

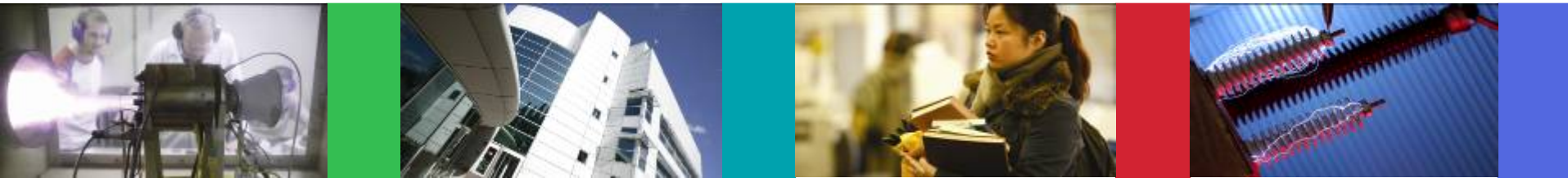
MANCHESTER
1824

The University of Manchester
Aerospace Research Institute



The University of Manchester Aerospace Research Institute

Dr. Adam Joesbury
Research Programme Manager

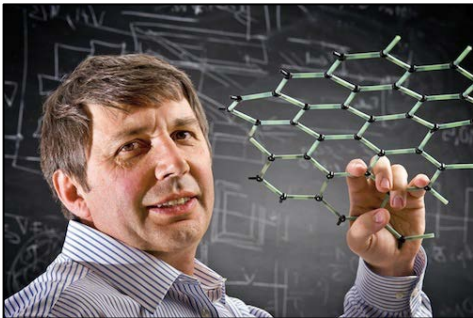




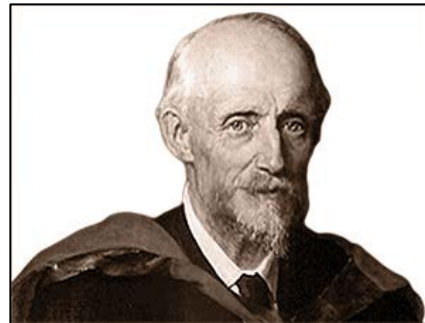
The University of Manchester - facts and figures

- Largest single-site university in the United Kingdom
- A history dating back to 1824
- 39'700 students (10'640 international students)
- 1'000 degree programmes
- 4'110 research staff
- €1.19bn income (€407m research income)

- Associated with 25 Nobel prize winners
- In 1824 pioneered courses in Mechanical Engineering
- Birth place of the Reynolds Number
- Where Rutherford split the atom
- First programmable computer was built
- 3rd largest steerable radio telescope and home to the Square Kilometre Array control centre
- Arthur Lewis became Britain's first black professor
- Geim and Novoselov isolated graphene for the first time



Andre Geim



Osborne Reynolds



Ernest Rutherford

Academic Faculties:

- Science and Engineering
- Medical and Human Sciences
- Life Sciences
- Humanities

Institutes and Centres:

- Aerospace Research Institute
- BP International Centre for Advanced Materials
- Dalton Nuclear Centre
- National Graphene Institute
- Graphene Engineering Innovation Centre
- Jodrell Bank Radio Telescope Observatory
- Manchester Institute of Biotechnology
- Northwest Composites Centre
- Photon Science Institute
- Sir Henry Royce Institute for Advanced Materials
- Tyndall Centre of Climate Change Research



Aerospace in the north-west of England

- Major companies operating in the region are
 - ❑ Airbus
 - ❑ BAE Systems
 - ❑ Rolls Royce
- Annual aerospace revenue for the region is approximately \$10bn
- The aerospace supply chain in the region employs over 20'000 people (25% of total UK aerospace workers)





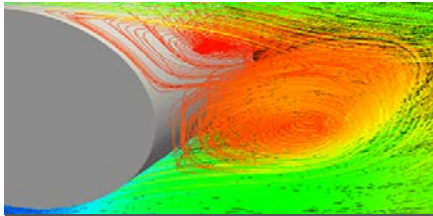
Mission:

To gain full benefit from the University's diverse research capability, to be Internationally recognised as a centre of excellence in aerospace research and innovation and become a collaborator of choice within Europe and for the major aerospace companies.

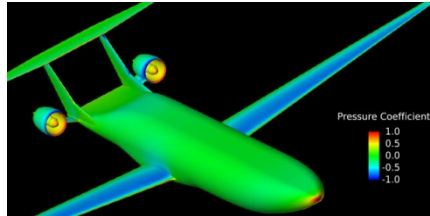
Academic Members:

The Aerospace Research Institute is truly cross and multi-disciplinary in nature. There are currently more than 100 academics who make up the membership of the Institute. All academic Members and Associates are affiliated with a home School within The University.





