V-22 Osprey Short Take Off and Landing (Stol) Evaluation and Envelope Expansion

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Abstract: As a tiltrotor, the MV-22B Osprey has the capability to hover as a helicopter and fly like an airplane. By using intermediate nacelle angles for short-field take offs, the aircraft can liftoff with a gross weight that exceeds the aircraft's vertical hover capability. Positioning the nacelles in an intermediate position allows the aircraft to accelerate on the ground and use the wing in addition to the rotor to lift the aircraft. Innovative test planning, pilot technique, and procedures had to be developed based on a wide variety of possible nacelle settings and provide optimum performance with acceptable handling qualities for both the take-off and landing phases.

A multi-step test program was designed to develop a repeatable take off technique, optimize performance, and gather quality flight test data necessary to construct take off and landing performance charts for fleet pilots for density altitudes beyond 10,000 ft. In order to gather detailed and accurate data for the model a very repeatable technique, low ambient wind conditions, and established aircraft configurations were required.

This optimized technique provided detailed take off, landing, and other performance charts. In addition to providing pilots with performance charts, the test team developed procedures for a "short field" and "long field" takeoff (STO) and landing (ROL) configuration to meet the multiple mission requirements of the V-22 Osprey. The techniques were than validated with a handling qualities evaluation in crosswind conditions in excess of 20 knots.

The STOL test program was successfully completed during test periods in 2005, and 2006 demonstrating the ability of the V-22 Osprey to conduct heavy gross weight short takeoffs and landings up to 60,500 lbs at sea level, and up to 52,000 lbs at density altitudes in excess of 10,000 ft. Test techniques, instrumentation requirements, and preliminary results are presented.