



When can we realistically expect the US front runner OEMs to enter service?

As the cheeky title of this note mentions, a recurring question in the Advanced Air Mobility industry is when the leading electric aircraft will enter service.

There are two main reasons for this question:

- Entering service means selling aircraft or tickets, bringing much needed revenue to the OEM finances, stemming the capital outflows and the need to raise additional capital
- Proving the business case for eVTOL and electric aircraft actually works and delivers the promised savings and business opportunities

The answer to this question is complex, as these types of aircraft - eVTOLs (electrical Vertical Take Off and Landing) and eCTOLs (electrical Conventional Take Off and Landing) - have never been certified before. And, unfortunately, there is no clear information on the projects' timelines from the OEMs due to complex project scopes and ever-moving ambitious EIS (Entry Into Service) target dates.

In order to provide our answer to this question, we have focused our analysis on the progress towards EIS of the three leading US OEMs, in alphabetical order, Archer, Beta Technologies and Joby Aviation. We have compared the certification timeline of their vehicles to other certified aircraft of similar price and complexity, as a perfect comparison

does not exist. We have also made informed assumptions on milestones and durations of the various phases based on the progress of each OEM, derived from publicly announced data and our analysis of the number of aircraft flying, the number of flight hours accumulated and the overall maturity of the product as well as operational and production capabilities. Finally, we will concentrate our EIS analysis on the United States, as there are too many unknowns and uncertainties surrounding the EIS in the United Arab Emirates cities of Dubai and Abu Dhabi, especially around the certification jurisdiction.

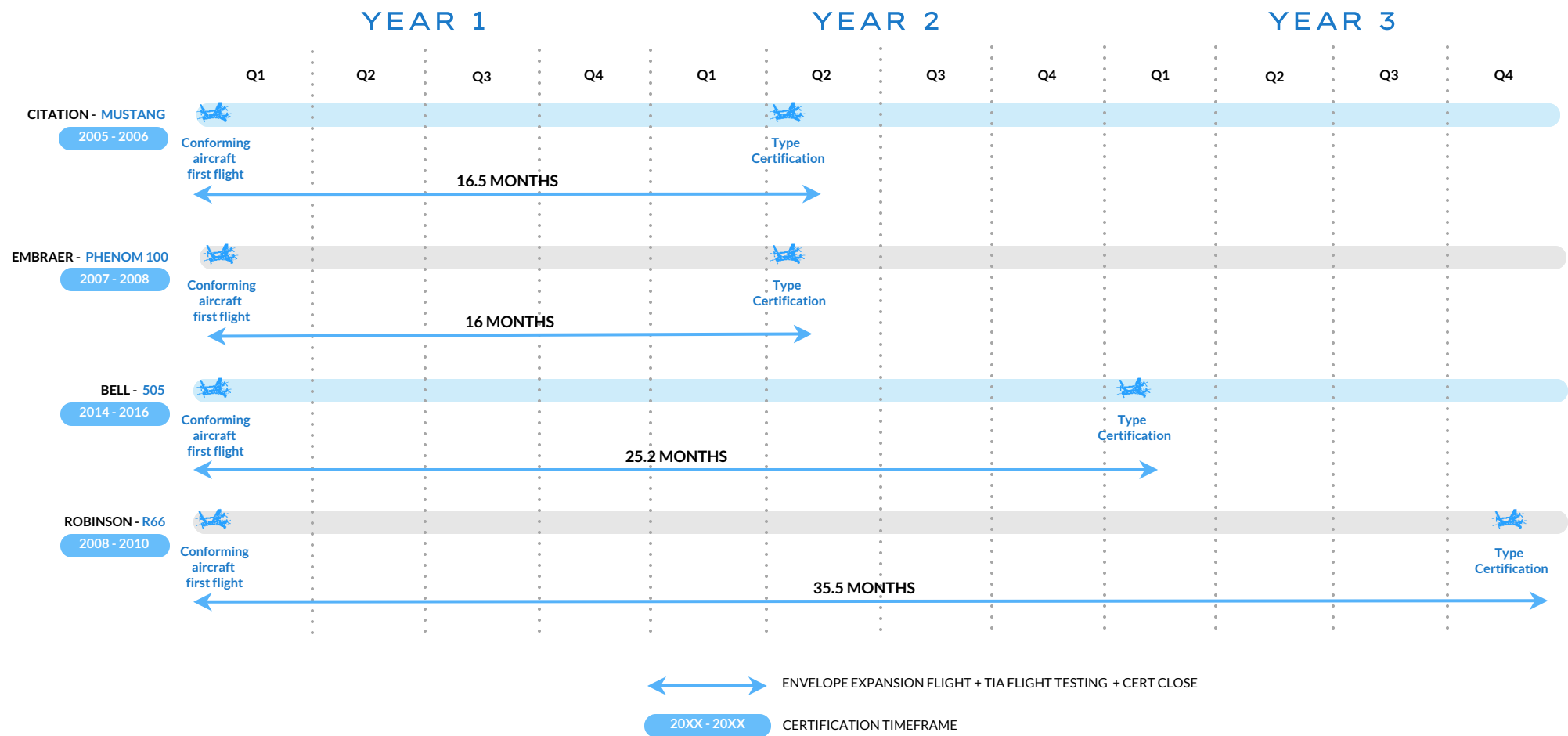
Since the FAA Innovate 28 implementation plan was published, the industry has looked at the 2028 Los Angeles (LA) Summer Olympics as a milestone for scaled eVTOL and eCTOL operations. As we will see 2028 is right around the proverbial corner.

