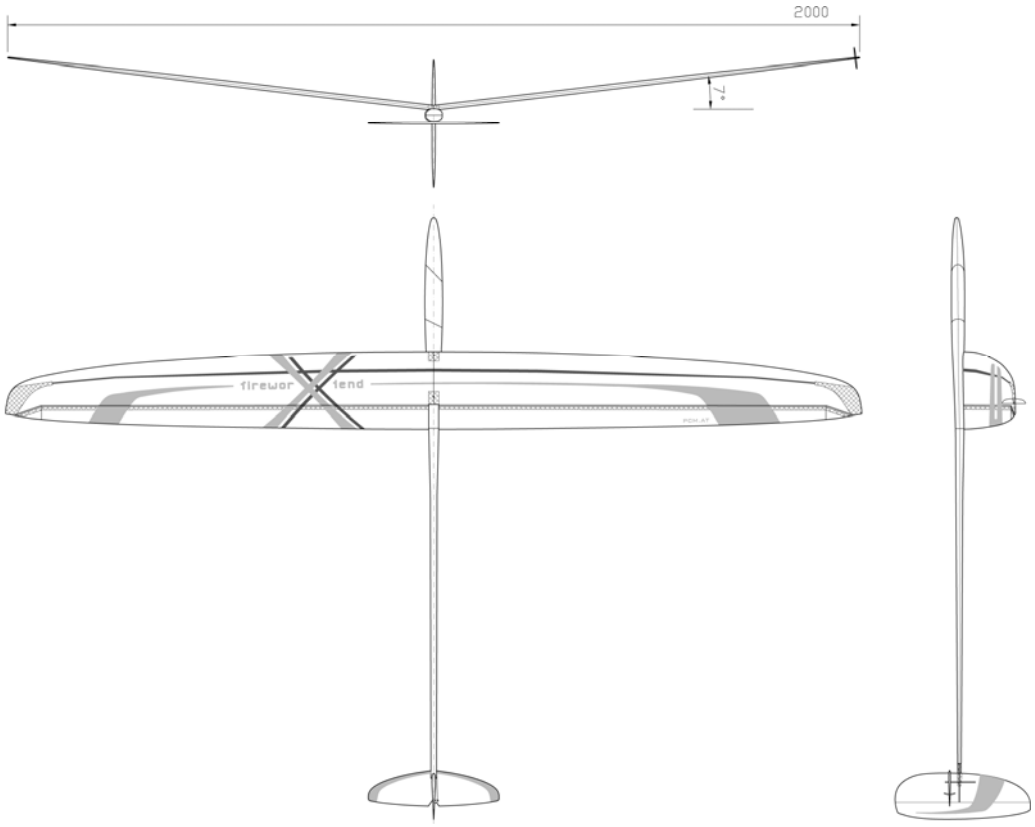
Wing span [mm]:	2000
Takeoff weight [g]:	420
Airfoil:	AG 455ct-02f AG47ct-02f von Mark Drela



BUILDING INSTRUCTION

SAL-DLG FIREWOR-X-TEND

CONTENTS

DATA

ASSEMBLING THE MODEL

OTHER

DATA

1. Kit – contents

Fuselage + canopy
Wing, two parts, + connector
Elevator and rudder CFR

Radioboard
Carbon rods for mounting elevator, 2 pieces
Carbon lever for rudder, 1 piece
Carbon levers for ailerons, 2 pieces
Plastic tube for push rods, 2 pieces
Carbon pipe for push rods, 2 pieces
Carbon covers, 2 pieces, for mounting rudder
Carbon covers, 2 pieces, for wingservos
Carbon cover, 1 piece, for wing/fuselage
Kevlar wire for controlling rudder
Steel wire for spring, 1 piece
Screws for fixing wing, 4 pieces
Aerodynamical fences, 2 pieces
Throwing blade, 1 piece

Building instruction

2. What else do you need:

Epoxy-glue (for example UHU 300 endfest or Stabilit, no fast hardening epoxy resin)
Super glue
Cotton flocks (for thickening glue)

