Investigating Which Fin Shape Results in Minimal Induced Drag

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Aerodynamics is heavily dependent on the four main forces of flight, weight, lift, thrust, and drag. Drag heavily impacts the aerospace industry's ability to create faster and more effective aerodynamic vessels. By developing three different rocket bodies: elliptical, triangular, and square, this project tested the hypothesis that the elliptical fin design would produce the least induced drag. Each Rocket body was identical in both design and production process. The separate fin designs were all made to have equal area to ensure that the force of drag data would not be skewed, as derived from the force of drag equation. Each rocket body was put in the same wind tunnel and held at the same top speed and air density. The results from the experiment were .27 Newtons of drag for elliptical, .305 Newtons of drag for triangular, and .33 Newtons of drag for square. Compared to the triangular fin design, the elliptical fin design produced 11.5% less drag. As compared to the square fin design, the elliptical fin design produced 18.2% less drag. This shows that the elliptical fin design produced the least induced drag force. This suggests that the elliptical fin design is the most efficient design for aerodynamic vessels trying to achieve minimal induced drag. Further experiments will clarify the safety constraints of this design.

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