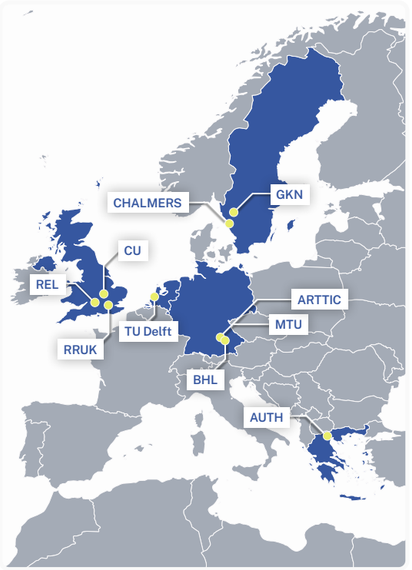
The Consortium

A team of experts from academia & industry



CHALMERS

Bauhaus Luftfahrt
The Aviation Think Tank

ARISTOTLE UNIVERSITY OF THESSALONIKI

TU Delft

GKN AEROSPACE

MTU Aero Engines

ARTTIC

Cranfield University

Reaction Engines

The MINIMAL project researches disruptive highly-efficient composite cycle engine technology to shorten the gap to year 2050 climate neutrality.

Coordinator

Carlos Xisto

Associate Professor in Aerospace Propulsion
Dep. Mechanics and Maritime Sciences | Fluid Dynamics
Chalmers University of Technology
Hörsalsvägen 7A, M-Huset
SE-412 96 Gothenburg
Sweden

Project Office

ARTTIC Innovation GmbH

Oskar-von-Miller-Ring 29
80333 München
Germany

MINIMAL

MInimum enviroNmental IMpact ultra-efficient cores for Aircraft propuLsion

www.minimal-aviation.eu

Co-funded by the European Union

UK Research and Innovation

EU Project co-funded by the European Union's Horizon Europe Programme under the grant agreement n°101056863 and by the UK Research and Innovation (UKRI) funding guarantee under the project reference n° 10040930, 10053292 and 10039071.

About the project

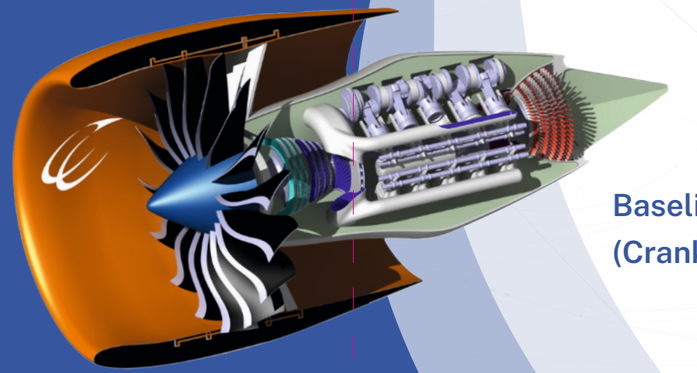
Building a sustainable and climate-neutral future for aviation is an inevitable requirement for a society with increasing mobility needs. Rapid action must be taken if we are to stabilise global air temperatures below the limiting 1.5°C increase set by the Paris Agreement. MINIMAL (MInimum enviroNmental IMpact ultra-efficient cores for Aircraft propuLsion) contributes to a radical transformation in air transport by showcasing ultra-efficient low-emission technologies that can greatly reduce the climate impact of aviation.

MINIMAL attacks the major sources of CO2 and non-CO2 emissions in aeroengines. New propulsion systems fuelled by hydrogen or sustainable aviation fuel (SAF), and using composite cycle engine (CCE) technology, will offer unparalleled thermal efficiency and performance flexibility for climate-friendly operations.

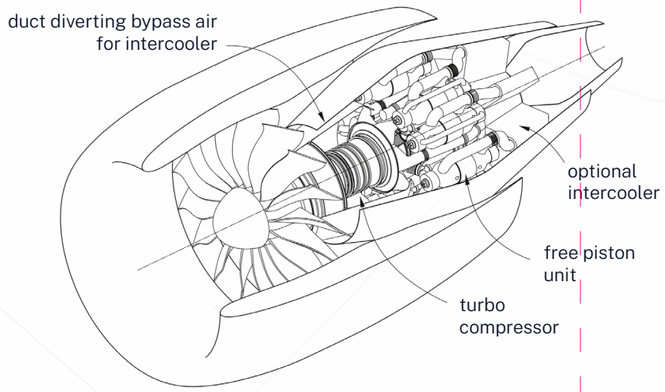
Experimental (TRL 3) proof of concept will be provided for cutting-edge technologies enabled by liquid hydrogen fuel:

- opposed-piston low-NOx hydrogen combustion technology
- heat-management systems that exploit the cooling potential of hydrogen

Integration studies on the CCE architectures will allow the quantification of performance benefits in different application scenarios covering a representative range of typical missions. This analysis will directly connect the climate response to engine performance and emissions. The end goal is to identify the engine design options giving minimal climate impact.



Baseline CCE (Crankshaft-Based)



Free Double-Piston CCE

Opposed Free-Piston CCE