Electrical equipment (On/Off-switch, cables, plug, ...)
Electronic equipment
Steel wire, shrinking tube...
(Voltage control recommended, f.e. DLG-saver from Simprop)

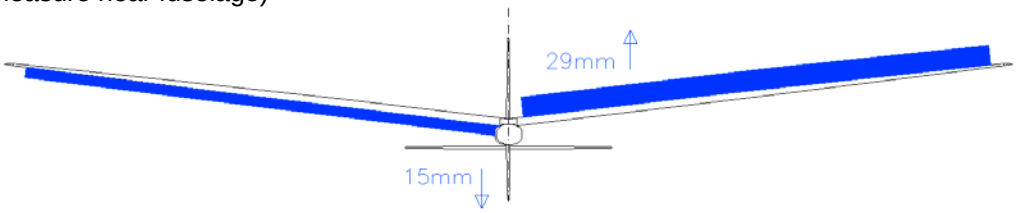
3. Electronic equipment

Servos rudder:	- Dymond D47 - Futaba FS31 - Expert X31	
Servos elevator:	- Dymond D47 - Futaba FS31 - Expert X31	Alternative (stronger): - HS 5055 MG
Servos ailerons:	- Dymond D60 - Hyperion HP-DS09SCD	
Accumulators:	- GP NiMH Zelle 400mA/h, (+35g lead necessary) - Enelope 800mA/h, AAA, (+19g lead necessary) - Sanyo HR-40 1000mA/h, AAA, (also app. +19g lead necessary)	
Receiver:	- MZK Sexta - Jeti Rex 540MPD - Rx Schulze 835	
Logger:	- Logo - Lola - Ram3 - Z-Log	

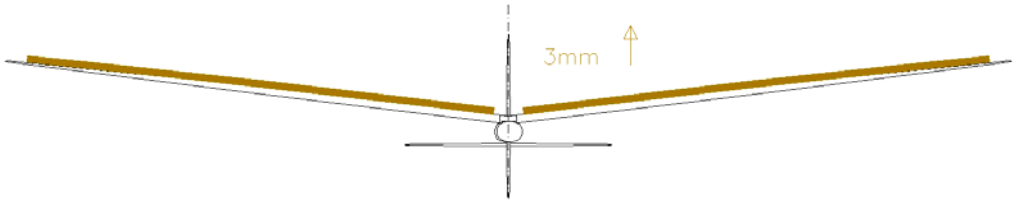
4. Settings for the first flight

Centre of gravity: 65mm (62-70mm)
(measure from the leading edge of the wing to the back)

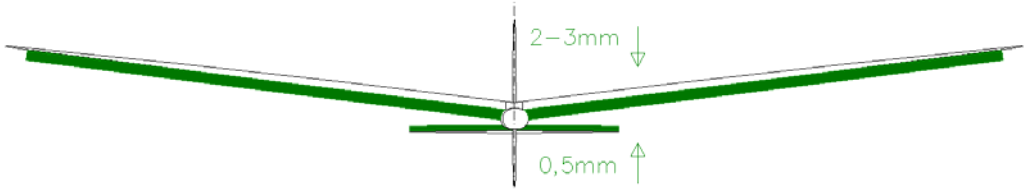
Ailerons (measure near fuselage)



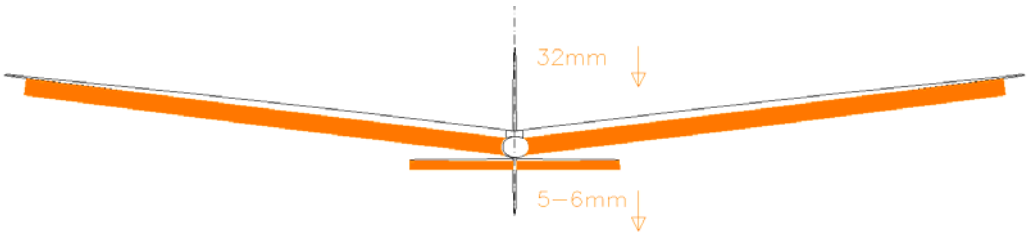
Flaps negative (start, speed) (measure near fuselage)



