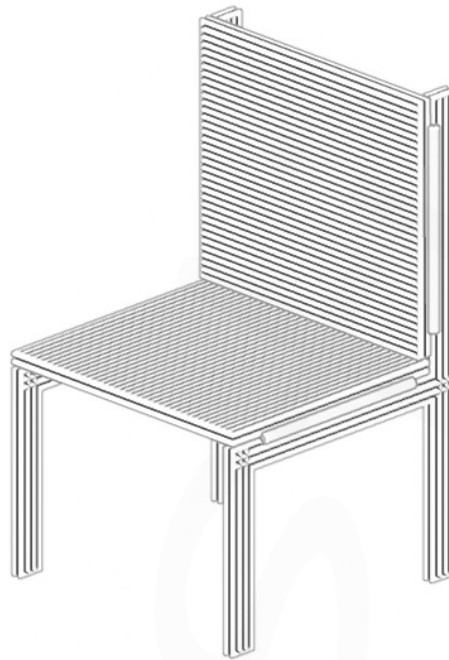


MAKE • DISCOVER • COLLECT

Chair for a small character

Beginners aged 10 and over, teenagers and adults. • Approximately 50–80 minutes



Build a miniature chair for an imaginary small character from four parts. Choose the colours and infill strips, join the cool parts and use the piece of furniture in your scene.



Your outcome

Build a clearly recognisable miniature piece of furniture from simple components.

Construction illustration. The instructions show the successive stages. Full-size (1:1) templates are supplied on a separate sheet.

What you need

A 3D pen, the selected filament and equipment available in your workspace. See the complete list below.

Tool

- | | |
|---|---|
| ☐ 3D pen compatible with PLA | 1 |
|---|---|

Workstation

- | | |
|--|----------------------------|
| ☐ Transparent mat for PLA | 1, clear area 230 × 150 mm |
|--|----------------------------|

Preparation

- | | |
|--|--|
| ☐ Page with the W01 and W02 templates at 100% scale | 2 copies: 2 × W01 and 2 × W02 in total |
| ☐ Standard paper scissors | 1 |
| ☐ Standard ruler with millimeter markings | 1, preferably 30 cm |

Filament — amounts include extra

- | | |
|---|------------------|
| ☐ PLA 1.75 mm — colour shown in the illustration | 4.0 m · ≈ 12.0 g |
| ☐ PLA 1.75 mm — colour shown in the illustration | 5.6 m · ≈ 16.8 g |
| ☐ PLA 1.75 mm — colour shown in the illustration | 5.6 m · ≈ 16.8 g |
| ☐ PLA 1.75 mm — colour shown in the illustration | 0.5 m · ≈ 1.5 g |

Total filament: 15.7 m · approximately 47.1 g

The quantities include extra filament. Grams indicate estimated net filament mass, excluding packaging.

Before you start

A miniature for a small character

The chair measures approximately $6 \times 6 \times 10$ cm. It is not intended to support a person's weight. Do not bend hardened PLA; achieve the correct alignment before welding.

- 1 Print TWO copies of the page with the W01 and W02 templates at 100% scale, without fitting to the page. Prepare a standard ruler with millimeter markings, preferably 30 cm. Use it to check that the control line on each copy is 20 mm long. Choose a small character, your own PLA colors, and a stripe layout.
- 2 From each copy, cut out one paper W01 and W02, leaving a 5 mm margin around the template outline. Assign them as follows: W01 from copy 1 → side 1 (SIDE_L), W01 from copy 2 → side 2 (SIDE_R); W02 from copy 1 → seat (SEAT), W02 from copy 2 → backrest (BACK). Keep W01 in its printed orientation: the paper is 70 mm wide × 110 mm high.

Rotate both W02 templates a quarter turn (90°) counterclockwise from the printed orientation: the paper is now 70 mm wide × 63.6 mm high. Use standard scissors only for paper.

- 3 Prepare a clear area of 230×150 mm under the transparent mat. From its lower-left corner, use a ruler to position the lower-left corners of the paper templates: W01 / SIDE_L at (5, 5) mm, W01 / SIDE_R at (80, 5) mm, rotated W02 / SEAT at (155, 5) mm, and rotated W02 / BACK at (155, 75) mm.

The longer edges of the W01 profiles run vertically on the paper. The rectangles do not overlap; all four remain in place while drawing.

- 4 Place the mat securely, flat and fully supported on the work surface, away from the table edge. Set up the pen according to the device and PLA instructions. Touch only cool parts.