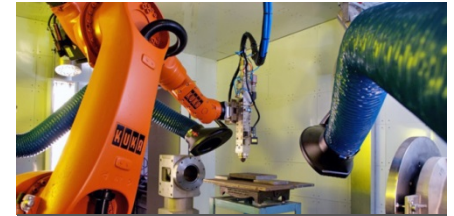
Aerodynamics, fluid dynamics and flow control



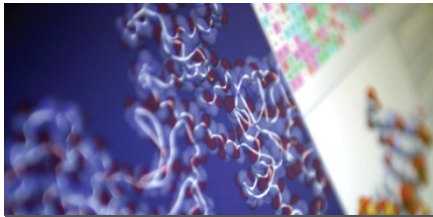
Modelling and simulation



Aviation security, imaging and non-destructive testing



Advanced manufacturing



Enterprise

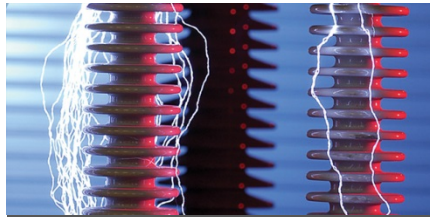
Aerospace Research Themes



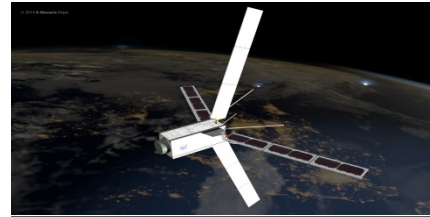
Environmental sciences



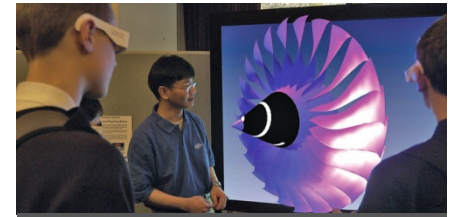
Autonomous systems



Advanced electrical power systems



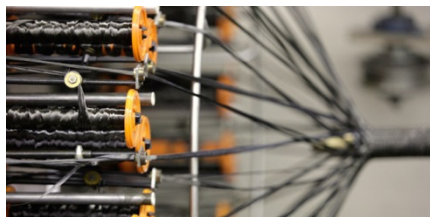
Space



Synthetic environments and systems simulation



Aerospace structures



Composites



Aerospace light alloys



The University of Manchester
Aerospace Research Institute

Future flight technologies

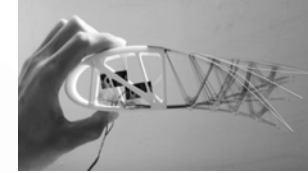
Example Project



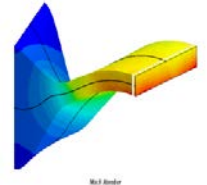
Micro jet engines
(MACE)



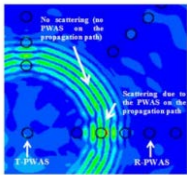
Fault tolerant flight control
(EEE)



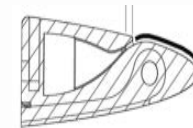
Structural morphing for optimum efficiency
(Materials)



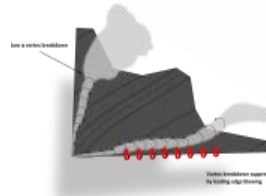
3D Fluidic Thrust Vectoring
(MACE)



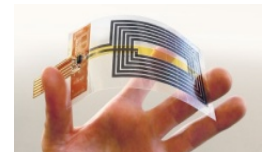
In situ SHM of composites
(Materials)



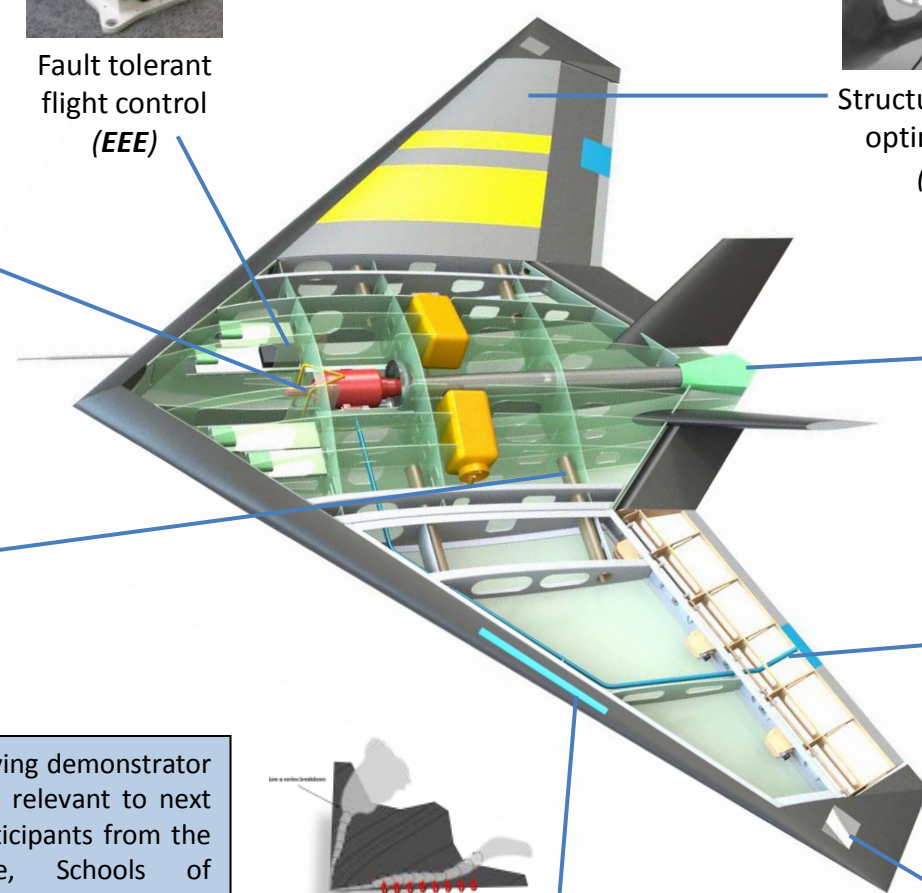
Supersonic Circulation Control for flapless flight
(MACE)



