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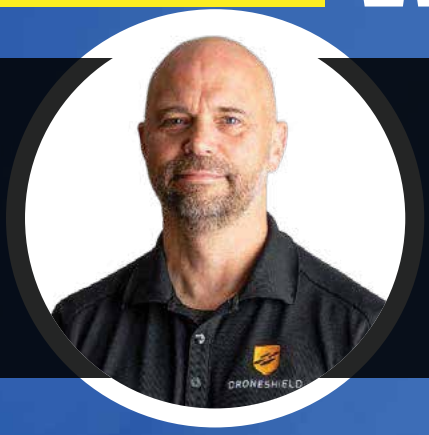

A Conversation on Drone Security with **Tom Adams** of Drone Shield and **John Halinski** of SRI Group.

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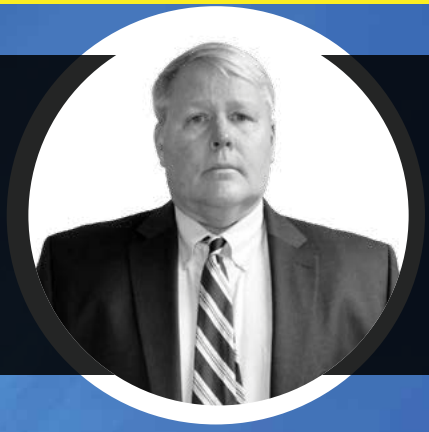

Mr.Bruno Queiroz
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Mr. Kent Wilson
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Mr.Dillon Harr
Wireless Carrier Applications Engineer at Optical Zonu

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Mr.Mathi Gurusamy
Chief Strategy Officer-Lantronix Inc.

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CADFEM **SPECIAL FEATURE**

ENGINEERING THE SKIES: HOW SIMULATION IS POWERING THE NEXT GENERATION OF DRONES

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ENGINEERING THE SKIES: HOW SIMULATION IS POWERING THE NEXT GENERATION OF DRONES

The race toward smarter, faster, and more efficient drones is reshaping industries — from defense and logistics to precision agriculture and surveillance. Yet, designing drones that can fly longer, carry heavier payloads, and perform reliably under harsh conditions remains one of the toughest engineering challenges today. Each design decision — from propeller shape to battery cooling — demands precision that leaves no room for guesswork. Traditional trial-and-error methods, while valuable, are slow, costly, and often unable to capture the complex interplay between aerodynamics, structures, and electronics. This is where simulation steps in — offering a faster, more intelligent way to design, test, and validate before a single prototype takes flight. And at the heart of this transformation are Ansys technologies, brought to innovators in India by CADFEM, the Elite Channel Partner of Ansys (now part of Synopsys).

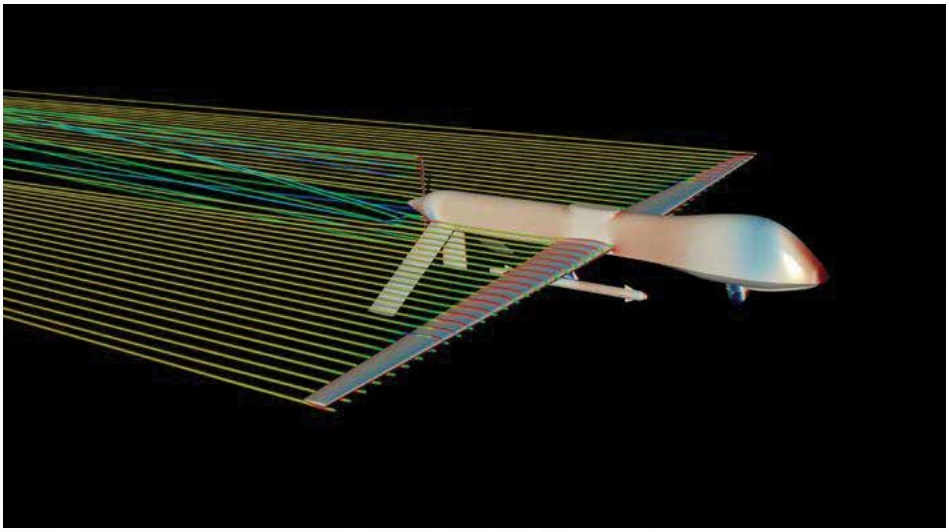
Aerodynamic Precision: From Wind Tunnels to Virtual Skies

