Progress Update 02

Embry Riddle Aeronautical University - College of Business and Engineering

Team APPA

Agenda

PROJECT OVERVIEW

DESIGN CHANGES

UPDATED COST ANALYSIS

REGULATIONS

SEATING CONFIGURATIONS

Requirements

- Fixed-wing passenger aircraft
- 10-20 passengers
- Highlight new technological innovation
- Environmentally considerate
- Noise reduction
- Optimized cost for short-haul flights

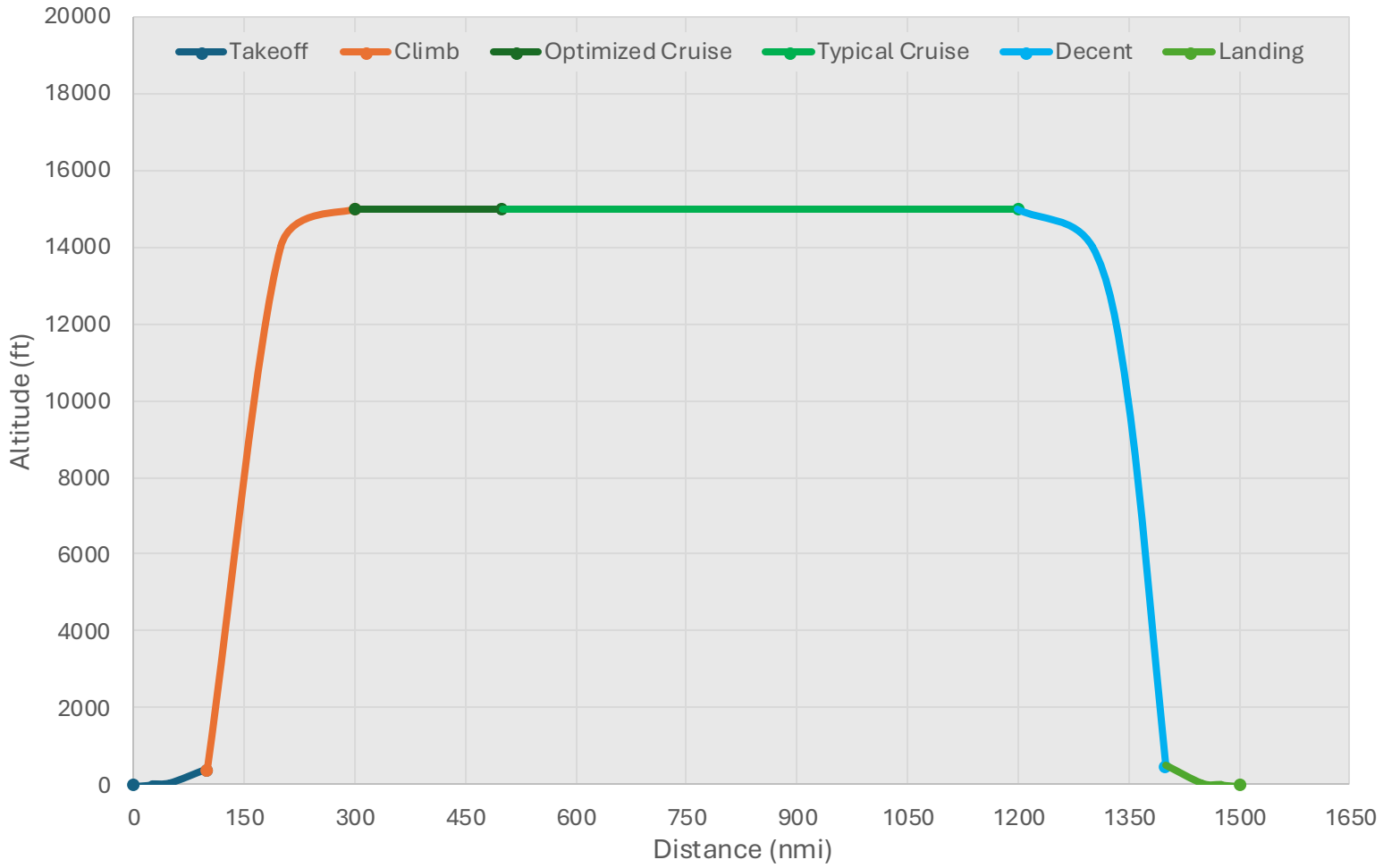
Aircraft Regulations

The aircraft falls under FAA 14 CFR Pt. 23

Customer Requirements		**Regulatory Requirements**	
Passengers:	10-20	MTOW:	≤19,000 lbs
Range:	1,500 nmi optimized for 500 nmi	Maximum Seating:	10-19
Technical Innovation:	Hybrid-electric Propulsion system	Max Operating Speed (High Speed):	>250 knots
