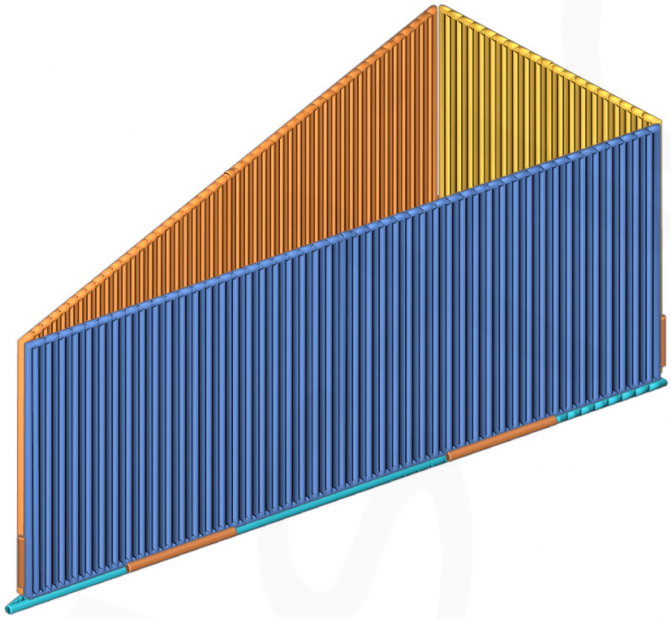
MAKE • DISCOVER • COLLECT

A Boat for a Message

Beginners aged 10 and up, teenagers and adults • Approximately 45–70 min, including 25–40 min using the pen



Build an open PLA boat from four filled parts. Once cool, place a small paper message inside and display it on a dry shelf.

Your outcome

Build a three-dimensional boat that can hold your own small paper message.

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.

Equipment

☐ 3D pen for PLA and stand	**1 set**

Filament

☐ PLA compatible with the pen Your own colors; consumption requires a later production estimate.	**Enough for four parts and short joints**

Equipment

☐ Transparent PLA-compatible work surface	**1, with a clear 32 × 30 cm area**

Preparation

☐ 1:1 template printout Bottom once, shared side template twice, stern once.	**1 set: 1 A4 page**
☐ Ruler and ordinary paper scissors	**1 of each**

Materials

☐ Paper for a message A light note that fits inside the open hull.	**1 small piece**

Tools

☐ Pencil or pen For writing a message once the boat is cool.	**1**

Filament — amounts include extra

☐ PLA 1.75 mm — colour shown in the illustration	**3.1 m · ≈ 9.3 g**
☐ PLA 1.75 mm — colour shown in the illustration	**5.3 m · ≈ 15.9 g**
☐ PLA 1.75 mm — colour shown in the illustration	**5.3 m · ≈ 15.9 g**
☐ PLA 1.75 mm — colour shown in the illustration	**2.2 m · ≈ 6.6 g**
☐ PLA 1.75 mm — colour shown in the illustration	**0.2 m · ≈ 0.6 g**

Total filament: 16.1 m · approximately 48.3 g

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

Before you start

Assembly assistance

A second person supports the cold upper corners while the maker joins the accessible contact points with the pen. Do not touch the nozzle or fresh PLA.

Your colors

Choose colors for the bottom and walls. You may change them between fill strands according to the pen instructions, while keeping the strands connected.

Shelf decoration

The result is a decorative boat for dry display. It is not intended to float or have a watertight hull.

A message in the boat

The boat holds one light paper note. You can swap the messages. Keep it on a dry shelf; the model is not designed to float or touch water.

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.

Prepare your workspace

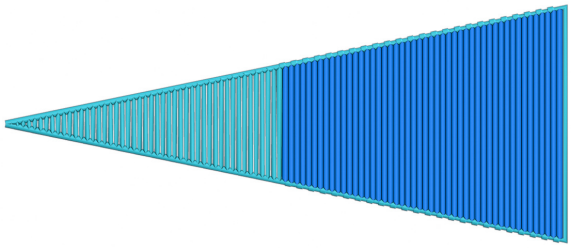
1. Work on a stable tabletop. Place the pen stand and cable outside the drawing area. For assembly, arrange for a second person to hold the cold upper sections of the walls.
2. Print the complete set of A4 templates at 100% scale, without fitting to the page. Measure the printed 20 mm control line. If its length is different, correct the scale and print again before drawing.
3. Cut out the rectangular template fields from the paper together with their labels and a small margin: DNO, BURTY ×2 and RUFA. Do not cut along the boat outline. The scissors are used only to prepare the paper.
4. Under the transparent work surface, within the clear 32 × 30 cm area, place DNO in the center with the bow pointing left. Place the BURTY template above the bottom, with its longer side horizontal and a gap of approximately 3 cm between the paper fields. RUFA lies on the right, approximately 1 cm from the bottom's paper field.

