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DESIGN AND ANALYSIS OF HUMPBACK WHALE WING WITH WINGLETS

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Abstract

Several aviation pioneers from the early ages of 15th century give up their lives to make the human flying possible resembling a simple bird which we observe in our everyday life. Moderately, the situation tends to change by invention of significant hot air balloons which are powered by the helium gas lately. And then several pioneers exhibit their successful invention of gliders. But none of them could cope to establish a significant role in aerospace industry compared to the revolution encountered by the invention of successful 'Heavier-than-air-flight' by the Wright Brothers.

This Project, 'DESIGN AND ANALYSIS OF HUMPBACK WHALE WINGS' put forward this significant aerodynamic problem and deliberately strives to minimize this by redefining the most successful aerodynamic shape in the aerospace industry from the ages. This project mainly focuses on the aerodynamic shape of the wing to reduce the downwash generated by comparatively decreases the vortex generation at the trailing edge significantly provided that circulation remains zero.

Redefining the aerodynamic shape of the wing in the sense by incorporating the circular cross-sections at the leading edge of the wing, termed as 'Ventral Fins' or 'Tubercles', distributed along the span of the wing at regular space intervals. These shapes are inspired from the most efficient swimmer in the North Atlantic Ocean named as 'Humpback Whale'. Therefore the aerodynamic shape of the wing itself coined from its name 'Humpback Whale Wing'. This project labels the contrast between the typical conventional wing with the Humpback Whale at the same fluid conditions as well as operating conditions projecting the aerodynamic role of tubercles.

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Hot air balloons, Humpback Whale Wings, Aerodynamic shape

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