

## **Airborne Wind Energy Demonstration Unit**

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A demonstration unit is being constructed as a proof of concept for airborne wind energy. The concept behind airborne wind energy is generating power from wind using an aircraft, such as a kite or glider, at much higher altitudes than current wind turbines can reach. This demonstration unit will autonomously fly a kite. The power produced by the kite is the line velocity times the line tension. The line tension will be measured using load cells, and the servo motors that will be controlling the kite will set the line velocity.

A ground station is being constructed to house the servo motors, servo drives, load cells, and other various components of this demonstration unit. This ground station is being built out of extruded aluminum. Designs of the ground station were made and edited using Autodesk Inventor and Solidworks. Once finalized, quotes were acquired from four different companies to find the cheapest cost of materials. The ground station will be constructed here at NASA Langley Research Center.

Experiments are being done to make kites with better lift over drag ratios than the kite currently being used. These current kites are made out of nylon and have a lift over drag ratio of about 7.5. The experimental kites will be made out of expanded polypropylene foam and expected to have a lift over drag ratio of 15.

A program is being written that will control the kite and also displays the data collected from the various sensors and other components. The program controls a camera which it uses to track the kite and keep it on its designated flight path.

The demonstration unit is expected to be able to fly the kite autonomously and produce a measureable amount of electricity. The experimental kite should have a higher lift over drag than the current kite.

This demonstration unit adds to NASA's search for alternative energies. If successful, airborne wind energy could be researched and advanced more and eventually large scale wind farms of airborne wind energy systems could be implemented throughout the world, and eventually on the moon and other planets, such as Mars.