AirCab

AlphaTech pvt. ltd.

Course- Technical Project Management | Instructor- Prof. Nehal Patel | Year- Fall 2023

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PURPOSE/SCOPE

Air taxis, propelled by Electric Vertical Takeoff and Landing (eVTOL) technology, offer a sophisticated solution for efficient urban mobility, catering to time-sensitive and last-minute connectivity needs. Beyond routine transit, these services prove invaluable in emergency situations, providing swift and reliable transportation. Notably environmentally friendly, eVTOL technology reduces carbon footprint, while its vertical capabilities minimize land use constraints associated with traditional infrastructure. In essence, air taxis embody a progressive and eco-conscious paradigm for contemporary urban transportation.

PROJECT		
PROJECT NAME	AirCab	
CLIENT	Uber	
PRODUCT	e-VTOL	
BEGIN DATE	**END TIME**	**PROJECT DURATION**
Dec 1' 2023	Mar 23' 2037	3466 days

GOALS
OBJECTIVE
· Research, Design, and development of an e-VTOL to be used for commercial transportation
· Guarantee end-customer safety and comfort whilst ensuring economic use
· Achieve sustainable model design for mass production of 100 e-VTOLs
· Ensuring environmental sustainability via ecologically conscious methodologies

STANDARD ADHERENCE
ISO 19115 - Geographic Information – Metadata (ensures air traffic management)
ISO 9241-210 – Ergonomics of Human-system Interaction – Part 210: Human-centered design for interactive system
ISO 19600 – Compliance management systems- Guidelines
ISO 10004 – Quality Management- customer satisfaction- guidelines for monitoring and measuring

SCOPE OF WORK	
· 1 Preliminary Design Review	· 2 Design and integration plan
· 3 Build and assembly	· 4 Ground test procedures and flight testing
· 5 Compliance reports	· 6 Handoff
PROJECT DELIVERABLES	
· e-VTOL Vehicle	

MILESTONES	
EST DELIVERY DATE	**PROJECT MILESTONE TITLE**
12/1/23 and 3/25/26	**Propulsion and aerodynamics**
8/29/29	**aesthetic**
11/15/33	**software**

BUDGET	
DELIVERABLES	**BUDGET REQUIRED**
e-VTOL	**$67,331,925**

CDRL (Contract Deliverables Requirements Lists)	
Design Deliverables	· Preliminary Design Review – Detail system design analyses, performance predictions, draft drawings. · Critical Design Review - Finalized aircraft design including structural analysis, electrical schematics, bill of materials. · Production Design package - All released manufacturing drawings, wiring diagrams, installation instructions.
Build Deliverables:	· Prototype aircraft - Fully functional pre-production aircraft meeting design specifications. · Ground test cell - Dedicated rig for testing propulsion system and components.
Verification Deliverables:	· Simulation models and test data - Models and test reports covering aerodynamics, performance, stability analysis. · Ground test plans and reports - Documents covering all component level ground qualification test executed. · Flight test plans and reports - Details on all flight tests executed to verify aircraft capabilities.
Certification Deliverables:	· Regulatory airworthiness certificate for the approved aircraft configuration · Environmental compliance docs - Noise level, emissions etc. test data to show compliance to regulations. · Production certificate - Manufacturing quality management system certification for series production
Support Deliverables:	· Maintenance manuals - All documents on maintenance procedures, spare parts list, repair instructions · Training materials - Training content for pilots, maintenance technicians and mission specialists.

Work Breakdown Structure

Schedule Management

Cost Breakdown Structure

RISK ANALYSIS

Risk	Responsible	Accountable	Consulted	Informed
Operational Risks	eVTOL Aircraft Manufacturer	Federal Aviation Administration (FAA)	eVTOL Operators, Industry Experts, Public Representatives	Regulatory Bodies, Industry Stakeholders
Safety Risks	eVTOL Aircraft Manufacturer	FAA, National Transportation Safety Board (NTSB)	eVTOL Operators, Battery Experts, Structural Engineers, Pilot Training Experts	Regulatory Bodies, Public Representatives
Economic Risks	eVTOL Aircraft Manufacturer, eVTOL Operators	Investors, Government Agencies, Urban Planners	Industry Experts, Transportation Providers, Infrastructure Developers	Public Representatives
Regulatory Risks	eVTOL Aircraft Manufacturer, Industry Associations	FAA, International Civil Aviation Organization (ICAO)	eVTOL Operators, Regulatory Experts, Legal Counsel	Regulatory Bodies, Public Representatives
Other Risks	eVTOL Aircraft Manufacturer, Vertiport Developers	Urban Planners, Noise Mitigation Experts, Social Equity Advocates	eVTOL Operators, Community Representatives	Regulatory Bodies, Public Representatives

