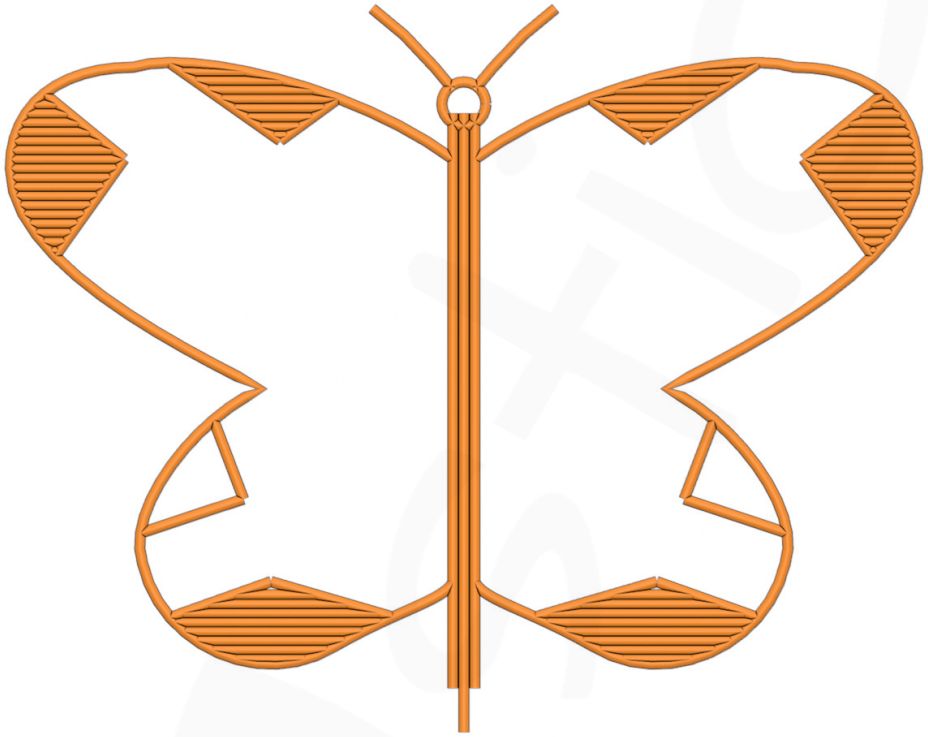
MAKE • DISCOVER • COLLECT

Butterfly with Two Symmetrical Wings

Ages 10 and up, subject to the device instructions and required adult supervision. • Approximately 28–45 minutes



Create a flat 100 × 80 mm butterfly from PLA. Repeat short ribs and choose three pairs of sections to fill. The mirrored arrangement and rhythm create a clear ornament.

Your outcome

Create a clear, original ornament through symmetry and rhythm.

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.

Tools

- [ ] 3D pen for PLA 1.75 mm — **1 pc.**
  Power supply and setting down in accordance with the device instructions.

Work surface

- [ ] Transparent flexible work mat — **1 pc.**
  Suitable for the device temperature and PLA; minimum area 150 × 110 mm.

Template

- [ ] W01 sheet on A4 — **1 pc.**
  Plain paper, printed at 100%, without scaling.

Check

- [ ] Ruler with millimetre markings — **1 pc.**

Filament — amounts include extra

- [ ] PLA 1.75 mm — ochre — **1.1 m · ≈ 3.3 g**

Total filament: 1.1 m · approximately 3.3 g

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

Before you start

Device and age

Age 10 and up is the activity profile. The instructions for the specific device take precedence; an adult provides the supervision they require.

Template under the mat

The actual mat is transparent. The solid-model illustrations show it as opaque, without printing. Use the actual W01 under the mat.

1. Work on a stable tabletop, away from its edge. An adult checks the pen instructions: the permitted age, supervision, PLA, 1.75 mm filament, and where to set down the hot nozzle take precedence over the activity description.
2. Print W01 on A4 at 100%, without scaling. Check the 20 mm segment with a ruler; the grid is 5 mm, with heavier lines every 10 mm. Reprint if incorrect.
3. Place W01 under a flexible, transparent mat suitable for the pen temperature and PLA. Trace the actual template through the mat. In the illustrations, the mat is opaque to make its surface easier to see; the print does not show through.
4. Make a short test trace on a free area of the mat. Once cool, compare its width with the 20 × 1.2 mm strip on W01 and its side with the strip's 1.2 mm height. Adjust the speed to produce one layer without ridges at intersections. The test is a working trace, not part of the butterfly.