Leading edge flow control
(MACE)



Printed Graphene Antenna
(EEE)



To develop a large model scale flying demonstrator for novel aerospace technologies relevant to next generation aircraft. involving participants from the Aerospace Research Institute, Schools of Mechanical, Aerospace and Civil Engineering (MACE), Electrical and Electronic Engineering (EEE) and Materials at the University of Manchester.



The University of Manchester leads two AERO-UA research Pilot Projects:

- Design of Aerospace Composite Structures
- Manufacturing Aerospace Composite Structures

Contributing research partners in these Pilot Projects are:

 Ukrainian Research Institute of Aviation Technology



Ukrainian Aerospace Cluster 'Mechatronics'



National Academy of Science



National Aerospace University

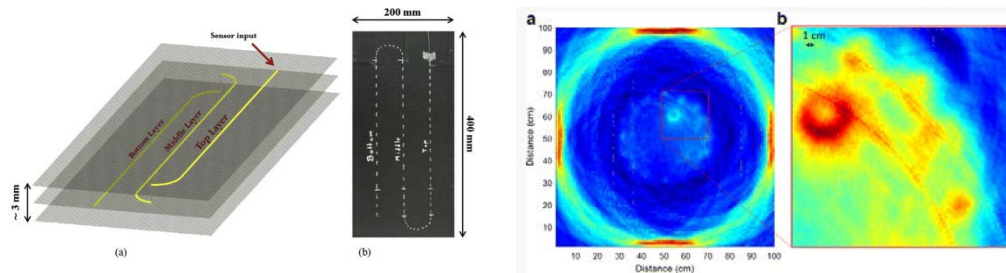


Technology Partners (Poland)

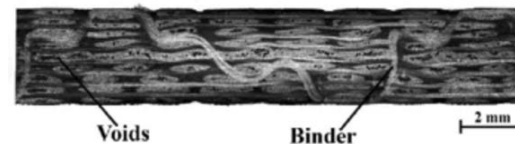
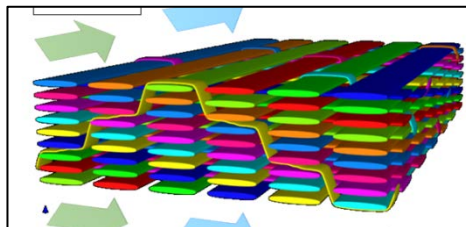


Two topics will initially be investigated, both will involve the use of Finite Element Method (FEM) **simulation** for the purpose of composite **structure design**

- Simulation informed by acquired data from Structural Health Monitoring



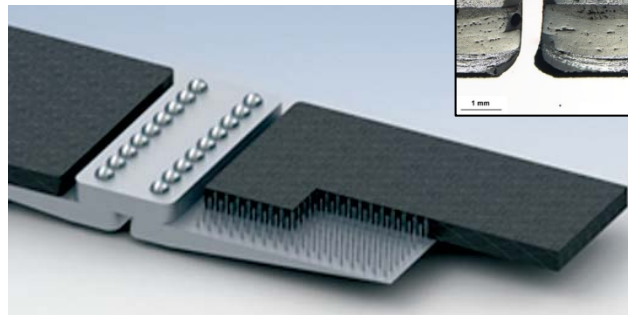
- Simulation of polymers reinforced by complex fibre architectures for multifunctionality





Innovative techniques for *hybrid-joining* composites to metal

- Practical experimental approach, manufacturing, examination and testing of innovative joining techniques
- Feasibility assessment of Non-Destructive Inspection (NDI) of dissimilar material joints
- Review of composite to metal joining technologies and evaluation of technology implementation feasibility



MANCHESTER
1824

The University of Manchester

www.aerospace.manchester.ac.uk

Thank you

adam.joesbury@manchester.ac.uk

