GKN AEROSPACE

AM Overview

FAA-EASA AM Workshop 2024

MAKING THINGS FLY

Requested Talking Points – Production Approval Holder

Please share the status of your past and present additive manufacturing (AM) programs.

- Customer/Sectors
- Aviation experience?

Please share the status of your additive capabilities:

- Machines/materials
- Other capability(ies)
- Lessons Learned

Does your company have experience with metallic AM in a production environment? If so, please share.

What does your company need from FAA/EASA concerning guidance documents?

What does your company need from FAA/EASA concerning helpful R&D (e.g. is there a roadmap that says when things need to be ready to support product cert?)

GKN Aerospace in Numbers

£3.35bn
SALES in 2023

31
MANUFACTURING LOCATIONS

16,000
PEOPLE

4
GLOBAL TECHNOLOGY CENTRES

12
COUNTRIES

ON BOARD
100,000
FLIGHTS A DAY

Our Global Footprint

GKN Aerospace is the world's leading tier one aerospace supplier of systems and components

12 Countries > 31 Sites > One Global Team

Our leading technology is shaping the future of flight….

Today | **Tomorrow** | **And beyond…**

4 world-class Global Technical Centres creating a network of innovation

- Trollhättan, Sweden
- Bristol, UK
- Dallas, US
- Hoogeveen, The Netherlands

Develop Technology knowledge for exploitation

Industrialise Sustainable Technology

Increase Collaboration

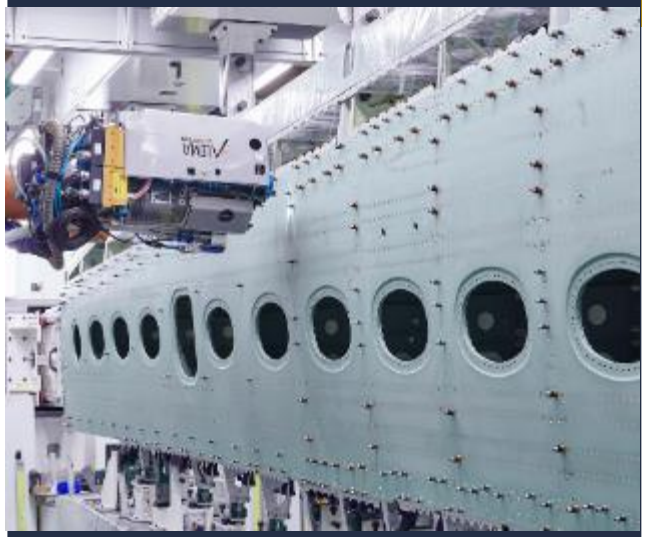
Provide Technical Capability

Showcase GKN Aerospace capabilities

Create an Ecosystem hub

A Focused Business with Three Core Markets

CIVIL AIRFRAME
42%



Tier 1 expertise across fuselage, empennage and wing. Lightweight composite and metallic structures, electrical distribution systems, transparencies, components.

ENGINES
36%

Super Tier 1 capability across structural engineered components, parts repair, commercial and aftermarket contracts.
OEM capability for RM12 engine.

DEFENCE AIRFRAME
22%

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

> All percentages relate to total company sales at end 2023

Global AM Footprint

Customer Focus by Location

- USA – defence aerospace customers (DED)
- Sweden – aero engines customers (DED, LPBF)
- UK – defence, civil and aero engines customers (DED, PBF and polymer)

GKN Aerospace Installed Metal AM Capacity

- 7 DEDw development cells
- 3 DEDw cells in production
- 2 DEDp cells in production
- 6 LPBF development machines
- 2 LPBF production machines

Future Capability

- DEDw cell expected to come into production over the next 4 months
- DEDw/p cell in El Cajon
- Additional SLM NXG XII LPBF