   All fields are separate and do not overlap.
5. Below the bottom, leave a clear 14 × 7 cm area for the second side, with a gap of at least 2 cm from the bottom field. Only after the bottom and first side have cooled, move just the BURTY paper there; the DNO and RUFA templates remain in place. Check the entire work-surface area before tracing each outline.
6. Choose the colors and set up the pen according to its instructions for the PLA being used. Always cool completed parts flat; parts may be handled and assembled only when completely cold.

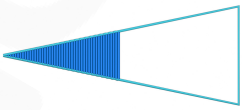
Estimate from the approved brief; there is no time limit for home or workshop use. It includes preparing the paper, making four filled parts, assisted assembly, cooling and tidying up. The pace and cooling require a physical trial.

STAGE 01 / 08 • Session dom-lub-warsztat

Draw and fill the bottom



1. Outline



2. Half filled

3. Complete part

NOW Bottom

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

PARTS FOR THIS STAGE

1 × Bottom · PLA for a 3D pen | template kadlub

→ T001 • Techniques — reference appendix

Choose PLA colors for the bottom and walls. After arranging the templates, trace the triangular bottom. Fill from the bow with short strands running from edge to edge, side by side with a slight overlap. Join every strand to the outline. Leave the bottom flat to cool.

✓ **Check**

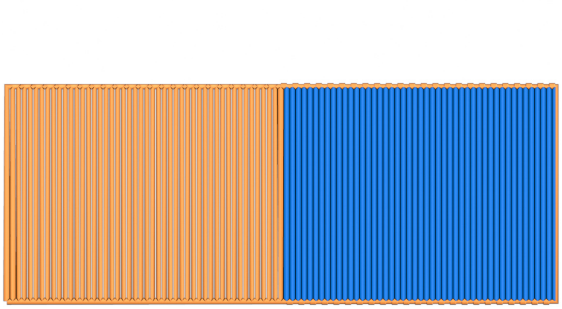
The pointed bow is visible, and the entire fill is connected to the outline.

If it does not work

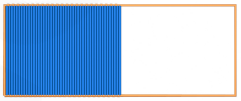
Bridge the gap with a short PLA strand. Remake a warped bottom flat before assembly.

STAGE 02 / 08 • Session dom-lub-warsztat

Make the first side



1. Outline



2. Half filled

3. Complete part

NOW Side 1

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

PARTS FOR THIS STAGE

1 × Side 1 · PLA for a 3D pen | template kadlub

→ T001 • Techniques — reference appendix

On the upper template, trace the rectangular side. Starting at a short end, fill it with strands connecting the long edges; each new strand touches the previous one. The images show the outline, the half-filled part and the complete part. Leave the part flat to cool.

Check

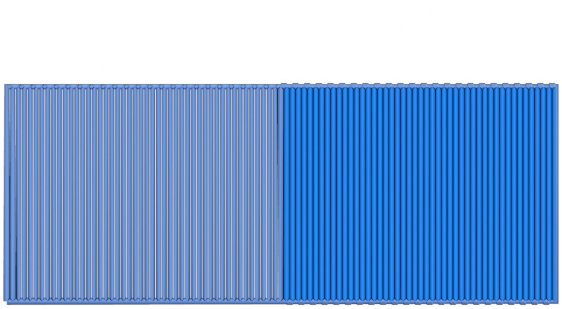
The side has a closed outline and connected fill; the corners lie flat.

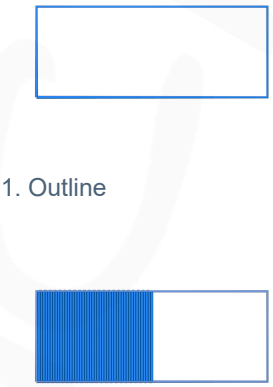
If it does not work

Fill the gaps between the strands. Do not bend the PLA; remake a warped part before joining.

