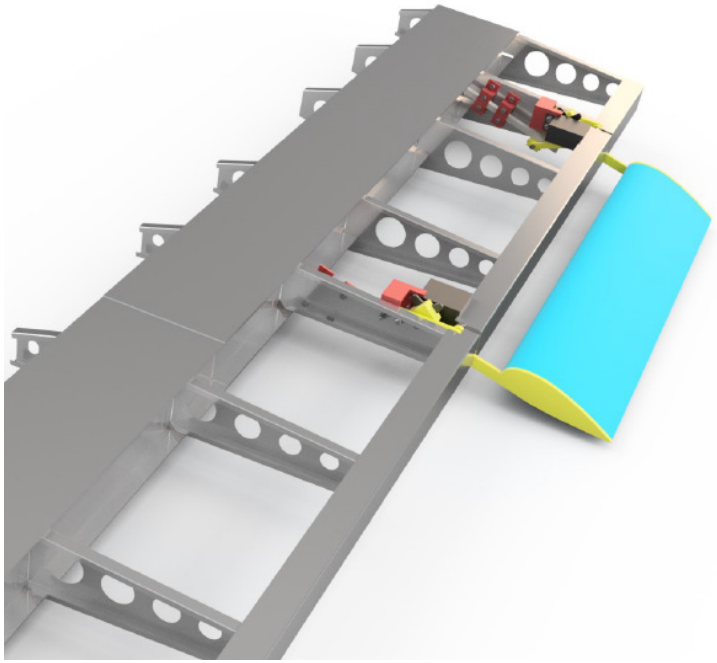
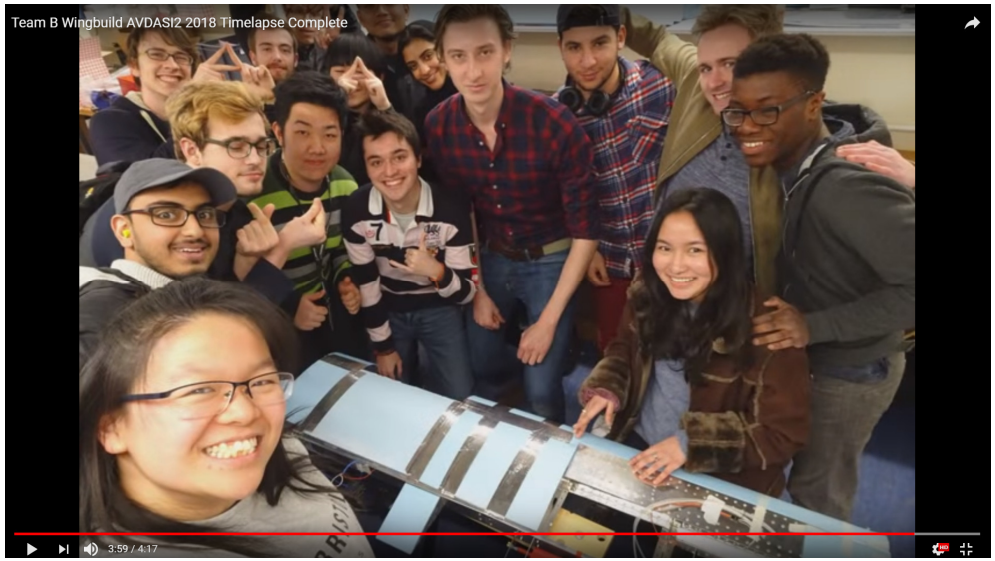
Aerospace Vehicle Design & Systems Integration

Wing Design Build & Test



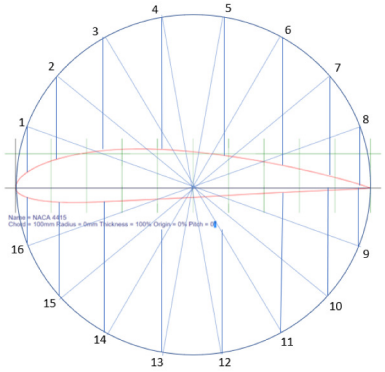


https://www.youtube.com/watch?v=A3XZ-pIG1Hw

2nd Year students are tasked to design, build and test a 1.5m span wing to achieve aerodynamic, structural and mechanical performance requirements.