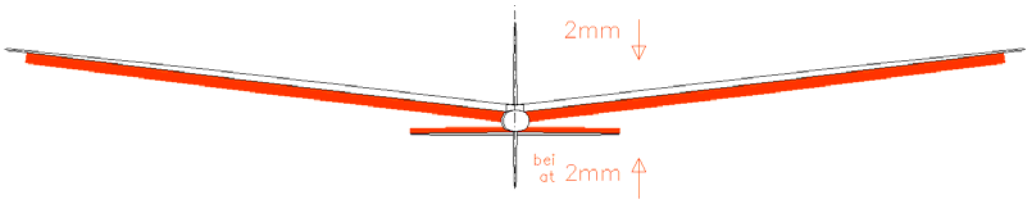
Flaps positive (thermal) (measure near fuselage)



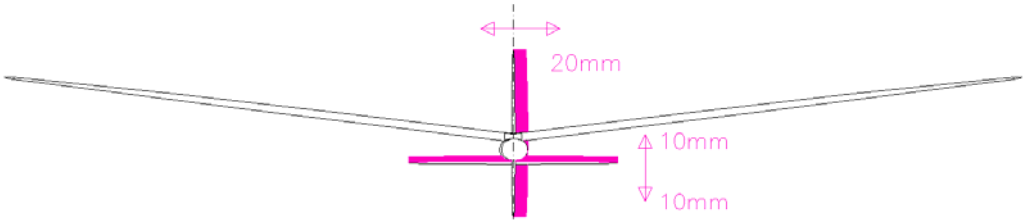
Landing position (measure near fuselage)



Snap Flap (measure near fuselage)



Rudder (measure at deepest point)



Angle of attack of elevator (for first flight): set elevator parallel to axis of boom, slightly pulled (1,5mm)

ASSEMBLING THE MODEL

General information on DLG-models

DLG-models are constructed strong enough to withstand the demands of starting, flying and landing and at the same time light enough to achieve the least possible flying weight. Each part is dimensioned to its possible minimum and produced using lightest and fewest material.

In order to continue this concept, please account the following when you assemble the model:

- Always **use glue sparingly**. **Grind** all gluing spots **thoroughly**, before you apply the glue.

- Try to **save weight** especially when you **finish and mount the stabilizer** to avoid additional lead in the nose of the fuselage for the correct centre of gravity.

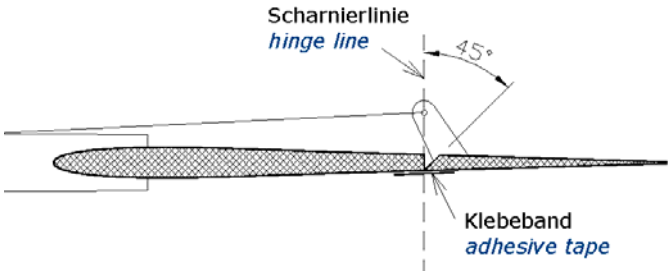
As Firewor-X-tend is constructed very similar to Fireworks 4, you will find some pictures of Fireworks 4 and also Mini-Fireworks in the following instruction. Don’t let yourself be confused by this, the way of building is quite the same.

5. Stabilizer

5.1 Installation of the CFR-stab

Sand the rudder **wedge-shaped** on the **hinge line**, so that you can move it in both directions. Note that the **hinge line** must be placed **on the left side** (looking towards flight direction) for **right-handers** and the other way round for left-handed persons.

Next, glue the **lever** in extension of the axis of the boom. The **hole of the lever** should be **above the hinge line**. Fix the control surface of the rudder with **adhesive tape**.



Before you fix the stabilizer to the fuselage, thread the **kevlar wire through the boom** to the hole in the fuelage cone.

Then, **check** the **good fit** of the rudder. The axis of the boom should be right-angled to the hinge line of the rudder. The kevlar wire should not chafe on the sharp carbon. It must be free movable.

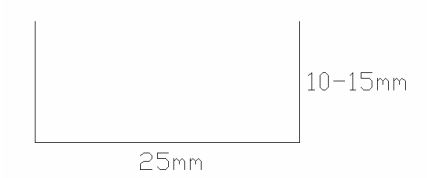
Sand the part of the boom which will be positioned in the stab and about 1-2cm before.