For assembly in cards 5–6, arrange for a second person to help: they support the cool edge of the seat, including during grip changes and while adding the second side, until all four legs rest on the surface and the welds have cooled. Both people must keep their hands out of the path of the hot nozzle.

- 5 Before assembly, all four parts must be cool and rigid. This is a good time for a break. Leave the patterns under the mat; in the cleared area, stand the sides with their legs on one flat surface.

Estimate from the brief, with no lesson time limit or physical measurement; pen time is included in the making and assembly time.

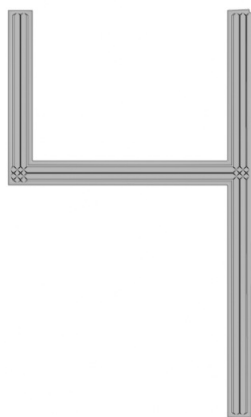
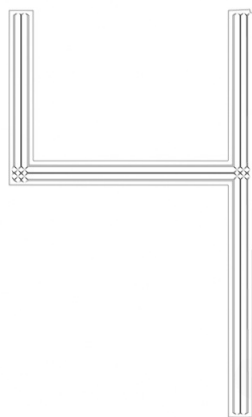


How to read the instructions

The large image shows the completed stage. Small views show the action and current parts. ×N means repeat the whole action N times, cooling and checking each time. Illustrations are not at 1:1 scale.

STAGE 01 / 08 • Session Praca własna

Make two identical sides



Outline of both sides • What to repeat: Outline of side 2



Infill and second layer • What to repeat: Filled side 2

Two cool sides

NOW Side 1 with two legs • Side 2 with two legs

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Side 1 with two legs • PLA | template SIDE_L

Trace the entire profile, including both legs. Add internal strands in both legs, the tall post and the crosspiece. Repeat the same paths on the cool first layer; together, the two layers are approximately 3,2 mm thick. Do not close the opening between the legs. Support: Flat mat for PLA; the entire part being drawn rests on the surface.

Cooling: Wait until the whole piece is cool and rigid before lifting it.

1 × Side 2 with two legs • PLA | template SIDE_R

Trace the entire profile, including both legs. Add internal strands in both legs, the tall post and the crosspiece. Repeat the same paths on the cool first layer; together, the two layers are approximately 3,2 mm thick. Do not close the opening between the legs. Support: Flat mat for PLA; the entire part being drawn rests on the surface.

Cooling: Wait until the whole piece is cool and rigid before lifting it.

On the first pattern, make the outline including the legs, followed by joined strands inside the legs, post and crosspiece. Once it has cooled, repeat the paths with a second layer. Leave the opening between the legs empty. Follow the same sequence on the second pattern. Let both sides cool.



Check

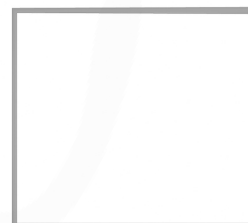
The two sides have the same shape and two integral legs each.

If it does not work

Fill the gap on the flat support. Remake a crooked side; do not bend cold PLA.

STAGE 02 / 08 • Session Praca własna

Start the seat



First outline

Half of the infill

NOW Seat

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Seat · PLA | template SEAT

→ T001 • Techniques — reference appendix

Complete the outline on the seat template. Fill about half the interior of the first layer with strands from edge to edge. Each strand touches the adjacent one and joins the outline; everything remains flat and supported. Stop at the halfway point of the first layer shown and leave the seat on the mat.

Completing and cooling the full layer, then adding the second layer crosswise, are covered in card 3.



Check

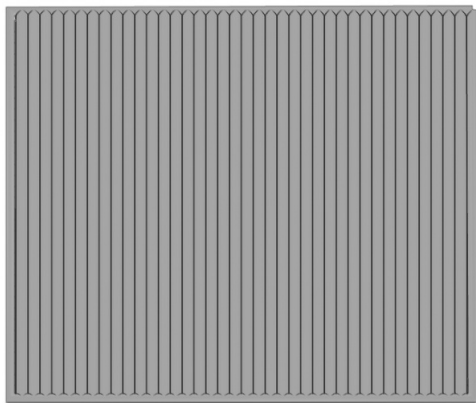
The completed outline and the joined half of the first layer are visible; the other half remains empty.

If it does not work

Join a loose end to the edge and fill the gap with PLA.

