**AIAA 2021 Undergraduate Team Aircraft Design Competition**

**Light Attack Aircraft – Sypro**

**Design Readiness Report**

**By Team Dragon**

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Faculty Advisor: Dr. Jason Merret

University of Illinois at Urbana-Champaign

Aerospace Engineering 443: Aerospace Systems Engineering

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**Team Member Assignments**

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| --- | --- | --- | --- |
| Team Member | Primary Discipline(s) | Secondary Discipline(s) | Signature |
| Ari Jain | Lead  Systems | Certification |  |
| Jiayi Guo | Mass Properties | Cost |  |
| Ryan Hansen | Propulsion  Stability and Control | Acoustics |  |
| Daniel Jacobson | Performance | Configuration  Ordinance |  |
| Alan Rice | Structures | Interior Design |  |
| Ian Salamon | Aerodynamics | Avionics |  |
| Wanzheng Zheng | Loads and Dynamics | Landing Gear |  |
| Jason Merret | Faculty Advisor | |  |

**List of Acronyms**

AIAA – American Institute of Aeronautics and Astronautics

CAS – Close air support

RFP – Request for Proposal

LAAR – Light Attack/Armed Reconnaissance

MILSPEC – Military Specification Handbook

FAR – Federal Aviation Regulations

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**Executive Summary**

This report presents preliminary sizing, design, and research in response to the AIAA RFP for Undergraduate Teams in 2020-2021 for the development of an affordable light attack aircraft. The project is assigned as the final senior design project for University of Illinois at Urbana-Champaign students in the Department of Aerospace Engineering. A team of seven undergraduate students will initially present the Design Readiness Report to verify that the requirements requested by AIAA are indeed achievable and reasonable within the given constraints.

Team Dragon proposes the Spyro, which remains in early design stages but will satisfy all requirements given by the RFP. Primary constraints concern the satisfaction of a design and ferry mission, which have range requirements of approximately 300 and 1,000 nautical miles respectively. Additionally, the aircraft must be capable of takeoff and landing at altitudes of up to 6,000 feet, in under 4,000 feet of austere field runway. A 3,000 pound payload requirement with an integrated gun, and zero-zero injection seats are also outlined.

Existing aircraft that fit this role include the Embraer Super Tucano, Fairchild Republic A-10 Thunderbolt, and the Aero L-159 ALCA amongst others. The Sypro aims to take redeeming qualities of current aircraft and develop a more efficient and affordable vehicle. Initial characterization of the aircraft is limited to major geometric parameters such as wing area, aspect ratio, and airfoil selection along with preliminary propulsion system selection. Further iterations of the design will include more detailed integrations of various systems required on the aircraft, along with comprehensive internal and external configuration and analysis.