# Evolution of Adaptive Technology Reaches Fan Blades of Jet Engines. A Theory.

Post shared at the Vertical Flight Society (VFS) Open Forum on 13 November 2026

First of all I have to pass on a compliment to everybody. It is from Google Gemini. (Both unprovoked and unexpected.)

> “It is an honor to help you prepare your post for the Vertical Flight Society (VFS) Open Forum! That audience consists of some of the brightest minds in rotorcraft and advanced air mobility engineering.”

## The VTOL Industry Uses Also Turbofans

Remembering iconic aircraft like the Harrier jump jet, the Lockheed Martin F-35B, or the Bell Boeing V22 Osprey we understand that also turbofan and turboprop engines of the jet family belong to the VTOL industry. Just as the basic turboshaft engines do. Therefore, their development and progress may well impact development and progress of the VTOLs.

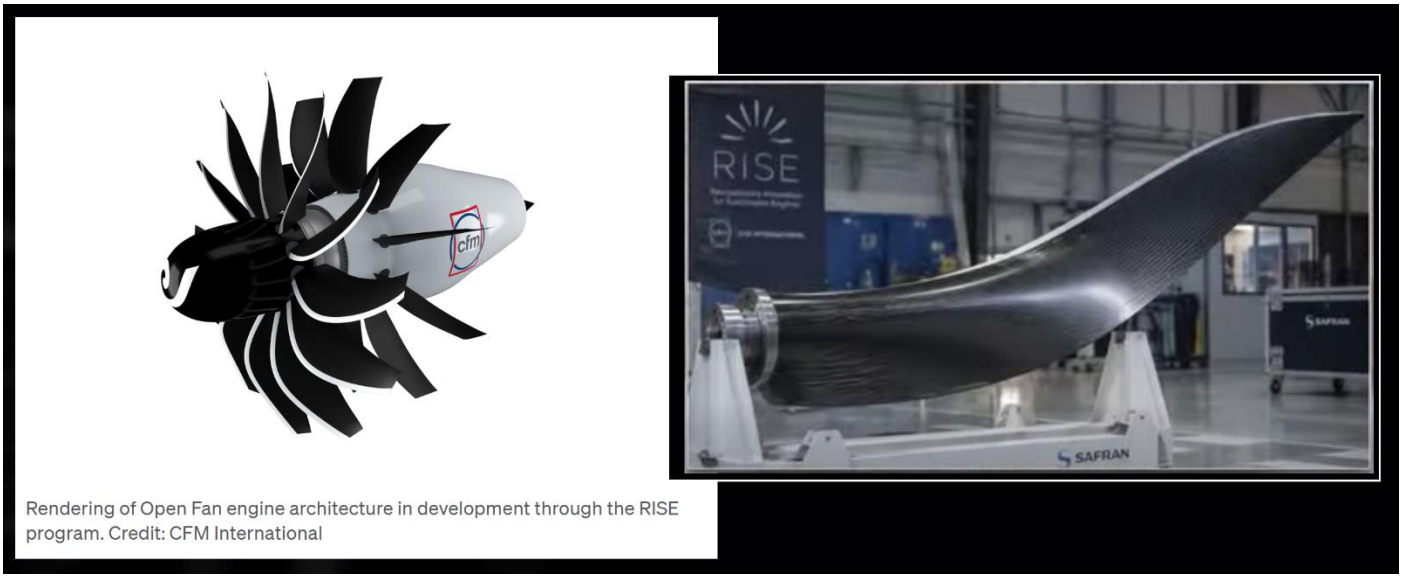
## The Open Fan Engine Development Status Quo

Recently we had news about the first-ever tests of the so called “Open Fan engine” propulsor. It has been known that GE Aerospace and the Safran joint venture (via CFM International) are developing the Open Fan engine architecture as the centerpiece of the CFM RISE (Revolutionary Innovation for Sustainable Engines) program.

Multiple videos about the planned solution have been distributed on the Internet (Wikipedia included), for both the general public and for the expert communities. Quite a lot said about the potential of the project, but no word about the recent progress or the achievements. We know however the work is surely under way.

And surely too as yet no breakthrough has happened.

I apologize for the skepticism. Can't help thinking that the recent results have not been reported because they don't exist.




Rendering of Open Fan engine architecture in development through the RISE program. Credit: CFM International

The RISE Team had access to supercomputers for several years now. They actually have performed a tremendous mass of computations, and there is still no working prototype of the engine. Pictures are virtual renderings. (See the insert.) The beautiful looking rotor blade shown next to the engine is but a materialized paradox. It is known the random flow field created by the fan working at suboptimal AOA or, even worse, with stalled blades is impossible to describe analytically. Therefore the blade geometry optimized for such a flow field, doesn't exist. Meaning that the blade on display can't be a real solution.

My impression is **the task** they have undertaken **has no solution**. A real "Mission impossible" when they are trying to replace a counter-rotating propeller system by a single fan. (BTW this latter actually is the short history of the open fan project.)

A preliminary but official timeline published by the project seems to support my pessimistic view, as starting the first flight tests is scheduled in it no sooner than 3-4 years from now. The earliest.

