Name(s)
Yiyi Ouyang

Project Number
S0322

Project Title
Flight Analysis of a Winglet's Effect on Aircraft Performance Inside a Subsonic Wind Tunnel

Abstract

Objectives/Goals
The goal was to measure lift (via weight) and drag (via Hooke's Law) on wings with varying cant angles in subsonic conditions with a 2-degree angle of attack.

Methods/Materials
3-D Printer, Fan, Wooden planks, Powertools, Spring, and scale. I used plywood and the fan to construct a wind tunnel. The 3-D printer fabricated the wing which was tested with a spring and scale.

Results
The wing with the cant angle of 110 performed the best based on its lift to drag ratio. It had the highest lift to drag ratio with a cant angle of 100 being the next highest. There may have been inconsistencies with the wall effect and thus a margin of error of around 15 degrees can arise.

Conclusions/Discussion
It seemed that at 110 degrees, the spillover effect of high-pressure wind to low-pressure wind was the least. This means that a cant angle of 110 degrees may be best at conserving oil, increasing mileage, and decreasing wingtip vortices.

Summary Statement
I used Hooke's law to measure drag and a scale to measure lift inside a self-constructed wind tunnel.

Help Received
My dad cut the wood. I used the drill and constructed the wind tunnel by myself.