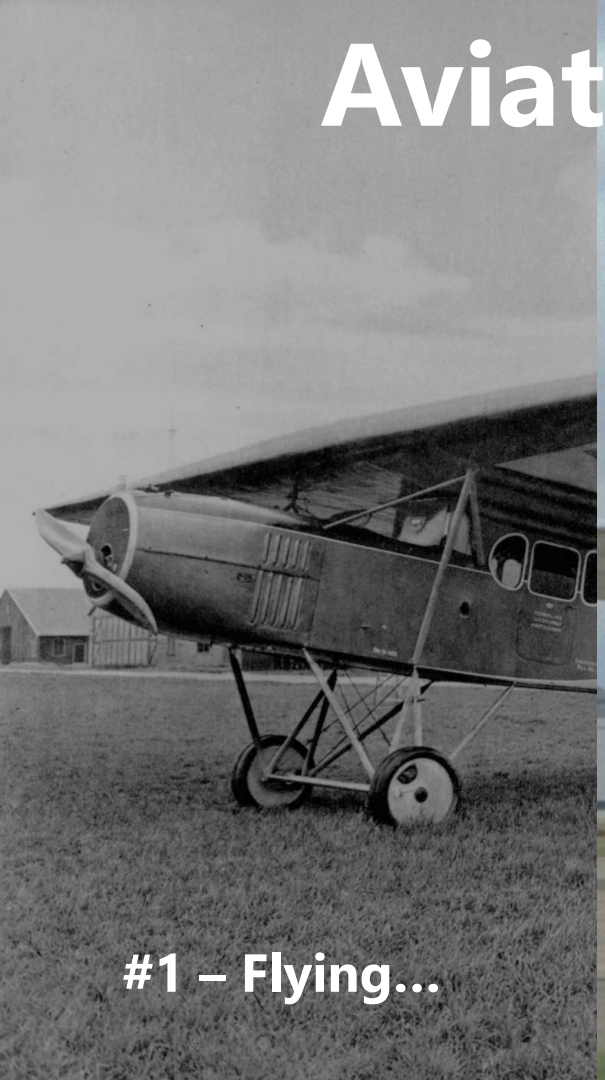

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TERATEC
20 - 21 OCTOBRE 2026
PARIS · PALAIS DES CONGRÈS

FUTURE AIRCRAFT PROPULSION

Pierre COTTENCEAU
EVP Engineering, Research & Technology
Safran Aircraft Engines



Aviation's Revolutions



#1 – Flying…



#2 – … Safer & Faster …



#3 – … More efficiently …

#4 … Next Revolution ?

Commercial 2035 2050

Carbon Neutrality



Military 2035

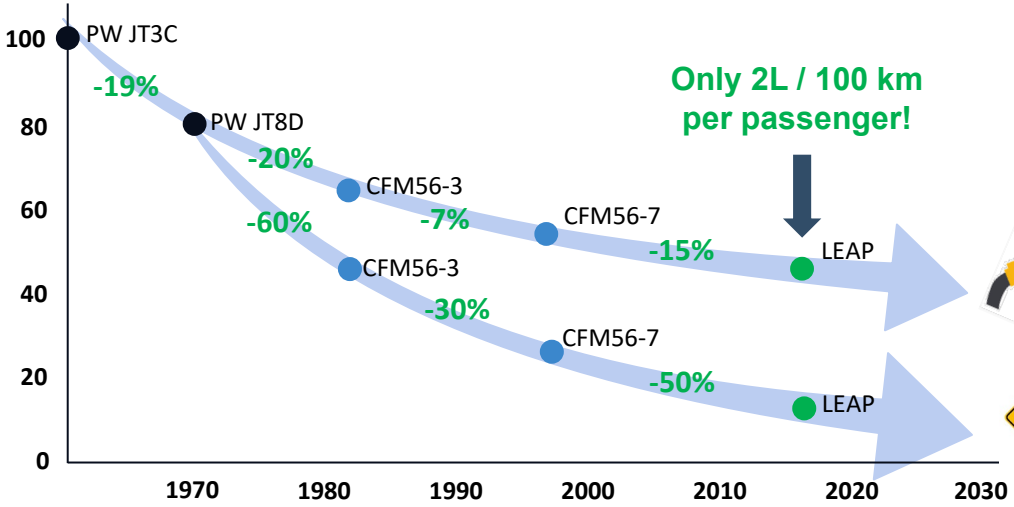
New usages
Sovereignty

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Huge progress has already been achieved !







