CIAMFlyer
Introduction to the Model Aircraft World
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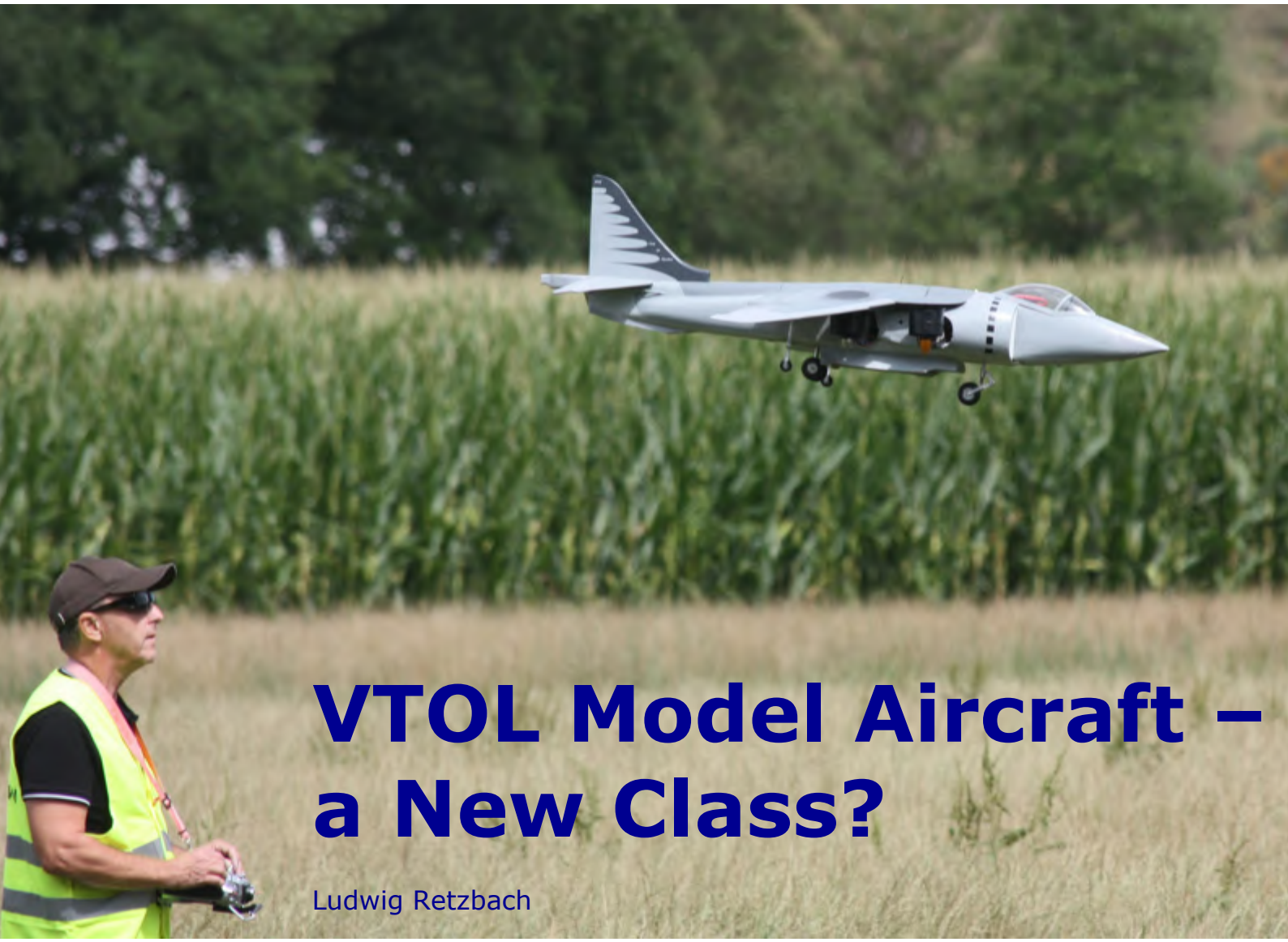


VTOL Model Aircraft – a New Class?