STAGE 03 / 08 • Session Praca własna

Finish the seat



Complete seat

NOW Seat

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

Finish the first layer. Once it has cooled, repeat the outline and lay the second layer crosswise, from edge to edge. All strands join to their neighbours and the outline. Choose your own strip colours. Leave it to cool.



Check

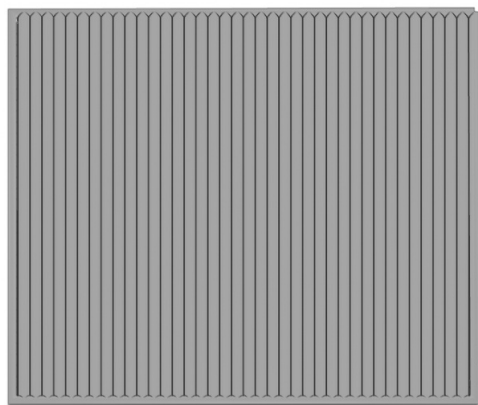
The seat has a continuous surface and two joined layers.

If it does not work

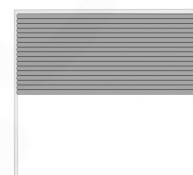
Fill the missing area on the flat support and let it cool again.

STAGE 04 / 08 • Session Praca własna

Make the backrest



Outline



Partial infill

Completed backrest

NOW Backrest

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Backrest · PLA | template BACK

Close the outline. Fill the first layer with strands from edge to edge, touching adjacent strands. Once it has cooled, repeat the outline and lay the second layer crosswise. The total thickness is approximately 3,2 mm. All strands must be supported; choose your own PLA colours.

Support: Flat mat for PLA; the entire part being drawn rests on the surface. Cooling: Wait until the whole piece is cool and rigid before lifting it.

Close the backrest outline on the pattern. Fill it from edge to edge with adjacent strands. Once the first layer has cooled, repeat the outline and add the second layer crosswise. You can repeat the seat colours. Let all four parts cool; you can pause the work here.



Check

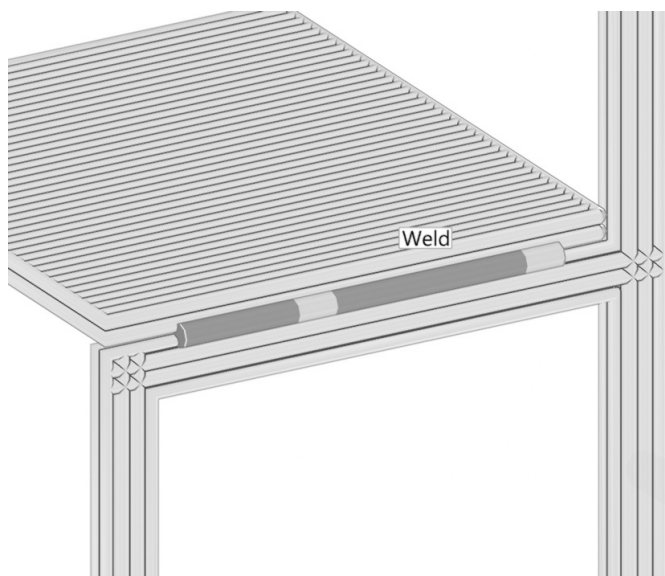
You now have two cool sides, a seat and a backrest with consistent infills.

If it does not work

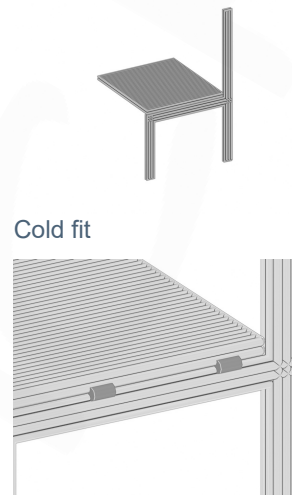
Fill the gap while the part is flat and let it cool. Do not assemble a flexible or warm part.

STAGE 05 / 08 • Session Praca własna

Join the seat to the first side



Reinforced joint



Two supported tacks

NOW Side 1 with two legs · Seat · Seat weld — left

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Seat weld — left · PLA | template follow the written method

→ T002 • Techniques — reference appendix

Stand the side on both legs. Rest the seat on the crossbar: it extends forward from the tall rear post toward the short front leg. Align the outer edges. A second person supports the cool free edge of the seat from below at the front corner. Grip the cool front of the joint with a finger underneath and your thumb on top.