Engines	Acoustic footprint
JT8D 70's	95 km²
CFM56-5B 90's	25 km²
LEAP	~ airport area



-50% vs 1960

NO_x

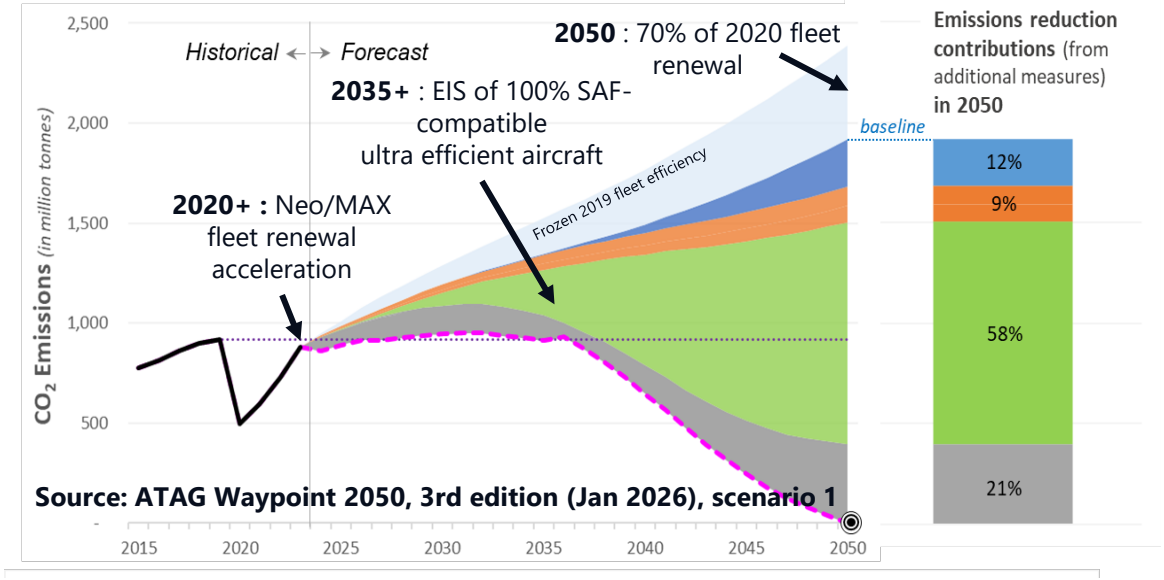
-86% vs 1970

-45 dB vs 1970

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Industry CO_2 Roadmap





X-Efficient Aircraft

Air Traffic

Sustainable Aviation Fuels

Offsets

URBAN MOBILITY COMMUTERS

Electrical Propulsion

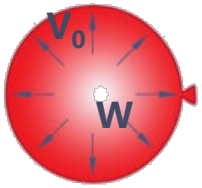
(electric/hybrid, fuel cells, etc.)