Reduce Environmental Impact:	Fuel efficiency, lighter materials, noise reductions, …	Service Ceiling :	20,000 ft

Mission Profile

- Passenger transport
- Point-to-point
- Optimized for short-haul flights
- Cruise ~15,000 ft



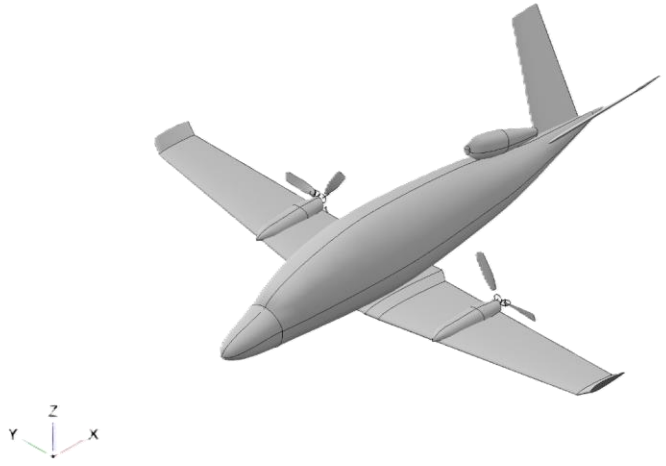
Markets for Solaris

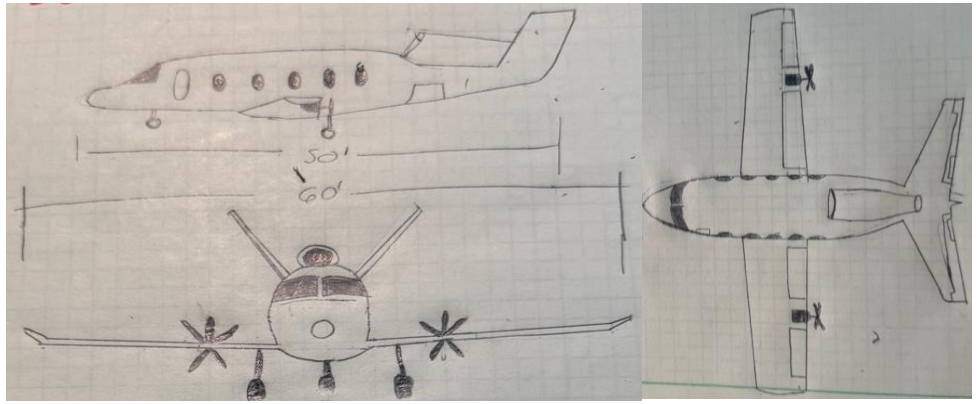
- Geneva → Paris ~221.16NM
- Istanbul → Ankara ~197.38NM
- Milano → Rome ~262.08NM
- Nice→ Paris ~375.17NM
- Larnaka → Tel Aviv ~183.19NM

AIRPORT 1		AIRPORT 2		YTD CURRENT YEAR
LSGG	Geneva International	LFPB	Paris Le Bourget	304
LTBA	Istanbul Atatürk	LTAC	Ankara Esenboğa	173
LIML	Milano Linate	LIRA	Roma Ciampino	161
LFMN	Nice Côte d'Azur	LFPB	Paris Le Bourget	139
LCLK	Larnaka International	LLBG	Tel Aviv International	119

