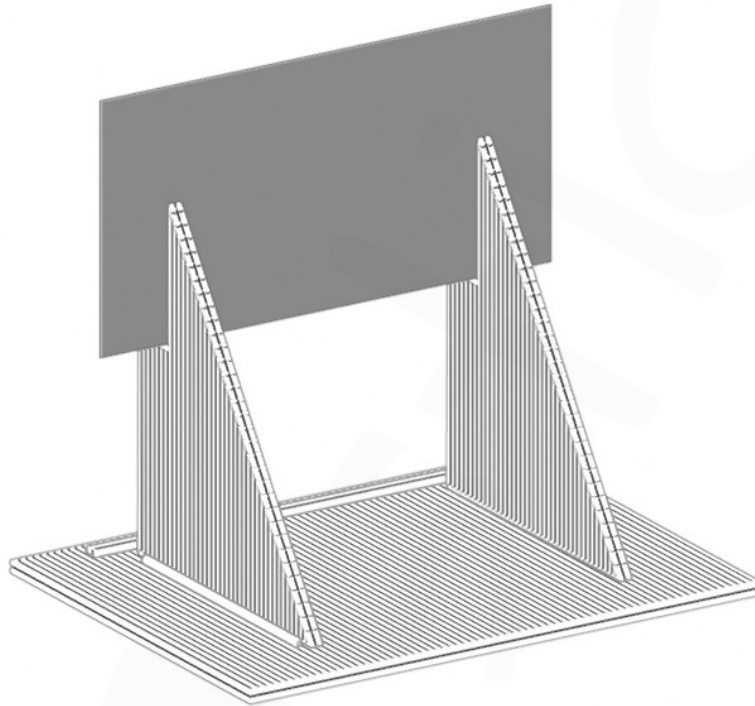


MAKE • DISCOVER • COLLECT

Message holder

Beginners aged 10 and over, teenagers, and adults. • Estimated time: 40–65 min, including 25–40 min of pen work; no time limit.



Build a three-dimensional holder from a flat, solid base and two triangular supports. Choose the colors, join the parts, and place your own message in the unobstructed slot.



Your outcome

Make a stable object and learn a simple three-dimensional joint.

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

What you need

Additional items are needed. Prepare the complete list below before starting.

Equipment

☐	PLA-compatible 3D pen	1
☐	Standard transparent mat	1

Templates

☐	1:1 template printout	Base template and support template for making 2 pieces
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Additional materials

☐	Card Prepared, approx. 70 × 36 mm, one layer approx. 0.2 mm thick.	1
☐	Pencil For the assembly lines on the cooled base and for the message.	1

Equipment

☐	Ruler with millimeter markings For checking the 20 mm print scale and measuring the support positions.	1
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Filament — amounts include extra

☐	PLA 1.75 mm — blue — base (participant's color)	6.3 m · ≈ 18.9 g
☐	PLA 1.75 mm — turquoise — left support (participant's color)	1.9 m · ≈ 5.7 g
☐	PLA 1.75 mm — orange — right support (participant's color)	1.9 m · ≈ 5.7 g
☐	PLA 1.75 mm — yellow — tacks and seams (participant's color)	0.1 m · ≈ 0.3 g
☐	PLA 1.75 mm — yellow — strands at the front of the base (participant's color)	0.1 m · ≈ 0.3 g

Total filament: 10.3 m · approximately 30.9 g

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

Before you start

Hot tip and freshly extruded PLA

Use the device according to its instructions. During assembly, hold only the cool upper area of the support; keep your hand away from the nozzle and the seam. If you cannot maintain a safe distance, ask an adult for help.

- 1 Place the mat securely, flat, and entirely on the worktop, away from the edge of the table.
- 2 Print the templates at 100% scale, without fitting them to the page. Use a ruler to check the 20 mm reference segment: it must measure 20 mm. If it does not, correct the settings and print again.
- 3 Place the verified 1:1 printout under the transparent mat. Choose the colors for the base, supports and finishing.
- 4 Prepare a sheet of paper, a pencil and a ruler. The base's solid fill will hide the template: use a pencil to draw the assembly lines on its completely cool top according to the measurements from stage 3. Move parts only after they have cooled completely.

