

# Using Fluid Dynamics to Create a Submersible Aircraft

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The purpose of this project is to design a craft that can travel through air as well as water using an invertible foil. The foil will be able to change the direction of the force being produced and allow the craft to counteract gravity while in air and buoyancy while in water. We hypothesized that since they are both fluids and act similarly, a craft is capable of traveling through both. Two crafts were constructed, one from insulation styrofoam (Mark I) and the other from maple veneer (Mark II). The first test of Mark I was in water. As the craft was pulled through the water it began to descend as expected and was soon completely submerged. The craft then experienced structural failure and both wings completely ripped off. At that point the craft emerged from the water. The craft was too badly damaged to perform more testing. With Mark II the main issue we wanted to address was structure. We achieved a stronger frame using veneer plywood. Mark II achieved submersion in water without any major problems. However, when we towed the craft through the air with a car, we created an excess of lift. This quickly led to a stall and a crash landing. The crash landing caused a damaged wing. A second test in air was attempted but the imbalance of lift due to the broken wing caused the craft to roll and crash. The craft was not tested further. In conclusion, from the brief testing done with both crafts it has shown that the same principles used for flight in the air can also be used for submersion underwater. However, because of the damages from the externally powered tests to both Mark I and Mark I, no testing was done regarding unassisted flight. The possibility of an unassisted submersible aircraft still remains open and needs to be explored further.