STAGE 03 / 08 • Session dom-lub-warsztat

Make the second side





1. Outline

2. Half filled

3. Complete part

NOW Side 2

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

PARTS FOR THIS STAGE

1 × Side 2 · PLA for a 3D pen | template kadlub

→ T001 • Techniques — reference appendix

When the first side and bottom have cooled, slide just the BURTY paper template out of the upper area and into the clear lower 14 × 7 cm area. The cold parts stay in place; the other templates do not move. Trace and fill the second side in the same way. You may choose a different color. Cool it flat.

✓ **Check**

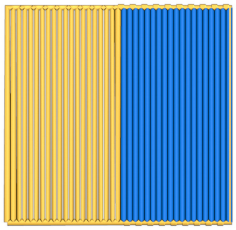
You have two separate sides with the same dimensions; the paper does not overlap the other templates.

If it does not work

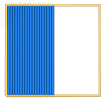
If the template has shifted, stop drawing. Position the paper in the clear area, align it with the cold outline, and only then continue.

STAGE 04 / 08 • Session dom-lub-warsztat

Add the stern



1. Outline



2. Half filled

3. Complete part

NOW Stern

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

PARTS FOR THIS STAGE

1 × Stern · PLA for a 3D pen | template kadlub

→ T001 • Techniques — reference appendix

On the template on the right, trace and fill the smaller stern rectangle. Join adjacent strands to the outline. Allow it to cool. You now have the bottom, two sides and the stern; you may take a break at this point.

✓ **Check**

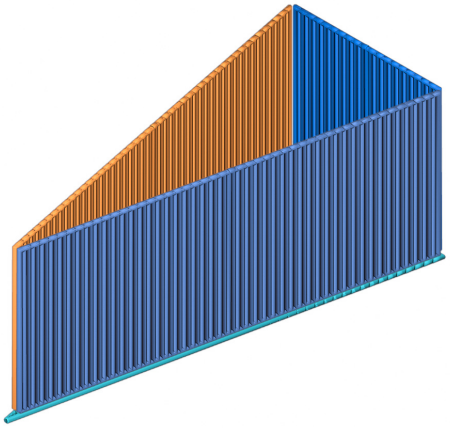
The four parts are rigid, flat and completely cool.

If it does not work

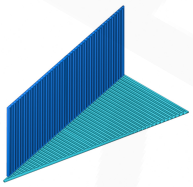
Add any missing fill connections. Do not lift a warm part or fit it to the hull.

STAGE 05 / 08 • Session dom-lub-warsztat

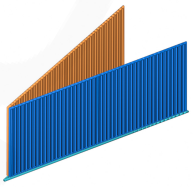
Set up the three walls



Close the rear with the stern



Position the first side



Add the second side

NOW Side 1 · Side 2 · Stern

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

Separate the cooled parts from the work surface; leave the bottom flat. Position the first side, second side and stern, in that order, on the edges of the bottom. The short ends of the sides meet to form the bow.

The helper first holds the sides, then grips both upper rear corners, holding one side together with one end of the stern in each hand. Put the pen down before tacking.

✓ **Check**

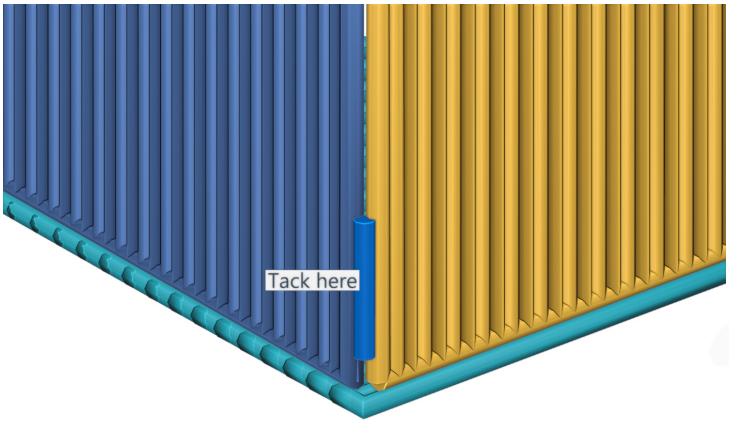
The walls stand vertically, their lower edges rest on the bottom, and the three corners touch without being forced together.

