

Pratt & Whitney:
Meeting The Future Propulsion Needs Of Commercial Aviation

Pratt & Whitney
An RTX Business

Andrew Murphy
Chief Engineer, Advanced Commercial Engine Programs

September 2026
35th Congress of the International Council of the Aeronautical Sciences

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Pratt & Whitney Profile

A legacy of aviation firsts, safety and dependable engines

At a Glance

500+
unique aircraft types powered over first 100 years

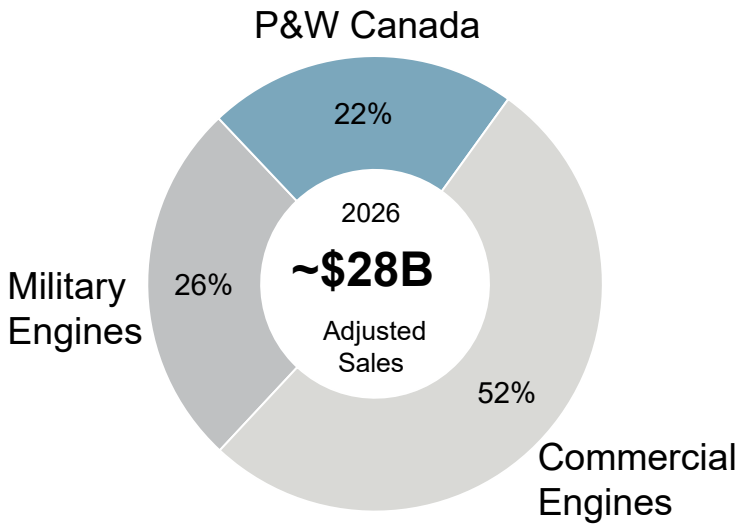
45K+
mission-focused people

90K+
in-service fleet today

17K
of the world's best customers

Balanced, World-Class Portfolio





100+ Years of Innovation & Dependable Engines

Single aisle



Business & GA



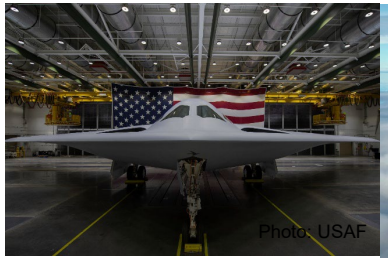
Regional Turboprop



Fighter



Bomber



Mobility



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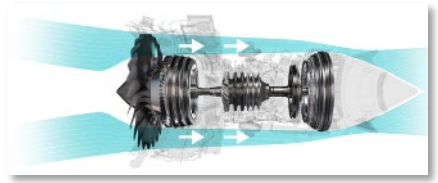
The appearance of U.S. Department of Defense (DoD) visual information does not imply or constitute DoD endorsement

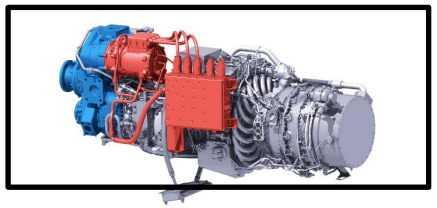
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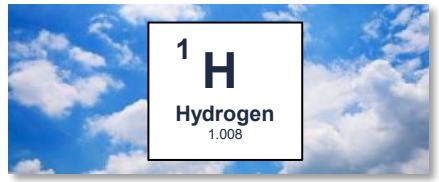
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Propulsion technology roadmap to 2050











2020 2030 2040 2050

Continued investment in fuel efficiency and reduced emissions technology

Hybrid-electric

Hydrogen

≤ 50% SAF-Jet A blends ▶ 100% SAF drop-in / non-drop-in

Continued investment in noise reduction technology

Demo In-Service

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The GTF Advantage Engine

GTF Advantage



More thrust
+4% SL
+8% Alt.

