On the 'Wing... #180

British Aerospace at Warton BAeW P.103

Always on the lookout for full scale aircraft with a unique style, especially tailless and canard planforms, we'd like to pass along the British Aerospace at Warton BAeW P.103 as a good candidate for power scale slope soaring.

The most well known STOVL (Short Take Off Vertical Landing) aircraft is the Harrier. From the deck of a small aircraft carrier, a fully loaded Harrier takes off by accelerating down the flight deck and up a curvilinear ramp to essentially leap into the air. Upon returning to the carrier, a vertical landing is performed. STOVL makes best use of available engine power and fuel supply.

The Harrier is designed to operate with a fixed engine supplying vectored thrust. That is, there are nozzles on either side of the aircraft which rotate to direct engine thrust downward, forward, or toward the rear. Designed in England, built in both the U.K. and the U.S., and used by the U.S. Marine Corps and several other military forces, the Harrier is tremendously maneuverable and can be used from either sea based or land based sites. Despite its various advantages in combat situations, it does have one disadvantage other than its relatively high operating cost — it is not a supersonic aircraft.

British Aerospace, with the availability of new engine technology, in 1977 began working on a preliminary tilt-engine design for a twin engined supersonic fighter type aircraft with STOVL capability. While that preliminary BAe Warton design looks to be derived from the Eurofighter, the P.103 project actually began six years earlier.

The BAeW P.103 was made possible by engines of much shorter length, and a new afterburner system called PCB (Plenum Chamber Burning) which doubled the exhaust pressure of the engine used in the Harrier. The engines could be tilted, and because of their short length the engine tail pipes were always a reasonable distance above the ground.

The critical part of any tilt-engine design is the balance between the center of gravity and the thrust line. This drove the design toward the canard configuration, one of the traits retained in the Eurofighter.

Two engines placed well outboard would certainly cause problems if one engine failed because the aircraft would immediately flip to the side, making egress of the pilot extremely difficult or impossible. BAe apparently worked out a solution to this problem, but details are lacking.

Of more importance perhaps, is the pitch maneuverability of the aircraft at any speed. On the BAeW P.103, this pitch maneuverability was provided by deflector flaps just aft of the engine, and by engine tilt itself at slower speeds. Because of the interaction of differential thrust from the engines, engine tilt, and the deflector flaps, some sort of computerized system was necessary to help control the aircraft in all flight regimes.

The P.103 took shape over several years and had a direct influence on the design of the Eurofighter. A full size P.103 mock-up was built, wind tunnel testing was performed, along with a multitude of engine tests, and the aircraft was successfully flown many times on a simulator. A prototype was never constructed.

Aside from being a canard, the P.103 has a couple of interesting points which make it attractive to the slope scale modeler. First, the original aircraft had no rudder, so a control system using only outboard ailerons and inboard elevators would be very easy to design and construct and be accurate to the original. Second, the canard surface is fixed and acts to direct the airflow over the leading edge of the wing at the root. This should improve the stall characteristics in comparison to a similar planform using the wing alone. Keep in mind, a model of larger size is called for because of the relatively narrow canard-wing gap. A rendition with a six foot wing span or larger would look truly exceptional skimming along the slope at high speed.

We'd very much appreciate hearing from any *RCSD* reader who designs, builds and flies a model of the BAeW P.103.

Suggestions for future On the 'Wing... columns are always welcome. Contact us at P.O. Box 975, Olalla WA 98359, or at <bsquared@appleisp.net>.

Resources:

Boot, Roy. From Spitfire to Eurofighter. Airlife. England, 1990.

Buttler, Tony. British Secret Projects - Jet Fighters since 1950. Midland Publishing. England, 2000

Eurofighter Typhoon web site. <http://www.eurofighter.com/>

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