Design

Aerodynamics, Structures, Mechanisms, Actuation & Control



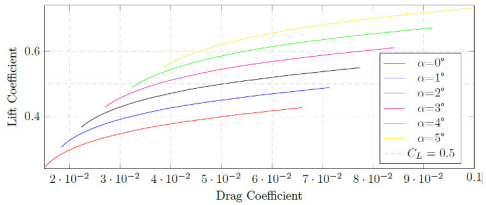
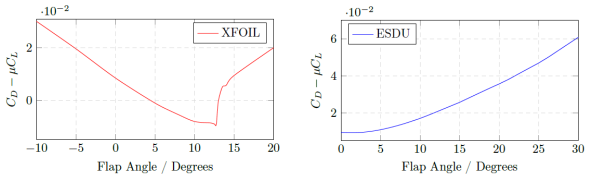


Figure 3: Lift against drag coefficients for various positive angles of attack with a full flap sweep



(a) XFOIL (b) ESDU

Figure 2: Predicted flap deflections for minimum take off distance at zero lift incidence

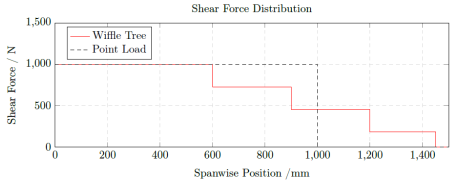


Figure 10: Shear force distribution along span with wiffle tree loading

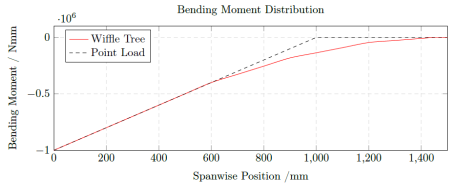
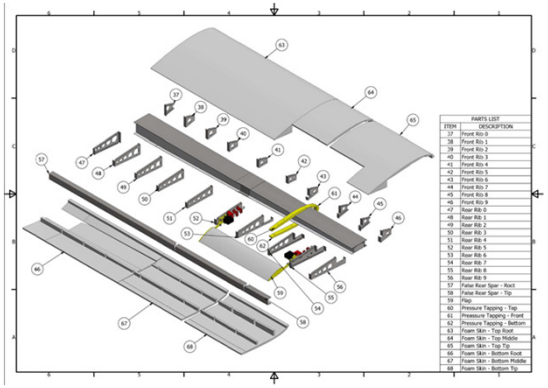
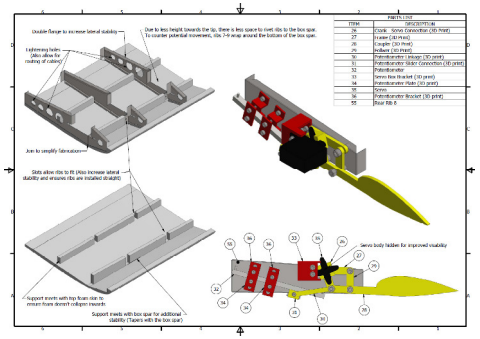