Best-in-cla[illegible]burn

Quietest engine

Lowest NOx

Intermix and Interchange

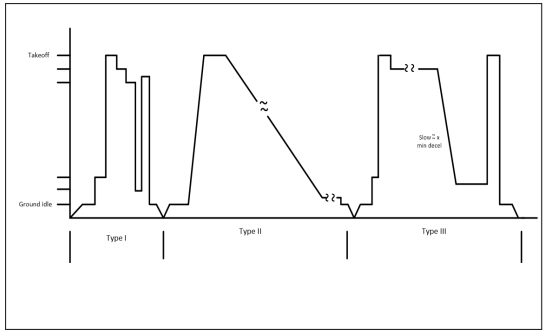
Mature Reliability at EIS

GTF Advantage Approach



Extensive ground and flight test

Accelerated mission testing



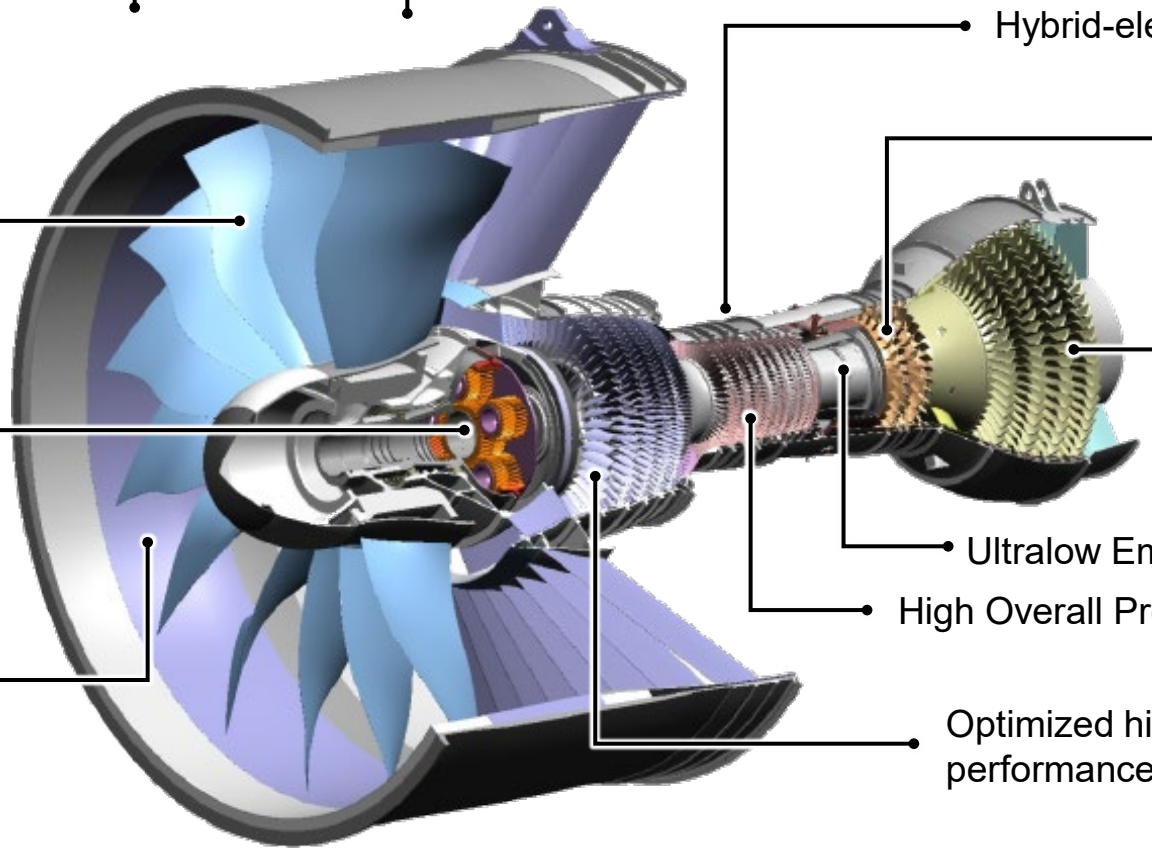


Harsh environment testing

The GTF Advantage is ready for services and deliver industry-leading economic and sustainability benefits

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Commercial strategy – 2nd Generation GTF



Fully compatible with 100% Sustainable Aviation Fuel (SAF)

Compact Lightweight Nacelle

Hybrid-electric

HPT High-Temperature Materials Advanced Cooling Technologies

Composite Fan Blades and Case

High-Speed, High-Efficiency LPT

Planetary Fan Drive Gear System (PFDGS)

Ultralow Emissions Combustor

High Overall Pressure Ratio, Small Core

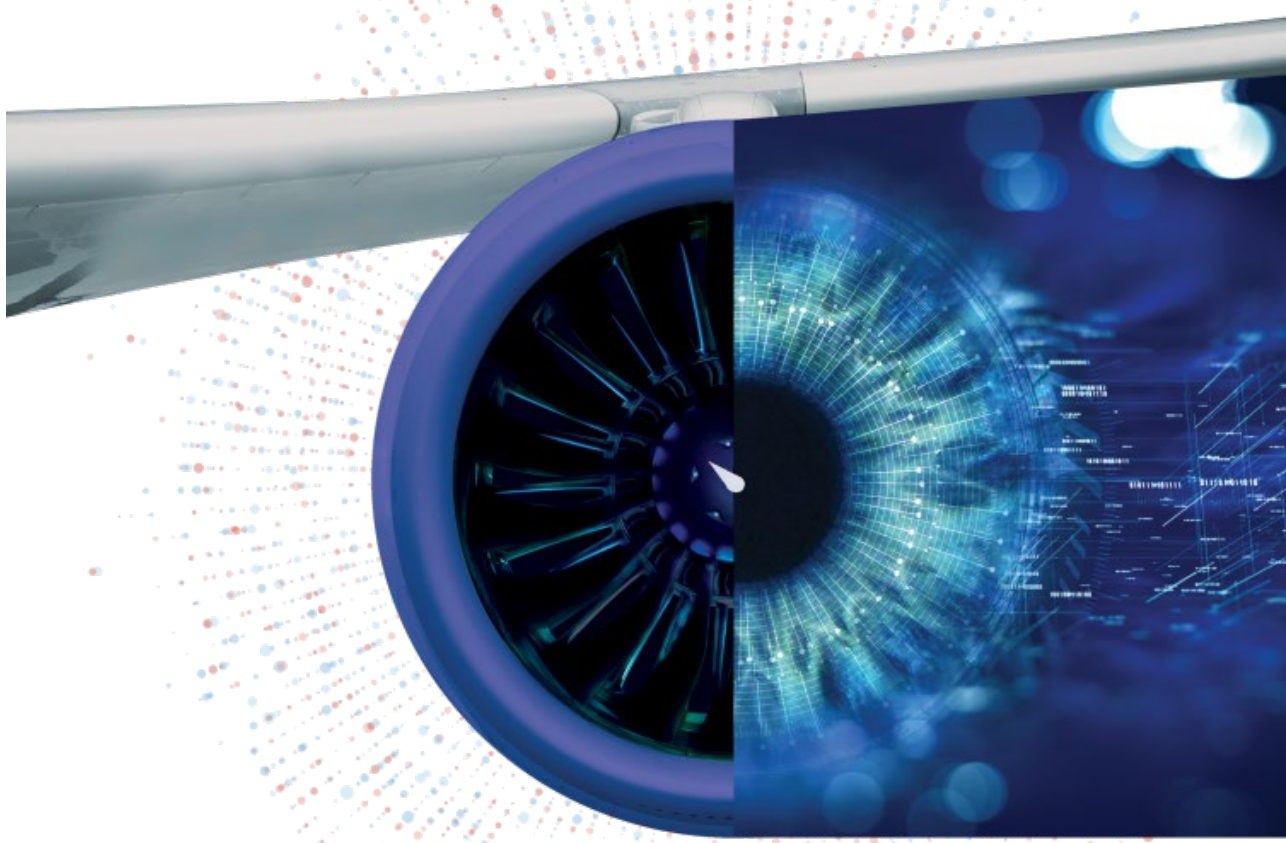
Dirt rejection and enhanced coatings

Optimized high/low work split for performance and durability

Improve efficiency, reduce noise and emissions, increase durability, reduce life cycle cost

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Engine Efficiency And Emissions



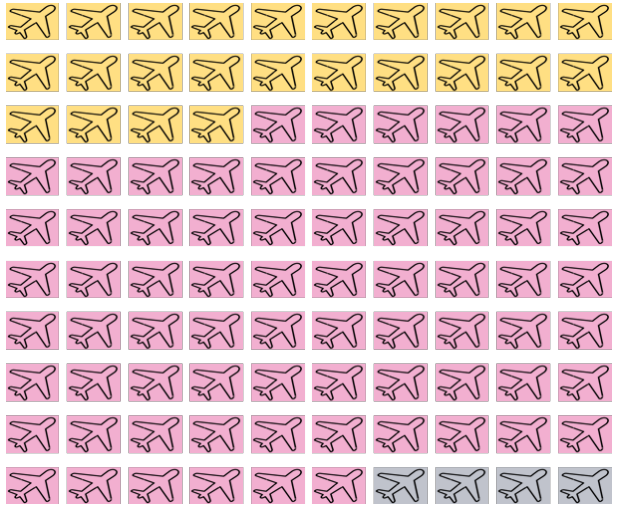
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Noise

Noise is a high priority for NGSA; progress required as part of delivering sustainable aviation

