AIAA Next Generation Carrier-Based Strike Fighter Aircraft

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AE460A/B Senior Design Project

Problem Statement

Modern carrier-based fighters such as the Boeing F/A-18E/F Super Hornet face growing limitations in range, survivability, and efficiency within increasingly contested environments. At the same time, Augustine's Laws highlight a critical challenge: defense budgets grow linearly while aircraft costs rise exponentially. These constraints drive the need for a next-generation strike fighter that extends operational reach, enhances survivability, and delivers greater capability, without unsustainable cost growth.

Stats about the plane

Performance:
Combat Radius: 400 nmi
Max Speed (Sea Level): M 1.22
Service Ceiling: 60,000 ft
Max Rate of Climb: 50,000 ft/min

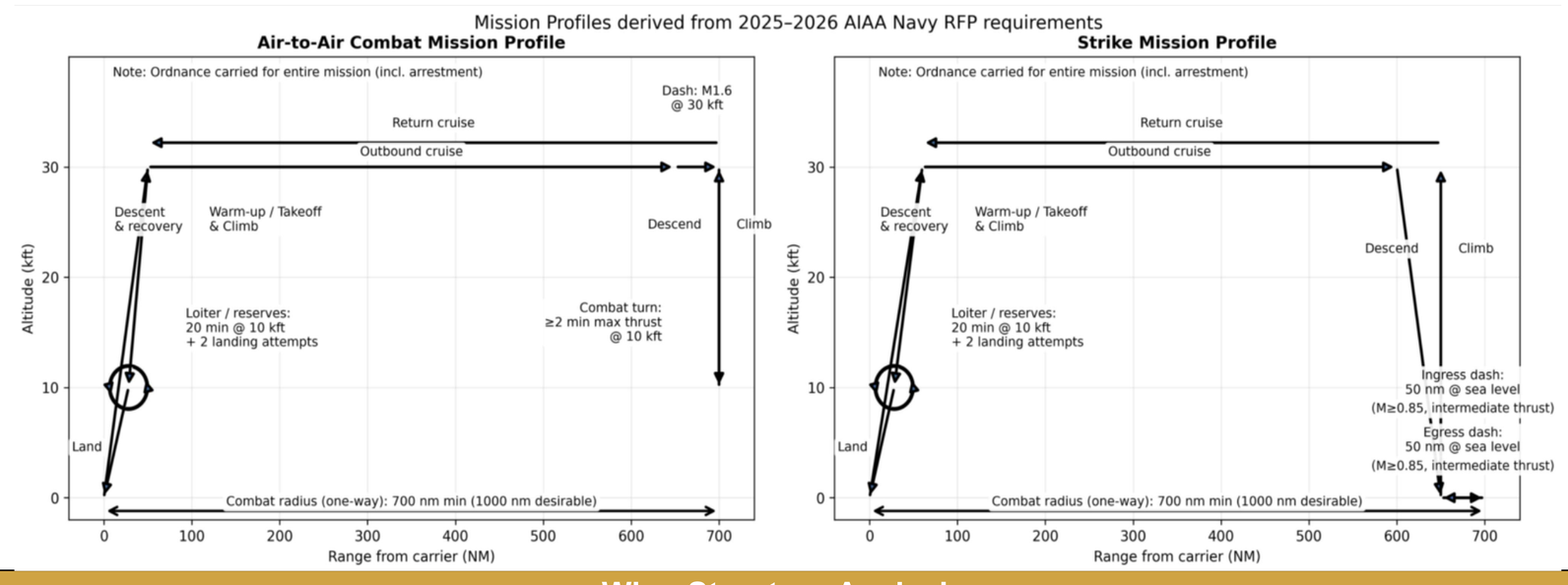
Weight and Payload
Max Takeoff Weight: 63,600 lbs
Empty Weight: 39,200 lbs
Payload Capacity: 4,400 lbs
Fuel Capacity: 20,000 lbs

