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Wind Tunnel Wing Modeling with Neo® Stereolithography and Somos® PerFORM™

A practical application overview based on wind tunnel testing at Embry-Riddle Aeronautical University

This wind tunnel test model manufacturing approach isn't limited to aircraft wings. The same workflow applies to planes and UAVs, drones, wind turbines, and racing cars. Anywhere teams need accurate geometry and airflow data and the ability to iterate designs quickly.

The Challenge

Wind tunnel models have to strike a careful balance. They need to be stiff enough to handle loading and mounting, have a surface finish suitable for aerodynamic testing, and avoid excessive laser reflection when using optical techniques like Particle Image Velocimetry (PIV), all without becoming heavy or slow to produce. At Embry-Riddle Aeronautical University (ERAU), CNC-machined sub-scale wings typically take 3-4 weeks after CAD finalization, and metallic surfaces can create laser reflections that interfere with optical measurements.

The Approach

To shorten lead times and improve test readiness, ERAU produced three wing models using a **Neo®800 printer** and **Somos® PerFORM™ resin**. From finalized CAD, all three wings were printed in just over 47 hours, with material costs of around $4,350 and minimal technician involvement thanks to automated cleaning. One wing printed in orange **Somos® PerFORM™ Reflect** resin did not require a matt black coating, helping reduce laser reflection for PIV without additional surface treatment.

~90% faster
Model fabrication
vs CNC machining

47 hours, 2 minutes
Total print time for three copies

**~$4,350**
Resin cost for all three wings

3X load
Passed static testing

1-2 hours
Post-processing time for surface preparation for laser test

Case Study:
SLA-Printed Wing Performance in Wind Tunnel PIV Testing

Wind tunnel test environment

Low-speed wind tunnel testing of wing sections and full-scale model to evaluate aerodynamic performance and flow behavior.

ERAU wind tunnel

CNC-machined reference models

Metallic wing models are used as a baseline for stiffness, geometrical accuracy, and mounting interfaces, but can introduce long lead times and optical reflection challenges.

Metallic wing model

SLA-printed wing models

Wing models are produced using Neo® stereolithography and Somos® PerFORM™ to capture complex geometry, internal features, and instrumentation-ready designs.

Neo SLA 3D printed wing

Structural and handling checks

Printed models are validated through static load testing to confirm stiffness and suitability for wind tunnel testing.

Wing preparing for a static test

Surface preparation

Models are finished using sandable primer and matt black coating to achieve aerodynamic surface quality and minimize laser reflection for optical measurements.

Surface preparation

Wind tunnel installation

The assembled wing model is mounted and aligned in the wind tunnel, with attention to repeatability and measurement access.

Stratasys wing assembly in the wind tunnel

PIV and flow visualization

Particle Image Velocimetry (PIV) is used to capture detailed flow structures using camera arrays, laser scans, and seeded flow.
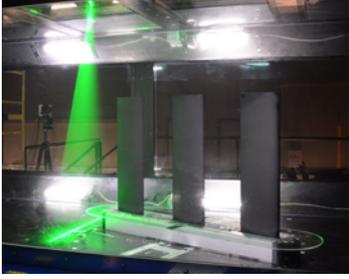
PIV with wing models, Laser and camera

Flow field results

Velocity vectors and wing-tip vortex structures are visualized to support aerodynamic analysis and validation.
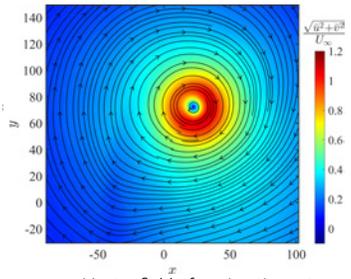
Vector field of a wing-tip vortex

Using Neo® stereolithography with Somos® PerFORM™ enables accurate, PIV-ready wind tunnel models with complex internal features, supporting faster iteration for aerospace and high-performance aerodynamic testing.

Explore how Neo® can support your next wind tunnel program.

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