Estimated time for five stages of work at home or in a workshop; it is not a time limit. The time was not measured. The estimate covers preparation, work with the pen, assembly, a function test and cleanup. Cooling continues until the parts and welds have cooled completely.

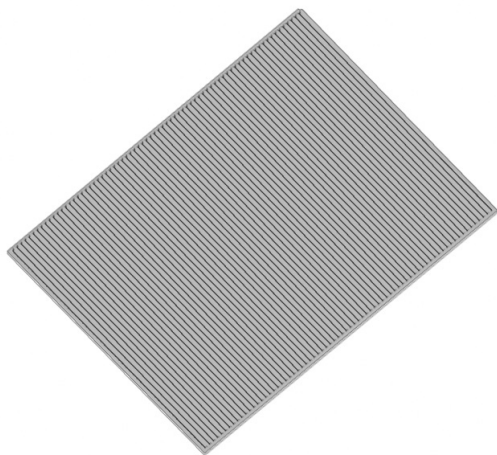


How to read the instructions

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 / 05 • Session 1

Make the base



Outline

Infill progress

Two layers

NOW Base

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

PARTS FOR THIS STAGE

1 × Base · PLA | template BASE

On the 1:1 template, outline the base with an approx. 1.2 mm strand. Fill it with adjacent strands, then run the second layer across the first. Join the ends to the outline. Total thickness: approx. 2.3 mm. Once cooled, use it in the assembly. Number of layers: 2.

Outline the base on the mat. Fill it with adjacent strands from edge to edge, joining them to the outline. Run the second layer across the first; total thickness approx. 2.3 mm. Choose your own color. Wait for it to cool.



Check

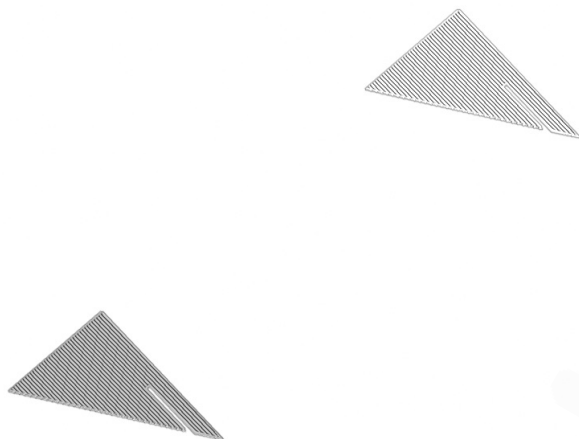
Two layers form a solid base, including beneath the support feet.

If it does not work

If the strands do not join the outline, fill the gap on the mat and wait for it to cool.

STAGE 02 / 05 • Session 1

Build two triangular supports



Outline with a notch • What to repeat:
Outline the right support

Strands from the bottom edge • What
to repeat: Fill the support

Stage outcome

NOW Left support • Right support

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

PARTS FOR THIS STAGE

1 × Left support; 1 × Right support • PLA | template SUPPORT

Make the triangle flat, with an open notch, following the 1:1 template. Fill it with adjacent strands from the bottom edge to the outline; below the notch, end at its bottom. Repeat the outline and infill for the second layer without filling the notch. Once cooled, stand the entire part upright; do not bend the PLA. Number of layers: 2.

Make two supports using the same template. Outline the triangle with an open notch. Fill it with strands from the bottom edge to the outline; below the notch, end at its bottom. Add a second layer. You may choose different colors for the two supports. Wait for them to cool.



Check

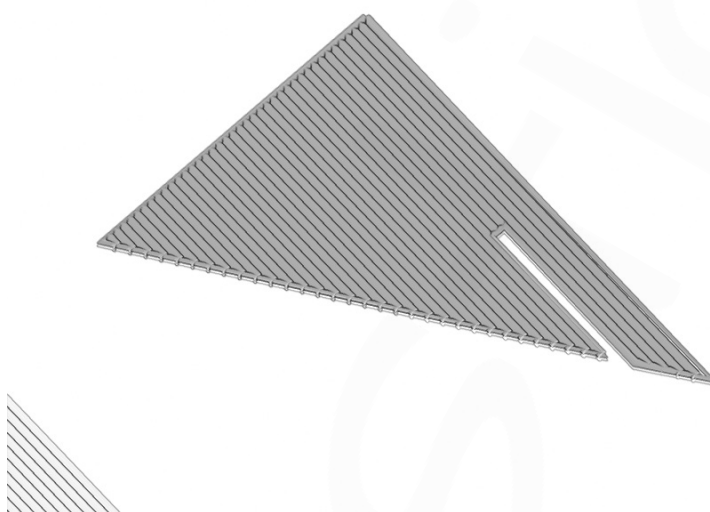
Both supports are solid and straight; both notches remain empty.