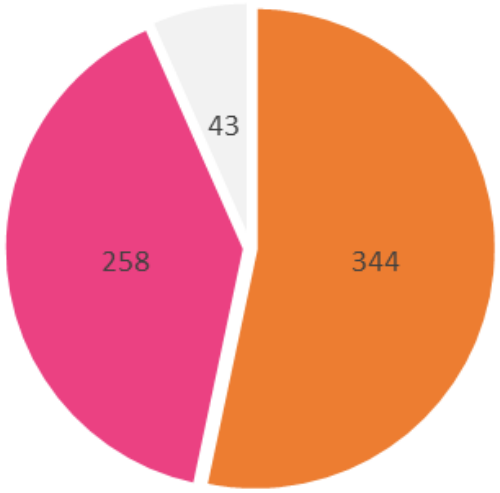
Single-aisle and regional jets dominate movements and noise experienced at vast majority of airports

96% of aircraft movements are SA & RJ



U.S. aircraft take-offs by aircraft category

>90% of U.S. Airports only see SA & RJ



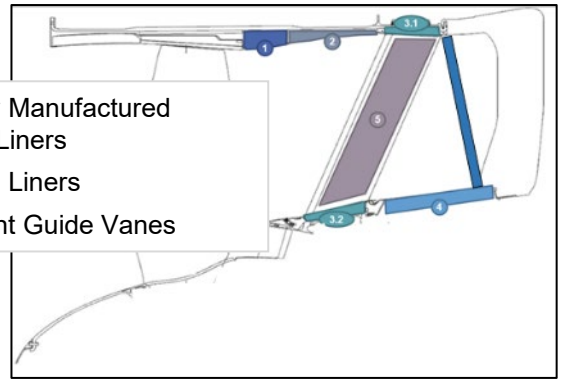
Number of U.S. Airports With > 0.5 Weekly Movements

Regional Jet (RJ) | Single-aisle (SA) | Widebody (WB)

Noise and Emissions Reduction (FAA CLEEN III)

P&W goal: 3 EPNdB; -10% nvPM, -5% NOx; -0.8% fuel burn

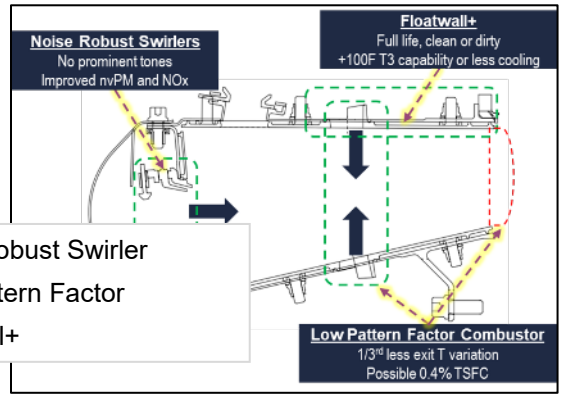
Novel treatments: engine test in early 2027



Additively Manufactured Acoustic Liners
Low-Loss Liners
Low-Count Guide Vanes



Combustor: Rig and engine test complete



Noise Robust Swirler
Low Pattern Factor
Floatwall+



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Emissions Reduction Through Combustor Technology

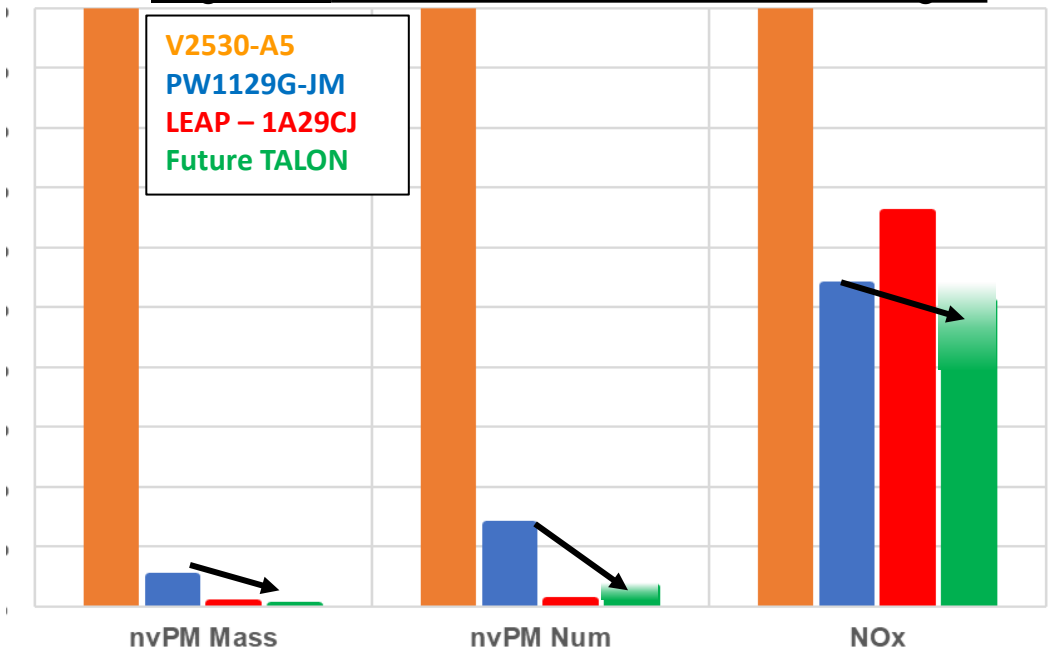
Class leading emissions while maintaining benefits of Advanced Rich Quench Lean (ARQL)