If the stabilizer is **aligned correctly** on each axis, let **super glue** run into the upper and lower join from both sides. Pay attention to the **kevlar wire**, so that it keeps **free movable**.

Last, glue the **two carbon covers** left and right of the join also with super glue. Note, that the hole for the installation of the elevator must be kept open.

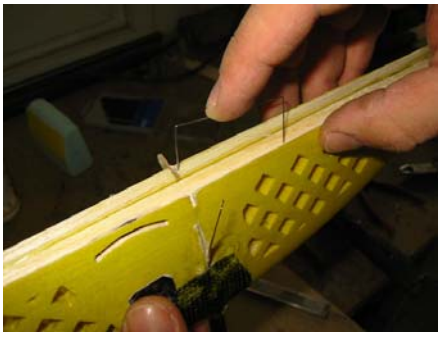
5.2 Torsion spring for the rudder

Bend the wire according to drawing.



Tip back the **control surface** of the rudder completely.

(You see it here at Fireworks 4.)



Stick the spring **into the balsa material** and then harden the balsa with super glue.

5.3 Connection of the wire for the rudder

Now you can **hook in the kevlar wire** into the lever.

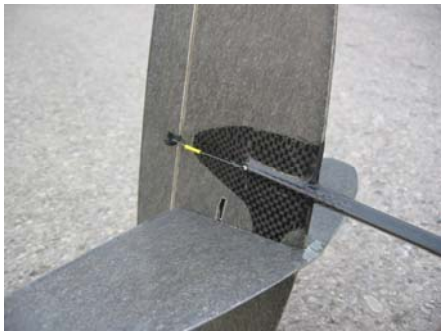
Make a **loop, twist the end** and put the end of the wire into a **shrinking tube**. Shrink it and fix it with a **drop of super glue**.

(Here show on Mini-Fireworks.)

In order to lead **the wire into the boom**, drill a little **hole in the carbon cover**.

5.4 Installation of the elevator

Fix the **carbon rod (2mm)** with superglue **in the rudder**. Now you can mount the elevator.

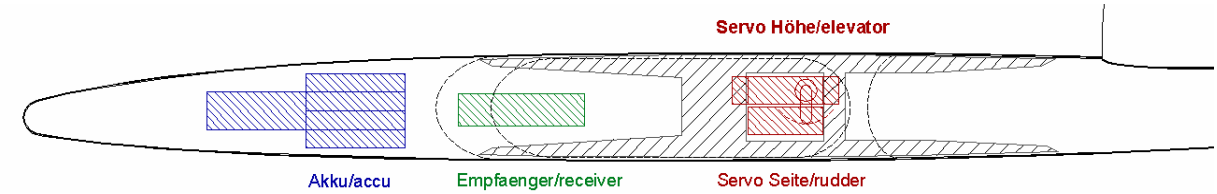


The elevator will keep the distance between the two carbon rods. If you move the spring without the elevator mounted, the spring may disappear inside the rudder. Only when the elevator is mounted, the spring will move along the track cut out.

Nevertheless, **check the elevator for free movability**. If necessary, enlarge the hole in the rudder.

You can stick the 2 halves of the elevator to each other **on the leading edge** with an **adhesive tape** to avoid unintended demounting.

6. Fuselage – radio board



In order to **gain full strength**, it is absolutely necessary to **fix the servoboard** in the fuselage!

Before you fix the servoboard in the fuselage, grind the gluing spots thoroughly and strengthen the edges of the servo board with super glue.

Before you glue the servoboard, you should first **find out the optimal position.** To do so, place the servoboard inside the fuselage without gluing and mount servos for vertical and horizontal stab.

Make sure that all **levers are freely movable** (also with canopy mounted), and that the **deflections** of the levers are big enough.

Note, that the holes in the servoboard are accessible and that the **servos can be screwed** without problems from outside.

You can variate the position of the servos with small **blocks of wood**.

(Here you see the fuselage of Fireworks4.)