With your other hand, make two PLA tacks from the outside: one at the rear and one in the center. Let them cool, connect them with a weld, and let it cool again. Move your grip to the cool rear, extend the weld toward the front, and let it cool.

The helper provides continuous support, including during the grip change and while moving on to card 6. Both people must keep their hands out of the path of the hot nozzle.



Check

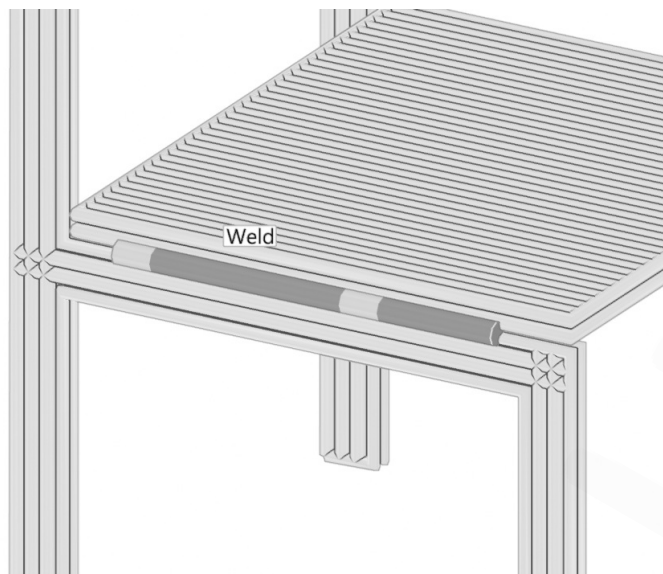
Both legs of the side touch the surface; the weld is cool, and the helper continues to support the free edge of the seat.

If it does not work

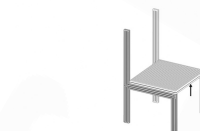
Correct the alignment without pressing before making the tacks. Support a weak spot, add PLA and let it cool.

STAGE 06 / 08 • Session Praca własna

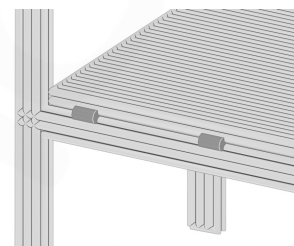
Position the second side and align the legs



Second joint reinforced



Helper supports the seat while the side is added



Two tacks on the second side

NOW Side 2 with two legs · Seat weld — right

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Seat weld — right · PLA | template follow the written method

→ T002 • Techniques — reference appendix

The helper continues to support the seat. Without releasing it, they shift their support under the cool front edge between the sides, making room for the second side. Place it under the opposite edge of the seat, with the tall post at the rear and the short leg at the front. Align the outer edges; the seat sets the spacing.

Rest all four legs on one flat surface. Grip the cool front of the new joint. From the outside, make two tacks, one at the rear and one in the center, let them cool, and connect them with a weld. Once it has cooled, move your grip to the cool rear, extend the weld toward the front, and let it cool.

The helper provides support throughout the grip change and assembly until all four legs are supported and the welds have cooled. Only then release your grips. Both people must keep their hands out of the path of the hot nozzle.



Check

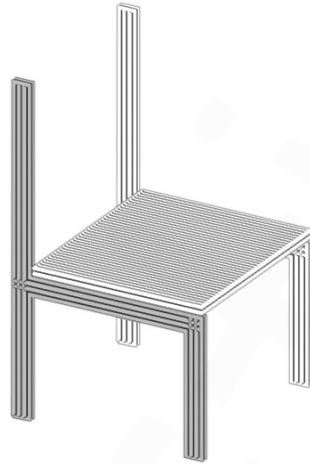
All four legs touch one flat surface, the seat is level, and both welds are cool before the grips are released.

If it does not work

Correct the alignment before making the tacks. Support and fill a loose joint. Do not force cold PLA straight.

Position the second side and align the legs — construction details

Fit before welding

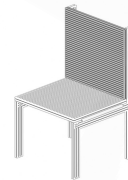


STAGE 07 / 08 • Session Praca własna

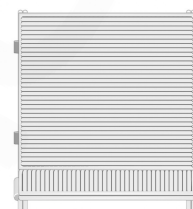
Position and attach the backrest



Two side welds



Backrest supported on the seat



Four attachment tacks

NOW Backrest · Backrest welds

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Backrest welds · PLA | template follow the written method

Make short PLA tacks on the supported joint, let them cool and then connect them with sections of weld. Do not make this part separately. Finished cross-section [mm]: 2.4 × 2.4. Support: All four legs stand on a flat surface. The bottom of the backrest rests on the seat; the backrest touches the front faces of the rear posts.