Chosen Design

Solaris XIL-1





- Meets desired criteria
- Reduces emissions and optimizes short-haul flights
- Most feasible while also having power innovation
- Aesthetically pleasing and unique

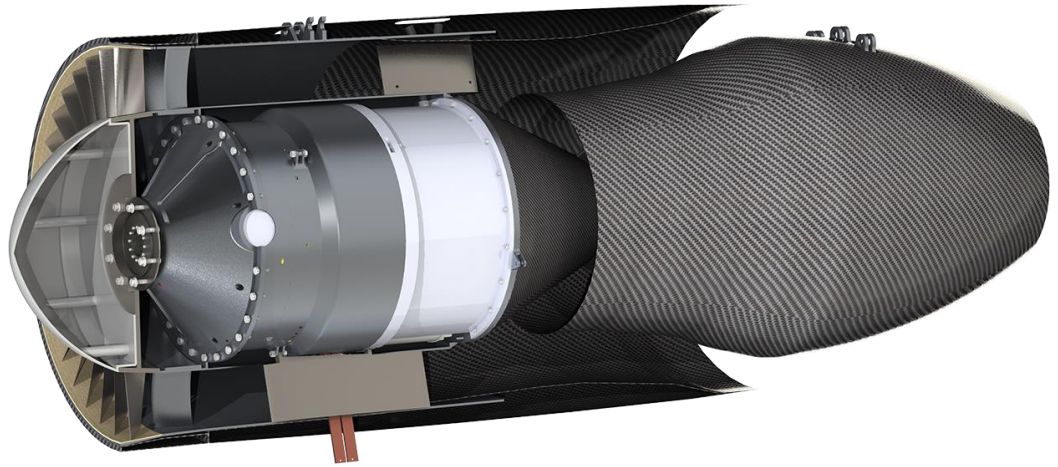
Wing & Tail Selection

- Low-Wing
  - Housing for retractable landing gear
  - Easy maintenance and refueling
  - Lower drag than high-wing
- V-Tail
  - Structural weight reduction
  - Lower drag
  - Aesthetics

Propulsion

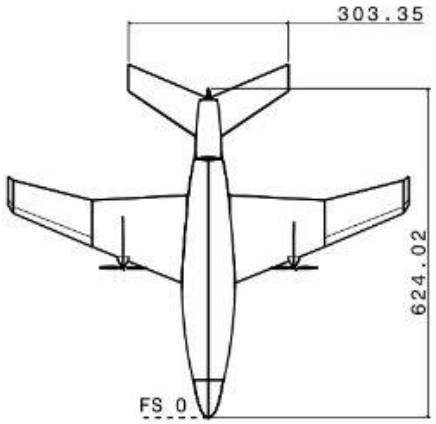
Looking at ways to improve performance

- VerdeGo Aero VH-5
  - Hybrid-electric turbofan
  - Can generate power in series and/or parallel
  - Full thrust at takeoff, low power during cruise
  - Entry Service Date: 2031
- Electric Puller-Props
  - Previously pusher-props, design change to improve aerodynamics
  - Driven by two MAGIDRIVE 500 kW motors
  - Powered by the Amprius 420 Wh/Kg High Energy Battery
  - Reliant on battery at takeoff, powered by VH-5 during cruise



Technical Drawing

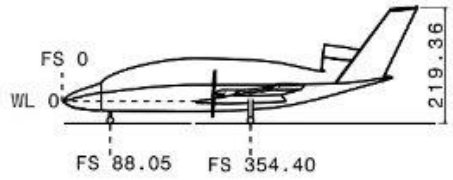
First Draft



Top View

Front View

SURFACE	WING	V-TAIL
SPAN (FT)	63.29	33.00
AREA (FT^2)	501.41	194.25
MAC (FT)	10.73	6.03



Right View

SCALE: 1:67	EMBRY-RIDDLE AERONAUTICAL UNIVERSITY DAYTONA BEACH, FLORIDA		
ALL DIM: INCHES	TEAM NAME: APPA (ADVANCED PROPULSION POWERED AIRCRAFT)		
	PART NAME: SOLARIS XIL-1		
	DRAWN BY: KEVIN NADOLNE		
DSGN FROM VSP	CLASS SECTION: AE 420 - 02	DATE: 02 - 18 - 2025	SHEET 1/1

