Boeing Wingbox Assembly

THE DESIGN LAB at Rensselaer

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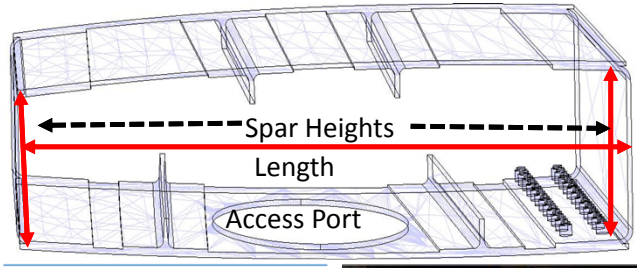
BOEING

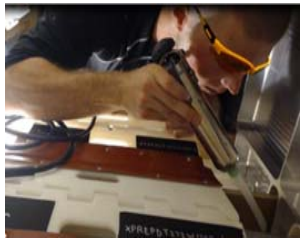
Purpose and Motivation

Develop an autonomous or semi-autonomous system to perform various tasks required for the manufacture and maintenance of airplane wingboxes. Reduce need for human work inside wingbox, increasing efficiency, safety and decreasing costs.

Confined Space: The Wingbox



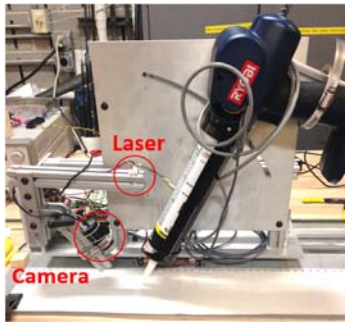
Approximate Dimensions	
Length	33” – 187”
Wing Boxes Per Wing	20 – 30
Front Spar Height	7” – 34”
Rear Spar Height	6” – 42”
Access Port	18” x 10”



The small dimensions of the wingbox make human performance of tasks such as laying and inspecting sealants difficult.

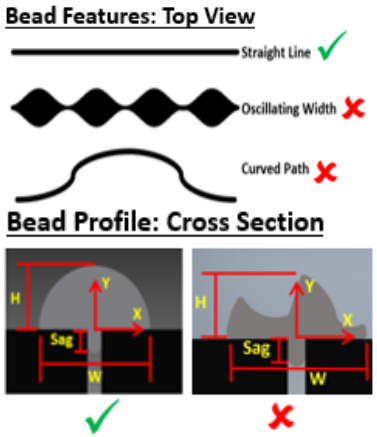
Inherited System

Utilizing a separate camera and laser, a foundational bead analysis system was created by previous teams with width analysis capability.



Main Semester Objective

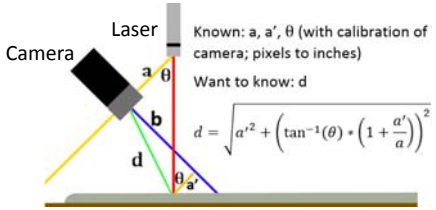
Design and build a prototype end effector, to house and expand upon the inherited system, for post application analysis of bead sealants as applied to butt seams.



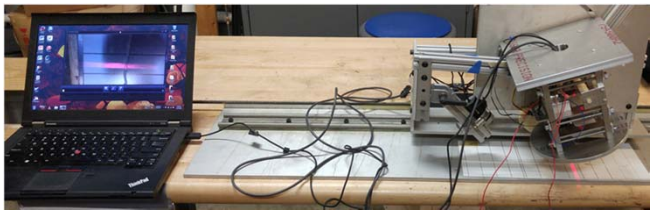
Sub Systems

- Computerized Visual Inspection System
  - Computer analysis of bead geometry
- Housing
  - Contain camera, laser, and supporting hardware in one unit.

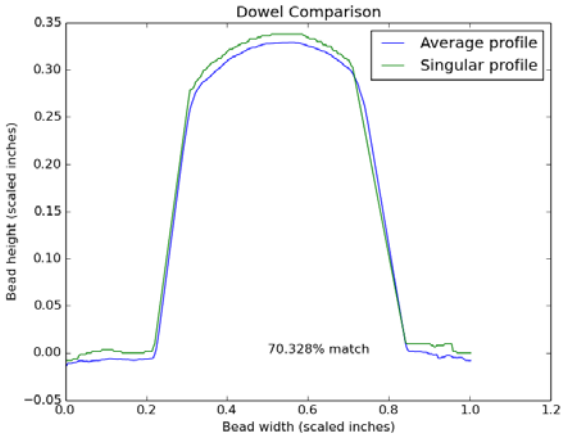
Technical Approach



CVIS Results and Final Housing



Combined system analyzing a sealant bead.



Final System