DRAFT FROM THE AIAA

UNMANNED STRIKE FIGHTER
RFP FOR AIAA TEAM STUDENT DESIGN COMPETITION

This request for proposal addresses the need for an unmanned offensive tactical air capability to permit known-location target attack in high-threat areas via a reusable system, and without risk of an aircrew. This would fill a gap between cruise missiles and manned strike systems.

Maximum creativity is sought in this solicitation, within bounds of feasibility, risk, and affordability. Specific technical requirements are listed below, but reasoned deviations from these requirements are permitted if supported by credible trade study analysis.

Life-cycle cost shall be analyzed and used as the primary measure of merit for optimization and reporting. Comparisons to equivalent manned systems are highly desirable.

BACKGROUND

Design provisions for the flight crew of combat aircraft place many constraints on the vehicle and its performance. Numerous cost and weight penalties are associated with systems that are necessitated only or largely by the presence of a human pilot including displays, switches, g-seats, g-suits, oxygen, pressurization, and other environmental control systems. The aircraft's maneuver capabilities are limited by the pilot's physiological limits such as g tolerance, susceptibility to disorientation, or even physical endurance. With pilots onboard, all aspects of the aircraft design process are strongly impacted. The aircraft size, shape, and configuration arrangement are affected. Providing adequate visibility leads to constrained forebodies and large canopies that increase the aircraft's drag and signature. The design of the aircraft is strongly influenced by human-related issues such as safety factors, redundancy levels, failure modes, and vulnerability. Most of the useful life of today's combat aircraft is devoted to training and proficiency flying, thus requiring longer design lives than would be needed to meet combat requirements.

Removing the constraints imposed by the pilot could lead to revolutionary design approaches and should allow for dramatic new vehicle concepts. One class of vehicle that is of particular interest are Uninhabited Combat Air Vehicles (UCAV), of which this RFP is an example. The UCAV can be designed specifically for combat rather than primarily for proficiency flying. This would allow the vehicle to be optimized to do a specific mission and would enable it to complete radical new maneuvers impossible or even unimaginable with a pilot in the vehicle. The design approach for UCAV's would focus on designing a vehicle with a shorter operational life and with lower factors of safety and lower levels of redundancy than piloted aircraft. These new design approaches and aircraft concepts should provide dramatic improvements in performance such as reduced observables and drag and increased range, speed, payload, maneuverability, and survivability. These vehicles should be lighter, smaller, and less expensive than current piloted aircraft and as a consequence are a possible solution to an overwhelming issue for the military - the affordability of future weapon systems.

REQUIREMENTS:

Maximum flyaway cost:	$8,000,000 (1996$) - average price for 1000 buy
Operational Life:	100 Missions (~500 hours)
Payload:	1 - 2000 lb JDAM
Range/performance:	800 nm radius,
	cruise Mach ≥ 0.7 at 40,000+ ft
	with 1.5 turns midmission at cruise speed/alt.,
	with instant. turn rate ≥ 20 deg. per sec.
Alternative mission:	Calculate total range for mission with 200 nm
	ingress/egress at 250 ft. at M 0.9
Acceleration	M=.4 to .8 @5000 ft. in 40 sec. (or less)
Specific excess power	+ 225 fps @ 5000 ft. @ M0.4 (or more)
Ferry Range:	3,000 nm (external tanks allowed)
Takeoff/landing:	Conventional, <5000 ft
Propulsion:	Off-the-shelf commercial jet engine
Signature:	Low observables (RCS & IR)
	500 lb allowance for classified treatments
Avionics:	GPS guidance, flight computers, data links, EO/IR sensor,
	EW countermeasures, modular bay, 500 lbs weight allowance
	Unmanned, but man-in-loop for weapons drop
Deployment Envelope:	8 at a time can be shipped in a C-5
Storage:	Long term, almost-mission-ready storage-capable