Risk Matrix

	1	2	3	4	5
1	L	M	H	H	H
2	L	M	M	H	H
3	L	L	M	M	H
4	L	L	L	M	M
5	L	L	L	L	M

Risk 1:

Complex technology: The complexity of eVTOL aircraft systems increases the likelihood of malfunctions or design flaws, which could lead to accidents. (Consequence:4, Likelihood:4)

- Implementing rigorous testing procedures, employ fail-safe mechanisms, and incorporate advanced diagnostics and monitoring systems into eVTOL aircraft design.

Risk 2:
Battery Fires: Battery fires in eVTOL aircraft pose a significant threat to passenger safety and could hinder the widespread adoption of this technology. (Consequence:5, Likelihood:3)

- Implementing rigorous battery safety standards, invest in research and development of safer battery technologies, and incorporate advanced fire suppression systems into eVTOL aircraft design.

Risk 3:
New Airspace Rules: The development of new airspace rules and regulations for eVTOL aircraft is a complex and time-consuming process, which could hinder the widespread adoption of this technology.(Consequence:2, Likelihood:3)

- Establishing clear and consistent regulatory guidelines, collaborating actively with industry stakeholders, and prioritizing safety and efficiency in airspace management.

Risk 4:
Structural failures and High Development costs: In order to ensure safe flight operations, eVTOL aircraft must have structural integrity and weight, strength, and aerodynamic efficiency must all be balanced, designing and testing these structures might be difficult. The high upfront costs associated with eVTOL development might discourage investors and reduce the amount of money available for eVTOL projects.
(Consequence:5, Likelihood:3)

- Conducting rigorous testing under a variety of flight situations, using modern engineering techniques and computer models to analyze and optimize structural integrity, and integrate innovative materials and production processes. Investigate low-cost manufacturing methods, streamline the supply chain, and take into account government support or subsidies to lower development costs.

Risk 5:
Public Acceptance: The public's approval of eVTOL technology may be influenced by worries about noise pollution, safety, and aesthetics..(Consequence:3, Likelihood:3)

- Organize campaigns for public education and awareness, communicate in an open and transparent manner, and proactively resolve issues through operational and design considerations. Provide affordable, practical, secure, and easily accessible eVTOL services, highlighting their ability to shorten travel times, enhance connectivity, and ease urban traffic congestion.

Risk 6:
Uncertainty about Certification and international differences in regulations: Uncertainty may be introduced by the changing regulatory procedure for eVTOL aircraft, making it difficult for businesses to manage the certification procedure. The lack of clarity surrounding the particular prerequisites for eVTOL certification may cause delays and impede the technology's development. (Consequence:3, Likelihood:5)

- Develop clear compliance plans, work with regulators and industry partners, and take an active role in regulatory talks to guarantee alignment with changing safety and operational requirements. Establish a transparent and effective certification process by cooperating with authorities, interacting with them often, and offering technical advice and experience.

Schedule recovery

- Dependencies and Delays: The electric motor of propulsion and the rotor of aerodynamics are interlinked. In case the testing of the rotor gets delayed, we plan to move forward with the production of electric motors and the rotors would be assembled with the motor later.
- Quality Issues- extending time during testing would impact the schedule. Implementing quality improvement measures, regular testing procedures etc.
- Budgetary constraints- dependencies and delay might also require the employment of buffer budget. Renegotiating the contract, checking the shall statements etc.
- Technology failures- implementing backup systems, biweekly meeting with tech lead, quickly addressing technical issues.
- Scope changes- evaluating scope changes, adjusting timelines and communicating revised schedules to stakeholders.
- Regulatory Compliance challenges- keeping a regular check on the regulatory requirements, engaging with regulatory authorities early in the project, and adapting plans to comply with evolving regulations.