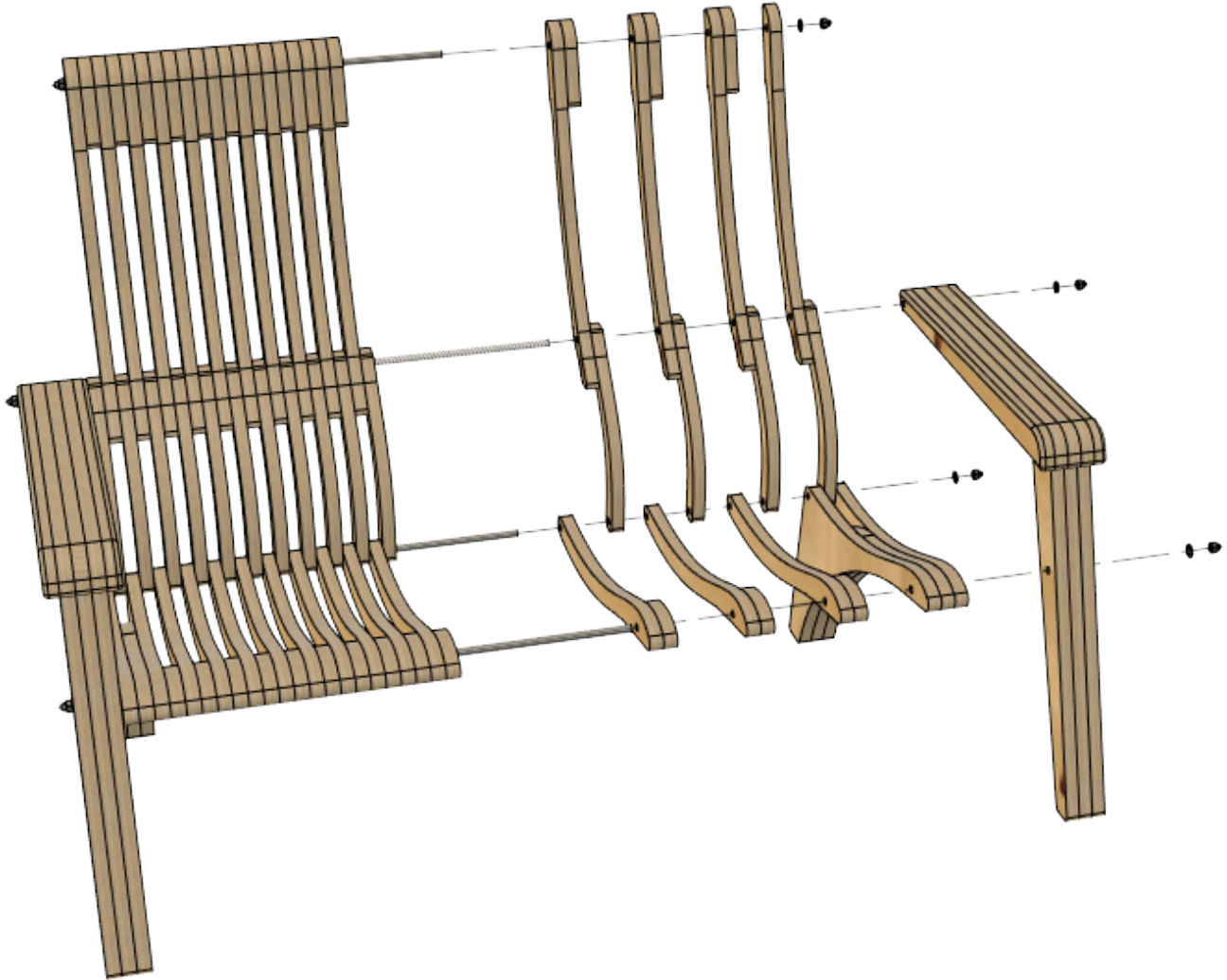
There are infinite number of ways to finish furniture, we are still learning how to achieve the best results fast. There will be no step-by step instructions here, but general advice.