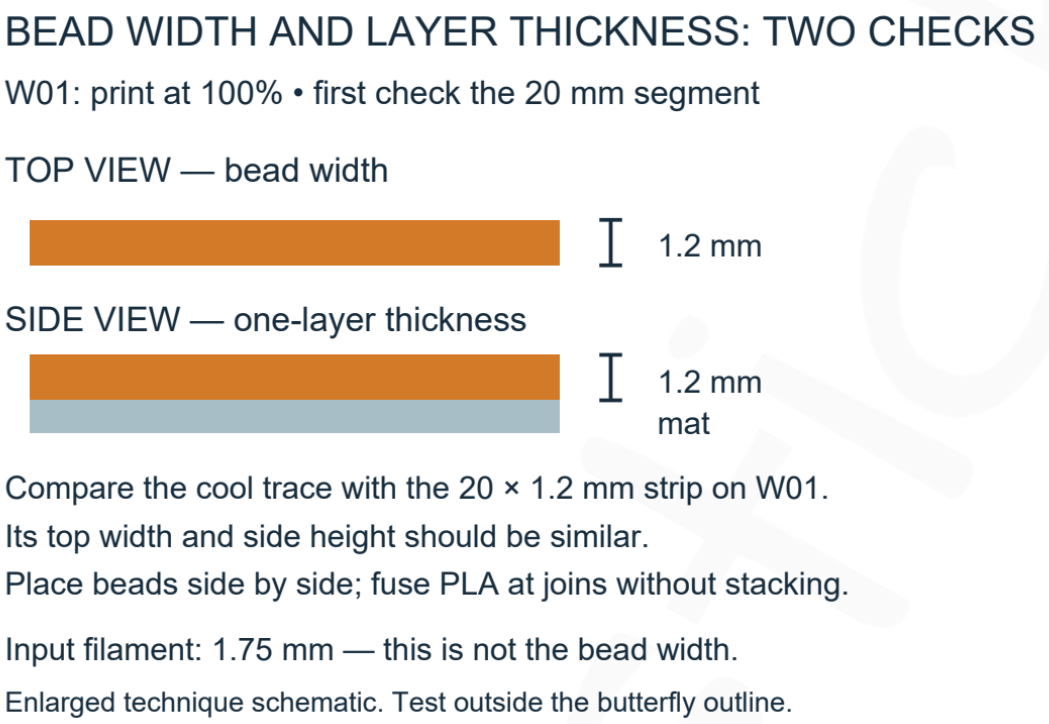
Work at your own pace. The time is an estimate, not a measurement of completion time. 3D pen: 18–30 min; speed and cooling depend on the device.

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 / 03 • Session 1

Draw the body and mirrored outlines



Enlarged technique diagram: strand width from above and object thickness from the side. Actual states O01 and O02 are shown separately.

PARTS FOR THIS STAGE

1 × Butterfly · PLA | template W01

One layer on W01 under a transparent mat: first the body and outlines, then the short ribs and three pairs of sections. Bead width 1.2 mm; thickness 1.2 mm. Number of layers: 1. Support: The entire deposited path rests on the transparent, flat mat.

Strand direction: Outlines from the body and back; ribs in pairs; fills made with adjacent traces. Cooling: Allow to cool completely while flat before removing by hand. Tip access: From above, without sliding the nozzle under existing elements.

On W01 under the transparent mat, use the large schematic to check the sample: bead width and one-layer thickness, 1.2 mm each. Draw the axis, adjacent body beads and head. O01: add the left outline. O02: add the right outline and short antennae from head to tips.

Hot-fuse each outline 3 mm into the body beads at top and bottom, in the same layer; do not stack.

Check

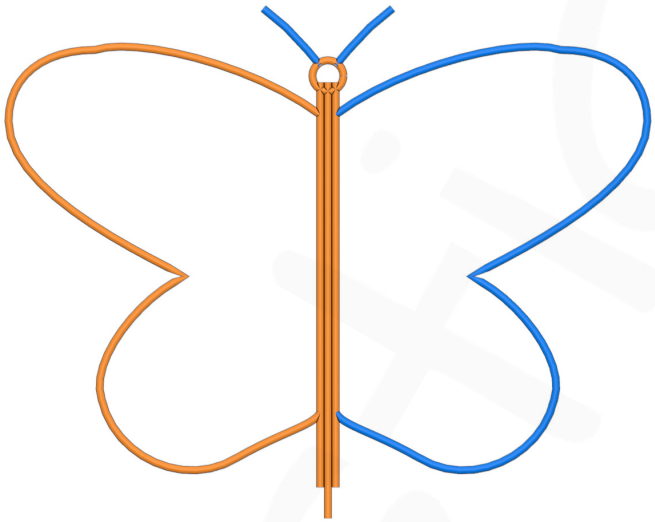
Both wings connect to the body and the antennae to the head. The outer outline measures 100 × 80 mm, including the bead width.

If it does not work

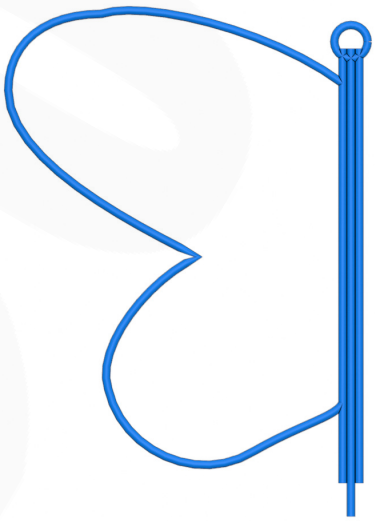
Join an open line on the mat with a short PLA trace, without adding a second layer. Remake a cracked butterfly.

