

Fly straight: Building a cardboard glider

Equipment

- Glider template (page 5) printed out on A4 paper in landscape orientation
- Corrugated cardboard, A4 size, corrugations running lengthwise
- Scissors
- Glue stick
- Large elastic band
- Ruler
- Sticky tack
- Optional: craft knife, steel safety ruler and cutting mat
- Optional: colouring pencils / crayons to decorate glider

Safety

- Take care when handling scissors. Craft knives should only be used under the supervision of a responsible adult.
- Check the area where you will fly your glider is clear of people or other hazards

Instructions

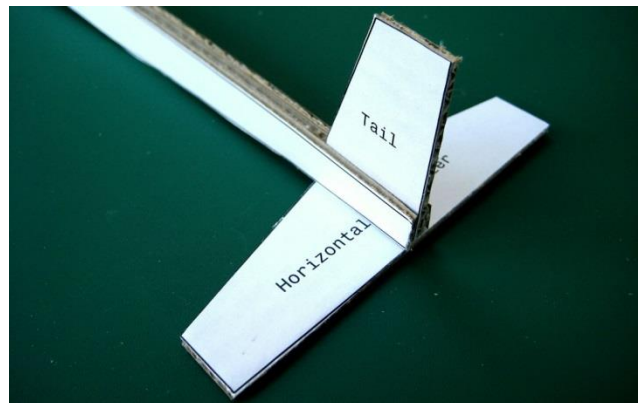
- 1) Optional: if you would like to colour the template this is best done before the glider is put together. The inner fuselage and one of the outer fuselage shapes will end up inside your glider so only decorate the tail and one outer fuselage. If you want to decorate the other side of your glider then trace out another fuselage shape and glue this on to the undecorated side of the fuselage at the end.
- 2) Glue the template carefully to your corrugated cardboard. Alternatively, cut out the shapes and glue individually to your cardboard, making sure the wings and fuselage line up lengthwise with the cardboard corrugations (this helps makes it stiffer along the length of the wings and fuselage). It is important that all the template shapes are properly glued to the cardboard otherwise you will have problems cutting out and gluing the parts together later on.
- 3) Cut your glider parts from the cardboard, following the template shapes carefully. Try to avoid bending or crushing the cardboard. Take particular care when cutting the fuselage pieces as these needs to be as neat as possible so that, later on, the wing lines up properly and the horizontal stabilizer glues in place. If possible cut the straight edges of the fuselage with a craft knife under the supervision of a responsible adult.



4) The fuselage is put together like a sandwich, with the inner fuselage as the filling. Take an outer fuselage piece and place it template side upwards. Cover the fuselage thoroughly with glue. Place the inner fuselage carefully on top (again, template side upwards). Take care to line up the pieces as neatly as possible, especially the top edge and the section under the tail. Now repeat the process with remaining outer fuselage piece.



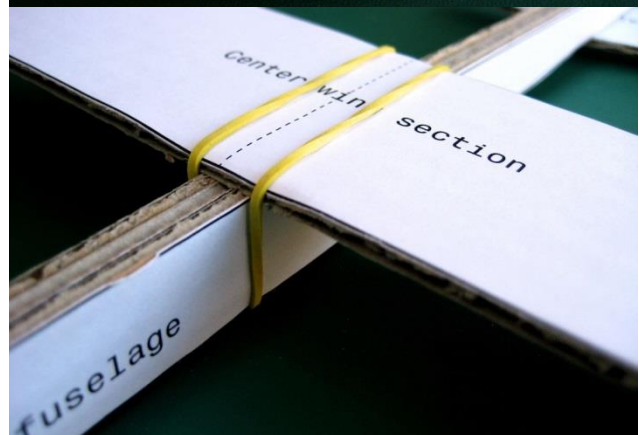
5) Glue the horizontal stabilizer to the fuselage so the point faces to the front of the glider and the flat edge lines up to the back of the fuselage. If your fuselage bottom is a bit wobbly then you may need a small amount of sticky tape to help secure the horizontal stabilizer, just a short bit on either side should do.



6) Taking the wing, place your ruler on the dashed line between the wing and winglet. Hold the ruler in position and push down firmly – this will give a neat crease in your cardboard. Do the same for the other side. Position the winglets so they are set at the same angle, mirroring each other. Aim for an angle of between 25 and 45 degrees



7) To attach the wings to the fuselage, loop the rubber band around the fuselage holding the spare slack above the main body. Place your wings just in front of the rubber band, then pull the band down over the wings and loop it over the front end of the fuselage. The rubber band should hold your wings firmly but not so tightly that you risk crushing your fuselage. Slide the wing so that the central dashed line on the wing lines up with your fuselage.



- 8) Take a penny sized blob of sticky tack and gently stick to the nose of your glider. Make it as even as possible.



- 9) Your glider is now ready for launching.