If it does not work

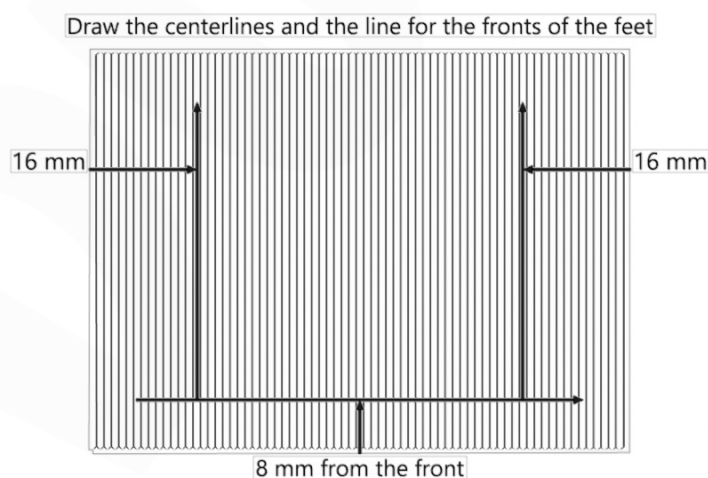
Remake the support if its notch is filled or the support is warped. Do not bend the finished PLA.

Build two triangular supports — construction details

Solid support • What to repeat: Complete the support

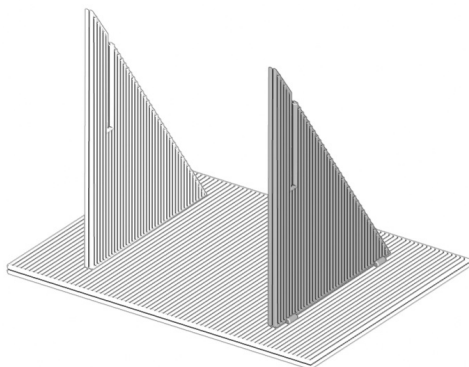
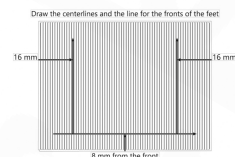


Mark in pencil: centerlines 16 mm from the sides, fronts of the feet 8 mm from the front

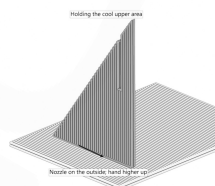


STAGE 03 / 05 • Session 1

Position and tack the holder



Pencil on the cool base: 16 mm / 8 mm



Cool grip; foot on the base • What to repeat: Position the right support

Stage outcome

NOW Left support • Left tacks and seam • Right support • Right tacks and seam

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

PARTS FOR THIS STAGE

1 × Left tacks and seam • PLA | template follow the written method

1 × Right tacks and seam • PLA | template follow the written method

→ T001, T002 • Techniques — reference appendix

On the cool base, measure 16 mm from each outer side and 8 mm from the long front edge; connect each pair of marks with a pencil to form two axes and the front line for the feet. On both cool supports lying flat, use a pencil to mark along the foot the tack-weld ranges at 4–7 and 37–40 mm and the weld endpoints at 3 and 41 mm.

Measure from the front outer edge of the foot (0 mm). Align the center of the foot's thickness with the axis and its front high edge with the 8 mm line, with the notch facing forward. Set the support vertical. Rest the foot on the base and hold the cool upper area; make two tack welds from the outside within the marked ranges.

Hold until cool; repeat for the second support. If it is difficult to maintain a safe grip, ask an adult for help.

