The Effect of Porous Wings On Small Aircraft

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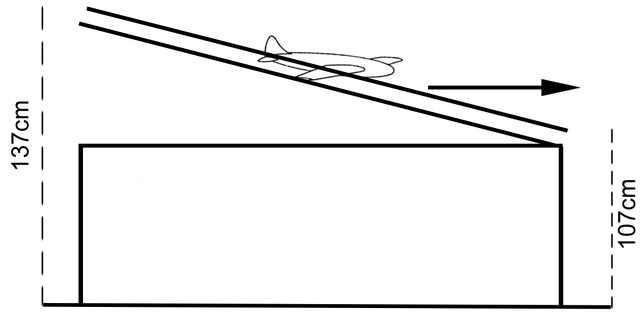
Introduction

Current hand-launch reconnaissance drone

- Small scale flight vehicles are susceptible to aerodynamic instabilities
- Yohanna Hanna's Ph.D. work, under advisement from Dr. Geoffrey Spedding, looks to see if porosity has any effect on these instabilities
- Project was preliminary research to see if a porous wing alters flight on small, 55 cm wingspan gliders



launcher setup

Experimental Setup

- Bungee cord attatched to vice 132 cm from start of tape measure on ground
- Drilled 1 mm, 1.5 mm, 2 mm holes in gliders (number of columns varied from plane to plane) after testing each as a control

Skills Learned

- Basic properties of lift and drag on an airfoil
- Dryden Wind Tunnel and it's force balance
- Problem-solving to successfully launch gliders with consistency

The gliders used in experiment

Results

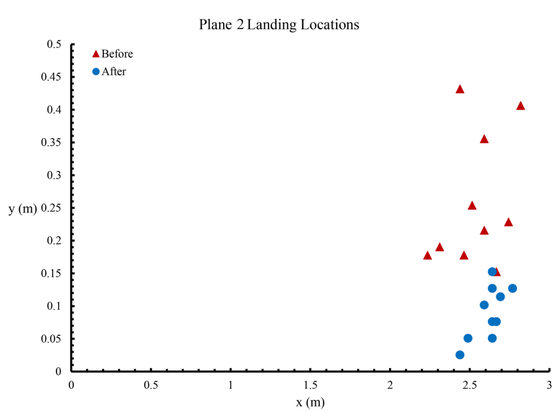
- On average, gliders with holes glided a shorter distance than without holes, however all measurements were within uncertainty

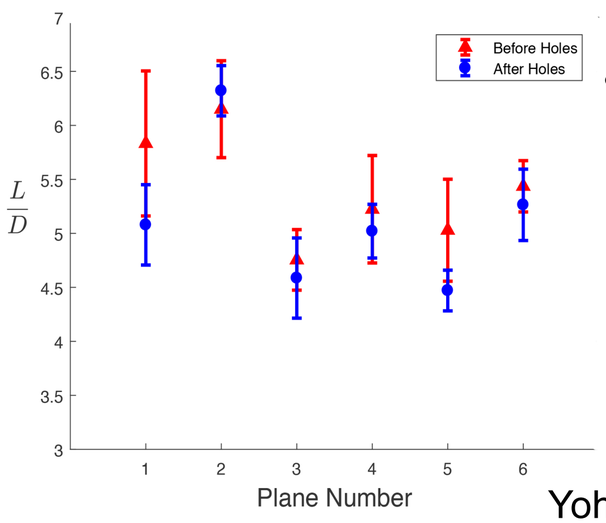
Conclusions

- Due to inconsistency in resulting launch distances despite consistent force of launch, deemed inconclusive whether or not porous wings made an impact
- Deviation from tape measure did decrease with porous surface, but further research would need to be conducted to explore the conclusion that planes had increased stability in flight

Relationship With STEM Coursework

Bird wings are the basis for testing porosity in flight vehicle wings





- Previous Physics and Calculus knowledge was required to understand lessons in aerodynamics and lift

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