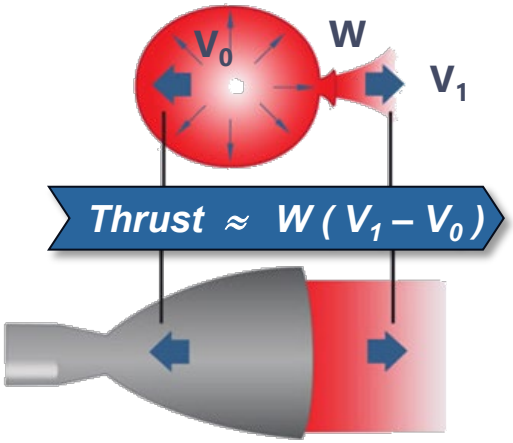
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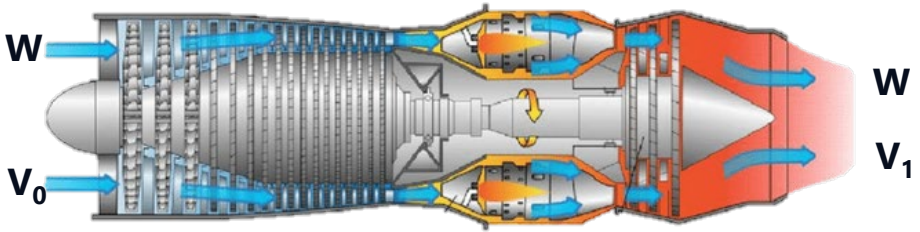
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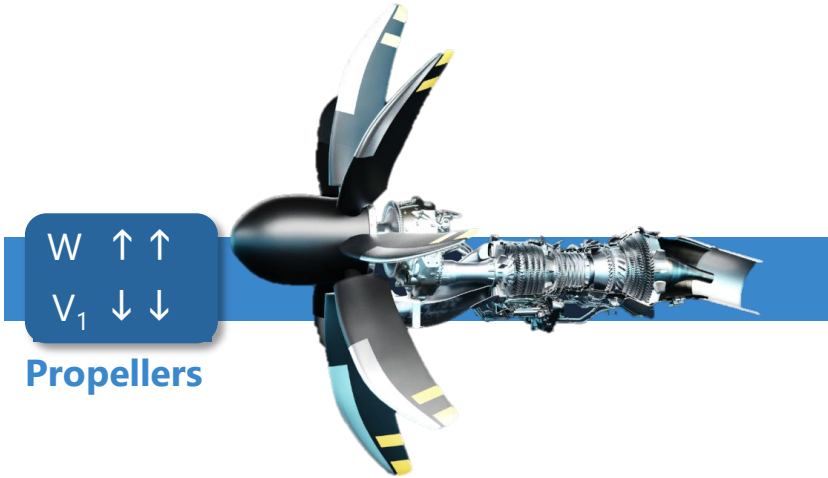
3 Ways to Design Engines