Cost analysis

- **Phase 1:**
  - Still verifying R&D costs.
  - Forecasting ~18% of net due to hybrid approach
- **Phase 2:** Supplier validation:
  - Engine costs: $2,208,839
  - Composite costs are still in talks
- **Phase 3:** Comparing with industry standards
  - Ex. Mitsubishi Regional Jet (MRJ) estimated development cost of $1.9 billion
  - Gulfstream G200 (6M total price),
    - Annual costs: 1.5M variable, 256K fixed
- **Phase 4:** Integrate with production scaling & break-even analysis.
  - Quantity discount factors to be considered when produced in bulk

Job Divisions	Annual Wage
Research and development	$128,020
Aerospace parts and products manufacturing	$126,780
Control instruments, electromedical, and navigational devices manufacturing	$121,530
Engineering services	$120,640

Cost Analysis continued

Targeting regional airlines & charter markets.

Maintenance cost advantages over legacy aircraft.

Markup Strategy (10-15%) based on estimated break-even costs.

Cost Analysis continued

Certification Cost: $52,152,500 For 500 AC

Development Cost: $3,190,000 For 500 AC

Manufacture/production Cost: $116,500,000 for 500 AC

- $233,000 per AC

Break Even Point: 338 units.

- Total Fixed Cost: $52,152,500
- Unit Variable Cost: $377,500

Operational: $294,000 per year

- $534 per flight hour

Marketing Budget

Budgeting (in millions)		
Branding	10.0%	$1.80
Digital Campaign	25.0%	$4.50
Traditional Advertisement	12.5%	$2.25
Events & Trade Shows	20.0%	$3.60
Customer Engagement	15.0%	$2.70
Partnerships	17.0%	$3.06
Miscellaneous	0.5%	$0.09
	100.0%	$18

Marketing Approach

- Target Companies:
  - Flexjet
  - NetJets
  - Regional companies
  - Charter companies

Seating and Cabin

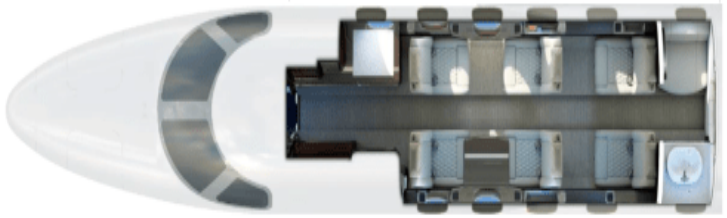
- Economy seating of 10-14 passengers
- VIP seating 6-10
  - Generous recline
  - Tables for conversation or work
- Rear lavatory
- Small forward galley

Floor plan configurations

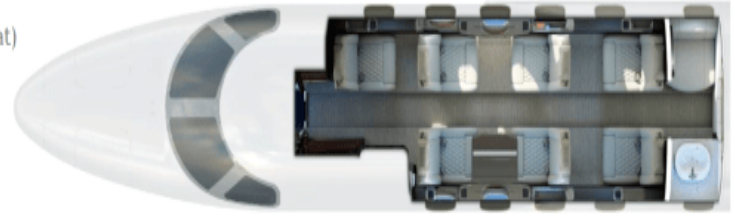
17 ft 2 in (5.23 m)

14 ft 9 in (4.50 m)

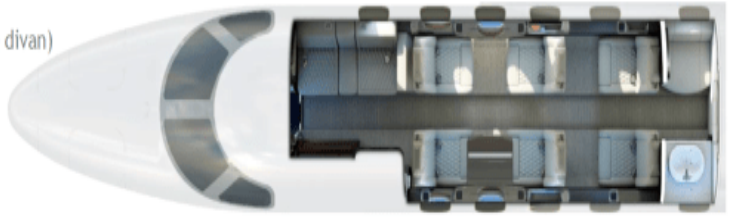
LAYOUT 1
9 Occupants
(optional belted lavatory)