Ludwig Retzbach

After a relatively long absence, VTOL (vertical take-off and landing) aircraft are making a comeback. VTOL aircraft require no or only a very short runway for take-off and landing and, unlike copters, once they have taken off vertically can transition into normal flight like an ordinary fixed wing aircraft and transition back for landing.

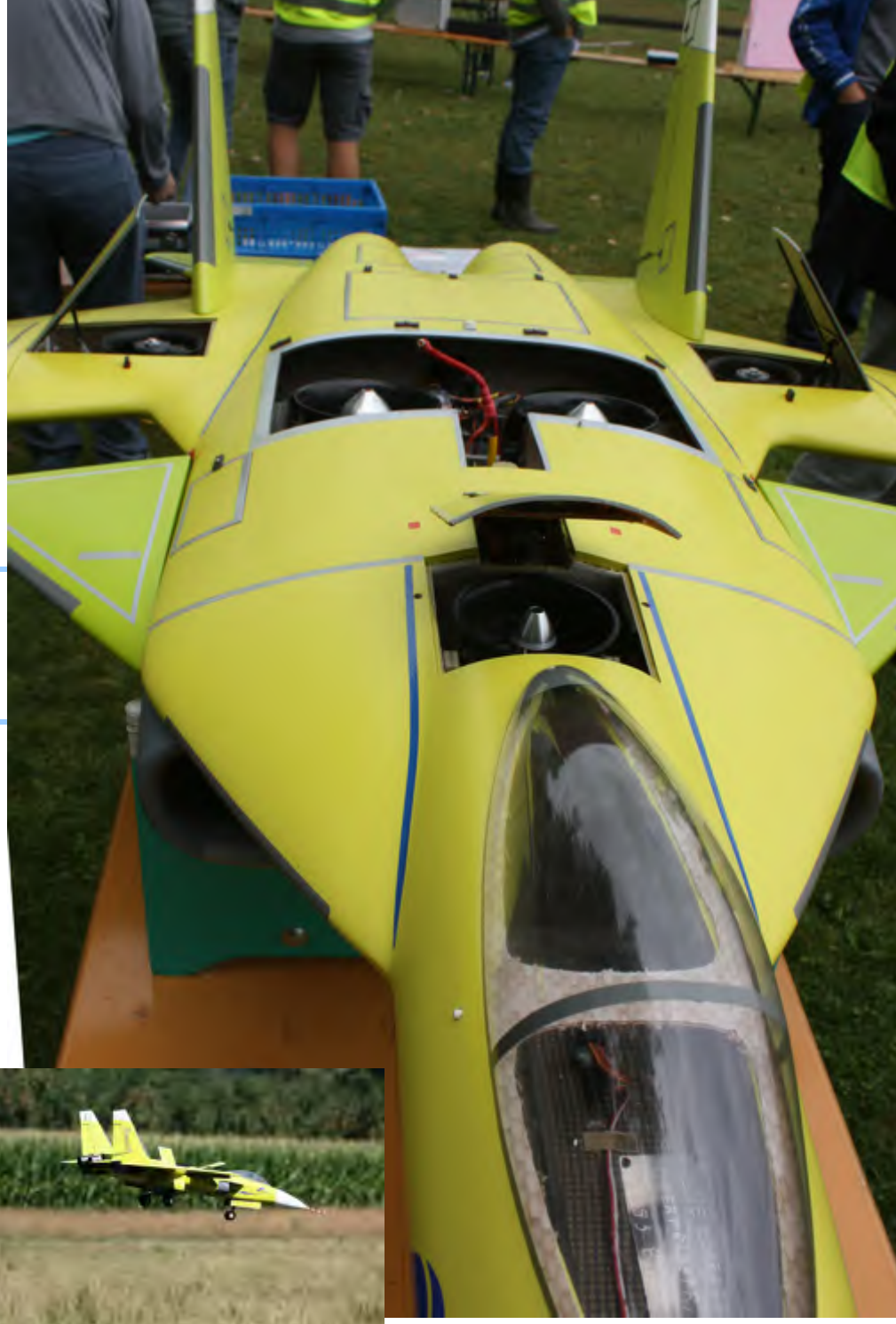
50 years of Do 31 VTOL prototype aircraft