If it does not work

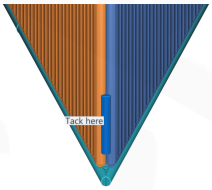
Reposition the parts. Do not bend cold PLA. If an edge is warped, remake that flat part.

STAGE 06 / 08 • Session dom-lub-warsztat

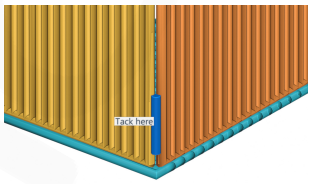
Tack the three corners



Rear corner 2



Bow



Rear corner 1

NOW Tack joint: bow · Tack joint: rear corner 1 · Tack joint: rear corner 2

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

PARTS FOR THIS STAGE

1 × Tack joint: bow; 1 × Tack joint: rear corner 1; 1 × Tack joint: rear corner 2 · PLA for a 3D pen | template follow the written method

→ T002 • Techniques — reference appendix

The helper continues to hold the cold upper sections of both rear corners. Tack the bow, rear corner 1 and rear corner 2, in that order. From the outside, run approximately 9 mm of PLA upward across both touching edges. After each tack joint, move the nozzle away and hold the parts in position until cool.

Keep fingers on the cold upper section.

Check

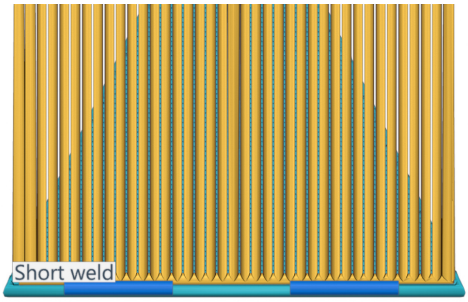
Each of the three corners has a short joint that grips both walls; the hull retains its shape.

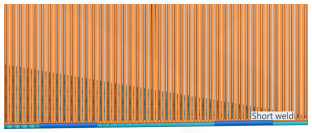
If it does not work

If a joint caught only one wall, correct the position and add a short tack joint across both. Allow it to cool while continuing to hold the upper section.

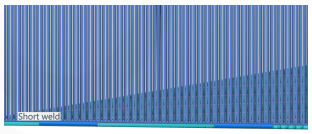
STAGE 07 / 08 • Session dom-lub-warsztat

Join the walls to the bottom





Side 1 at the bottom



Side 2 at the bottom

Stern at the bottom

NOW Side 1 at the bottom · Side 2 at the bottom · Stern at the bottom

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

PARTS FOR THIS STAGE

1 × Side 1 at the bottom; 1 × Side 2 at the bottom; 1 × Stern at the bottom · PLA for a 3D pen | template follow the written method

→ T003 • Techniques — reference appendix

While the cold upper section is supported, add two separate strands from the outside at each of these points: side 1, side 2 and the stern. The strands at the sides are approximately 2 cm each; those at the stern are approximately 1.2 cm each. Every strand grips the wall and the edge of the bottom. Cool each strand after applying it.

The bottom remains flat throughout; do not apply PLA underneath.

✓ **Check**

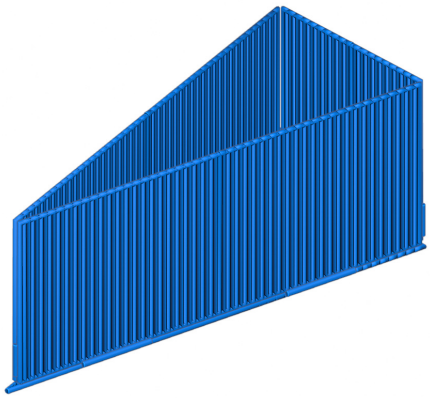
Six short strands join the three walls to the bottom; the gaps between the strands remain visible.

If it does not work

If a weld missed one edge, let it cool, correct the position and add a short joint across both edges. Do not lift the warm hull.

STAGE 08 / 08 • Session dom-lub-warsztat

Position your own boat



Finished decoration

NOW Bottom · Side 1 · Side 2 · Stern · Tack joint: bow · Tack joint: rear corner 1 · Tack joint: rear corner 2 · Side 1 at the bottom · Side 2 at the bottom · Stern at the bottom

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

After the welds cool, release the walls and check that the boat stands by itself. Write a small paper message, fold it and place it inside the open hull. Set the boat on a dry shelf.