Powder Bed

EOS M290 LPBF (4 off) – 2015

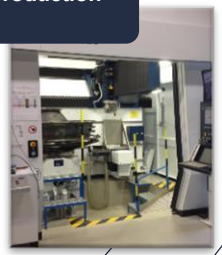
Renishaw quad laser LPBF - 2021

SLM NXG XII LPBF - 2024

DED

AMD cell – 2021 (upgrade from the first LW/DED cell 19 years ago

2 DEDp production cells

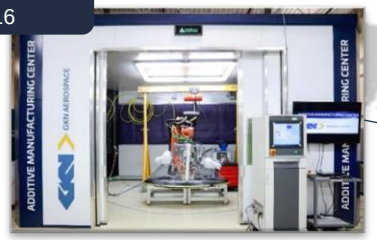


3 DEDw Production Cells:
- Trent XWB ICC
- Vulcan 2.1 Nozzle
- PW1500 FCMR

LWC - DEDw 2017

Additional DEDw production cell being added for FCMR Q4 2024

Cell 1 DEDw - 2016



Sweden
Trollhattan

USA
GTC, Fort Worth TX

United Kingdom
GTC, Bristol

Cell 2 DEDw - 2018

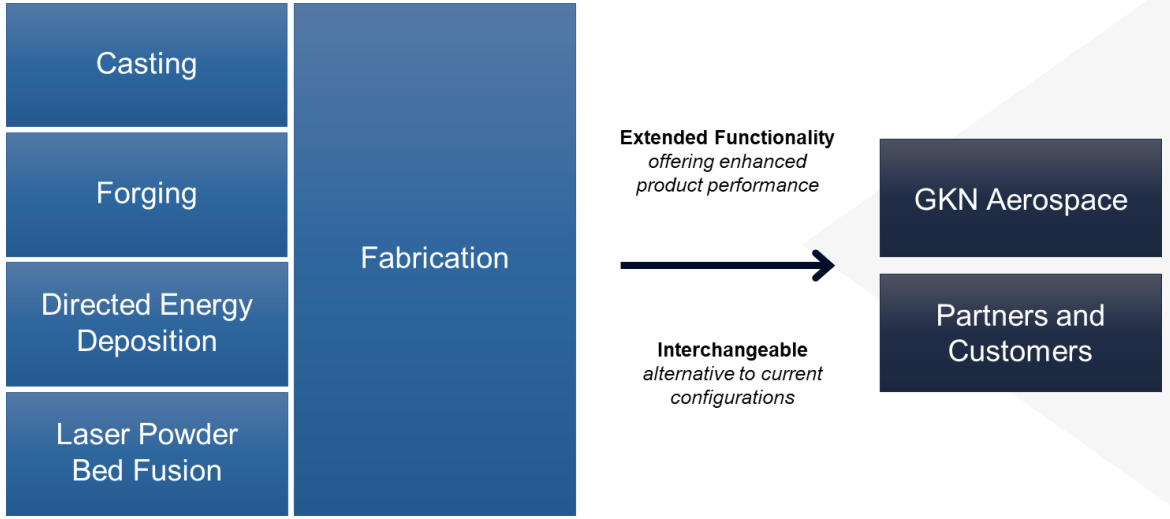
Cell 3 DEDw – 2023
5.3x2.2m build area

Cell 1 DEDw – 2021

Material Solutions

Dedicated division within GKN Engines with focus on Additive Manufacturing

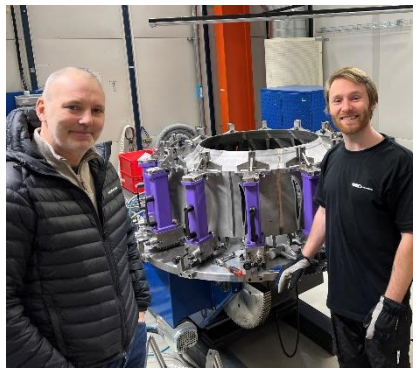
- Material Solutions' mission is to reduce material and energy use in production and to offer more lightweight and functional aerospace components to reduce emissions in use
- The division is leveraging on GKN's expertise in fabrication of large engine structures from castings and forgings, adding DED and LPBF to the toolbox of manufacturing processes



Material Solutions

Industrialization

- A new low rate production workshop of 4500m2 will be fully operational in 2025
  - Multiple DEDw and LPBF cells
  - Post processing operations (e.g. heat treatment, welding and inspection)
- Through the acquisition of Permanova Lasersystem, GKN aims at accelerating industrialization of large scale DED manufacturing



DED Capability

Three teams developing large scale additive capability to address customer requirements in Engines (Sweden), Defence (USA) and Civil (UK)

- DEDw and DEDp fabrications in production for engine applications
- Targeting civil Aerostructures with OEMs
- Large 2m+ Aerostructures in development with defence OEMs

PBF Capability

Solely focused on aerospace applications

- Various machines (EOS, Renishaw, SLM)
- Primarily focused on Ti and Ni alloys
- Complex demonstrators
  - Leverage benefits of AM, push the technology
- Initial production of low criticality components
  - Demonstrate robustness and repeatability of the process
- Previous production experience from aero-defence

EMVAL

What is needed from FAA/EASA?

Although challenging, the guidance available is largely well suited.

Industrial documents very helpful (AIA, NADCAP, SAE, FAA/EASA Memos)

- Clarity on expected Means of Compliance to Federal Regulations could be beneficial
  - Level of material testing required for certification, and guidance on production testing expectations
- Continued collaboration from key organizations in forms such as this to gain alignment across the industry

For GKN, key to success is close collaboration with our customers (TCH) and efficient flow-down of expectations from regulatory bodies

Thank you

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