

DARPA Lift Challenge – RFQ Package

RFQ-0: Overview / Cover Letter

Project: DARPA Lift Challenge – Inflatable Airframe Quad-Lift VTOL

Summary:

We are developing a 55-lb maximum-weight VTOL capable of lifting a 110-lb payload over a 5-nautical-mile mission.

The airframe uses an RF-welded inflatable structure supporting four propulsion pods and a central payload cradle.

RFQ-1: Inflatable Airframe

- RF-welded TPU/PVC tubular ring, 1.6–1.8 m diameter
- Tube dia: 80–120 mm, 3–6 psi
- 4 independent air chambers
- Fabric receivers or saddle mounts
- Weight, burst rating, valve options requested

RFQ-2: Motor Pod Saddles

- Clamp-on rigid saddles for inflatable tubes
- Materials: Aluminum or composite
- Support 3–5 lb static load per motor pod
- Provide FEA if available

RFQ-3: Propulsion System

- 4 pods, \geq 60 lb thrust each
- Prop diameter: 31–36 in
- ESC: 4–5 kW peak
- Provide thrust curves, weight, wiring

RFQ-4: Battery System

- Energy: 1.2–1.5 kWh
- Weight target: 11–15 lb
- \geq 150 A continuous discharge

- BMS with protections

RFQ-5: Avionics / Flight Control

- Pixhawk-class controller
- GNSS, telemetry
- CAN ESC interface

RFQ-6: Payload Cradle

- Holds 110-lb Olympic plates
- Steel cables/webbing to central hub
- Quick-release for ground handling

RFQ-7: Wiring Harness

- 150–200 A high-current bus
- ESC lines, avionics rails
- Anti-spark connectors

RFQ-8: Assembly & Integration (Optional)

- Frame assembly
- Pod installation
- Wiring and avionics setup

RFQ-9: Test Stand

- Thrust up to 80 lb
- Power up to 6 kW
- Data logging