✓ Check

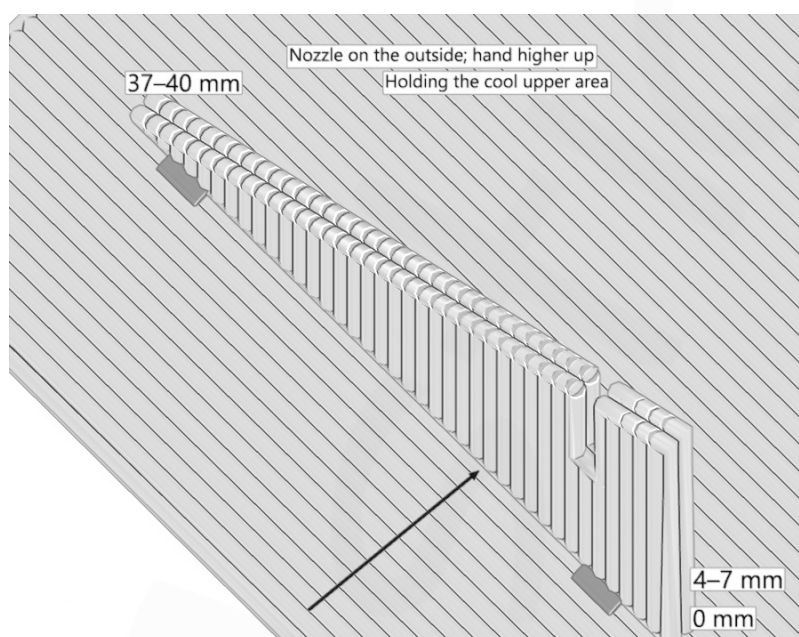
After all the tacks have cooled, check vertical alignment. Slide a loose sheet of paper into both slots at once: it must go in without forcing it or bending the supports. Remove the paper before any further work with the hot nozzle.

If it does not work

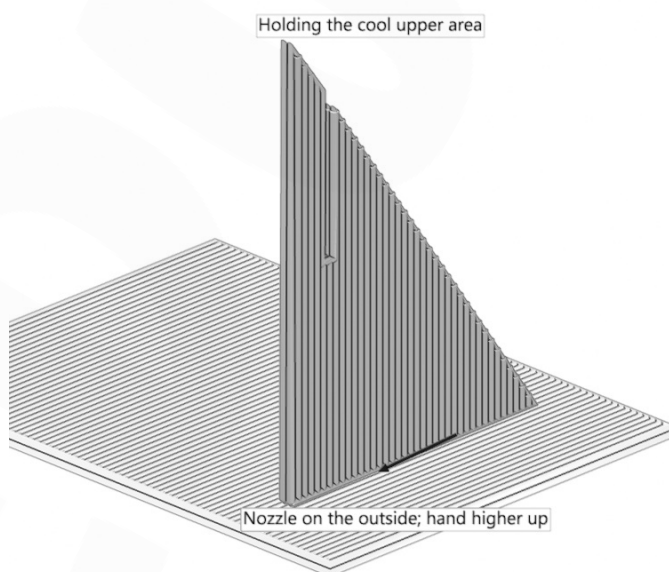
If the sheet of paper does not slide in freely or a support is leaning, stop assembly. Do not reinforce the welds, force the paper in or bend the PLA; once it has cooled, ask an adult for help.

Position and tack the holder — construction details

Tack welds at 4–7 and 37–40 mm from the front outer edge of the foot • What to repeat: Tack the right support

