

Electric jets – an interesting contradiction

Aeromodellers have long ago implemented a concept that is – at least to date – not possible in people-carrying aviation: faithful reproductions of jet aeroplanes with electric ducted fan, EDF

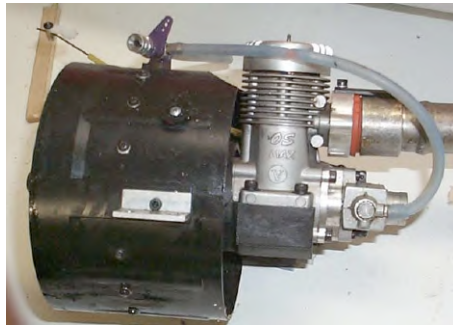
The ducted fan principle – as old as jet aeroplanes

The desire to build model aircraft that externally resemble people-carrying jets as closely as possible is probably as old as the invention of the first aeroplanes with jet engines nearly 75 years ago. Thus, the idea of placing the propeller in a tubular housing and integrating the assembly in the fuselage of the model aeroplane was fairly obvious. The concept of the "intubed propeller" was developed in the 1930s by Italian aircraft engineer Luigi Stipa (1900 to 1992) and trialled in practice from 1932 with various bizarre-looking Caproni-Stipa experimental planes. To this day, the principle is considered an important step in the development of the jet drive.



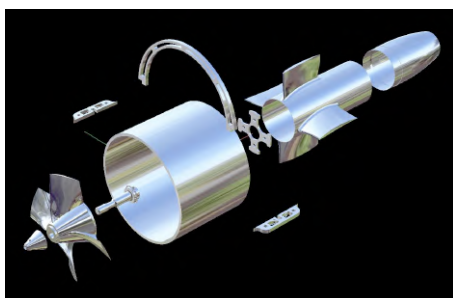
Bizarre-looking Caproni-Stipa experimental plane

The ducted fan principle →



It started with combustion engines

The first jet models were equipped with either JETEX or Pulso engines, both of which had multiple drawbacks. Long before electric propulsion became established in model aviation, the impeller principle had achieved remarkable technical sophistication and had become very popular. Interest in scale reproductions of military and civil jet aeroplanes was significant. In the United States, U.S. Navy jet carrier pilot Bob Violett began building ducted fan jets with combustion engines as early as the late 1970s. As these engines were initially less efficient than conventional propeller engines,



his models were built to be extremely lightweight. In 1980, the company Byron USA launched a beautiful F-16 which, in a short time, also made ducted fan flight popular in Europe.

Electric motors become the obvious choice

With the emergence of electronically commutated (brushless) motors (the first ones that could be used in aeromodelling were made in 1994 by Aveox, USA) the use of combustion engines for impellers became increasingly rare. They had too many disadvantages compared to electric motors, such as problems with starting and also cooling.

Aeromodellers began to build their own electric ducted fans



Modern electric motors have low vibration, start at the push of a button and can easily cope with the rotational speeds required for ducted fan. Even more than ten years ago, aeromodellers who had experience with electric propulsion systems began to build their own electric ducted fans.



In addition to carbon fibre reinforced plastics, wood and metal were also used for both turbines and stators. It took only a few years for a large international community of electric jet aeromodellers to emerge. The term "EDF" for electric ducted fan was adopted by the numerous manufacturers of propulsion systems and jet models.



High tech ducted fans conquer model jet aviation

Improved ducted fans are continuously being developed by various manufacturers around



the world. Improvements include not just power increases but also reductions in noise – modern jets running at speeds of 20,000 to 40,000 rpm only generate a pleasant humming noise. With a ducted fan weight of less than 1.5 kg, static thrust can be as high as 100 to 150 N. This means that electric turbines can match gas turbines in terms of power and weight. Although there is still a large difference in the power densities of batteries and kerosene, EDF propulsion systems are becoming

increasingly popular due to their easy handling. There is hardly a jet plane that hasn't been reproduced. The spectrum ranges from small mini jets weighing only several hundred grams to large multi-engine machines weighing 10 to 20 kg. The world of electric jets has no limits – do you want to be part of it?

Photographs
D. Schuebeler
H. Mettler

Electric ducted fan with controller in a jet model airplane

