

Marvelous Meaningful Monthly Math

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Central Area Tech Prep, Mitchell Technical Institute, and Bridges

Science, Technology, Engineering and Mathematics January

Career – Aerospace Engineer

Math Activity

"We use math all the time," says Phil Evans, an aerospace engineer. The aerodynamicists calculate the loads (forces) upon a plane using wind tunnels and computer calculations.

The designers then do preliminary calculations to determine whether the parts they've designed can withstand the loads that will be placed upon them. "The designers just have to get [the load calculation] close," says Evans.

They don't have to absolutely confirm that a part can withstand a certain load -- that's up to the stress department. The stress analysts use a computer program called finite element analysis to determine whether a part is strong enough -- or too strong!

You're designing a support rod for the inside of an aircraft wing. Your current design specifications call for the rod to be made out of aluminum and to have a diameter of 20 millimeters. (Note that in this field, you will be using the metric system of measurements!)

It will be supporting a load of 50×10^3 newtons (N), a measurement of force. According to your stress analysis tables, the allowable stress on aluminum is 100×10^6 Pa. A Pa is a Pascal, which is: N / m^2 .

You know that the formula for stress on a rod is:

Stress = load / area

Area = πr^2

$\pi = 3.14$

r = radius, in meters

Determine the stress on the rod. Can you use an aluminum rod? Is it within the allowable stress for aluminum?

Name _____ School _____ Teacher _____