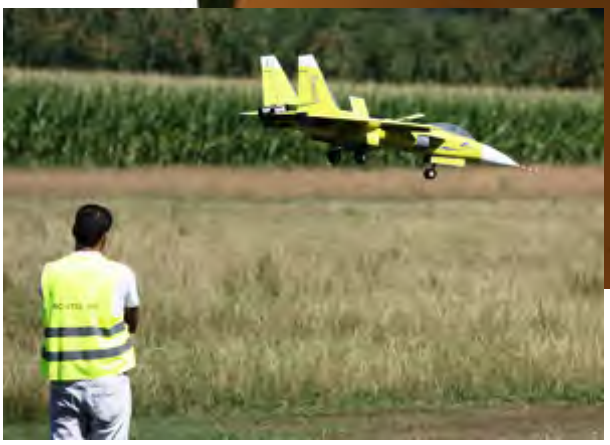
50 years ago, the Dornier Do31 prototype aircraft, with now 94-year-old test pilot Dury Wood at the controls, succeeded in completing the first VTOL airfield circuit with complete take-off and landing

transitions. As part of the celebrations to mark this anniversary, a VTOL meeting was held in Friedrichshafen, Germany. Aeromodellers were tasked with recreating this VTOL achievement with a model aircraft. Only electric models with propellers or ducted fans were eligible to take part.

Ducted fans

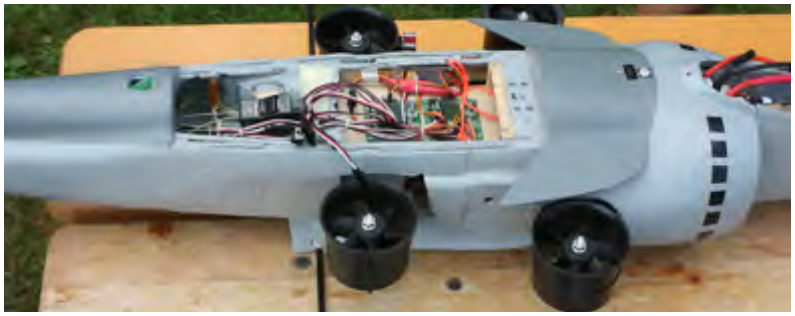
The best model was a SU-X, a SU-47 Berkut with short take-off capability that had been modified for vertical take-off. The model version of the prototype with forward-swept wings and canard is based on two 90 mm ducted fans, swivelling in the middle of the fuselage, with thrust vector-controlled jets and three auxiliary engines for the roll and pitch axes that are closed off by fuselage hatches during horizontal flight. The model is built in a highly weight-optimised honeycomb design. Probably one of the best-known VTOL aircraft is the Harrier which was duly represented at the meeting. On one of the Harriers, the Pegasus engine with swivelling jet nozzles was replaced with four swivelling ducted fans and the model performed some impressive manoeuvres.