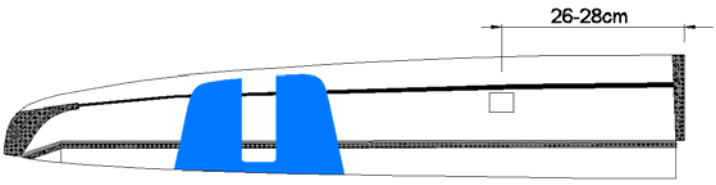
You can fix the servoboard with a drop of super glue to make the position check easier.

Then, glue the board carefully **with epoxy-glue** (for example UHU 300 endfest or Stabilit, no fast hardening epoxy resin). You can add **carbon rovings** left and right of the gluing spots for additional strength.

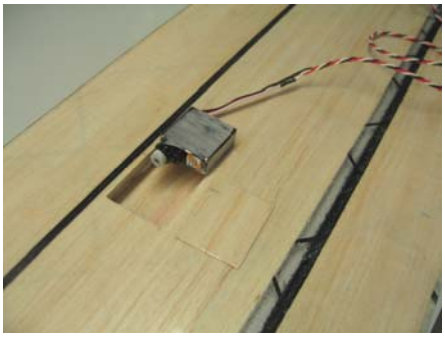
If you have a **hard landing**, always **check** if the servoboard is still fully glued before you make the next start!

7. Controlling the ailerons

Cut a hole on the **underside** of the wing with a sharp knife app. **26-28cm from the mid of the wing**. Note not to cut the carbon roving grid.

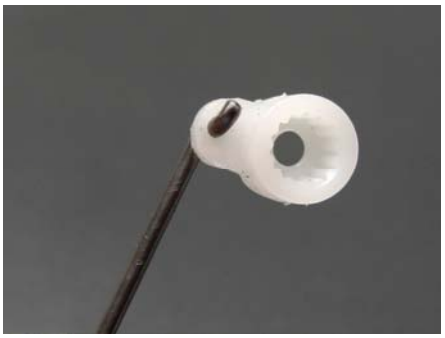


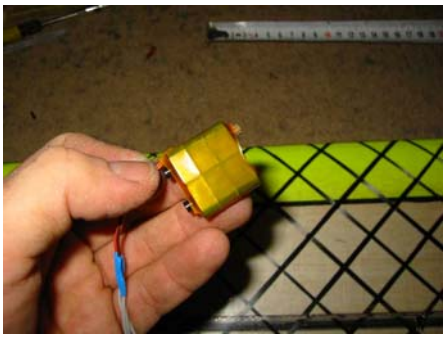
If the carbon disser is behind the balsa, hold the wing **against light** to see it. The hole should be slightly bigger than the servo itself.



Shorten the lever of the servo, so that it can be moved inside the wing.

Pack the servo inside a **shrinking tube**, so you will be able to remove it again.

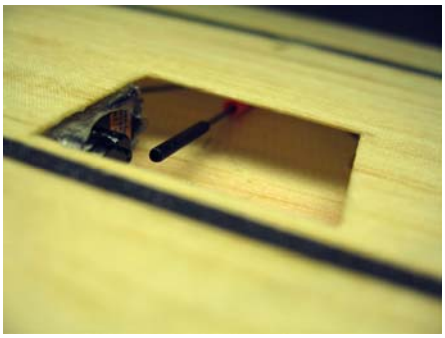




Glue the servo with Stabilit Express or with a 5minute Epoxy.
Use a **steel wire, d=1mm**, as pushrod. You can make a **variable joint** by cutting the steel and gluing a piece of carbon pipe on one end.

Drill a **hole to lead the push rod** through the wing and glue a plastic tube for better leading of the push rod.

Cut **2 slits** as shown for fixing the lever.

