

Experimental aircraft program to develop the next generation of vertical flight

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One of the greatest challenges of the past half century for aerodynamics engineers has been how to increase the top speeds of aircraft that take

off and land vertically without compromising the aircraft's lift to power in hover or its efficiency during long-range flight.

The versatility of helicopters and other vertical take-off and landing (VTOL) [aircraft](#) make them ideal for a host of military operations. Currently, only helicopters can maneuver in tight areas, land in unprepared areas, move in all directions, and hover in midair while holding a position. This versatility often makes rotary-wing and other VTOL aircraft the right aerial platform for transporting troops, surveillance operations, special operations and search-and-rescue missions.

Compared to fixed-wing aircraft, helicopters are slower-leaving them more vulnerable to damage from enemy weapons. Special operations that rely on lightning-quick strikes and medical units that transport patients to care facilities need enhanced speed to shorten mission times, increase mission range, reduce the number of refueling events and, most important, reduce exposure to the adversary.

By their very design, rotary-wing aircraft that take off and land vertically have a disadvantage achieving speeds comparable to fixed-wing aircraft. Since its invention, engineers have attempted to overcome this design barrier but have encountered lower [fuel efficiency](#) and less lift capacity, controllability, simplicity, and reliability of design. While engineers have improved the speed of fixed-wing aircraft-achieving two and three times the speeds of jets designed since the 1960s-attempts to increase efficient VTOL aircraft speed have stalled.

"For the past 50 years, we have seen jets go higher and faster while VTOL aircraft speeds have flat-lined and designs have become increasingly complex," said Ashish Bagai, DARPA program manager. "To overcome this problem, DARPA has launched the VTOL X-Plane program to challenge industry and innovative engineers to concurrently

push the envelope in four areas: speed, hover efficiency, cruise efficiency and useful load capacity."

"We have not made this easy," he continued. "Strapping rockets onto the back of a helicopter is not the type of approach we're looking for. The engineering community is familiar with the numerous attempts in the past that have not worked. This time, rather than tweaking past designs, we are looking for true cross-pollinations of designs and technologies from the fixed-wing and rotary-wing worlds. The elegant confluence of these engineering design paradigms is where this program should find some interesting results."

A Proposers' Day will be held on March 14th.

More information: The Broad Agency Announcement for the solicitation can be found at: www.fbo.gov/spg/ODA/DARPA/CMO/...A-13-19/listing.html.

Provided by DARPA

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