



Propulsion Solutions and Competency Development

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> GKN Aerospace

- > Contributing as a partner
- > Some examples
- > Building competence





GKN Aerospace In Numbers





A Focused Business with Three Core Markets



Tier 1 expertise across fuselage, empennage and wing; plus landing gear, wiring and transparencies



OEM capability for RM12 engine, plus super Tier 1 capability across the entire engine architecture



Full structure in place to support positions on leading US and European Defence platforms



Multi generational Prime position







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Our partnership legacy





Major Aerospace Engine Products - Military Turbofans and Space





Major Aerospace Engine Products - Commercial Turbofans

Fan Containment Cases





Business driven development – the inclined wave approach



We continuously invest in technology, of varying maturity and for different horizons simultaneously



How do we fly in 2050?

London-Dallas (7650 km) SAF Gas Turbine

London-Bristol (150 km) Battery Electric

London-Papendrecht (330 km) Fuel Cell Electric

London-Trollhättan (1100 km) Hydrogen Gas Turbine

London C-Heathrow (25 km) Battery Electric (eVTOL)

Gas turbine technology remains dominant for long-term sustainable narrow- and widebody solutions



Engine requirements

Notional Engines





Notional Engine Design

- A framework of engine models (existing and future engine concepts)
 - Engine performance model, thermodynamics properties at engine stations
 - Model for quantifying first order engine dimensions and weight
 - General arrangement
 - Technology sensitivity factors, (trade factors)







3D CAD

Tech intelligence, data, parameter trends



Clean Sky 2

Open Rotor Demonstrator

GKN Aerospace contribution to SAFRAN engine demonstrator





Front Rotating Frame

AFT Rotating Frame





Engine major Demonstrators at a Glance



VHBR Turbofan Middle of the Market

Demonstration of Advance 3 engine core **UltraFan**®

Very High Bypass Ratio (VHBR) Large Turbofan demonstrator for long range



>UHPE Demonstrator

(Ultra High Propulsive Efficiency) Short/Medium range passenger aircraft



> Advanced Geared Engine Configuration

HPC and LPT technology demonstration for future regional GTF applications





Next generation propulsion

SWITCH

Sustainable Water-Injecting Turbofan Comprising Hybrid-electrics

OFELIA

Open Fan for Environmental Low Impact of Aviation

NEUMANN

Novel Energy and propUlsion systeMs for Air dominance







Design improvements

Compressor structures





Sustainable manufacturing

Additive manufacturing





Fan Case – Replacing forging by near net additive parts



- Save ~80% titanium
 Save cost
 Reduced
- environmental impact
- > Supply chain security





Product focus \rightarrow The complete process chain must be managed





Added functionality

Heat management





Sustainable engine solutions

Hydrogen More electric







Hydrogen engine: legacy technology + hydrogen pump, preheater and adapted combustor





Competence

How to attract new engineers?





GTC Sweden – an innovation hub building a strong R&T network



- > 14 years of GKN operation at dedicated site
- > More than 130 dedicated engineering staff
- > > 80 PhD projects ongoing
- > Product design
 - Advanced propulsion concepts
- > Material
 - New material and new applications

> Manufacturing

- New processes and automation
- Demo production
- > Digital Enterprise solutions





Advanced





How to attract? - an example

> "The climate journey"

> 400,000 followers
> 84% women at age 13-24
> 69000 hours of watching
> >10.000 likes and comments



https://www.youtube.com/watch?v=9IN0XrntO-8



Thank you!

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