Launching

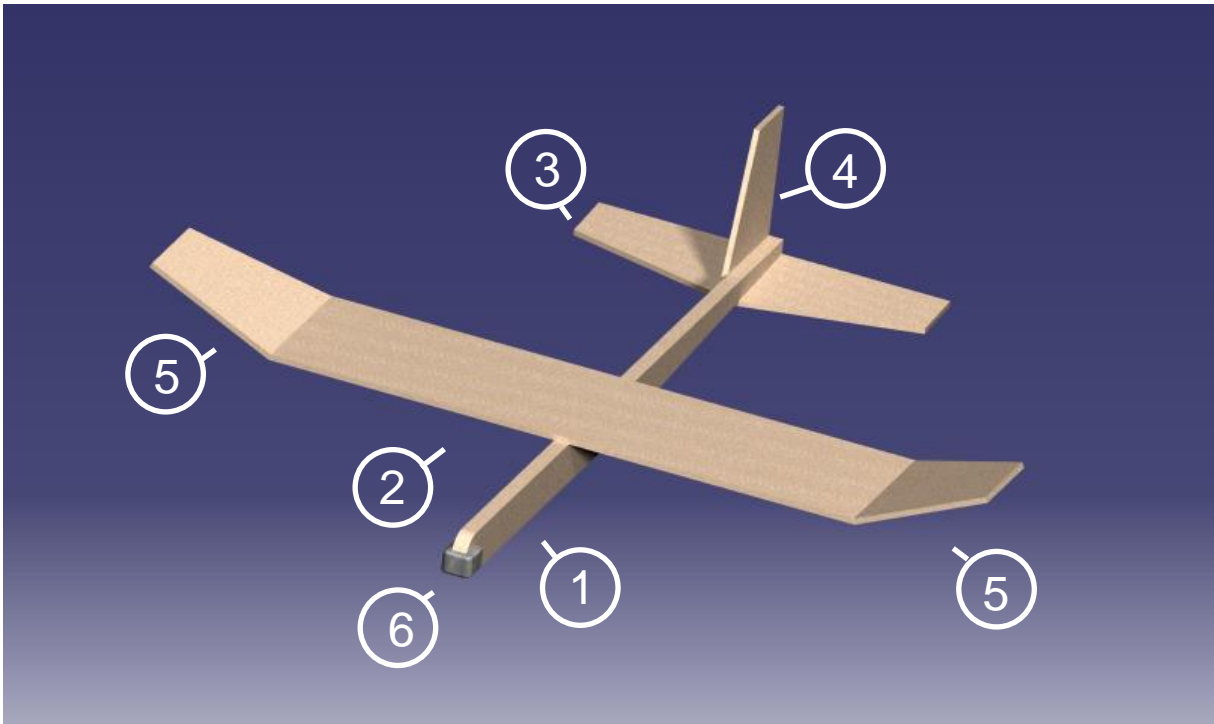
To fly your glider, first find a suitable space that is clear of things you could hit – including other people. Remember, your glider is relatively light weight so it will get blown around if it is too windy.

When launching make sure the nose is level or slightly down, if you launch it nose up the glider may stall and quickly go into a dive. In addition, you only need to give it a moderate push to get it started as most of the flight is a result of the glider slowly coming down to earth.

Adjustments and trouble shooting

- 1) Adjusting your wings and nose weight: The nose weight is added to help bring the balance point (centre of gravity) of the glider to just in front of the wings. This helps the glider to be stable in the nose-to-tail direction. Try adding more nose weight or moving the position of the wings and see what crazy flight paths you can get. However, you should get the furthest and most stable flight when the centre of gravity is just in front of the wings and this is what you find in commercial aircraft.
- 2) Glider flies off to one side: Check the wing is lined up centrally and the fuselage is straight. Now check that the angles of the winglets and horizontal stabilizers are symmetrical. Also make sure that your nose weight is even. If your glider still flies to one side, it may be the way you launch it – try asking a friend to launch it and see if they get the same result.

How your glider works



- 1) The fuselage. This links all the parts together and provides space for passengers.
- 2) The wings. These create the lift, allowing the aircraft to fly.
- 3) The horizontal stabiliser. This helps to make the glider stable in the nose-to-tail direction, preventing it tipping nose up or nose down.
- 4) The vertical stabiliser. This prevents the glider twisting side to side, so it continues in a straight line.
- 5) The winglets. These help to make the glider stable in the wing-tip to wing-tip direction, preventing it rolling side to side.
- 6) Nose weight. This helps to move forward the centre of gravity. This works with the horizontal stabiliser to make the glider stable in the nose-to-tail direction.

Acknowledgements

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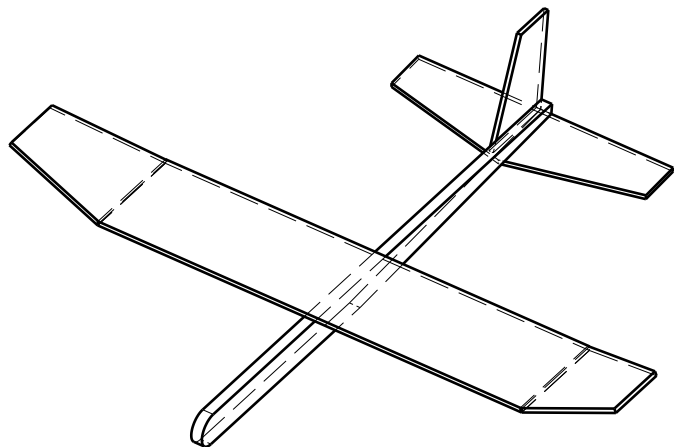
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Winglet

Center wing section

Winglet



Horizontal stabilizer

Tail

Inner fuselage

Outer fuselage

Outer fuselage

Scale 1:1 (needs to be printed on A4 paper size)

AMEDEO