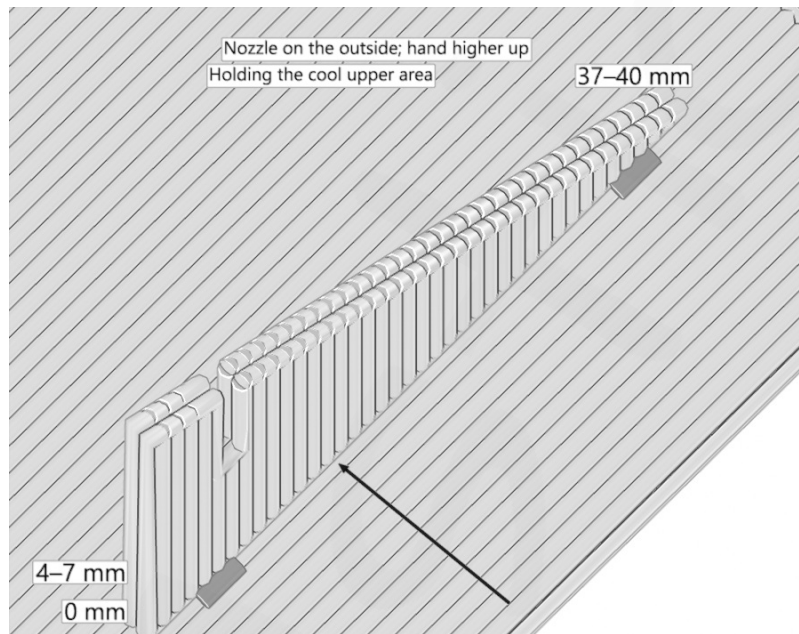


Positioning — base supports the foot



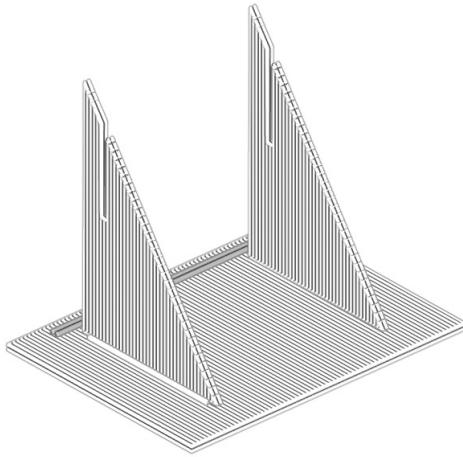
Position and tack the holder — construction details

Tack welds at 4–7 and 37–40 mm; 0 mm = the front outer edge of the foot. Foot resting on the base.

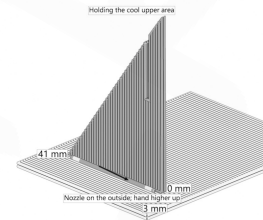


STAGE 04 / 05 • Session 1

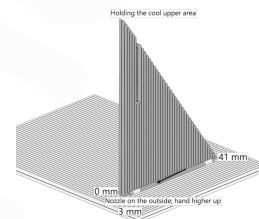
Reinforce the joints and finish the holder



Stage outcome



Weld from 3–41 mm from the front outer edge of the foot; cool grip area
• What to repeat: Make the full right seam



Weld from 3–41 mm (38 mm); 0 mm = the front outer edge of the foot.
Foot resting on the base.

NOW Left support • Left tacks and seam • Right support • Right tacks and seam • Your own finishing strands
Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Your own finishing strands • PLA | template follow the written method

→ T003 • Techniques — reference appendix

After successfully testing both gaps and removing the paper, make a full weld from the outside of each foot from 3 to 41 mm from its front outer edge. Move the nozzle toward the rear, joining the side of the support to the base.

The weld is 38 mm long: it includes the tack welds at 4–7 and 37–40 mm and extends 1 mm before the first and beyond the second. The foot rests on the base; hold the cool upper area until cool. Add two strands in your own color at the front of the base, avoiding the gap and the underside. Allow the entire assembly to cool.



Check

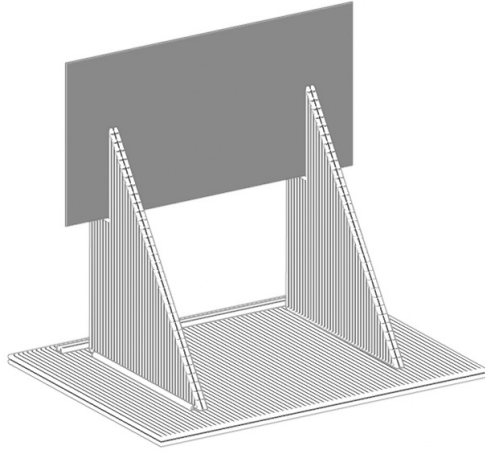
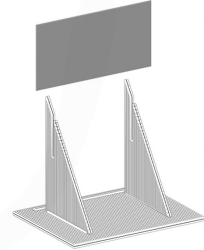
Both full seams join the supports to the base; the slot is unobstructed and the holder does not rock.

If it does not work

Fill any gaps in the seams while supporting the cool support. Let it cool without moving it; do not fill the notches.

STAGE 05 / 05 • Session 1

Display your own message



Card above the notches

Let go of the card; check stability

NOW Card with your own message

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

Write a message for someone you choose or a reminder for yourself. Place the cooled holder on a level worktop. Insert the card into both notches without holding the holder, then let go of the card. When the test is successful, place the message in the location you selected.