Combustor Evolution For Emissions

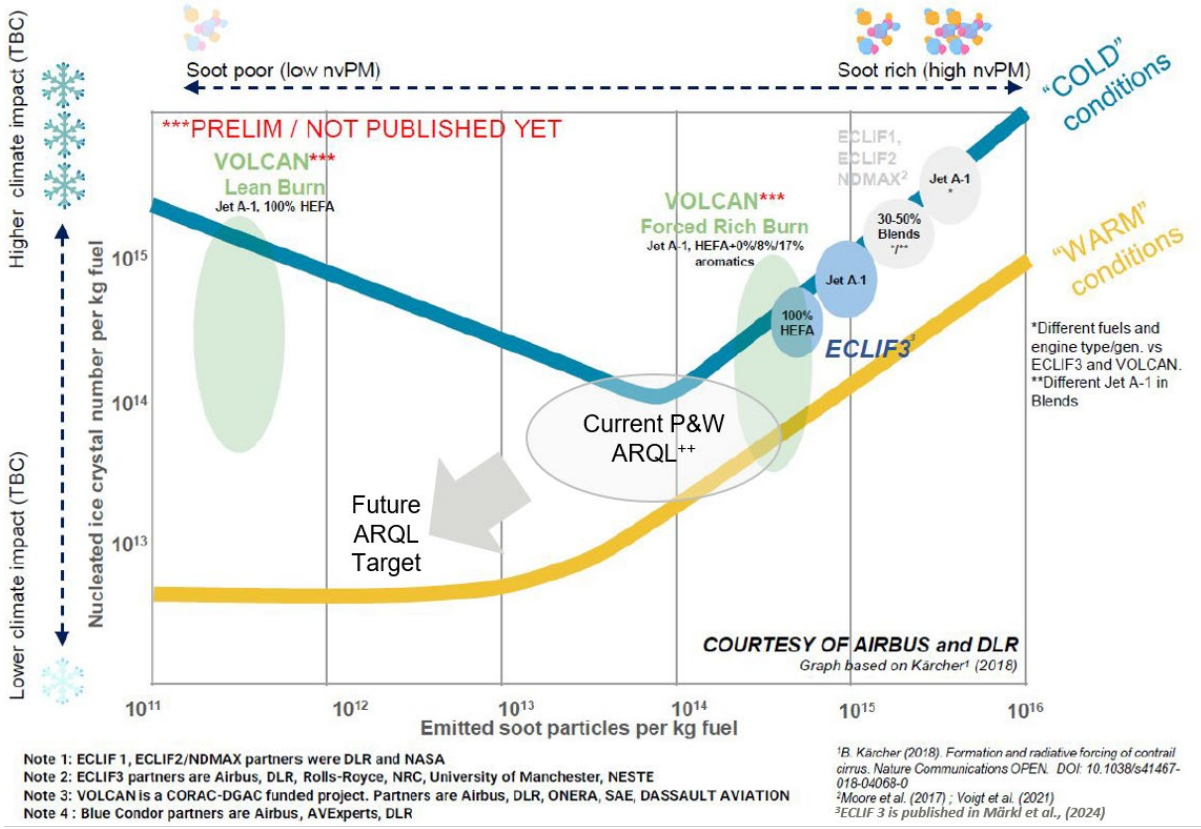
Evolution of class-leading Advanced RQL combustor

- Maintain class leading NOX
- Target “Lean-like” nvPM

Regulated Emissions Evolution and Future Targets



Prediction For Contrails (ICAS 2026)



Performing the science to inform policy making and drive technology selections

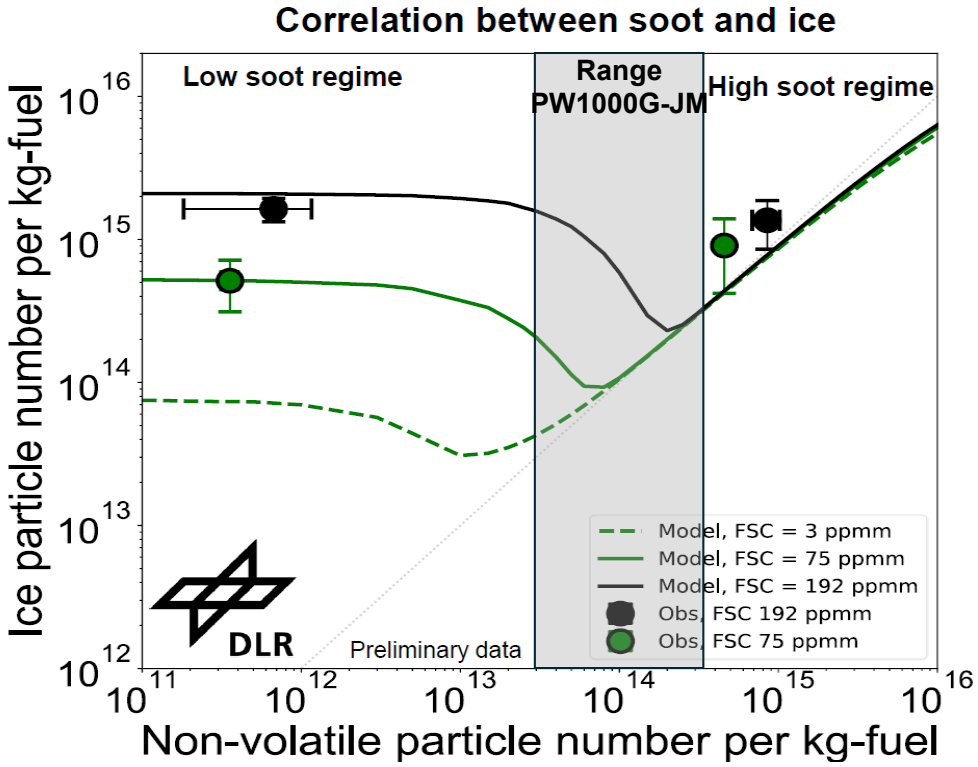
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Contrails Impact

ECLIF-X Flight Test Measurements of PW1100G-JM on A321NEO with DLR Falcon chase plane



ECLIF-X soot emissions compared to measurements and model results from CFM LEAP-1A engines



Measurements: Voigt et al., Nature, 2026; Model results (Yu, Uni Albany)

PW1100G-JM EI_{nv} in the range of predicted contrail ice crystal minimum; future tests expected to reduce further

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Alternate Airframe Collaborations

Blended Wing Body (BWB)