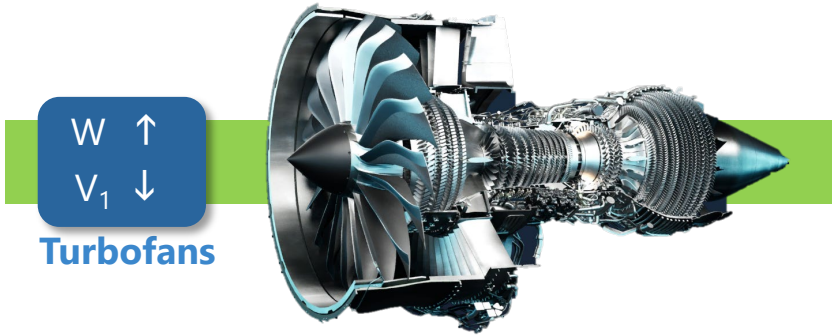


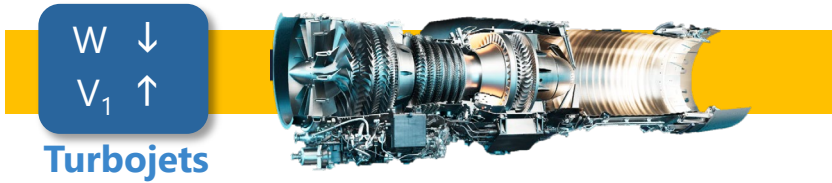
W = Airflow
V= Velocity









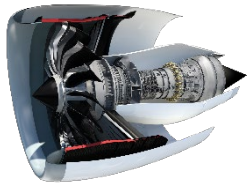


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Installation effects





Installed optimum of a ducted engine

Aircraft installation

Impact on landing systems
Effect on aircraft structures

Low Pressure Parts Losses

100
80
60
40
20
0

Weight

Drag

Propulsive

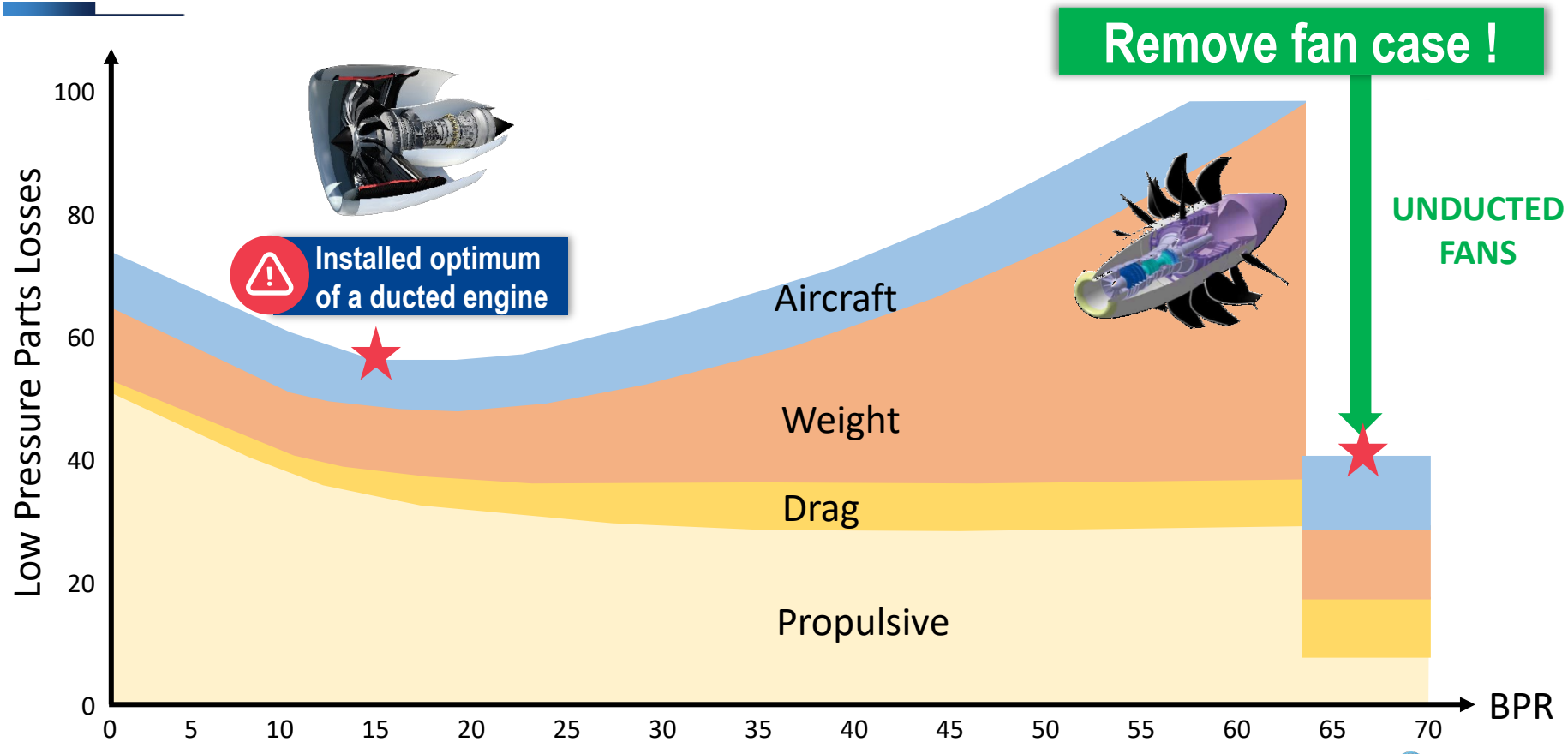
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

BPR

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Any other option ?



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Unducted fan history



GE36 (GE + Snecma)

- Thrust ~11 ton
- 2 counter rotative propellers
- Ground Tests 1987
- Flight Tests 1988
- 1988 Farnborough display

