

## **kite present for 2012 New Year wishes**

Before use the kite was tested to check whether all parts were free of heavy metals. The following parts were tested separately for arsenic, barium, cadmium, chromium, lead, antimony and selenium: sail, sticks, tail, flying line, packaging plastic. All test results were below the detection limit, except for chromium in the sticks (35-40 mg/kg) and antimony in the sail and tail (140-160 mg/kg). These measured levels of chromium and antimony are acceptable as they are both well below the regulatory levels.

### **Introduction to kite flying**

What is needed besides the kite is an open space, some wind and some patience and/or expertise. This small kite flies already with a light breeze of only 1 Beaufort upto winds of 4 Beaufort (3 – 25 km/h). Large, open areas are best. The most popular spots are beaches of course, and large grassy parks or open fields. The area upwind of the flying field is important too. Obstacles like buildings, trees or hills can cause turbulence far downwind.

### **Stability**

In flight, all kites are relatively unstable and they have a tendency to roll along their longitudinal axis, yaw along the vertical axis and pitch along the lateral axis.

Easy solutions to increase this stability is to adjust the angle of attack, and adding a long tail. The tail of a kite adds to its stability and balance. It also acts as a drag and for some kites will put a limit on the maximum altitude that can be reached.

### **Safety**

Whenever you fly, safety is a part of play. Remember not to fly kites in or near thunderstorms and rain... Not good kite weather! Always avoid flying over or near airports, power lines or traffic.

### **Theory**

The two principles critical to understanding why kites fly are an understanding of Newton's Law and Bernoulli's Principle. While other factors such as the friction between the air particles moving over the flying surface and the material comprising the flying surface are important, these two factors explain the major components of lift and therefore the major reasons kites fly.

The lift of a kite is generated mainly by the wind striking the sail (kite face). This produces a zone of increased pressure on its face and of decreased pressure on its backside. The flying line (tether) holds the kite under an angle (angle of attack) with the wind so the air is deflected downward. This generates an opposing upward force that balances the force of gravity. The flying line has to be connected to the kite's center of pressure. This is the point where all forces (lift, drag and gravity) coincide.

The air that strikes the face of the kite also spills over and around the kite to the backside creating here a partial vacuum. This lowered pressure "sucks" the kite upward, adding to the lifting force. This can be explained better by the Bernoulli principle and it is somehow similar with the cambered airfoil used to generate lift by the airplane wing. This additional force is very small compared with the lift generated as a reaction to the pressure on the face of the kite.

### **Above info and much more can be found on the Internet:**

<http://www.gkites.com/howtofly/sl-htf.html>

<http://www.aviation-for-kids.com/kites.html>

<http://www.windpowersports.com/kites/>

<http://www.grc.nasa.gov/WWW/K-12/airplane/kite1.html>

<http://www.archive.org/details/kitecraftkitetou00milliala>

[http://www.ehow.com/info\\_7795020\\_scientific-principles-kites.html](http://www.ehow.com/info_7795020_scientific-principles-kites.html)

[http://www.ict.griffith.edu.au/anthony/kites/hints\\_tips.html](http://www.ict.griffith.edu.au/anthony/kites/hints_tips.html)

<http://www.newton.dep.anl.gov/askasci/phy05/phy05112.htm>

[http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?\\_nfpb=true&\\_ERICExtSearch\\_SearchValue\\_0=ED326395&ERICExtSearch\\_SearchType\\_0=no&accno=ED326395](http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_ERICExtSearch_SearchValue_0=ED326395&ERICExtSearch_SearchType_0=no&accno=ED326395)