P&W powering JetZero BWB

JetZero – US DOD collaboration

High efficiency BWB configuration for dual use

Progressing towards first flight in 2027

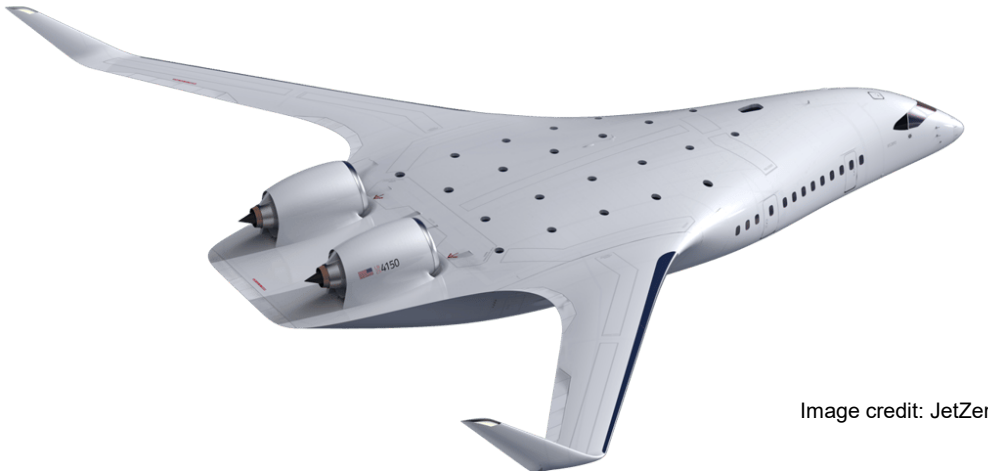
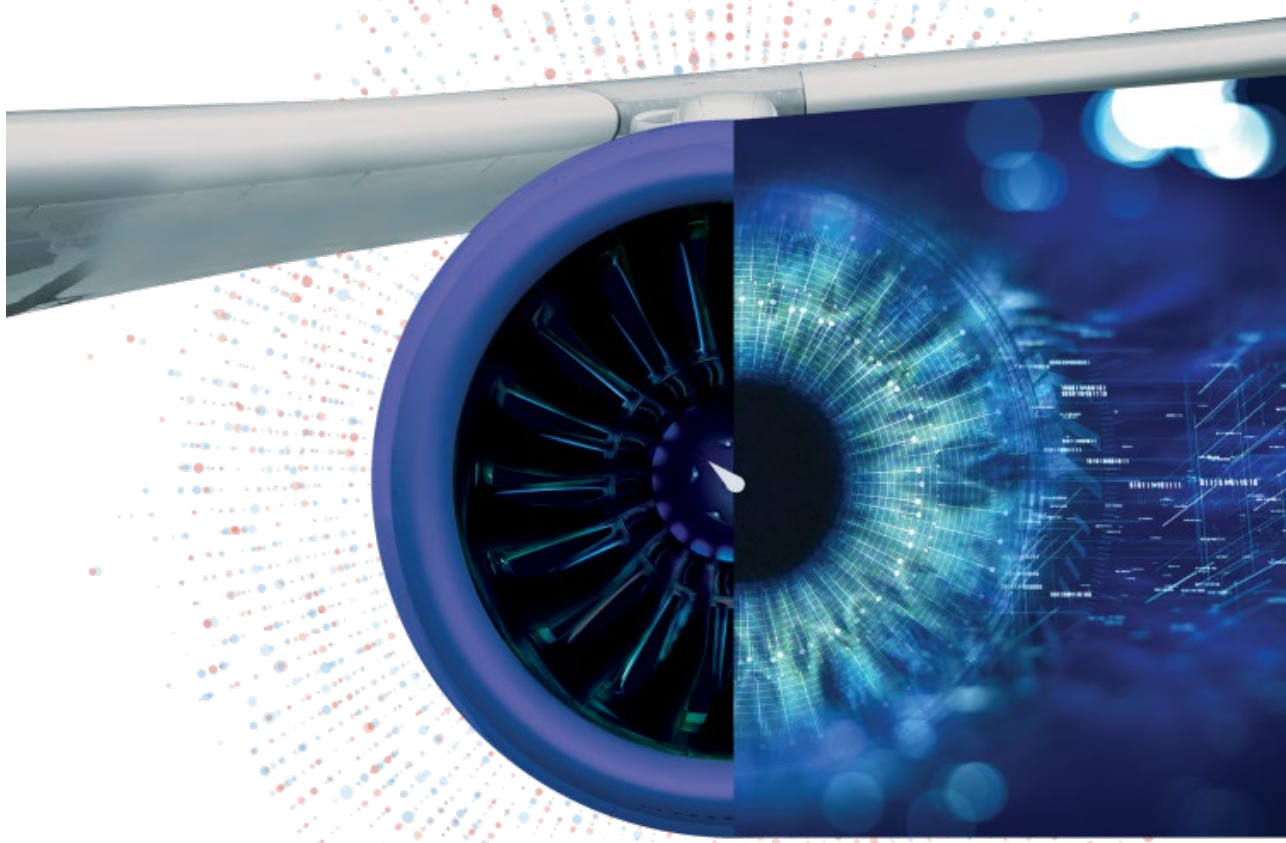


Image credit: JetZero

Collaborations deliver understanding of advanced configurations

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Hybrid Electric



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Advancing Hybrid-Electric Propulsion

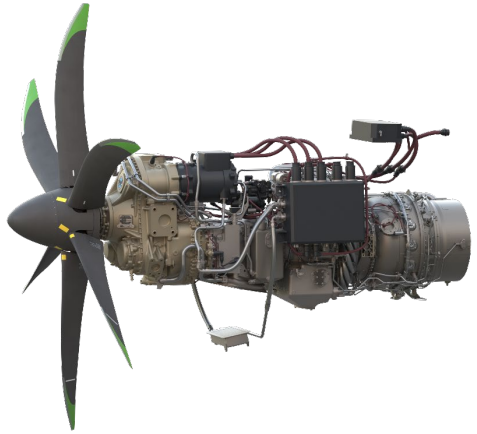


Image credit: Airbus Helicopters

Airbus Helicopters PioneerLab



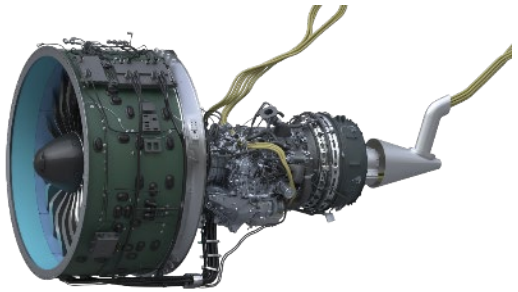
RTX Hybrid-Electric Flight Demonstrator



Clean Aviation PHARES

CLEAN AVIATION

Co-funded by the European Union



Clean Aviation SWITCH

CLEAN AVIATION

Co-funded by the European Union

Multiple projects demonstrate potential of hybrid-electric and advanced thermal engine technologies

Collaborating with start ups on disruptive technologies

EVIO **Horizon Aircraft** **Verdego**

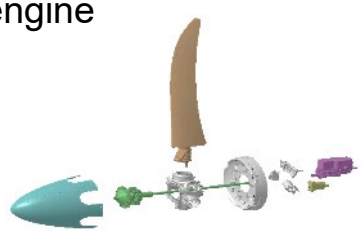
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Advancing hybrid-electric for regional aircraft

Clean Aviation PHARES project targets up to 20% improved fuel efficiency compared to 2020 baseline



