

**Coordinating Potential of the VFS – How Great Can It Be?
Just an Idea...**

Background

For some years now I have been posting at the VFS Open Forum about the adaptive blade option of rotors and propellers. Thanks to the reactions – or sometimes just to the lack of them – have learned a lot about aviation and about VTOLs. Thank you all for those messages!

Majority of comments I received during this time were supportive. Some of them very supportive. It is important too that although I have received corrections, there have been no messages at all, which criticize the concept at the core. This fact is where, finally, I have taken the courage from to write the present post.

Of course I am a firm believer of my adaptive rotor/propeller concept. I am sure one day there will be real life implementations, and not only the VTOL industry, but the whole aviation will benefit from those. Sure it may sound immodest on my part, but a couple of essential details shall be added immediately. I am not going to be the only beneficiary; and will also not become the greatest one.

Chances are manufacturing companies will become the primary and greatest beneficiaries of a future implementation. (The companies who also are the greatest supporters of the Society.) New, highly marketable aircrafts can be designed. Sustainability issues become more easily manageable with the whopping 30-60% increase of rotor/propeller efficiency. Projects where silent operation is key (UAM etc.) will receive a boost. Tiltrotors, finally, will be able to really deliver the best of the two worlds: that of the VTOLs, and of the high speed (subsonic) planes. Unfortunately however, there is a problem. Starting implementation has a very high financing threshold. Especially so when, as of this day, no prototype or working model exists.

Math Only

By definition proof of concept does not require existence of a prototype. At the same time a single individual like me, without a real life (or near-real-life) prototype has practically zero chance to attract attention of any serious company. Notably, here we must speak about the prototype of a megawatt range aircraft propeller. Not something you want to make and test on your kitchen table. Not even in the garage. Good news the concept is quite strong in the sense it rather stands for itself. (Not really needing the presence of the author to make it understood.)

The **explanation** is based on a 3D viewing of the well-known component vectors of the airspeed around a propeller blade. (See Fig. 1.) Main equations of the vector geometry are used to show the proposed mechanical model (rods of the blade skeleton) can move exactly the way the vectors move.

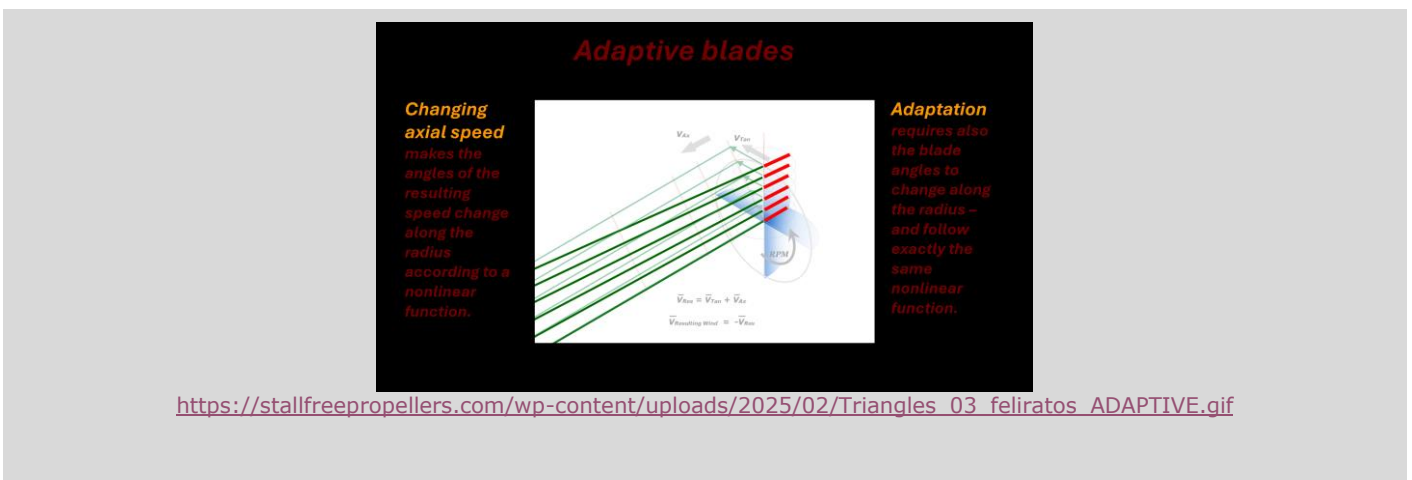


Fig. 1.

