USAF Reveals Latest X-Plane- X-56A

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http://www.aviationweek.com/media/images/defense_images/UAVs/MUTT_UAV-AFRL.jpg

EDWARDS AFB, Calif. - A new U.S. Air Force X-plane designated X-56A will explore active control technology for potential use in future high-altitude, long-endurance (HALE) reconnaissance aircraft.

Designed by Lockheed Martin's Skunk Works, the X-56A flying wing will also later be flown by NASA, and is an innovative modular unmanned air vehicle designed to test active flutter suppression and gust load alleviation. These technologies are considered vital for the successful development of the slender, lightweight, high-aspect-ratio wings that could be used by future transports as well as intelligence, surveillance and reconnaissance UAVs.

Formerly dubbed the Multi-Use Technology Testbed (MUTT), the UAV will test to the edge of the flight envelope where flutter occurs. Flutter is the potentially catastrophic dynamic coupling that can occur between the elastic motion of the wing and the aerodynamic loads acting on it. If a test goes too far and a wing fails in flight, the X-56A is fitted with a fuselage-mounted ballistic parachute recovery system.

Powered by twin JetCat P240 turbojets, and configured for easy wing replacement, the aircraft will be tested with stiff wings as well as multiple sets of flexible wings. The design also includes a hard point on the center upper deck of the aft fuselage that can either be adapted to house a third engine or the boom for a joined wing, thereby enabling testing of more advanced aerodynamic concepts.

The 28-ft.-span vehicle is the key test asset for the Air Force Research Laboratory-led Multi-utility Aeroelastic Demonstration Program (MAD). This is contributing to AFRL's follow-on work to SensorCraft, a class of HALE vehicles intended for surveillance as well as telecommunication relay and environmental sensing. Following Air Force flight tests, the X-56A will be used by NASA's Dryden Flight Research Center for further work also aimed at lightweight structures and advanced technology for future low-emissions transport aircraft.

AFRL MAD Program Manager Pete Flick says the SensorCraft studies "led us to very different configurations that are inherently more flexible with high-aspect-ratio wings. Gust-load alleviation and flutter suppression are two key technologies we needed to pursue, and there was no testbed out there where we could test active flutter suppression without a lot of risk. So we went out to develop a vehicle specifically for that purpose. So that's what motivated AFRL, and to work with NASA, which has a similar interest in pursuing configurations for future aircraft."

The NASA flights will be conducted under the subsonic fixed-wing project and will help to develop guidelines and methodology for active dynamic structural control as well as provide flight-validated aircraft models for academia. The aeroelastic and lightweight structures research will also contribute toward long-range planning for the proposed X-54 low-boom supersonic demonstrator program.

Displaying clear design heritage from previous Lockheed SensorCraft concepts as well as flying wing designs including the P-175 Polecat, RQ-170 and DarkStar UAVs, the X-56A is characterized by a cranked delta planform. The flight-test package will include two identical center bodies measuring 7.5 ft. long, as well as four sets of constant-chord wings. One set will be stiff for baseline flight tests, as well as follow-on research, while the remaining three will be identical flexible wings made with lighter skin material for flutter testing.

The X-56A is in final assembly at GFMI Aerospace and Defense, a Fountain Valley, Calif.-based engineering company specializing in prototype and mockup development. The aircraft is currently due to be delivered to Lockheed Martin in late April and will be transported to Edwards AFB in June. Flights with the 452nd Flight Test Squadron, part of the 412th Test Wing, will begin at the North Base in July and continue through September. Following an approximately 25-hr.-long flight test effort, the X-56A is expected to transfer to NASA by year's end.