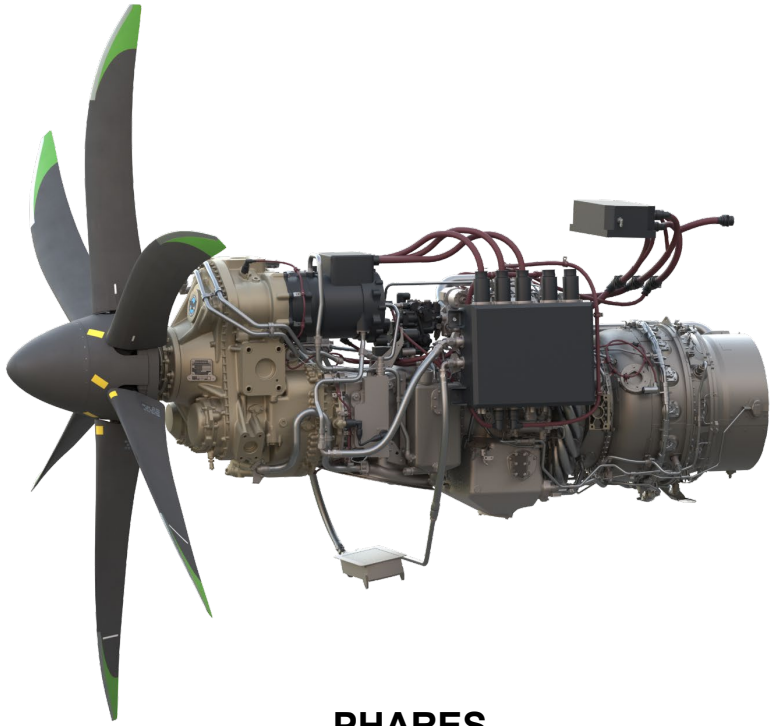
Pratt & Whitney Canada
PW127-derivative advanced thermal engine



Collins Aerospace
Advanced propeller system

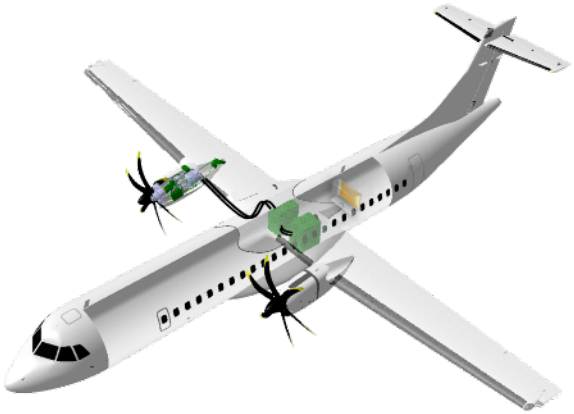


Collins Aerospace
Electric motor drive system



PHARES
Powerplant **H**ybrid **A**pplication **RE**gional **S**egment

Hybrid-Electric Ground Demonstration



DEMETRA
Demonstrator of an **E**lectrified **M**odern **E**fficient **T**ransport **R**egional **A**ircraft

ATR Hybrid-Electric Flight Demonstrator

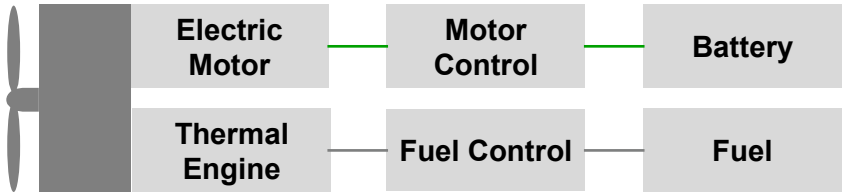
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RTX Hybrid Electric Flight Demonstrator

Targeting up to 30% improved fuel efficiency for a 250 nautical mile mission

Thermal engine and electric motor, mechanically coupled with a common control (parallel hybrid)

Hybrid power split between fuel and battery at different mission points





DEC 2022
Thermal engine first run

MID 2023
Thermal engine and e-motor to power (separately)

JUL 2024
Hybrid engine run to power

JUN 2025
Hybrid engine to power with batteries

2026
Flight standard engine and propeller test

2027
First flight

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Advancing Hybrid-Electric Propulsion

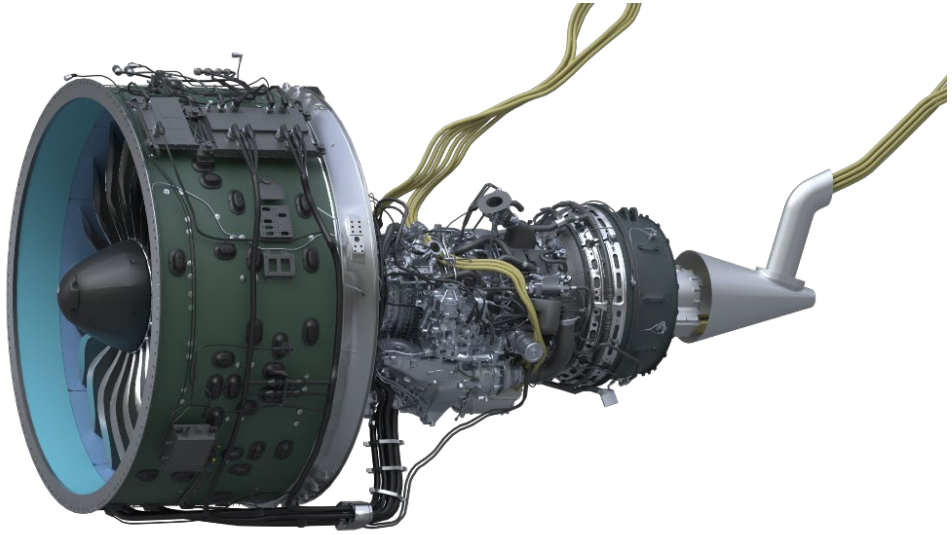
Hybrid-electric Single-Aisle aircraft demonstrator