Draw the body and mirrored outlines — construction details

O02: both outlines and antennae.

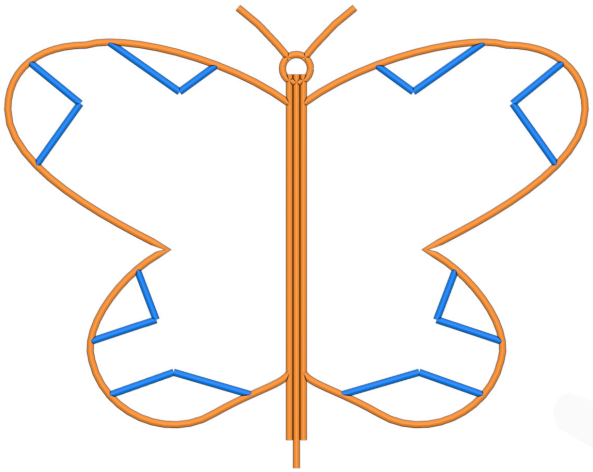


O01: body and left outline; the right side is still empty.



STAGE 02 / 03 • Session 1

Repeat short ribs on both sides



Repeat short ribs on both sides

NOW Complete model — all previously made parts

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

On the flat mat, draw the short ribs according to W01: from the outline to the inner tip of the section and back to the outline. Repeat on the mirrored side. Make four pairs of sections A–D, leaving the centres of the wings open. The nozzle approaches from above; the ends of the ribs fuse into the outline without building up layers.

Once cool, you may pause, leaving the model flat on the mat and switching off the device.

✓ **Check**

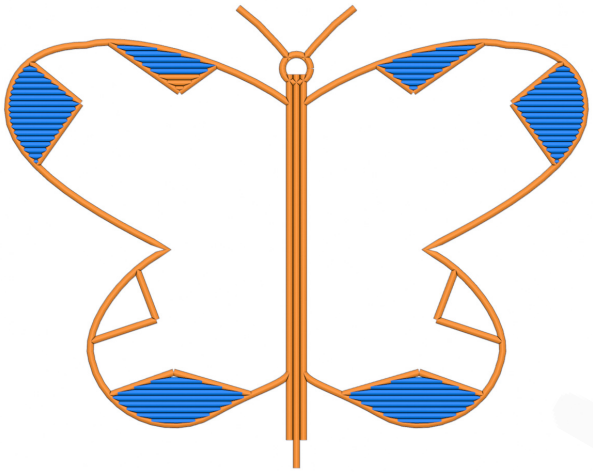
Each rib has two connected ends; sections A–D have mirrored counterparts. Nothing bridges the opening without support from the mat.

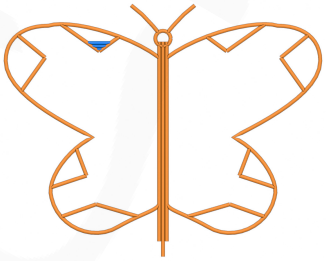
If it does not work

Fill a gap at the end of a rib on the mat with a short PLA trace and allow it to cool. Remake a cracked butterfly.

STAGE 03 / 03 • Session 1

Fill three pairs of sections





O04: the first three traces in left section A; the other sections are empty.

O05: six filled sections A, B, and D; the remaining open spaces stay open.

NOW Complete model — all previously made parts

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

Choose three of the four pairs A–D. The example shows A, B, and D. O04: start one section with short parallel traces, beginning at its narrow end. O05: complete it and the mirrored sections, six in total. Lay the traces side by side at intervals of approximately 1 mm; both ends reach the frame, and the sides fuse with the previous trace.

Everything lies on the mat, and the nozzle works from above. Leave the remaining sections and the centres of the wings open. Set the pen aside. The butterfly lies flat on the mat supported by the tabletop until completely cool. Visually check the connections without bending the wings.

After tidying the work area, show it without naming it and ask what it represents.

✓ **Check**

There are three similar pairs of fills; open spaces remain in the other sections. The fill is one layer, with no loose strands. The butterfly is recognizable without a label. Both wings remain attached to the body; three pairs of fills create rhythm and a mirrored arrangement.

If it does not work

Fill a small gap in a selected section on the mat with a short bead. Remake a cracked butterfly.

Finished — check the outcome

Check

Two mirrored sides and three pairs of filled sections create a clear ornament.

Check

The model is one flat butterfly: the wings connect to the body, and the short antennae connect to the head.

Check

Once cool, its outer dimensions are approximately 100 × 80 mm and it is one layer approximately 1.2 mm thick.

Check

The butterfly can be recognized without a label. Check visually; remake a cracked or weakened model.

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.