-25% Fuel Burn vs CFM56

Acoustic and dynamic issues

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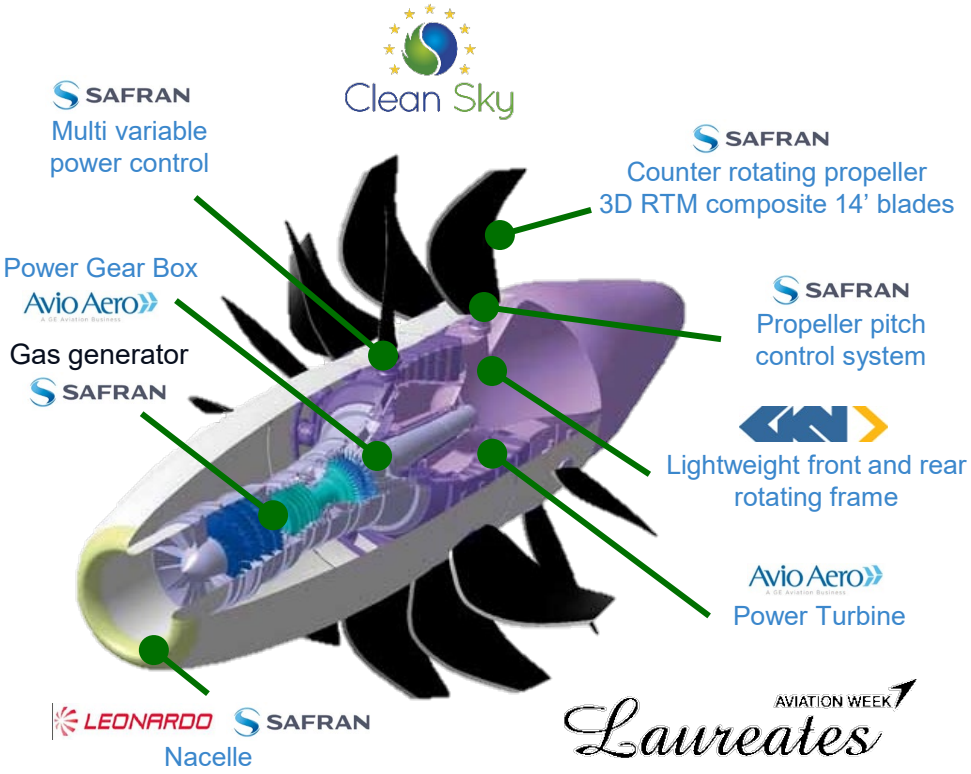
Contra Rotative Open Rotor

-15% in CO_2 vs LEAP



Ground Test (Istres, France, 2017)





AVIATION WEEK Laureates

Commercial Aviation Propulsion Award, 2019

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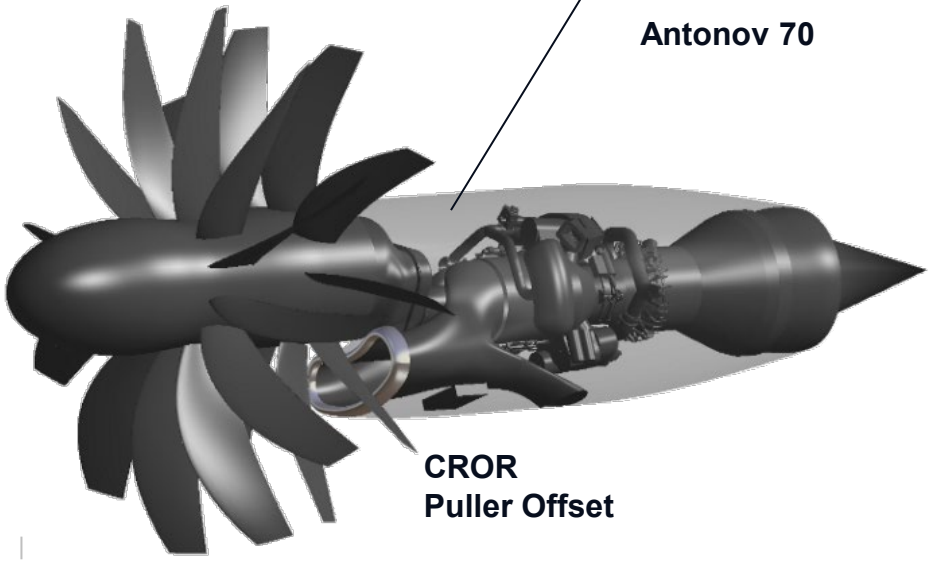
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Open Rotor Alternative Concepts