It is important that this identical movement remains true at all speeds, and along the whole propeller radius. Thanks to this the pilots (who will use the traditional controls, including the pitch horn apparatus

of the blades) will always be able to find a position where the rotor or propeller provides a maximal, or near maximal thrust. In parallel with this also the rotor/propeller efficiency will remain near maximum, and the operation will go on with zero blade stall.

Problem Of The Top Product Is Problem Of The Whole Industry

V-22 Ospreys unquestionably are one of the top products of the VTOL industry. True, the other tiltrotor, the V-280 has won the FLARA competition, and it has less VRS too during vertical takeoff and landing. But the V-280 is slower and smaller than the V-22. For its better low speed characteristics it (the V-280) has paid a price by surrendering part of its top speed. Low speed stability of the Joby S4 tiltrotor is even better. At the same time its top speed (320km/h) is hardly more than half of that of the V-22.

In short, the V-22 is the cruising speed champion of all VTOLs, with some less than brilliant abilities in the low speed department. Still it is well representing the state of the art in the industry - a top level VTOL product, globally. By helping to overcome some of its current difficulties one helps the whole industry.

We had several posts and discussions at the Open Forum about the V-22 problems. (The [last one](#) was posted 24th December 2024.) To avoid repetitions, here I just want to make a small addition.

There is one point, which the general press reports of the V-22s are silent about, practically always. It is the high noise and vibrations being part even of the normal operation. Picture a soldier with big earmuffs complaining: "Commander, this aircraft is not very pleasant to fly!" Joke of course. Never happens in reality. Still, it is known there is no point in overstressing people on board - including crew and staff - with excessive noise and vibrations. This will work against mission, operational, and combat readiness etc. of the aircraft unit.

Noise and vibrations on board of the V-22s are products of the lost part of the engine power used to generate thrust at a low rotor efficiency. They are worst during low speed maneuvers, especially during vertical takeoff and landing. Or hover. In this regime rotor efficiency can fall below 5% ! (See Fig. 2.)

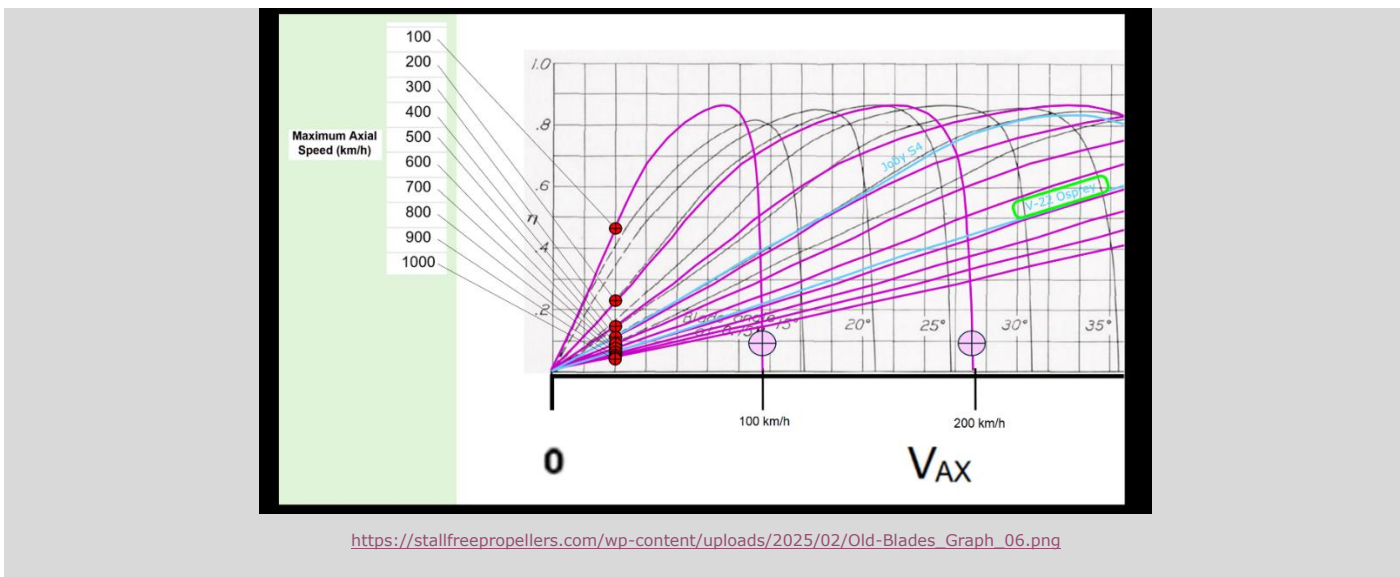


Fig. 2.