” **2028 is right around the ... corner** “

A final note: we are adopting an unusually stretched landscape format for this research note to provide the necessary real estate to make the many timelines contained within the following pages easier to read.

COMPARATIVE TIMELINES

CERTIFICATION PHASE

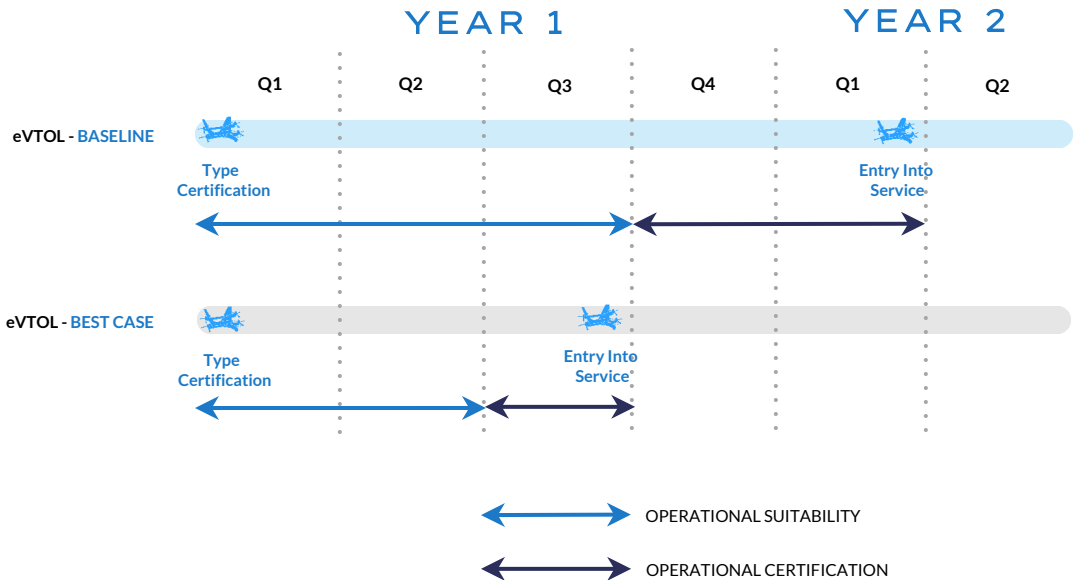


Due to the lack of certified aircraft similar to the eVTOLs and eCTOL we are analyzing, we have chosen to compare their certification timelines to two classes of vehicles, represented by the most recently certified aircraft:

- Single engine helicopters, due to the similar complexity and missions (**Bell 505** and **Robinson R66**)
- Very light business jets, due the similar pricing (**Citation Mustang** and **Phenom 100**)

The timelines reported show the duration in months between the first flight of a conforming/partially conforming aircraft and the award of the Type Certificate (TC) from the FAA.