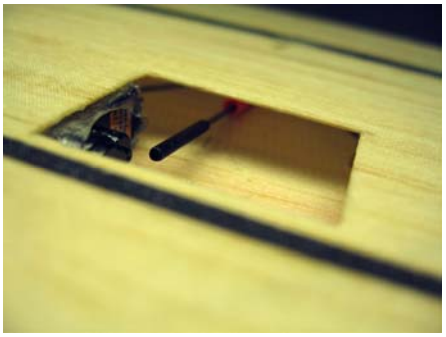


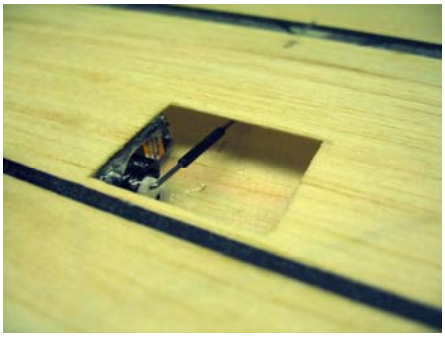
The **hole** in the lever should be a little bit **in front of the turning axis** of the rudder.

Glue the lever with epoxy glue or Pattex Stabilit.

Now you can **thread in the steel wire**.

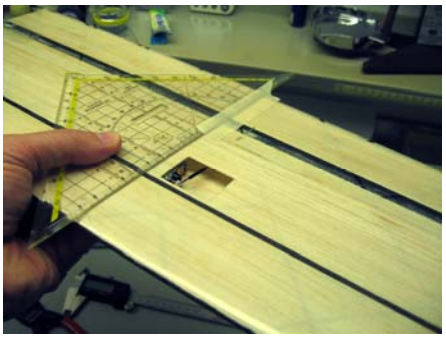
Hook the second part of the pushrod into the lever of the servo and thread it into the joining carbon pipe.





Hold the **aileron in zero-position** with a ruler. Now put a drop of **super glue** in the carbon pipe to fix the length of the pushrod.

Cover the hole in the shell with the carbon cover.



You can install the **plug** for the servo in the wing as shown.

8. Installation of the throwing blade

(Shown at Fireworks 4.)

Grind the blade, so that it gets an **aerodynamical cross-section** and it **feels handy** when you hold it in your fingers. Don't make the trailing edge too sharp, you might injure yourself when throwing your DLG.

Lay the **paper template** on the wingtip and **thrill a hole at the marked spot.**

(Both wingtips - left and right - are prepared for the installation of a throwing pin or blade.)

Mark the length of the blade.

Remember, that the axis of the blade should be turned a little bit to the fuselage (looking in direction of flight).

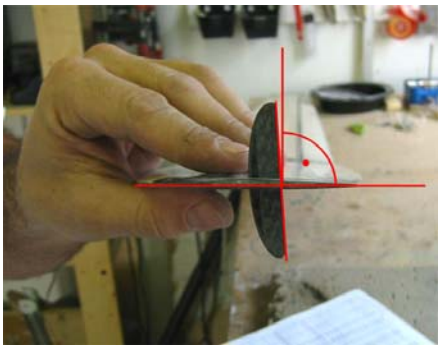
Now **cut an opening** into the wing with a small driller or a milling cutter.

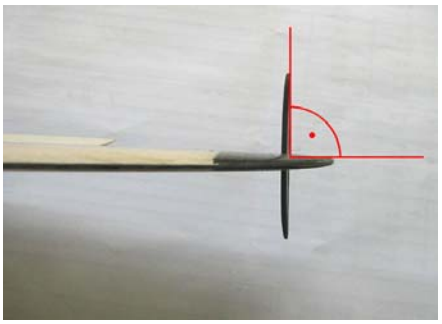
Alignment

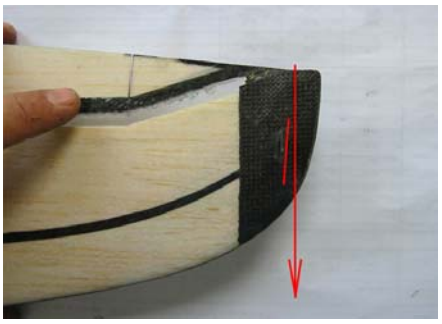
Side view:
Tilt the blade **on the upper side** of the wing a little bit **in the direction of flight.**

Front view:
Mount the blade **right-angled to the wing**.

View **from above**:
Turn the axis of the blade a little bit **to the fuselage** (looking in direction of flight).







If the cut is big enough, **put the blade through** and **align** it in all directions (see above).