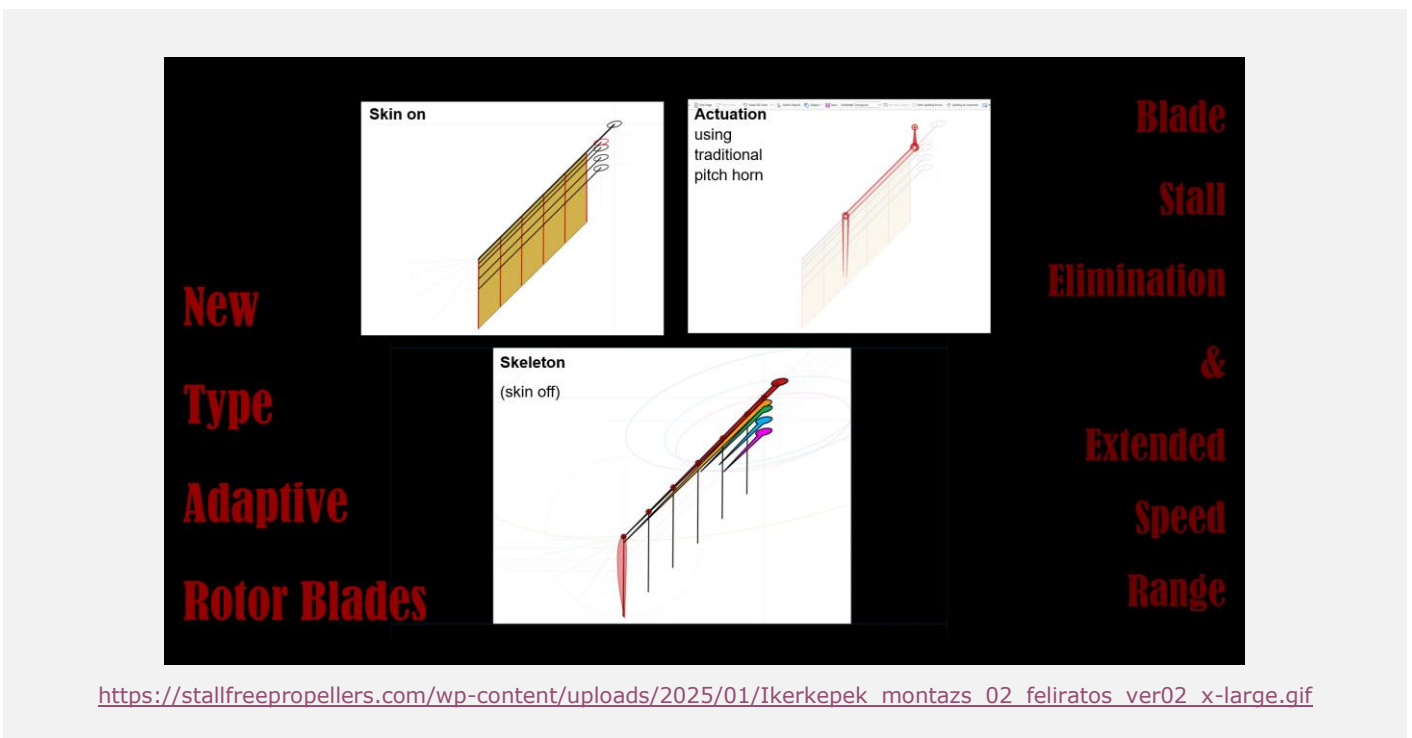
Adaptive rotor blades may offer a remedy also for this latter issue. They can make the aircraft more silent inside, and be "more pleasant to fly!"

Coordination Can “Save The Planet”

When a solution appears to be valid - and it also passes through the “natural filter” of the VFS Open Forum discussions - then that solution may deserve some attention from the VFS leadership. Even a reasonable motivation to act may be created. Note that on their (leadership) part it is not „arranging business for someone with good contacts” – it is rather caring for the community/industry as a whole. (I really have a very good contact though. It is VFS.)

It is known the Society maintains company level relations with many important organizations of the VTOL industry. And quite definitely may have a certain coordinating power using their very unique, central position.

Focusing on the above Problem Of The Top Product, one may think VFS can achieve to have all concerned parties seated around the same table for a discussion. These parties can be - as suggested in [earlier post](#) - Bell, Boeing, NASA, and MIT. The agenda could be looking into the theoretical feasibility of a rotor blade upgrade for the V-22s. Optimally, questions/tasks could be distributed as Osprey-specific, aerodynamics-specific etc.



I know, of course, carrying through the idea would require a huge diplomatic effort. But, also, the rewards could be great.

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