ENTRY INTO SERVICE PHASE

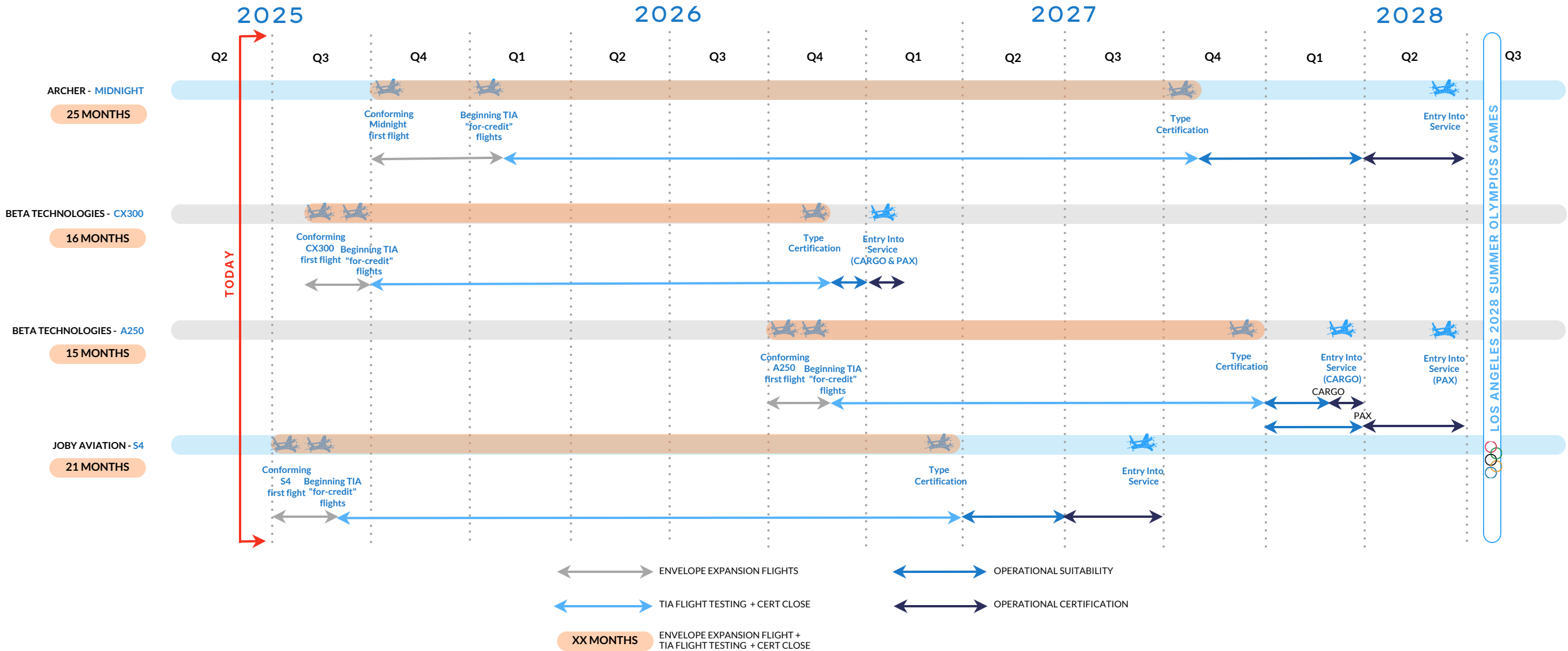


As eVTOLs are a new type of aircraft (per FAA definition of Power Lift), we believe additional testing will be needed post TC and before EIS. We have developed two scenarios:

- **Baseline:** modeled on a new and novel aircraft that has performed very limited pathfinder operational tests during development / certification and with some issues found during actual operational tests
- **Best Case:** modeled on a new and novel aircraft that has performed significant pathfinder operational tests during development / certification and with small issues found during the actual operational tests

The above scenarios do not apply to eCTOLs as this type of vehicles falls within well understood regulations.