Holding the cool centre of the top edge prevents it from tipping over. Strand direction: Guide the tip along the accessible outer joint; connect the beginning and end of each section to a cooled tack. Cooling: Maintain your grip until the tacks have cooled; after reinforcing them, wait for them to cool again.

Tip access: Work from the outer edges of the chair, making the left weld first and then the right; keep your fingers in the centre of the backrest, away from both welds.

Rest the bottom of the backrest on the seat in front of the rear posts. Align the top and side edges. Hold the cool centre of the top edge; the seat supports the bottom. From the outside, make two PLA tacks at each of the left and right posts, one lower and one higher. Let them cool.

Connect the tacks with a weld and extend it slightly upwards and downwards: first on the left, then on the right. Maintain your grip until it has cooled.



Check

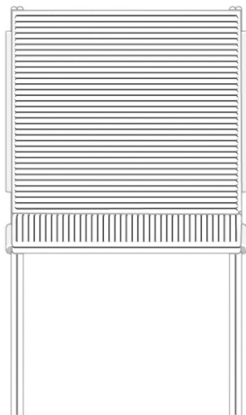
The backrest stands upright and holds to both posts; all legs still touch the surface.

If it does not work

Move the backrest without pressing before making the tacks. Support a weak weld, add PLA and let it cool.

STAGE 08 / 08 • Session Praca własna

Check and use the chair



Check from the side

Check from the front

NOW Check the complete model

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

Once it has cooled, check the four legs, the seat level and the backrest attachment. View the chair from the front and side. Use it as a piece of furniture in an imaginary scene and explain who the selected pattern was made for.



Check

The chair stands by itself on four legs, with a level seat and a strong backrest. Explain which small character it was made for.

If it does not work

Support a weak joint, add PLA and let it cool. Do not bend a crooked, cool chair; check the fit of its parts.

Finished — check the outcome



Check

All four legs rest on one flat tabletop.



Check

The seat is level, and the backrest is upright and does not detach when the cool part is touched lightly.



Check

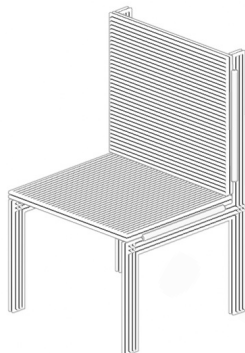
The infills are consistent; the chair has a role in an imaginary scene.

Storage

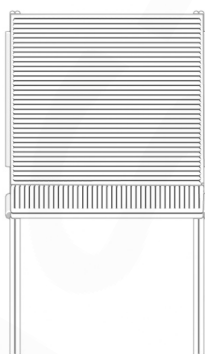
Store the model in a cool place away from sunlight and heat. Repair it on a suitable 3D-pen work surface using the same material as the part.

View from different sides

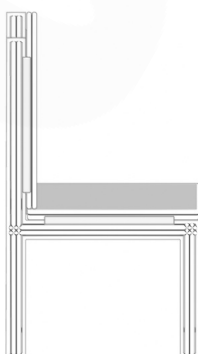
View 1



View 2



View 3



Techniques — reference appendix

T001 • Stage 2

1 × Seat · PLA | template SEAT

Close the outline. Fill the first layer with strands from edge to edge, touching adjacent strands. Once it has cooled, repeat the outline and lay the second layer crosswise. The total thickness is approximately 3,2 mm. All strands must be supported; choose your own PLA colours.

Support: Flat mat for PLA; the entire part being drawn rests on the surface. Cooling: Wait until the whole piece is cool and rigid before lifting it.

T002 • Stage 5 · Stage 6

1 × Seat weld — left · PLA | template follow the written method

1 × Seat weld — right · PLA | template follow the written method

Make short PLA tacks on the supported joint, let them cool and then connect them with sections of weld. Do not make this part separately. Finished cross-section [mm]: 2.4 × 2.4. Support: The seat rests on top of the side crosspiece.

Both legs of the side stand on a flat surface; one hand grips the cool front of the joint while the other guides the pen. Strand direction: Guide the tip along the accessible outer joint; connect the beginning and end of each section to a cooled tack.

Cooling: Maintain your grip until the tacks have cooled; after reinforcing them, wait for them to cool again. Tip access: From the outside of the side, below the edge of the seat; start at the back and centre. Before making the section at the front, move your grip to the cool back.