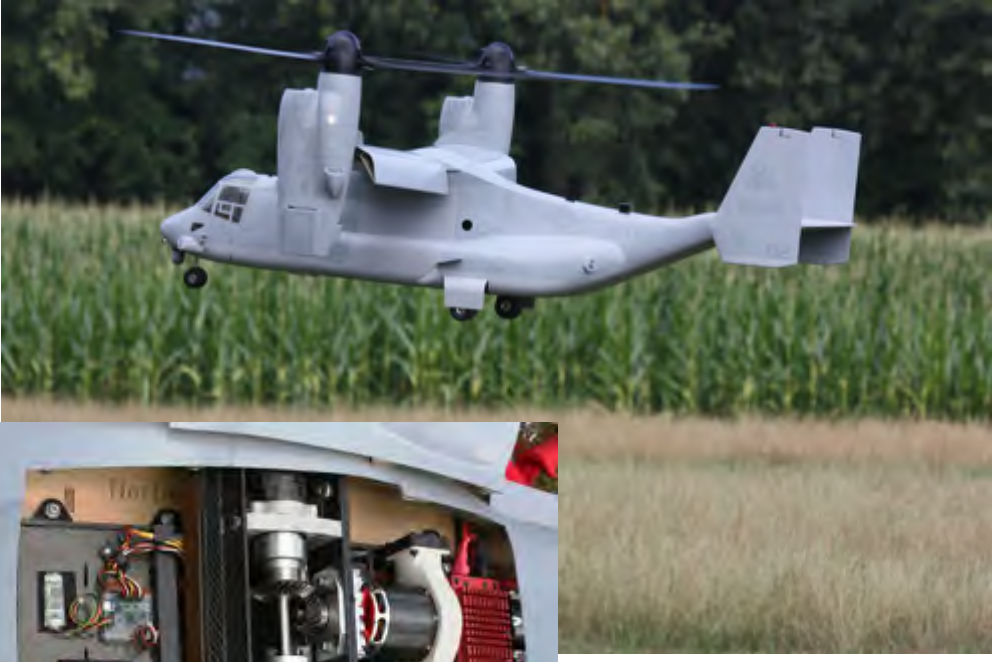


Modified SU-47 during vertical take-off

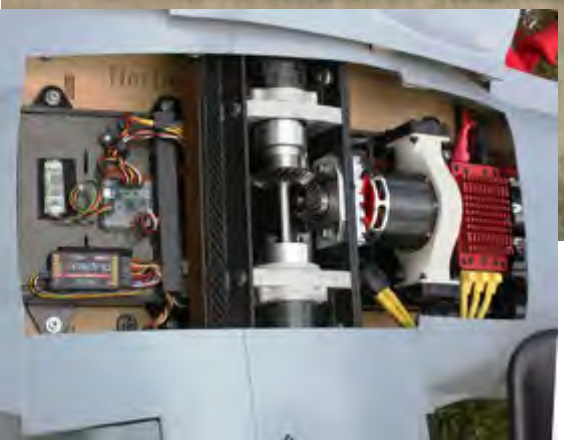
Swivelling main engines (covered by a grille during flight) allow vertical take-off and landing. The auxiliary engines operating underneath fuselage hatches are used mainly for attitude stabilisation.



← The swivelling nozzle Pegasus engine was replaced with four swivelling ducted fans.



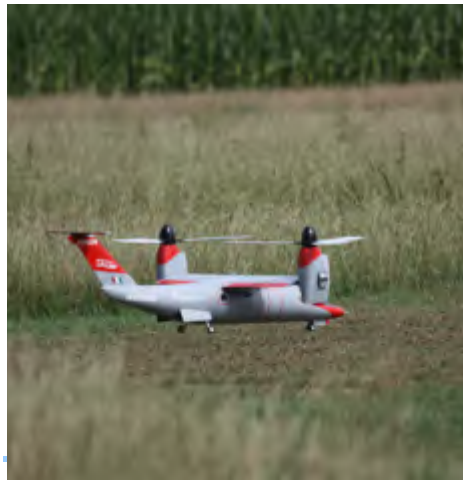
Bell Boeing V-22 Osprey.



Osprey propulsion unit and attitude control.