Performance Ratios
Thrust-to-Weight Ratio: 1.3
Ultimate Wing Loading: 2,780,000 lb-ft

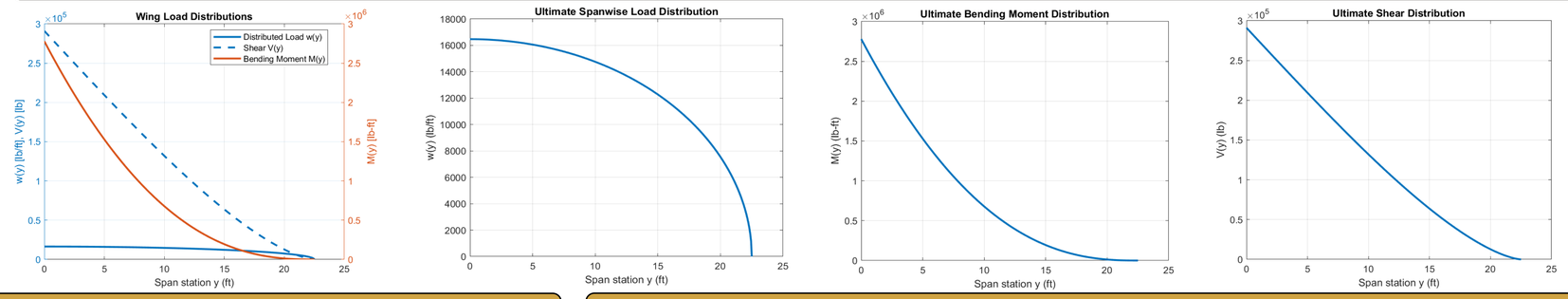
Size and Geometry
Wing Span: 45 ft, (35 ft folded)
Length: 50 ft
Wing Area: 457 ft^2
Horizontal Stabilizer Area: 110 ft^2
Vertical Stabilizer Area: 200 ft^2
Number of fins: 2

Design Features
Internal Payload Bay: Yes
Carrier Compatible: Yes
Crew: 1
Propulsion Type: Twin Turbofan with afterburners

Mission Overview



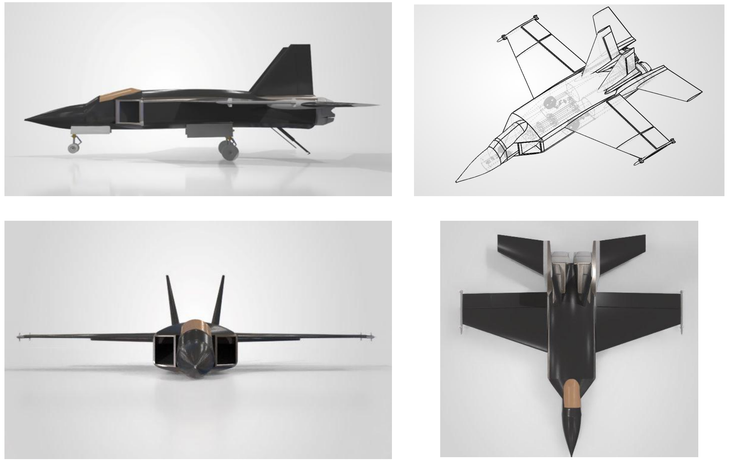
Wing Structure Analysis



Comparision Table

METRIC	ALEBORNE (NGCSF CONCEPT)	F/A-18E/F SUPER HORNET
COMBAT RADIUS (nmi)	400 nmi	~390 nmi
MAX SPEED (Mach)	1.84 @ 30,000 ft 1.22 @ Sea Level	1.6 @ 30,000 ft 0.85 @ Sea Level
SERVICE CEILING (ft)	60,000 ft	~50,000 ft
THRUST-TO-WEIGHT (Ratio)	1.3	~0.93
FUEL FRACTION (W_{fuel} / W_{TO})	0.46	~0.30 – 0.35

CAD Model



Flight Dynamics and Performance