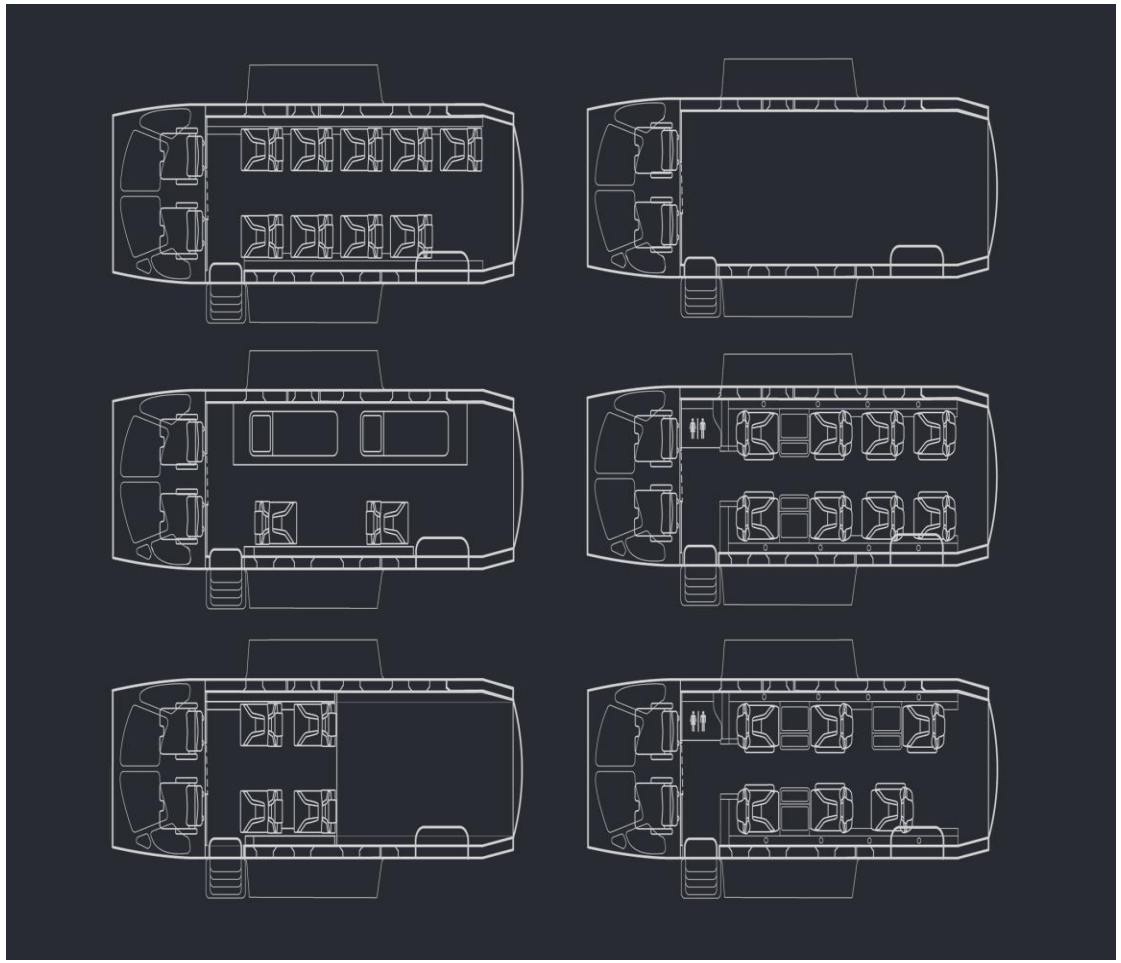


LAYOUT 2
10 Occupants
(optional belted lavatory and 7th seat)



LAYOUT 3
11 Occupants
(optional belted lavatory and 2-place divan)





Development Plan

- Next Steps:
  - Stability and Control
  - Performance
  - Aerodynamics
  - Detail Sizing