Optimized gas turbine with electrical transient management

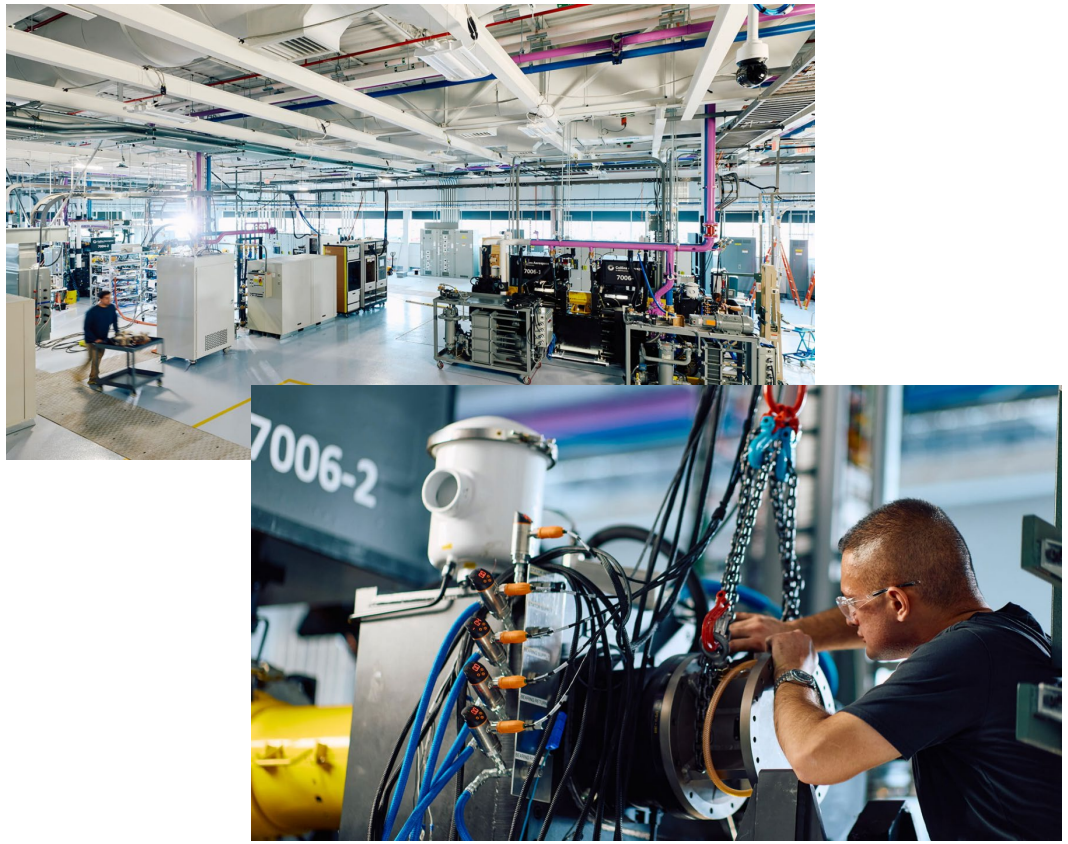
Completed integrated full-scale testing at Collins' GRID lab

Configuration updated based on product evolution

Preparing for end-to-end lab test and ground engine test



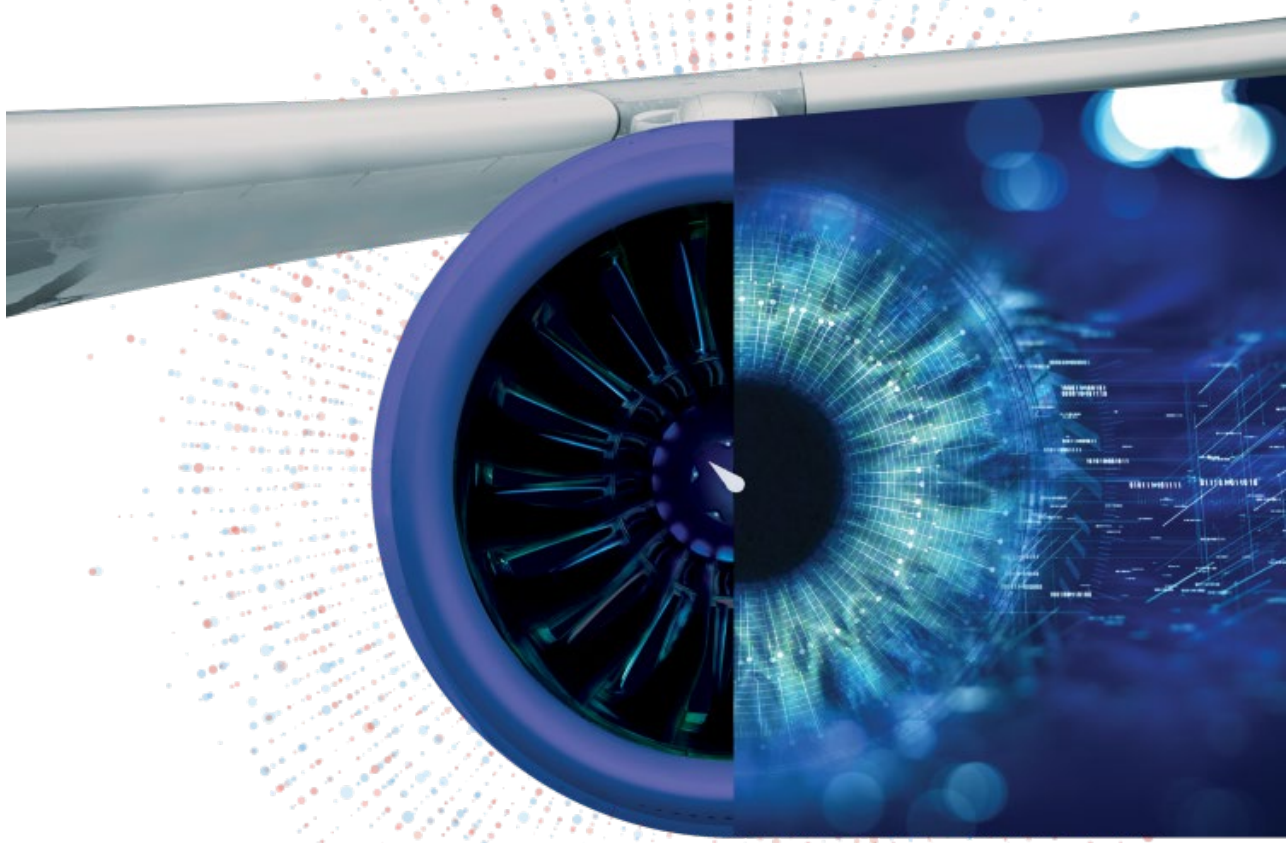
SWITCH Powertrain in Collins' GRID lab



Aircraft-level solution that is 3-5% more efficient than advanced non-hybrid aircraft

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Alternate Fuels



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Novel fuels

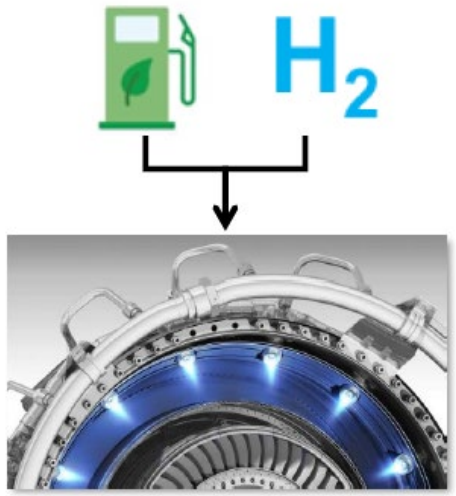
Strategy to secure long-term fuel options suitable for all market segments

- Advanced concepts to harness the potential of novel fuels
- Dual fuel concepts to bridge the transition

Dual fuel

- Enables cryogenic flight when available, but not required
- Gain real-world operating experience with new fuels

