

Re: Aircraft Scaling Problem / Question

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There's more to it than mass and volume, there's structural strength.
And that makes it an engineering problem, not just a math problem.

Yes, but your fixating on the engineering. Without the foundation in math there would be no engineering. You do realize that no matter how you manipulate the equations to increase efficiency some factors more important. If we are to worry about all those details then we loose sight of the whole point the original poster asked. He did not ask about engineering issues. He could care less(probably) about actually implementing this thing. What he did was carry out at thought experiment just for fun. Actually the insight gained by this is much more important than worrying about wether to use titanium or alluminum and how much it will cost or how thick it needs to be or which paint you should paint it with.

Hopefully this make sense. I'm not trying to be formal in my analysis and there are many things I'm not taking into account. Think about ants and how strong they are per unit mass. They can lift very heavy things without breaking there thin arms. If we tried to lift the same proportionate amount we would be crushed.

So you now agree that it is an engineering problem?

Nope. He did not ask about the real thing. In any case if you don't understand the mathematics you do not understand why the engineering does what it does? Why do they use lighter materials? Why do they put holes in the beams? Because mass/volume is the most important factor. Its more important then any other factor. If you can reduce 1 kg of mass then you can increase the lift by a factor that depends on the square.

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e.g., $L = LE/M = LE/V$

LE is the lift equation which is somewhat independent of ma