

High-End Tiltrotors: Why Not to Contract NASA and MIT for a Rotor Blade (Salvation) Solution?

Few days old report (a really nice one!) places **morphing technology** in a framework within aviation:

https://www.aerotime.aero/articles/biomimicry-aircraft-design-concep-boeing-airbus-nasa?utm_source=ActiveCampaign&utm_medium=email&utm_content=From+albatrosses+to+slimy+eels%3A+Aircraft+design+and+concepts+inspired+by+nature&utm_campaign=AeroTime+News+%2F+November+16%2C+2024#respond

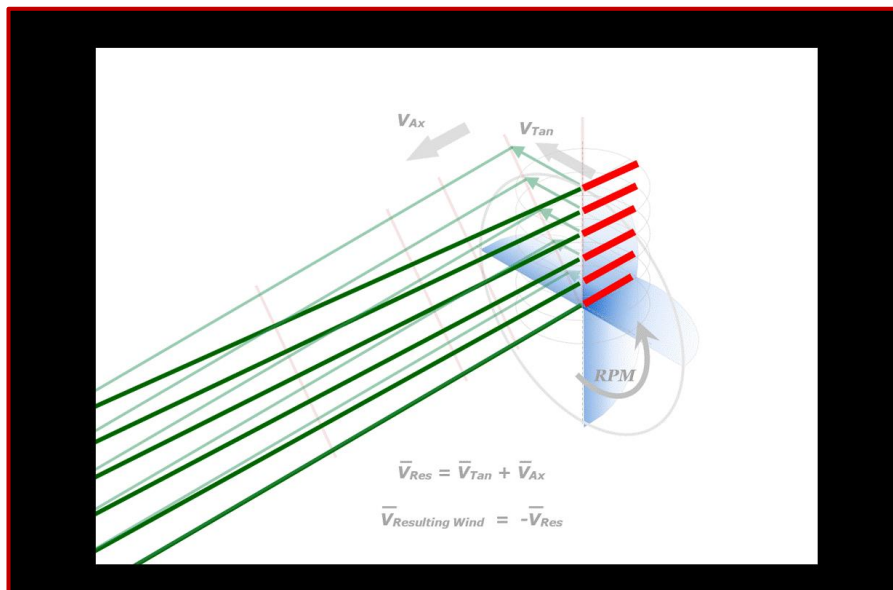
The screenshot shows a web page from AeroTime. The header includes the AeroTime logo and navigation links: Civil Aviation, Defense, Video, Executive Spotlight, Newsletter, Jobs, and About AeroTime. The main article is titled "From albatrosses to slimy eels: Aircraft design and concepts inspired by nature" by Ian Molyneux, dated November 16, 2024. It features an image of an Airbus aircraft with bird-like wings. A secondary article titled "Morphing wing" is also visible, featuring an image of a NASA/MIT morphing wing and text describing the project.

NASA and MIT completed their project with success, and terminated it in 2019. Sadly. Explanation was it was "just" a students' project, and with the respective diploma pieces finished, the mission itself was accomplished too. There were, of course, some possible future applications named too, such as airships and space-based structures.

Other explanations seem to be more likely. Clearly, at that time there were no real, and near-term profit making applications on the horizon. Improving airflow around airplane wings is possible but, as we know, those airflows are – normally - quite well-behaved anyway. Marginal improvements result marginal gains too. Chances are however that the same technology, supported by the NASA and the MIT, can be applied to some less well-behaved airflow cases too. That is – to some with much higher potential profits.

VTOL industry has been familiar with several, really complicated patterns of the wind. Famously complex ones, which keep imposing severe limitations on vertical flight. And also causing a brutal mass of extra costs and losses. Maybe – this is a chance to reinstate the above interrupted project?

In a recent [post](#) at the VFS Open Forum (27Oct2024) it was shown how a rotor/propeller blade should bend (not rotate!) to keep its alignment with the twisting vector field of the airspeed. (See the GIF below.) Pure morphing technology!



https://stallfreepropellers.com/wp-content/uploads/2024/11/Triangles_04_upload_.gif

At the same time, the above report wrote about a deformable wing "covered by a "skin" made of overlapping pieces that resemble scales or feathers". It is not hard to find similarities between the two ideas. An inner system of the skeleton defining overall shape of the wing/blade. The outer skin providing the fitting aerodynamic surface.

Blade geometry defined by the skeleton, has a different mathematics than geometry of an aircraft wing has. While the one used by the NASA/MIT team is unknown, the mathematics of a propeller blade is beautifully simple. (We speak about geometry - can be checked out on the above GIF.) Rods and hinges can easily be arranged so the assembly will move exactly as the speed vector-equations dictate.

...

Maybe, just, I am reading too much about Elon Musk 🤖

Laszlo KRUPPA

stallfreepropellers.com

Budapest, Hungary

kruppa.laszlo@outlook.com