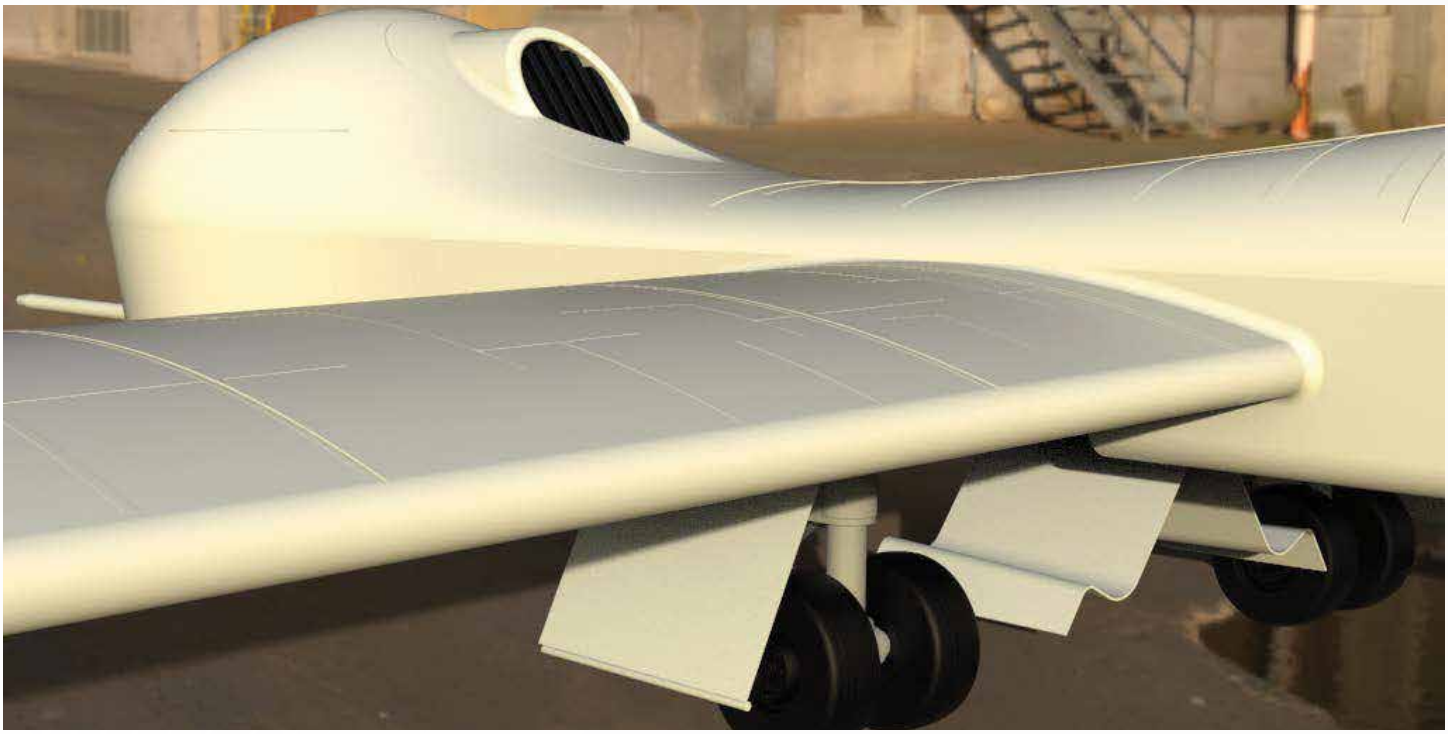
Achieving optimal lift while minimizing drag is essential to increase flight duration and payload efficiency. But real-world aerodynamics are complex — with turbulent wakes, crosswinds, and propeller–wing interactions that are difficult to test physically.

Using Ansys Fluent, engineers can create high-fidelity airflow simulations that mimic actual flight conditions, enabling fine-tuning of rotor geometry, propeller pitch, and airframe shape — all virtually. This means more stable, energy-efficient drones, designed for endurance and agility.

Structural Integrity Meets Lightweight Design

Every gram of material in a drone impacts its range and maneuverability. However,





lightweight designs can easily become prone to fatigue, vibration, or impact damage. With Ansys Mechanical, designers can simulate stresses, deformations, and material responses in different flight scenarios — ensuring frames and propeller arms withstand strain without unnecessary bulk. AI/ML-driven optimization using Ansys optiSLang helps identify key design parameters, detect potential structural weak points, and automatically explore optimal material layouts through intelligent design of experiments and sensitivity analysis. The result: lighter, tougher drones built for real-world durability.

Keeping Temperatures Under Control

Batteries, motors, and electronic systems generate significant heat during sustained flight — affecting both performance and safety. With Ansys Icepak, engineers model and optimize cooling strategies to prevent thermal hotspots and ensure balanced heat dissipation. This ensures longer component life, reliable operation, and safer missions.

Power and Propulsion: The Energy Equation

Efficient propulsion systems are the heartbeat of every drone. But optimizing the interaction between batteries, motors, and electronics can be a complex puzzle. Digital twins are transforming drone performance by merging real-world data, AI, and physics-based models.

Ansys Twin Builder enables complete system-level simulations to fine-tune energy flow, improving propulsion efficiency and extending flight time — critical for both commercial delivery and defense-grade drones.

Noise, Vibration, and Electromagnetic Performance

Rotor-induced vibration and acoustic noise can interfere with sensors, payload stability, and even mission accuracy. At the same time, communication systems packed into compact airframes risk electromagnetic interference. Using Ansys Mechanical for vibration control and Ansys HFSS for electromagnetic simulation, engineers can predict, isolate, and mitigate these effects before physical integration — ensuring stability, quiet operation, and flawless communication between onboard systems.

Smarter Systems, Safer Flight

Autonomy is redefining drone innovation — from AI-driven navigation to intelligent obstacle avoidance. With Ansys Avxcelerate, engineers can virtually test flight control algorithms and autopilot systems through hardware-in-the-loop simulations, while Ansys SCADE ensures embedded software meets the highest safety standards. By training AI models in simulation for complex or risky scenarios, these tools together bring intelligence, precision, and safety into every flight.

The CADFEM Advantage: Turning Complexity into Confidence

As an Elite Channel Partner of Ansys (now part of Synopsys), CADFEM India empowers drone manufacturers to integrate multiphysics simulation into every stage of design — from aerodynamics and materials to power electronics and embedded systems. By replacing trial- and-error with digital precision, teams achieve:

Rapid Iteration – Test, refine, and optimize designs virtually.

Reduced Cost – Minimize prototypes and physical rework.

Higher Reliability – Validate every component digitally before lift-off.

With CADFEM and Ansys, drone innovation is no longer bound by physical limits — it's accelerated by simulation intelligence. Furthermore, the integration of probabilistic AI enhances numerical simulations and engineering workflows, enabling smarter design exploration, better uncertainty quantification, and faster, more confident decision-making.

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