

## Chapter 1 : How a Hydrofoil Works

*design projects dealing with the HPS for include this project on the optimization of the oscillating hydrofoils and another project dealing with the.*

This equation says that as you go further from the center of the radius of curvature of a streamline, the pressure on the streamlines increases. The upper surface of the foil is closer to the center of curvature of the streamlines, therefore there will be a lower pressure than the ambient pressure above the foil. The difference between the pressure on the top surface and the ambient pressure at the bottom surface will produce a net pressure that will cause the lift. Angle of Attack As it has been presented, lift comes from the dynamics of the fluid in the area surrounding the foil. But the lift can be optimized by positioning the hydrofoil at an angle relative to the incoming fluid flow called the angle of attack See diagram. The goal is to optimize the lift to drag ratio. This ratio depends on the shape of the foil, which in this case is considered to be a thin foil. With a small angle of attack, the lift increases rapidly while the drag increases at a small rate. Detail of Hydrofoil Geometry At first, people can think that stalling is likely to be a problem in hydrofoils as it is in airfoils, but surprisingly it is not. A steep angle of attack is not needed in the design of the hydrofoil. On the contrary, small angles of attack are used on hydrofoils to optimize the lift to drag ratio as explained before. All these features have to be taken in consideration. So the features are designed to produce a minimum speed that will lift the boat of certain weight and keep it foilborne. One problem that a hydrofoil craft can experience is the height of the waves being greater than the struts. Also, if the craft is traveling faster than the waves, the foils could break to the surface and outside of the water, resulting in a loss of lift and a negative angle of attack when the foil dives into the next wave, making the craft crash into the sea. Hydrofoils have become very popular. They are used in various kind of sea traveling, from military use to watersports. The high speed, smooth cruise and better turns delivered by hydrofoils have been used in military ships. Sailing has also adopted the hydrofoils to gain more speed. It is a water ski with a hydrofoil attached which permits people to fly above the water surface. Every day more hydrofoils are used, and in the future, they may be the dominate method of sea traveling. See also on this site: Hook, Cristopher and A.

## Chapter 2 : Hydrofoil Design | Boat Design Net

*ii Abstract This report contains information pertaining to the spring portion of the senior design project at Calvin College for team 9: BOAT!.*

## Chapter 3 : Mechanical & Aerospace Engineering Capstone Projects - Old Dominion University

*Thanks very much for the explanation of the Wortmann airfoil. I saw that in fact, the drag is lower on the NACA at  $ncrit=1$ . However, the L/D ratio of the FXMP remains higher at this  $ncrit$  value.*

## Chapter 4 : Senior Design | Mechanical Engineering

*Senior Design Project Essence of Music Submitted To: Dr. Lei Wei EEL - Summer Senior Design 2 Submitted by: Group 14 Joshua Garber Baron Dolletski-Lazar.*

## Chapter 5 : Senior Design Projects | Calvin College

*A competition team project to design and build a fully-submerged canard hydrofoil system for a 6 m (18 ft) solar boat was completed to improve craft performance by reducing overall drag. The project focused.*

## Chapter 6 : Senior Design Projects - Department of Mechanical Engineering

*Design Projects A joint committee of department faculty and members of the department's External Advisory Board Senior Design Committee select a project or projects for each semester's capstone design project.*

## Chapter 7 : Cottonwood Project | Landform Design Group

*A hydrofoil craft has two modes of operation: the normal slow-speed hull- borne mode and, with increasing speed through the takeoff, the flying or foil- borne mode.*

## Chapter 8 : hydrofoil | Boat Design Net

*Capstone Highlights. Senior undergraduate students will have an opportunity to work on exciting capstone projects under the guidance of MAE faculty, as a part of Project Design and Management II course (MAE).*