EXFAN

Funded by the European Union

NOVEL RECUPERATION SYSTEM TO MAXIMIZE EXERGY FROM ANERGY FOR FUEL CELL POWERED GEARED ELECTRIC AIRCRAFT PROPULSION SYSTEM

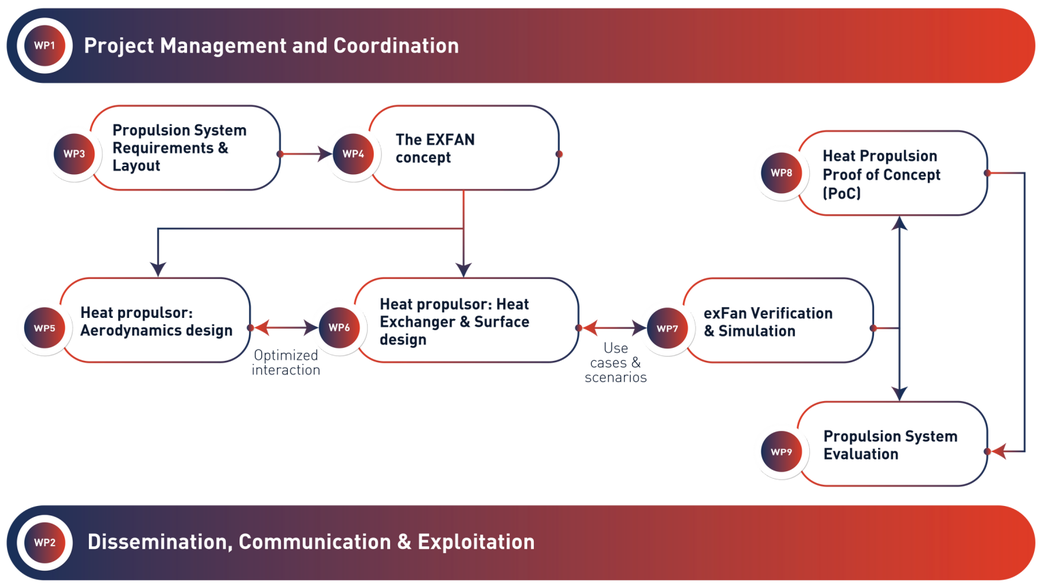
About

exFan is an EU funded collaborative research project set out to devise a novel heat dissipation and recovery system within a high-powered electric fan propulsion system driven by fuel cell technology. Central to this objective is the incorporation of a ducted heat exchanger (HX) within the propulsion system's nacelle. It will use the "Meredith effect" (ME) incorporating the ram jet effect to generate thrust from waste heat.

The breakthrough innovations proposed in exFan will:

- allow aircraft manufacturers to offer savings in operation costs,
- enable European aeronautics industry to maintain global competitiveness and leadership,
- create significant contribution in the path towards CO_2 and NO_X emission free aircraft,
- investigate how heat propulsor can be integrated within a hydrogen-electric propulsion system, advancing it to Technology Readiness Level 3 (TRL 3)

Work Plan



Objectives

Heat Dissipation

Design a revolutionary heat exchanger integrated into a geared electric fan.

Recuperation Technology

Develop an advanced recuperation device, harnessing cutting-edge technology to efficiently convert waste heat into additional thrust.

Thermal Management System

Lay out a sophisticated thermal management system to elevate heat quality.

System Simulations

Implement comprehensive system simulations providing invaluable insights into the complexity of the novel propulsion system.

Impact

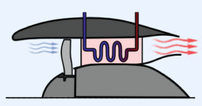
Reduce global warming potential.

Information Exchange

Facilitate knowledge transfer by sharing results with Clean Aviation and Clean Hydrogen JUs.

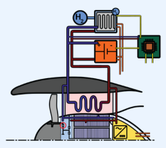
Challenges

Thrust vs Drag



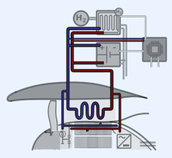
There is a tradeoff between the possible generated thrust and the drag of the HX

Operation conditions



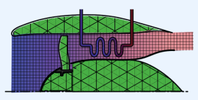
The optimal concept of operations for the exFan system might be different to standard aircraft operations

Heat quality



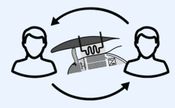
Heat Exchanger (HX) heat transfer rate depends on temperature difference

Validation

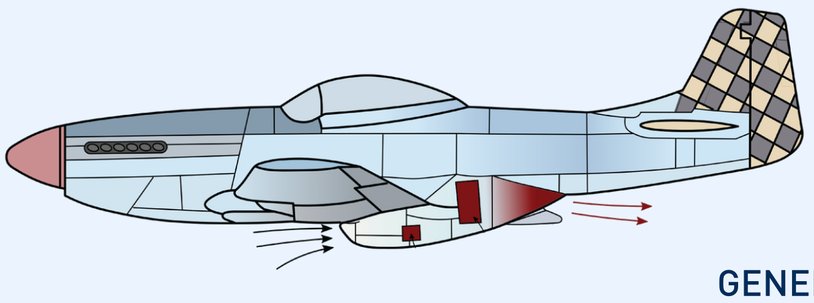


The exFan concept needs to be validated at a low TRL to justify further development

Integration



The integration of exFan into the propulsion system is necessary to enable interaction between the developments



EXFAN WILL DEVELOP A NOVEL THRUST GENERATING AND HEAT DISSIPATION SYSTEM FOR A GEARED ELECTRIC FAN OF MEGA-WATT CLASS POWERED BY FUEL CELL

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Technical Coordinator ADT engineering

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Project Partners

TUM FZG · IRES Innovation in Research & Engineering Solutions · Egile MECHANICS · EASN TIS · Fraunhofer IAPT · DLR Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center · powerid

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