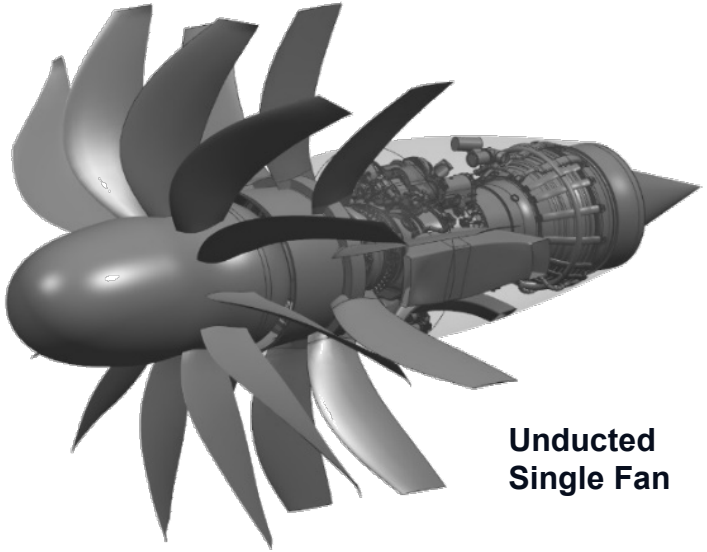




Antonov 70



CROR
Puller Offset



Unducted
Single Fan

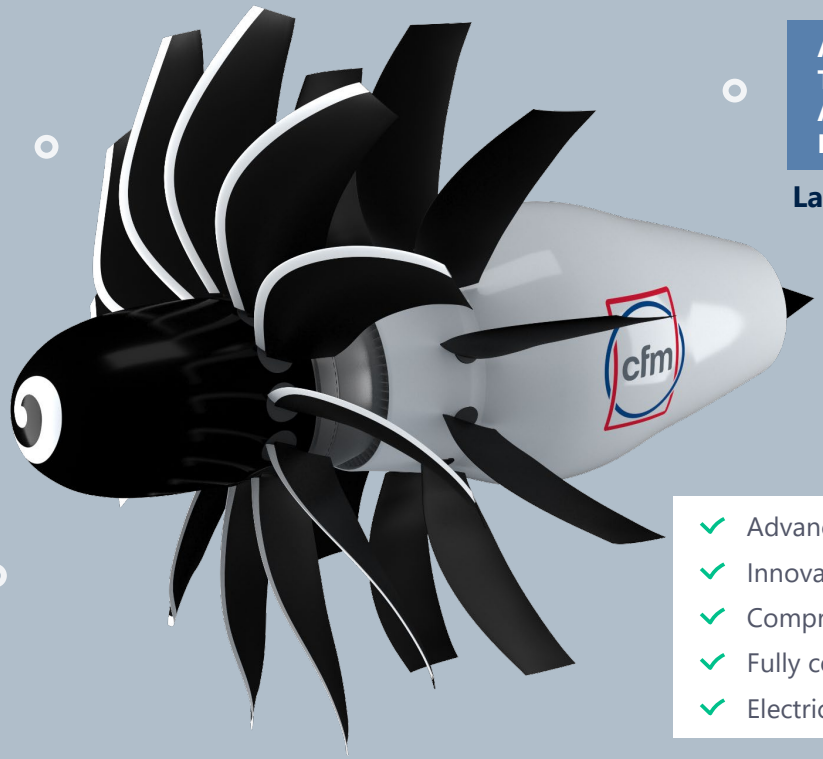
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RISE Open Fan… a disruptive architecture

-20%

FUEL CONSUMPTION* AND CO_2 EMISSIONS

Up to 80% lower with sustainable aviation fuels



AN AMBITIOUS TECHNOLOGY AND DEMONSTRATOR PROGRAM

Launched by CFM in 2021

ACOUSTICS & ENVIRONMENT

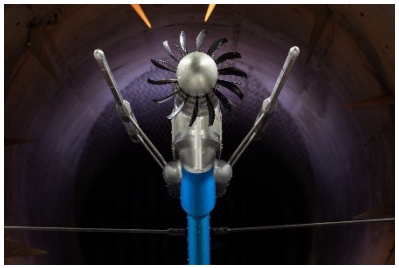
Compliant with future standards

- Advanced systems and materials
- Innovative and proven technologies
- Comprehensive plan of rig, ground and flight tests
- Fully compatible with alternative fuels: SAF or H_2
- Electrical hybridization capability