FORECASTED EIS TIMELINES



Notes:

- The proximity of a some EIS dates to the 2028 LA Summer Olympics is a pure coincidence and the result of the assumptions used for each OEM; we have not in any way massaged them to show eVTOL service availability in time for the Olympics
- The first 3 or 4 conforming aircraft of each OEM will only be partially conforming as they will perform specific flight tests (i.e. structures, cabin, avionics); fully conforming aircraft will be rolled out towards the end of the certification process to support the Function and Reliability (F&R) testing phase

ARCHER

Conforming aircraft first flight: the company has communicated that additional aircraft are being built and we think the OEM is eager to roll out a conforming aircraft

TIA "for-credit flights": due to the low number of hours accumulated by the small test fleet (around 500-600 hrs), we believe that the OEM will need additional envelope expansion flight hours to achieve the product maturity expected by the FAA

TIA flight testing and Cert Close: we use the certification of the Bell 505 as a comparison; we believe this timeline is optimistic due to the flight hours the OEM will need to fly for certification (estimated to be over 1,000 flight hrs)

Entry into Service: due to the limited work to date on their Part 135 operations, we think the FAA will want to perform more flights in a relevant environment before EIS; we are also assuming that the launch aircraft at EIS will be operated by the OEM, as the probable launch customers might not want to add the aircraft to their AOC (Air Operator Certificate) for operational and personnel reasons

BETA TECHNOLOGIES

Conforming CX300 first flight: the OEM mentioned a plan to roll out their first conforming CX300 in late summer

TIA "for-credit flights" CX300: due to the CX300 lack of VTOL capabilities, the envelope expansion should be very short

TIA flight testing and Cert Close CX300: we used the same certification duration as a very light jet, taking also into account the fact that the electric propulsion will be certified separately under Part 33 later in 2025

Entry into Service CX300: the CTOL mission will require limited route testing resulting in a relatively fast EIS

Conforming A250 first flight: we believe that the company will ramp up the A250 certification while the CX300 ramps down to level load their resources and spend

TIA "for-credit flights" A250: very short duration due to the additional and continuous flights of eVTOL demonstrators and pre-production aircraft in 2025 and 2026

TIA flight testing and Cert Close A250: we used a significantly shortened duration of the Bell 505 schedule as the OEM will have to only concentrate on testing the differences between their eVTOL and eCTOL configurations (the two aircraft have around 85% commonality, that will extend also to certification tests and documentation)

Entry into Service A250: the duration of this phase is short, taking advantage of the decades of experience of the launch operators and the fact that cargo flights can start in rural areas with minimal risks

JOBY AVIATION

Conforming aircraft first flight: the company is now producing only manned pre-production aircraft and we think it will shortly roll out its first certification aircraft

TIA "for-credit flights": the several thousands of flight hours accumulated by their pre-production and demonstrator aircraft, including opening the entire piloted flight envelope, will give the FAA confidence that the OEM's aircraft is at the expected level of maturity

TIA flight testing and Cert Close: the OEM has dry run many of the certification tests on their pre-production and demonstrator aircraft, possibly discovering issues that could have been found during for-credit flights, resulting in an abbreviated duration compared to the Bell 505

Entry into Service: the hundreds of hours the OEM continues to accumulate on their AOC with fixed wing aircraft and a growing eVTOL fleet, should provide the FAA with the expected operational confidence in a shorter timeframe than the 9 months best case scenario

RESEARCH NOTE

Tell me quando, quando, quando...

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