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We've nearly completed our assessment of various air vehicle options for a medium altitude endurance (MAE) UAV for the Navy.

We've been able to model and predict the performance of various fixed-wing UAVs and some V/STOL concepts, such as the tilt-rotor. All of the UAV options that we've been able to model suffer from some deficiency. A 2-stroke diesel, fixed-wing UAV would have the range and endurance required, but would not be easily integrated into carrier operations. A V/STOL UAV, such as the tilt-rotor, could be better integrated into flight deck operations but severely compromises range and endurance.

So, we asked ourselves "what would be the ideal solution if we ignore technological risk?"

The primary operational and performance objectives are:

- 1) 24 hours onstation at 500 nmi.
- 2) Takeoff weight under 3000 pounds.
- 3) Extremely short takeoff and landing (ESTOL) for minimal impact to flight deck operations; vertical launch and recovery is NOT a requirement as long as the vehicle could launch and recover in extremely short distances without assist mechanisms.
- 4) Heavy fuel engine
- 5) High reliability and maintainability
- 6) 300 pound payload capability

For the air vehicle, these objectives imply:

- 1) High aspect ratio
- 2) Mechanical simplicity
- 3) Relatively low empty weight
- 4) Single prop/rotor with a tilt-thrust capability

For the propulsion system, the objectives imply:

- 1) Relatively high power-to-weight
- 2) Compact design
- 3) Good fuel efficiency over a range of power settings
- 4) The ability to run on heavy fuels

The only air vehicle concept that seems to be able to (in theory) satisfy these objectives is the Freewing, tilt-body concept. However, the air vehicle would need to be considerably larger than any of your current vehicles. Your literature suggests that the tilt-body concept is very scaleable; however, the takeoff weight of a naval MAE UAV would likely have

to be at least 2000 pounds, which is several times larger than your largest UAV.

Of course, the air vehicle also needs an engine. The only engine concept that would appear (in theory) to be able to meet the stated performance objectives would be a heavy fuel, rotary engine. Wankel Rotary claims to be developing a family of rotary, heavy fuel engines that may be adequate if their performance objectives are met; however, based upon the experience of Lycoming with a rotary, heavy fuel engine back in the 1980's, I have serious doubts whether they'll be able to develop an adequate engine.

Any final thoughts??? Is a 2,000 pound tilt-body UAV really feasible? If you believe it is feasible and would like to submit a conceptual drawing, I would be happy to submit it in our final report.

Thanks for help.

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