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Integrated Lift Fan Gets Nod for Collier Trophy

A unique vertical lift system that will power one variant of the U.S. military's new Joint Strike Fighter (JSF) has been selected as the winner of the National Aeronautic Association's 2001 Robert J. Collier Trophy. The original trophy, awarded for the greatest achievement in aeronautics or astronautics in the United States during the prior year, is on permanent display at the Smithsonian's National Air and Space Museum in Washington, D.C.

The Integrated Lift Fan Propulsion System (ILFPS)--to be built by Pratt & Whitney and Rolls-Royce for JSF prime contractor Lockheed Martin--is designed for the short-takeoff and vertical-landing (STOVL) version of the JSF, which will be operated by the U.S. Marines and possibly Britain's Royal Air Force and Navy. NAA's Collier Selection Committee picked the ILFPS system for this prestigious award because it represents a significant breakthrough in the difficult task of enabling a fixed-wing aircraft to move vertically in the takeoff and landing modes of flight.

"The innovative solutions applied by Pratt & Whitney, and the entire industry team, will help advance vertical flight technology to the next level, providing dramatically improved performance capabilities along with safer aircraft," said Don Koranda, President of NAA in his announcement of the Collier Selection Committee's decision to Mr. Louis Chênevert, President of Pratt & Whitney.

The ILFPS combines a newly designed version of Pratt & Whitney's F119 engine (currently used on the Air Force's F-22 fighter) with a counter-rotating lift fan behind the cockpit, a three-bearing swivel nozzle at the rear of the aircraft, and two roll posts in the wings to achieve STOVL capability. As Pratt & Whitney describes it, the "deceptively simple engine-driven lift fan" serves to augment vertical flight just as the afterburner serves to augment horizontal flight. The engine is linked directly to the fan. Rolls-Royce will manufacture both the fan and the swivel nozzle for Pratt & Whitney.

"The integrated lift fan propulsion system was up against some tough competition for this award and it gives me great pride to know that our team has been so honored by our industry," said Chênevert. "Truly, this achievement would not have been possible without the visionary leadership of the Joint Program Office to establish the requirement for one fighter that met the needs of the Air Force, Navy and Marines. Their support was instrumental as the industry team developed this breakthrough technology."

In support of its successful bid for the JSF contract, Lockheed Martin demonstrated a STOVL version of the aircraft in a series of flight tests during the summer of 2001. Configured with the ILFPS, the fighter established

its ability to take off in a short distance, travel in level supersonic flight, and land vertically during the course of a single trip.

Commenting on the work of the JSF's propulsion engineers, retired U.S. Air Force Academy professor Dr. William Heiser said, "The F119 engine, already the most advanced in the world, had to be further upgraded and made capable of driving the lift fan through a concentric shaft. The 28,000 horsepower fan, along with its driveshaft, clutch, and gearbox, and the swivel nozzle and roll posts had to be designed and developed from scratch.

All ILFPS components had to be designed and developed to function properly together under all flight conditions, with and without afterburning, while meeting the durability requirements of the Concept Demonstration Aircraft flight test program...."

Recipients of the Collier Trophy include all members of the ILFPS's development team: Pratt & Whitney, Rolls-Royce, Lockheed Martin, Northrop Grumman, BAE Systems, and the Joint Strike Fighter Program Office. The Trophy will be presented to the team at a formal dinner hosted by NAA's affiliate member, the National Aviation Club, to be held May 29, 2002, in Arlington, Virginia.

The Robert J. Collier Trophy was first awarded in 1911, and is named in honor of the man who commissioned it—a prominent businessman and the first person to buy an airplane from the Wright Brothers for personal use. Collier was a visionary who believed in the practical value of aviation at a time when most people viewed it as a simple novelty.

The National Aeronautic Association is a non-profit, membership organization devoted to fostering America's aerospace leadership and promoting public understanding of the importance of aviation and space flight to the United States.