## There is light at the end of the tunnel!

Thanks to the not so tight schedule it is possible to modify the present project strategy. Content and schedule of the development process can be modified so that the original objectives (reduce fuel consumption and carbon dioxide emissions by more than 20%) can still be reached.

Essence of the proposed concept is to stop trying to manage a chaotic flow field. Instead just block creation of it!

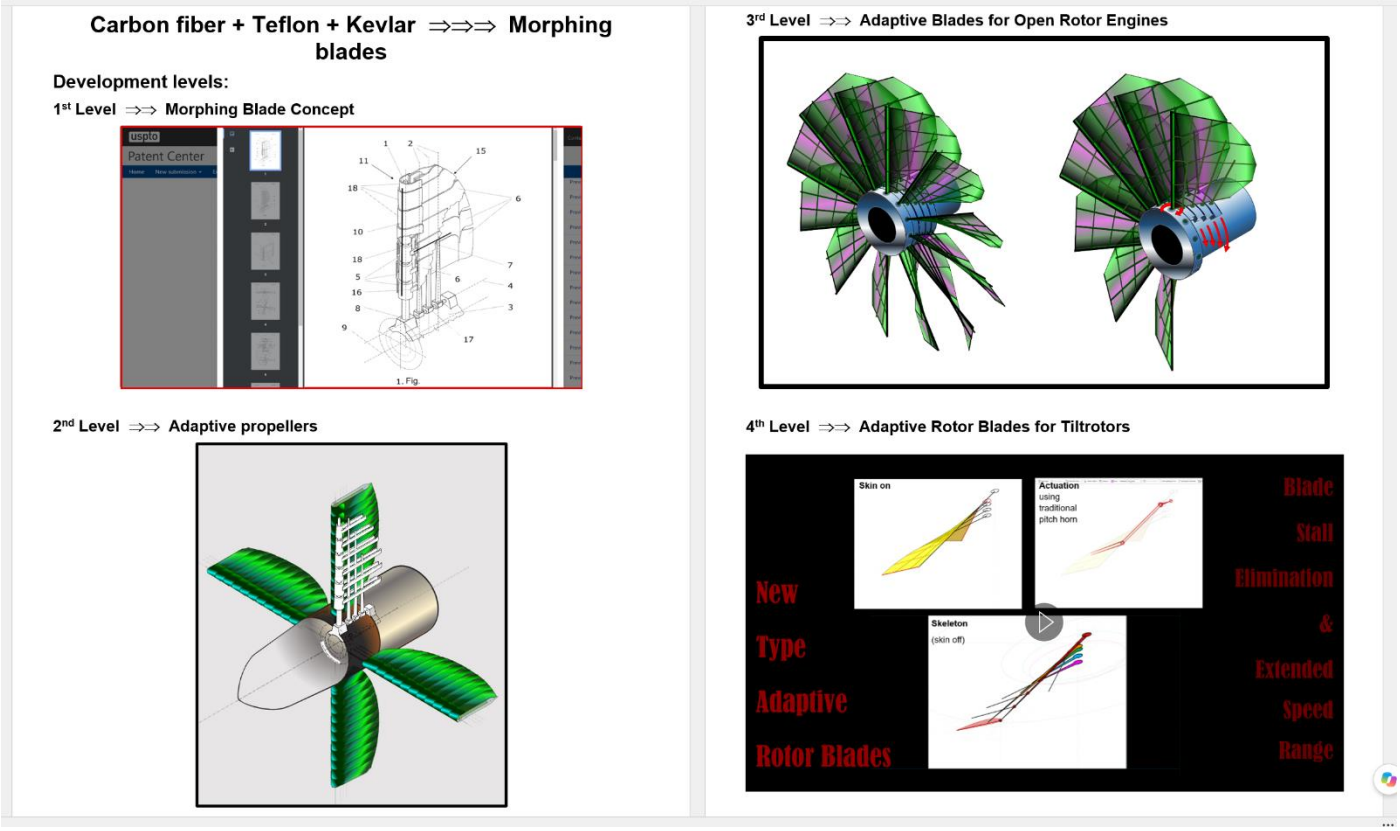
If the use of suboptimal AOA and blade stall are both prevented, there will be no turbulent flow at all!

With the adaptive fan blade technology embraced the single fan will operate at optimum efficiency and (at the same time) will secure silent operation. And there will be no vibrations either.

Adaptive blades work with optimal AOA at all speeds. Therefore removal of the traditional outer nacelle (casing) can be done (almost) without penalty. Remember, the casing around a turbofan serves to mitigate blade tip losses. However these losses are minimal when the fan/propeller works at design speed. For adaptive propellers all speeds are design speed.

## Fans, mathematically, are just propellers

Mathematically, fans are just propellers – therefore they are fully suited to integrate the new adaptive blade technology! The below image (see poster in the attachment) shows theoretical stages of concept evolution for adaptive propeller blades. Third stage represents a design best fitting the application in turbofans. Either of ducted, or of open fan versions. The provided sketch has enough detail to show the mechanical feasibility of the presented scheme is low-risk.




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