

Education Requirements for Careers in Engineering

2 year degree— Engineering technician

You can specialize in a wide range of engineering fields with a 2 year degree. Engineering technicians solve technical problems. Some help engineers and scientists do research and development. They build or set up equipment. They do experiments. They collect data and calculate results.

4 year degree— Engineer

There are 25 recognized fields in engineering, including civil (buildings, roads, and bridges), mechanical (machines), and nuclear, just to name 3. At this time, 4 year graduates are being recruited by companies, and are paid substantially higher than people with a 4 year degree in other topics.

Advanced Degree

Generally engineers continue working towards advanced degrees after they are employed to keep up with the current technology in their field.

Rewarding Career!

4-H Projects:
Aerodynamic Design
Robotics
Model Rocketry
Aerospace

STEM Connections

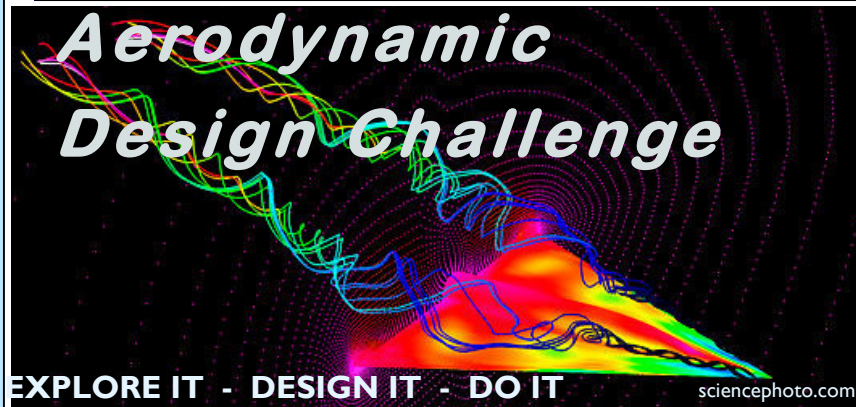
Colorado State University

Extension



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Connecting Science, Technology, Engineering, and Math concepts to our everyday lives.



Over the past 4 STEM Connections inserts, we have examined 2 and 3 dimensional design, explored aerodynamic design of a laminar glider, and built a wind tunnel to test designs. Each issue expanded on the ideas and concepts of design in 3 dimensions, and how those shapes interact with the atmosphere in a field called fluid dynamics.

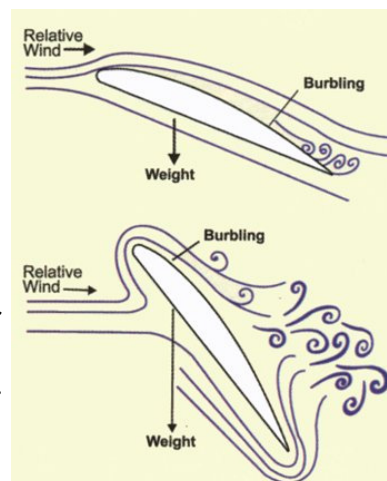
Design engineers work to produce an optimum design for an object that move through a fluid medium (both liquid and gas) with the least amount of drag. In a wind tunnel, we can see drag by the turbulence in the smoke as it flows past our design. The greater the turbulence, the greater the unsteady fluctuation (change) in velocity (speed) of the air surrounding the object. The greater the disturbance in velocity, the more impact on the object moving.

Now is your opportunity to take what you have learned and design parts of a rocket or airplane/glider to minimize drag and unsteady fluctuation in velocity. As in all science, we start with one variable (a thing that is liable to change). Start by designing an individual elements: for rockets—fins, fuselage, nosecone, or nozzle.; for airplanes—wings, fuselage, horizontal and vertical stabilizer on the tail.

Test your design. Plan on trying several different designs for each element of your rocket or airplane. As you examine each in the wind tunnel, try to figure out why one design is better than another. Perhaps there will be parts of each design that combined would make an element with very little turbulence when in your wind tunnel.

When you are satisfied with the design on your first element, move to the next element, and test several designs to find one that has the least turbulence in the wind tunnel.

When you have completed testing all your elements, put together your rocket or airplane. If your rocket or airplane are small enough, test the finished product in your wind tunnel. How did you do? Do you need to reposition any of the elements?



http://www.centennialofflight.gov/essay/Evolution_of_Technology/High_Lift_Devices/Tech6.htm
Colorado State University Extension 4-H programs are available to all without discrimination.

Materials:

- Scissors
- Craft knife
- Cutting board
- Materials for design of your choice, *i.e.*
 - Corrugated cardboard
 - 2L pop bottles
 - Balsa wood & sandpaper
- Adhesive (tape, glue)
- Wind tunnel (earlier STEM insert in your newsletter)
- Incense
- Incense holder
- Matches
- Bucket of water or fire extinguisher
- Video camera
- PARENT!

Directions:

- Examine various wing, nosecone, tail, fuselage and fin (elements) designs. What do they have in common?
- To the drawing board! Try several different designs of each element. Be creative.
- Test in wind tunnel (follow directions for that STEM Connections article).
- Redesign for the lowest amount of turbulence when the element is in the slipstream. Record.
- By decreasing turbulence, you can increase the efficiency of your element. Keep trying!
- This activity may take you days or weeks of careful planning and observations, but when you are done, you will have a rocket, airplane, or glider with an excellent design. Remember to record all results.