✓ **Check**

The boat stands by itself, none of the walls pull away from the bottom, and one light paper message rests inside the open hull.

If it does not work

Hold a loose joint by the cold upper section, join it with a short PLA strand and allow it to cool. Do not force the rigid hull straight.

Finished — check the outcome

Check
I can recognize the boat's distinct bow and open interior.

Check
The bottom and three walls form a three-dimensional hull.

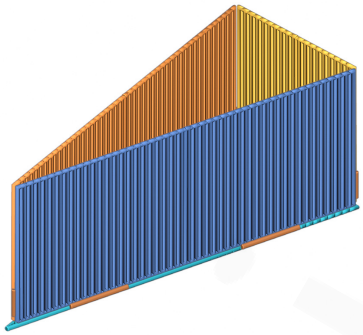
Check
Once cool, the boat stands on its bottom without support, and a light touch on a cold side does not separate the joint.

Check
One small paper message rests inside the open hull; the boat stands on a dry shelf.

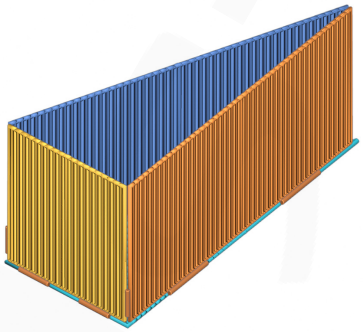
Storage
Store the model in a cool place away from sunlight and heat. Repair it on a suitable 3D-pen work surface using the same material as the part.

View from different sides

View 1



View 2



Techniques — reference appendix

T001 • Stage 1 · Stage 2 · Stage 3 · Stage 4

1 × Bottom · PLA for a 3D pen | template kadlub

1 × Side 1 · PLA for a 3D pen | template kadlub

1 × Side 2 · PLA for a 3D pen | template kadlub

1 × Stern · PLA for a 3D pen | template kadlub

Trace the 1:1 template. Fill from one end with short strands running from edge to edge, placed side by side with a slight overlap. Join every strand to the outline. Cool flat. Finished cross-section [mm]: 1.5 × 1.5. Support: Flat on the PLA-compatible work surface; the outline and every fill strand touch the surface.

Strand direction: First a closed outline; then crosswise zigzag strands spaced approximately 1.25 mm apart. Cooling: Leave the part flat until completely cool. Do not bend rigid PLA. Tip access: Hold the pen above the work, keeping fingers away from the nozzle path; use the settings specified in the device instructions.

T002 • Stage 6

1 × Tack joint: bow; 1 × Tack joint: rear corner 1; 1 × Tack joint: rear corner 2 · PLA for a 3D pen | template follow the written method

A short, accessible PLA joint at the contact point between cold parts, supported until cool. Finished cross-section [mm]: 1.4 × 1.4. Support: Keep the bottom flat; the helper holds both cold upper rear corners. The fresh PLA rests on the two touching vertical edges.

Strand direction: From bottom to top along the outer contact line; approximately 9 mm, with no unsupported section in mid-air. Cooling: After each tack joint, move the nozzle away and hold the parts in position until the joint has cooled completely.

Tip access: Place the nozzle outside the corner at a height of 4–13 mm; the helper's hands remain on the cold upper section, above 35 mm.

T003 • Stage 7

1 × Side 1 at the bottom; 1 × Side 2 at the bottom; 1 × Stern at the bottom · PLA for a 3D pen | template follow the written method

A short, accessible PLA joint at the contact point between cold parts, supported until cool. Finished cross-section [mm]: 1.7 × 1.7. Support: The bottom remains flat, while three cold tack joints position the corners; the helper continues to hold the cold upper rear corners. Each strand rests on the side and the bottom outline.

Strand direction: Two separate strands along the outer joint between the wall and bottom, applied one after the other with a cooling pause. Cooling: Hold the wall still until each short strand has cooled. Only then move on to the next one.

Tip access: Keep the nozzle low on the outside of the joint, not underneath; keep a cold grip at the top. Move the pen to the other side without lifting the hot boat.