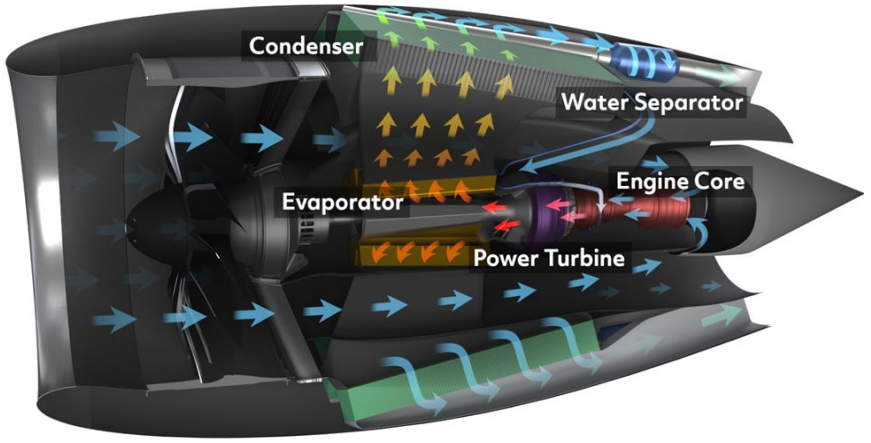
HyADES



Fuel-optimized propulsion systems

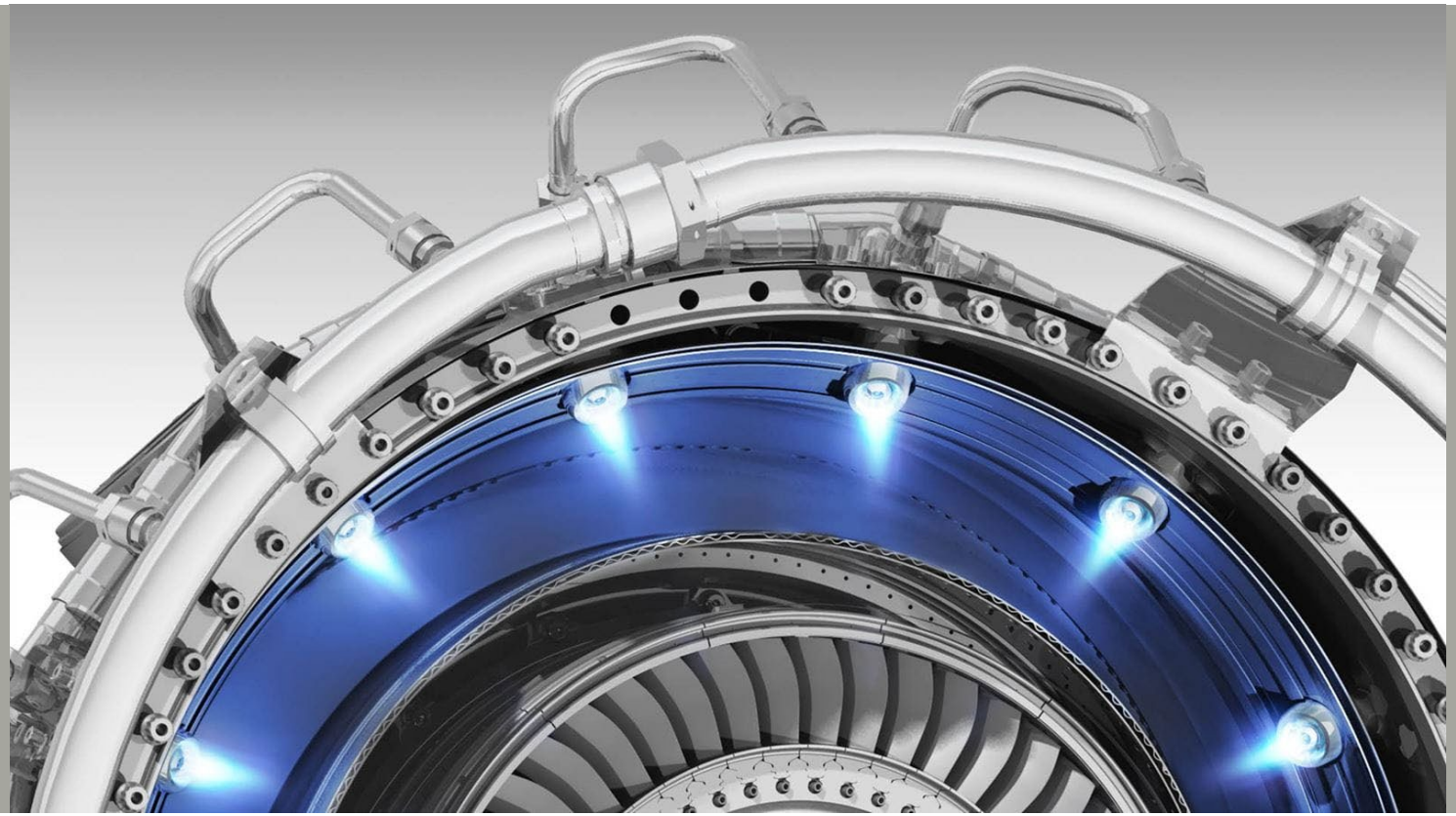
- Leverage unique properties of liquid hydrogen
- Maximize economic and environmental potential

HySIITE



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HYADES – Hydrogen Advanced Engine Study



Techno bricks & ground Demo

Multi-year project

Supported by INSAT

Supports 2050 Net Zero

Next Hydrogen partnership

Leverages PW127XTH as proven engine

Address Infrastructure challenges

Non-CO_2 emission mitigation

Phased approach

Achieving H_2 Ground testing and Multi-Fuel Investigation

Collaborators:	**INSAT**	**Next Hydrogen Solutions Inc**

Large Engine Multi-Fuel Hydrogen Combustion

Preparing to launch in January 2027



Pratt & Whitney is preparing to launch a multi-year research program in the Netherlands

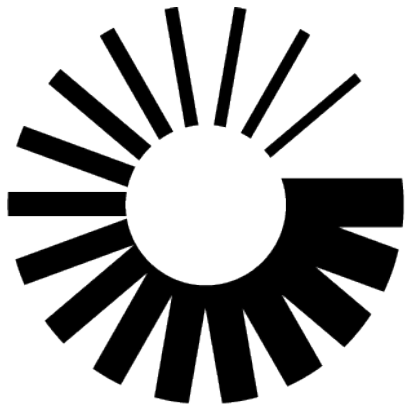
The program supports technology maturation in multi-fuel (hydrogen, SAF) combustion, LH_2 fuel preconditioning and LH_2 fuel system aircraft integration

Led by Pratt & Whitney's European Technology & Innovation Center (ETIC)

Collaborators: GKN, TU Delft, nlr, materialise, PHOTONFIRST, Somni, ADSE CONSULTING AND ENGINEERING

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