When the position is correct, **fix** the blade **with super glue**.

Ready mounted throwing blade

You should additionally strengthen the joint by **forming a rim of glue**. Use f.e. UHU 300 endfest oder Pattex Stabilit.

9. Optimizing

In order to **optimize the aerodynamical transition** between aileron and fuselage, you can glue the aerodynamical **fences** enclosed.

Ready mounted fences on Firewor-X-tend.

In order to move the triangular ends of the ailerons, you can bend a piece of **steel wire (1mm)** and glue it into the end of the aileron as shown. Let the wire jut out about 6mm. You can bend the end of the wire to ensure not to cause damage to the shell on the inside.

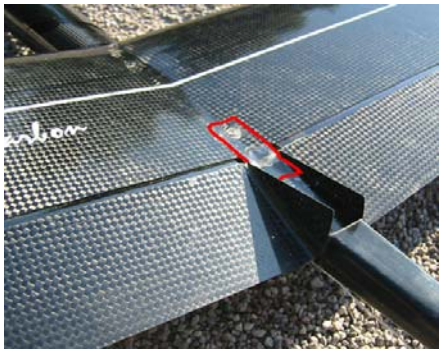
The easier way is to connect the control surfaces with **adhesive tape** (see picture).

As you nearly don't recognize a damage of the leading edge of the wing (f.e. after hard landing), we advise to put a **strip of adhesive tape over the leading edge**.

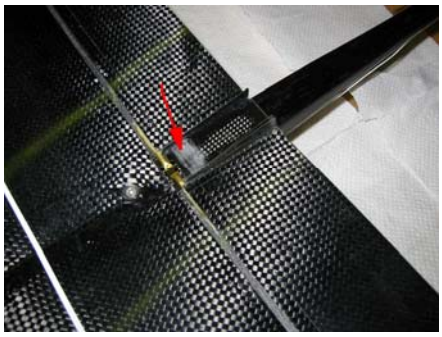
The film is thin enough not to disturb the aerodynamic, but it surely will extend the lifetime of your Firewor-X-tend.

Cover the **screws** with a piece of tape in order to improve aerodynamics.

Cover the **gap behind the rear screw** either also with tape … (as you see it here with Fireworks 4 carbon lite)



…or with the **little carbon tile** enclosed. Glue it on the part of the fuselage that is placed between the two ailerons.



You can thread in the wing from the front when mounting the wing on the fuselage.

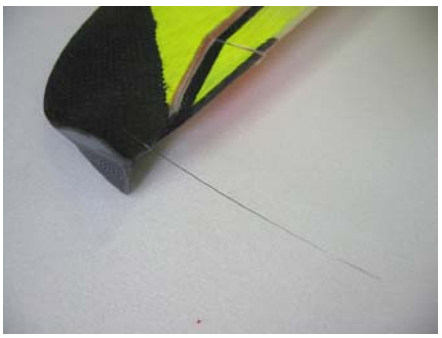
Firewor-X-tend fuselage with ready glued carbon tile.

10. Installation of antenna

In order to have an undisturbed reception a **part of the antenna** must be situated **outside the model**.

An easy solution is to **fix the antenna to the end of the elevator**. Lead the antenna inside the fuse behind the wing and then leave the fuselage.

Another possibility is to lay the antenna **inside the gap of the aileron**. For improving reception on **carbon wings** you can solder the antenna to a steel wire, d=0,3mm, which you fix at the end of the wing and let stand out to the back about 10-15cm.



Always **TEST THE RECEPTION** on ground before you fly!

OTHER

11. Check list before starting:

1. Check **centre of gravity**
2. Check **control surfaces**:
   Do control surfaces move in the correct direction?
   Check the greatest swings
3. Check **reception**:
   Leave the antenna inside the radio control and go away from the glider up to a distance of about 60m. The control surfaces should not tremble.

12. Notes for the use

Firewor-X-tend ist partly built with visual carbon fibre. To avoid heating of the carbon surface, the model should not lie **in the sun** too long. **During flight** heating by the sun is no problem, as the model is **cooled by the wind. On ground** the glider should be kept **in the shade.**