

COMPANY

Area-I

LOCATION

Kennesaw, Georgia, United States

SOFTWARE

Autodesk® Helius PFA

Woven composites take flight

Area-I performs accurate, efficient analysis of complex woven composites with Autodesk Helius PFA

With Autodesk Helius PFA, [we were able to] rapidly and accurately predict the structural performance of our complex composite airframe— manufactured from both unidirectional and woven composites— while identifying several inconspicuous structural problem spots.

— **Nicholas Alley**
Chief Executive Officer,
Area-I



Image courtesy of Area-I

Project summary

Area-I, an aircraft research and fabrication company, recently completed development and flight testing for its Prototype Technology Evaluation Research Aircraft (PTERA). The PTERA is an unmanned aerial vehicle (UAV) that serves as a low-risk, low-cost platform for flight testing high-risk technologies such as advanced aerodynamic treatments.

To perform a detailed analysis of the innovative wing design for the PTERA UAV, Area-I engineers relied on the woven composite analysis capabilities in Autodesk® Helius PFA software.

The challenge

The PTERA UAV's wing structure needed a design that would provide high lift and low drag with minimal bending. The high stiffness-to-weight ratio of carbon-based composites and the manufacturing versatility of woven fabrics made a plain-weave carbon epoxy composite the clear choice for meeting design objectives. However, since the PTERA UAV's wing structure is comprised of more than 50 individual woven components, employing traditional analysis techniques to optimize each part would be cumbersome. The results also would be based on methodologies not designed for woven materials.

The solution

By using Autodesk Helius PFA software on the PTERA UAV project, Area-I

engineers were able to design a layup that met all weight, strength, and deflection goals. Wing bending was minimized to ensure leading- and trailing-edge jet slots remained open during all phases of flight. In addition, the final layup schedules satisfied requirements that the wing would be failure free under severe 6-g loading.

The result

The constituent level stress and failure indices obtained by Autodesk Helius PFA helped to greatly simplify analysis for Area - I's engineering team.

"With Autodesk Helius PFA software, [we were able to] rapidly and accurately predict the structural performance of our complex composite airframe— manufactured from both unidirectional and woven composites—while identifying several inconspicuous structural problem spots," says Nicholas Alley, chief executive officer of Area-I. "The superior analysis allowed us to integrate solutions quickly into our design process, which literally saved hundreds of design hours by giving us the confidence to utilize a less complex and lighter design."

Learn more

Learn more about Autodesk Helius PFA software at www.autodesk.com/products/helius-pfa/overview.