Check

The card stands upright, and the holder does not tip over when it is inserted.

If it does not work

Do not force the card in. Check that the slot is unobstructed, the base rests evenly, and the supports are securely joined. After correcting the joints and allowing them to cool completely, repeat the test.

Finished — check the outcome



Check

The base and the two triangular supports have solid infill.



Check

The supports stand perpendicular to the base, with the notches aligned; the tacks are reinforced with full seams.



Check

The card stands upright, and the holder neither tips over nor lifts when the card is inserted without holding it.



Check

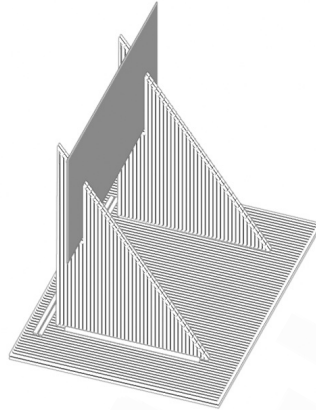
The finished holder has your own color scheme and displays the selected message.

Storage

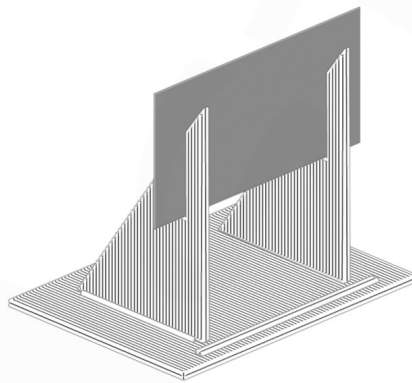
Store the model in a cool place away from sunlight and heat. Repair it on a suitable 3D-pen work surface using the same material as the part.

View from different sides

View 1



View 2



Techniques — reference appendix

T001 • Stage 3

1 × Left tacks and seam · PLA | template follow the written method

Ranges measured from the front outer edge of the foot. Stage 3: after aligning with the axes and the 8 mm line, rest the foot on the base, hold the cool upper area, and make tack welds from the outside at 4–7 and 37–40 mm. Allow to cool; check that it is vertical and check both gaps with a loose sheet of paper; remove the paper.

Stage 4: after the successful test, make a 3–41 mm (38 mm) weld toward the rear, extending 1 mm before the first tack weld and beyond the second. Hold until cool. Finished cross-section [mm]: 1.4 × 1.4. Support: Cooled BASE and SUP_L; foot resting on the base, cool upper part held by hand.

Strand direction: Along the foot from its front outer edge: tack welds at 4–7 and 37–40 mm, then a full weld from 3–41 mm toward the rear. Cooling: Keep it upright and hold the cool area until it has cooled completely. Tip access: Nozzle on the outside of the base, below the hand holding the upper area of the support.

T002 • Stage 3

1 × Right tacks and seam · PLA | template follow the written method

Ranges measured from the front outer edge of the foot. Stage 3: after aligning with the axes and the 8 mm line, rest the foot on the base, hold the cool upper area, and make tack welds from the outside at 4–7 and 37–40 mm. Allow to cool; check that it is vertical and check both gaps with a loose sheet of paper; remove the paper.

Stage 4: after the successful test, make a 3–41 mm (38 mm) weld toward the rear, extending 1 mm before the first tack weld and beyond the second. Hold until cool. Finished cross-section [mm]: 1.4 × 1.4. Support: Cooled BASE and SUP_R; foot resting on the base, cool upper part held by hand.

Strand direction: Along the foot from its front outer edge: tack welds at 4–7 and 37–40 mm, then a full weld from 3–41 mm toward the rear. Cooling: Keep it upright and hold the cool area until it has cooled completely. Tip access: Nozzle on the outside of the base, below the hand holding the upper area of the support.

T003 • Stage 4

1 × Your own finishing strands · PLA | template follow the written method

Using the selected color, add two strands at the front of the base, on its upper side. Avoid the support feet, slot, and underside. You may use a different color for each strand. Finished cross-section [mm]: 1.2 × 1.2. Support: Cool upper surface of BASE. Strand direction: Along the front edge, from left to right.

Cooling: Wait until it has cooled completely before use. Tip access: From above, in the open area in front of the supports.