Figure 11: Shear force distribution along span with wiffle tree loading





3.2.1 Actuation and Control Initial Plan

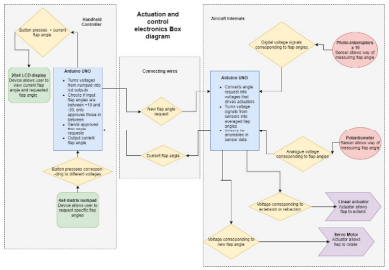


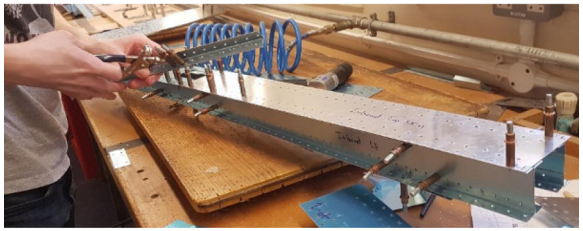
Figure 17: Electronic Box Diagram

Figure 36: Flap Prototype

Aerodynamic, structures Mechanisms and control

Build

Aerodynamics, Structures, Mechanisms, Actuation & Control



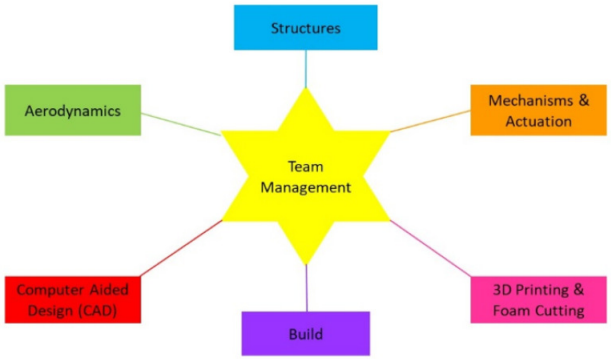
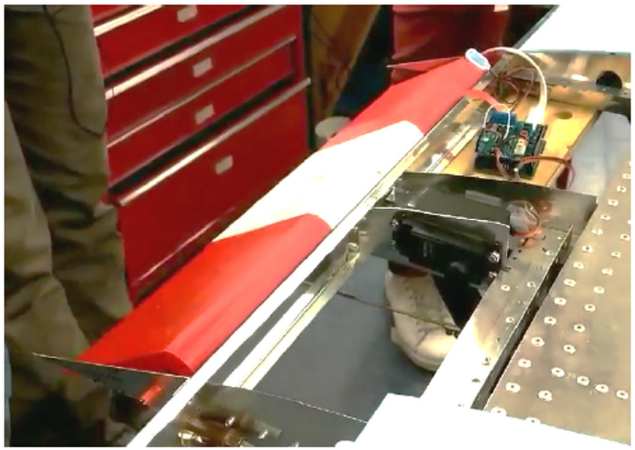


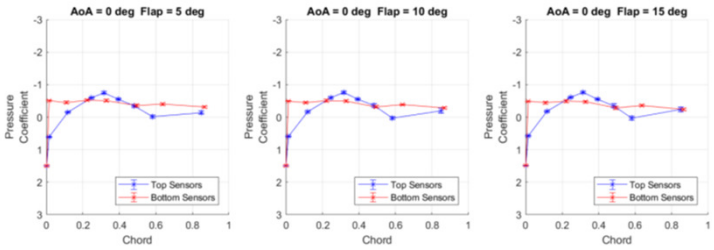
Figure 37: Team C organisation chart

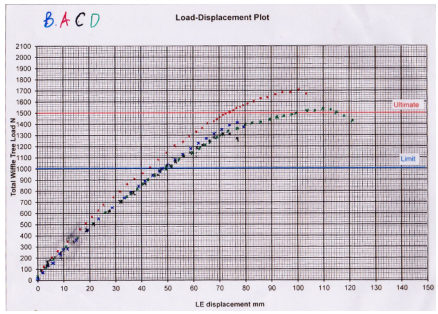


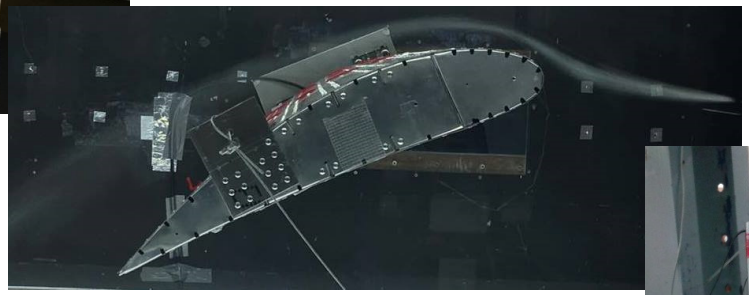
Starting from ordered aluminium sheets, rivets and foam blocks, wooden tooling boards students manufacture their wing within a strict schedule by numerous processes including: Wire cutting, laser cutting, hot wire cutting, hand fabrication

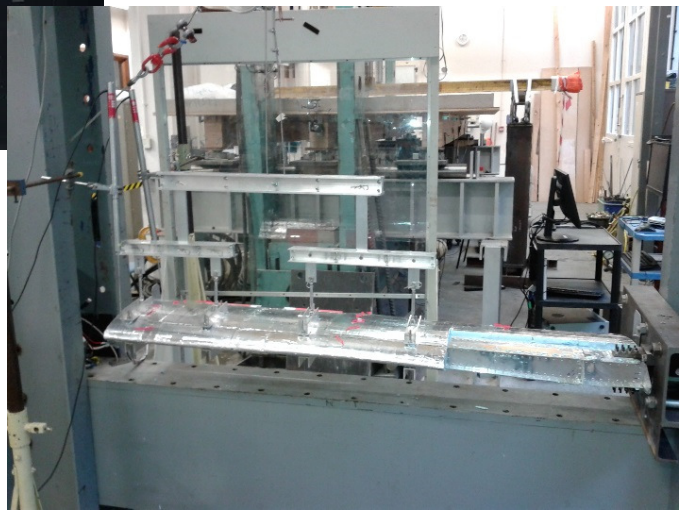
Test

Aerodynamics, Structures, Mechanisms, Actuation & Control









To conclude the wings are assessed by:

- Aerodynamic Wind tunnel testing
- Structural load testing
- Flap mechanism & control demonstration

and test results are compared with design prediction