- We prefer to use water-based polyurethane varnish because it dries fast (1 hour between recoating), it doesn't smell and it's easy to clean. It's also durable and suitable for outdoor furniture.
- We apply 3 thin layers with cloth with slight 320 grit hand-sanding in between.
- We perform these procedures on hanging parts:

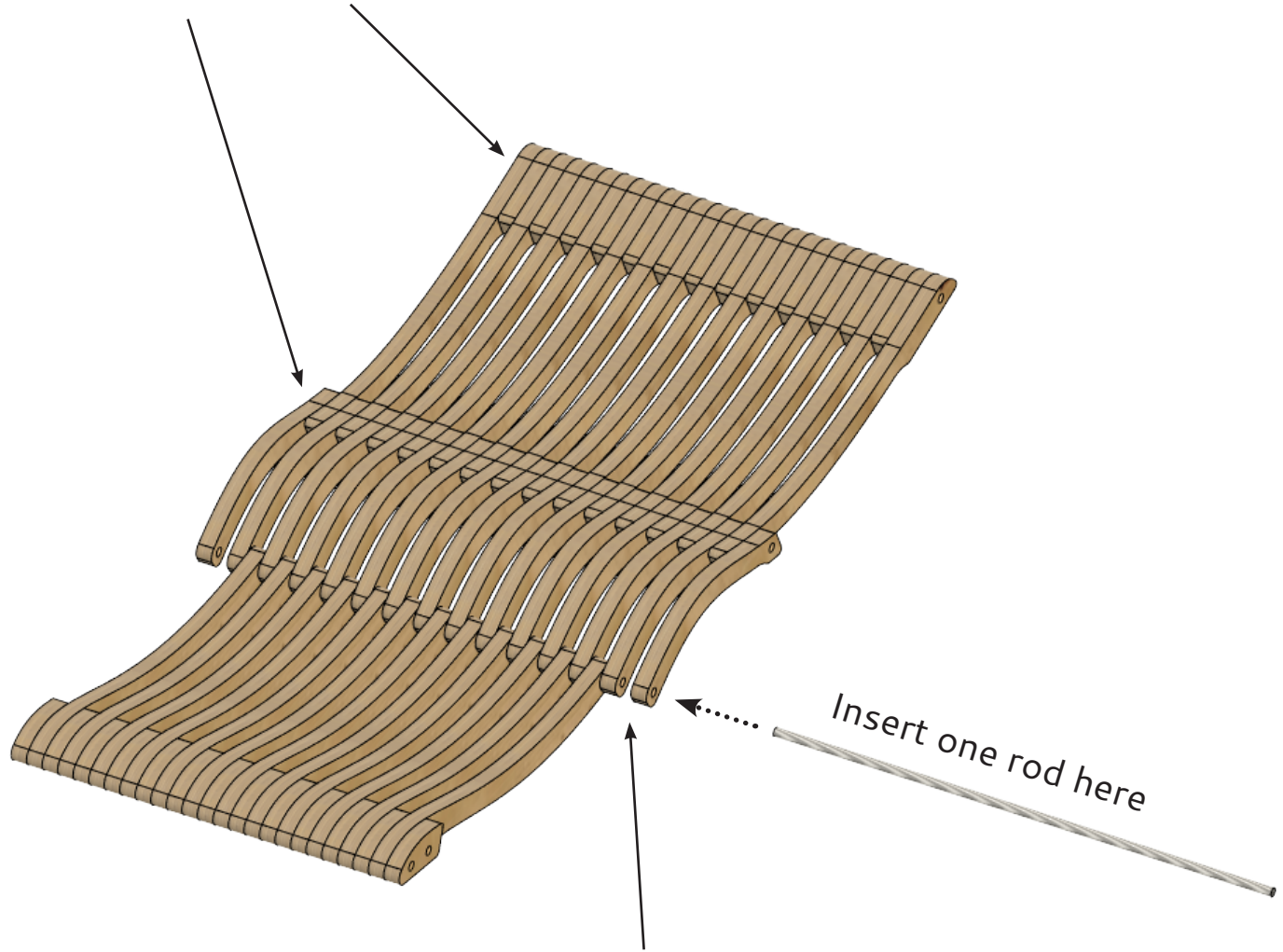


11. Assembly

Here is the exploded view of the chair so you can get familiar with it before you start:



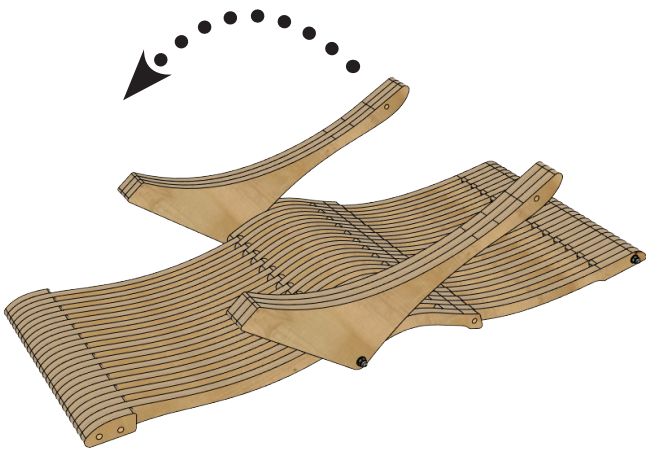
11.1 Take out all rods



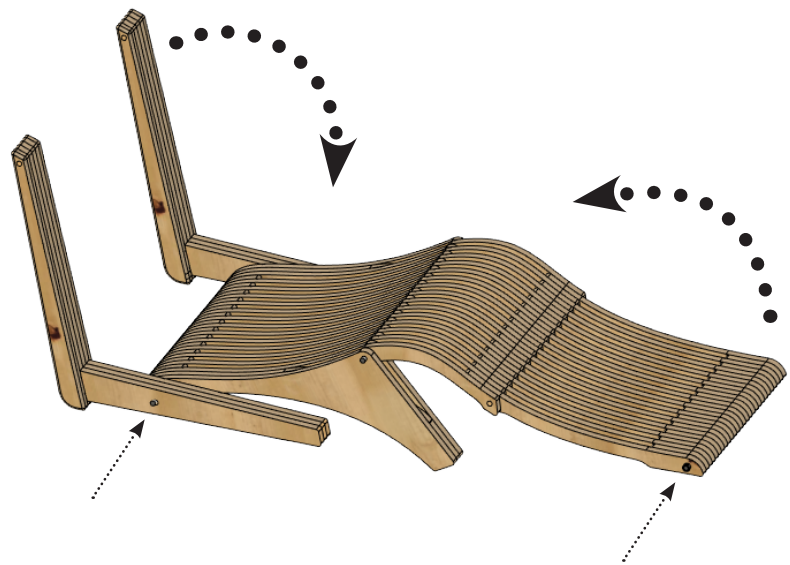
Leave space for the back legs on
both sides

11.2 Join the cushion parts with the back rest parts with a threaded
rod

11.3 Add the legs. It's easier to connect them while they are up-side-down and then flip them over



11.4 Join the arm rests with a rod, and flip them



11.5 Add a rod in the top of the back rest and lift it



11.6 Insert the last rod here to attach the arm rests to the back rest

12. Chair width

Simba chair has 27 layers of plywood at its top. Because of this, any variation in thickness of the parts will be amplified 27 times. Just 1 mm thicker plywood will make the chair more than an inch wider and that will definitely affect the chair's proportions and looks.

Our goal is to keep the top of the backrest as close to 20" (500 mm) as possible to avoid disproportion. You can add or remove layers to the chair to adjust its final width before cutting the threaded rods to their final length.



12.1 Mark the final length of the rods with a marker or masking tape



12.2 Take the rods slightly out and cut them to final length with a hack saw or a grinder

12.3 Tighten all the cap nuts

- The assembled chair can be sanded with 1000+ grid sandpaper to achieve the best smoothness
- It is recommended to add some epoxy on the chair legs to protect it from absorbing water from soil.
- It's also a nice idea to wax the chair before turning it over to a client. Wax will fill up any micro cracks and further seal the plywood.

Well done!

You have completed the Simba chair assembly!



Please consider leaving a review about your experience here:

<https://make.better.furniture/simba>



Credits

Thank you for buying the Simba chair files and showing your support! Without your contribution I wouldn't be able to make this design real.

I truly appreciate any feedback, suggestions, photos of the chair, and commercial partnership ideas.

Please send all of those to my personal email ajay@better.furniture.

– Ajay Verma, 2024



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