AEM 313 PROJECT 1 MEMO

Subject: Aerodynamics I Aircraft Project 1

TO: AEM 313 **Date:** 11 Oct 2017

CC: **Memo:** AEM313-Proj1-Assign-RevA

From: Charles O'Neill

REF: **Ext:** 8-5161

Summary:

Using XFOIL, design and construct a single-element airfoil maximizing:

$$Score = \frac{C_l}{C_d} \cdot Area$$

at a Reynolds number of 2,000,000 (two million). You may work in groups of 3-4.

Discussion:

Extending the range of an aircraft often requires optimizing the ratio, C_l/C_d . Fuel carried in the wings depends on the airfoil's area. You will design and construct a single-element airfoil operating at $\mathrm{Re} = 2 \cdot 10^6$ optimizing:

$$Score = \frac{C_l}{C_d} \cdot Area$$

This project can be started by 1) researching and testing existing airfoils, 2) evaluating performance with XFOIL, 3) iterating to find an optimal geometry.

Deliverables

You will deliver 3 items:

- A paper copy of your memo (in this format) discussing your final airfoil design and your approach. Place the final performance results in the Summary section. Then, discuss the process and details in the Discussion section.
- Two (2) airfoils of at least 0.125 inch thick from any material with a chord of 12 inches. In ink, write "AEM 313 2017, <Last Names>" on the side of each airfoil.
- An emailed geometry file of your final airfoil in XFOIL format. The email should have a subject line of "AEM 313 Project 1: <Last Names>" with only one attachment.

Grading

- 60% from the Score as determined by XFOIL. The highest Score in the class receives a 100% in this section; all others are prorated. **If you score higher than Dr. O'Neill, your team receives a minimum of 90% on this section.**
- 30% from your report.
- 10% from the 2 constructed airfoils.

Due Date

Full credit by Nov 10th 2017 at 5pm.