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An exhaustive technology development plan…











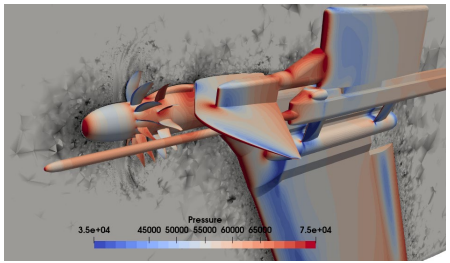


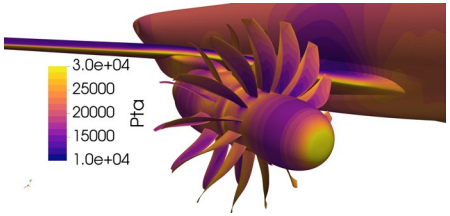


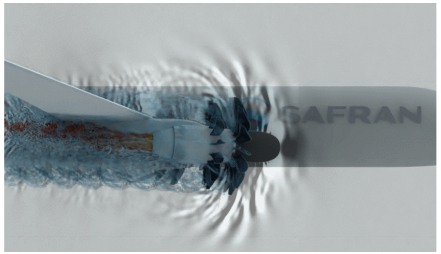
… culminating with the ground & flight tests of a product-representative demonstrator before the end of the decade!

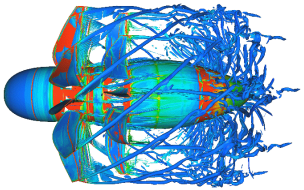
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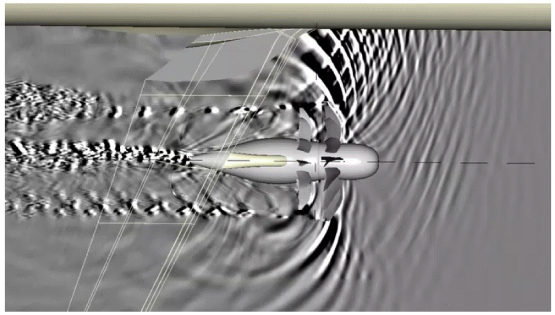
A full suite of simulation tools!

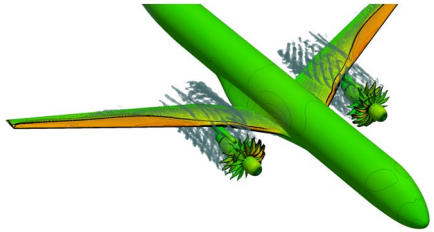


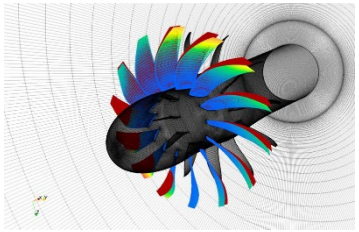


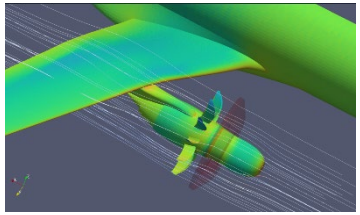


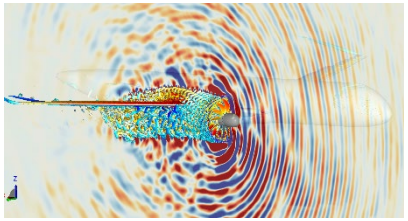


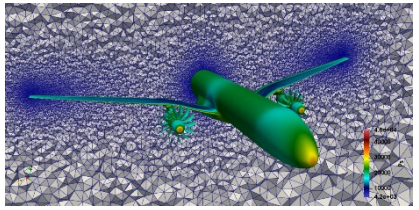












All sciences are heavily investing in simulation capabilities to prepare the next generation of engines

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Thanks for your attention!



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