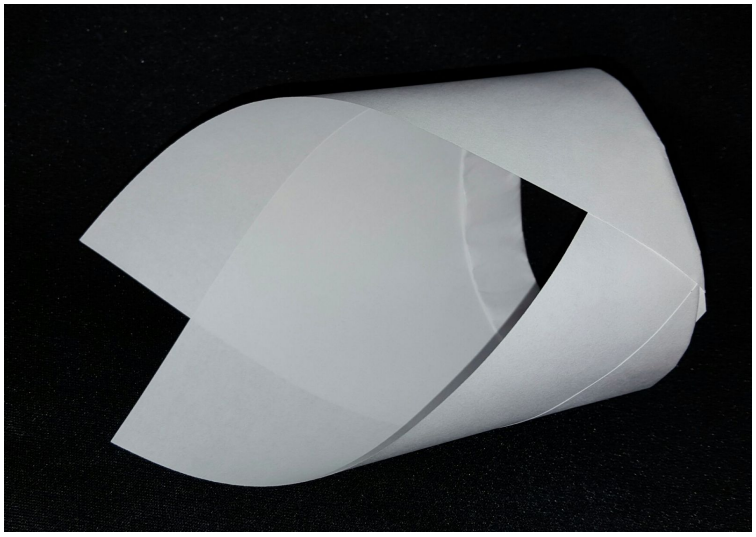
The Ring Wing Glider - Revised from NASA Jet Propulsion Laboratory materials



This is an example of the ring wing glider built out of a single sheet of 8.5"x11" white paper. Image credit: NASA/JPL-Caltech |

Overview: Students will use engineering design principles to turn a piece of paper into an experimental wing for a new type of aircraft designed to be more economical and efficient than today's airliners.

Materials:

- Piece of paper - 8.5 x 11 inches OR copies of the Ring Wing Template for younger students
- Transparent tape (optional)
- Additional paper for experimentation

Background: NASA's Aeronautics Research Mission Directorate is developing technologies that will make aircraft more economical and efficient than today's airliners. Aeronautics research takes on many forms, including researching various wing shapes and configurations. One revolutionary flying wing configuration, called the Blended Wing Body, or BWB, has a thick, airfoil-shaped fuselage section that combines the engines, wings and body into a single lifting surface. The BWB can carry as many as 800 passengers over 7,000 miles at an approximate cruise speed of 560 mph. Compared with today's airliners, it would reduce fuel consumption, harmful emissions, operating costs and noise levels. Another research concept for personal aircraft utilizes ring wing technology, allowing aircraft to take off and land in a variety of locations.

Airplanes of the future may look very different from those of today. NASA is developing high-payoff technologies for a new generation of safe, environmentally compatible, and highly productive aircraft. One such idea is this experimental aircraft: Youtube of circle wing airplane , which features a ring-wing lifting body concept.

[If you cannot figure out the procedures below click here]

Procedures

1. Fold a piece of 8.5- x 11-inch paper diagonally as shown in diagram 1.

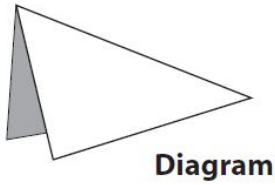


Diagram 1

2. Make a 1/2-inch fold along the previously folded edge.

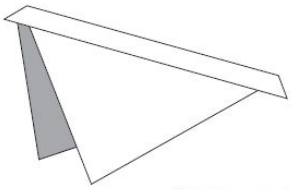


Diagram 2

3. Make a second 1/2-inch fold.

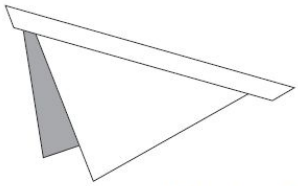


Diagram 3

4. Curl the ends of the paper to make a ring and tuck one end into the fold of the other.

5. Gently grasp the “V” between the two “crown points” with your thumb and index finger.

6. Toss the glider lightly forward. Note: The folds in the paper make the airplane’s front end heavy and the back end light. Curling the ends to make a ring changes the shape of the wing and improves the wing’s flight performance.

What else could you do?

Make a flipgrid of your flight and post it in “Omega Advisory”.

Make one change to your aircraft to enable a change in flight, then fly your aircraft several times. How did the flight characteristics change with your wing change? What is the cause-effect relationship between your change and the flight change? Can you predict what a change will cause?

Measure the diameter of your ring-wing glider and measure the average distance it will fly. Then create a second glider with a smaller or larger diameter and measure the average linear distance it will fly. Does diameter influence linear distance flown? Which size is the “best?”

Decide what constitutes the "best" flight. Is it distance? Hang time? Loops? Once criteria is determined, embark on creating the best paper airplane you can. Is a "typical" paper airplane "better" than your Ring Wing? Look up other designs on the internet (check out this one: Hoop Glider)

Create a data table to record your results.

Independent Variable: *What you are changing about your design each time.* *Ex: Diameter of Airplane, weight added*	***Dependent Variable:*** *What you are measuring/recording. Ex: Distance, Hangtime.*

Challenge by Choice:

- *Make an appropriate graph in Google Sheets to show how the changes to your Independent variable affected the outcome(dependent variable). Link: Tutorial on Google Sheets*

- *If you make a table and graph, Share it with me! I would love to see your data and the changes you made to your planes! alounsbury@cvsdvt.org*