Improving Small UAV Endurance and Payload

Andrew Mawn
Advanced Concept Technology Demonstration
U.S. Army Soldier Systems Center, Natick, Massachusetts

Cadet David Amiot
Cadet Joseph Cymerman
Cadet Matthew Donnan
United States Military Academy
West Point, New York

ABSTRACT:

While small Unmanned Aerial Vehicles (UAVs) have made a profound impact on military operations, users desire even greater versatility than what is currently available. To meet their demands for increased endurance and payload, several areas can be improved. However, changes to the wing design provide the fastest and least disruptive means of improving performance without removing the aircraft from the hands of deployed Soldiers. Moreover, altering the wing does not require adjustments to the control system, preserving the existing aircraft features. Possible focus areas include wingspan, airfoil, dihedral, wing materials, and taper ratio. The use of Computational Fluid Dynamics (CFD), wind tunnel testing, and flight testing will determine the optimal design. The best design has the fewest changes to the aircraft while yielding a one-hundred percent increase in payload. Residual benefits include lower power requirements, quieter flight, and increased endurance.

KEYWORDS: unmanned aerial vehicle, computational fluid dynamics, wingspan, dihedral, taper ratio, endurance, payload.

CONTACT: Andrew Mawn, U.S. Army Soldier Systems Center, Email: Andrerw.Mawn@us.army.mil

CDT David Amiot, United States Military Academy, West Point, NY, Tel: (845) 515-2272, Email: David.Amiot@usma.edu

CDT Joseph Cymerman, United States Military Academy, West Point, NY, Tel: (845) 515-1945, Email: Joseph.Cymerman@usma.edu

CDT Matthew Donnan, United States Military Academy, West Point, NY, Tel: (845) 515-4987, Email: David.Amiot@usma.edu