Propellers

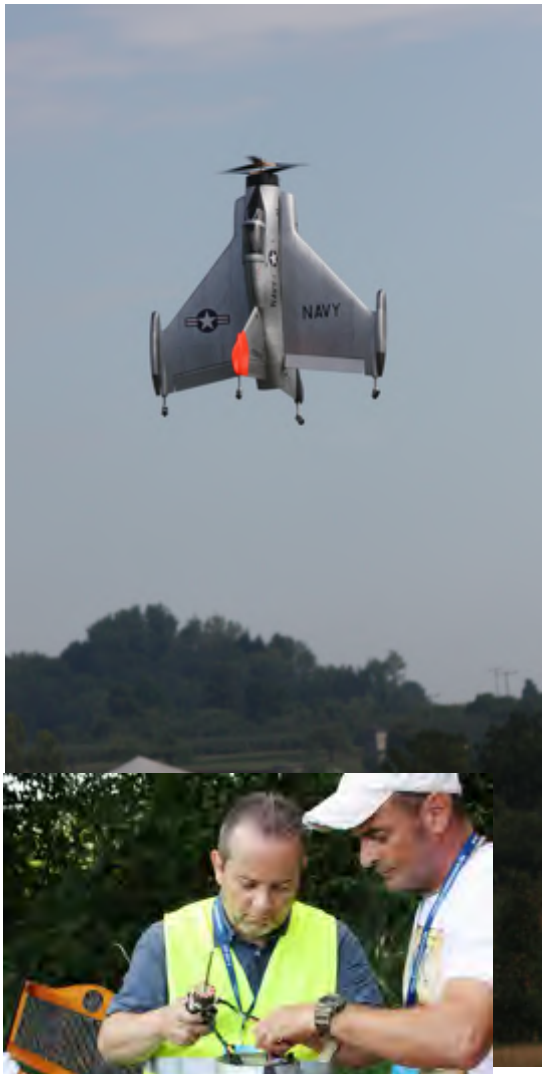
Among the propeller aircraft, the scale model of the legendary US tilt-rotor aircraft Bell Boeing V-22 Osprey was much admired. One electric motor with a 12s LiPo battery installed in the centre of the wing drives both outside rotors via a common drive shaft and angular gearbox. Rotors at the wing tips are tilted by a worm drive and controlled via swashplates. This Osprey represents a collection of ingenious individual solutions and demonstrates once again that models can well be far more advanced than the original. This is also likely to be the case for the Convair XFY-1 which dates back as far as 1947, i.e. more than 70 years. In its original version, this tailsitter project never made it beyond the trial stage. The builders of the model had put considerable effort into solving the far from trivial problems arising from the counter-rotating propellers and the model was taken through some high-speed horizontal flights with clean transitions to the tailsitting take-off and landing phases. The Agusta Westland AW609, a tiltrotor convertible aircraft with self-developed attitude control, was also not to be missed.

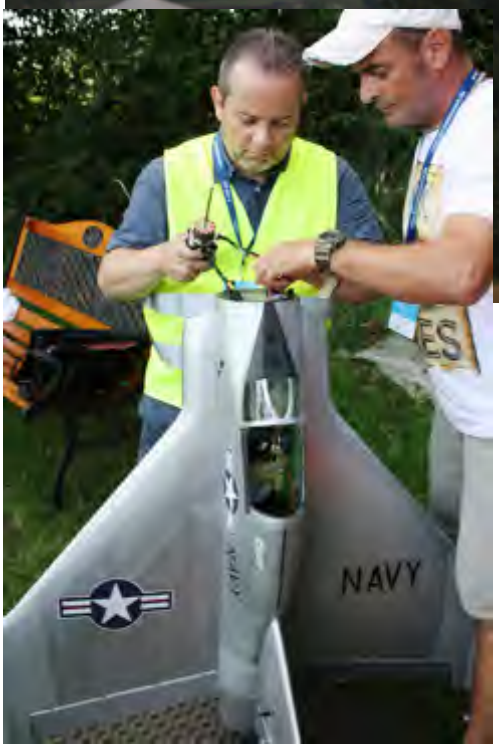


Agusta Westland AW609.

Tailsitting prototype aircraft.

Pogo – The original completed in 1947 never made it past the trial flight stage.





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