

Answer on Question #48196, Engineering, Other

Task:

Describe common misconceptions about lift?

Answer:

1. Wings create lift because they are curved on top and flat on the bottom. INCORRECT.

Incorrect because only some wings look like that, while other wings are symmetrical (they're the same on top and bottom,) while still others are flat on top ...and curved on the bottom! And don't forget the hang-gliders and the Wright Brothers' flyer, both of which used thin fabric wings with equal curvature top and bottom. The lifting force does not vanish if an airplane flies upside-down. Explanations for flight involve other things, and not airfoil asymmetry.

2. Part of the lifting force is due to Bernoulli effect, and part is due to Newton. INCORRECT

Incorrect because ALL wings, regardless of shape or degree of tilt, must create 100% of their lift because of Newton. To say otherwise would mean that a wing could violate Newton's Laws! Yet at the same time, ALL wings create 100% of their lift because of the Bernoulli Equation. This is true because 100% of the lifting force comes from pressure differences on the wings' surfaces.

3. The Bernoulli effect pertains to the shape of the wing, while Newton's laws pertain to the angle of attack. INCORRECT.

Incorrect because Newton's laws pertain to all features of the wing; both to wing shape and attack angle. Exactly the same thing is true of Bernoulli's equation: angle of attack is critical, but wing shape has effects too. Wings don't violate Newton's laws, and wings in conventional flight (slower than the speed of sound) don't violate Bernoulli's equation.

4. In order to generate lift, the upper surface of an airfoil must be more strongly curved than the lower surface? INCORRECT

Incorrect, since lift can be generated by symmetrical airfoil such as those used on acrobatic aircraft. Lift can also be generated by thin fabric airfoils, by sheets of paper (paper airplanes), by tilted pieces of flat plywood, or by "supercritical" airfoils which are more curved on the BOTTOM than the top.

-Flat thin wings generate lift entirely because of Newton; because they are tilted, while thick curved wings generate lift exclusively because of "Bernoulli Effect?" INCORRECT.

Think a moment: if a wing when a flat thin wing is given a positive angle of attack, the air above the wing speeds up, and the air below the wing slows down. 100 percent of the lifting force can be explained using either the "Bernoulli effect" or the Newton/Coanda principles. These two simply are a pair of alternate viewpoints on the same situation, and it's wrong to try to break the lifting force into a separate percentage of "Bernoulli" force and an "attack angle" force.

- Asymmetrical airfoils produce lift because of their special shape, while symmetrical airfoils produce lift because they are tilted? INCORRECT.

- A symmetrical airfoil cannot create lift? INCORRECT

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