



Aeronautics RTD Support and Activities in Ireland



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Contents

- A Brief History of Aeronautics in Ireland
- Profile of the Irish Aeronautics Sector
- Aeronautics RTD Support Organisations
- Irish Participation in European Aeronautics Research
- Summary



A Brief History of Aeronautics in Ireland

Alcock and Brown Land in Ireland in 1919 after the First Non-Stop Transatlantic Flight



Alcock and Brown completed their flight on the Irish coast. Deciding to land in what appeared to be a large green field - which was in fact a bog - they made an undignified landing which caused considerable damage to the aircraft.




A Selective Chronology

- 1919 Alcock and Brown
- 1936 Aer Lingus
- 1937 Aer Rianta
- 1975 Guinness Peat Aviation (Aircraft Leasing)
- 1980 Airmotive Ireland (now Lufthansa Technik)
- 1983 Sifco Ireland (now SR Technics)
- 1985 Ryanair
- 1989 TEAM Aer Lingus (then FLS Aerospace now SR Technics, Dublin)
- 1990 PWAI (60,000 Sq. Ft. facility)
- 1991 Lufthansa Shannon Turbine Technology
- 1992 Shannon Aerospace

Aviation Island

- The number of people directly employed in Aeronautics is greater than 10,000
- The number of aerospace industry employees per 1000 employed is amongst the highest in the EU





Profile of the Irish Aeronautics Sector

Aer Lingus and Ryanair

'Commercially Successful Airlines'

- Over the years Aer Lingus spun off on the order of 40 companies including GPA, TEAM, PARC, AMI, PWAI, DEVTEC - it is a profit-making national airline
- Ryanair currently serves 344 routes between 114 airports in 22 European countries and employs 2,700 people



Manufacturing, Testing, Simulation

- **BOMBARDIER, BELFAST** employs 5,300 people manufacturing aircraft in Belfast making it the biggest employer on the Island
- **EIRE COMPOSITES** – Advanced Composites Testing & Fabrication
- **HONEYWELL ENGINES, SYSTEMS & SERVICES** - Manufacturer of fan blades, compressor blades, vanes & VIGV's
- **MOOG** – A Manufacturer of Precision Control Components and Systems for Aircraft, Satellites and Automated Industrial Machinery
- Many other suppliers of precision parts such as **DEVTEC, HITOL,...**
- Also suppliers of CFD and other simulation modelling such as **ESIL, NUMA**, etc



Strong in MRO

- **SR TECHNICS, DUBLIN** – Heavy Aircraft Maintenance
- **AIR ATLANTA** – Heavy Aircraft Maintenance
- **SHANNON AEROSPACE** - Airframe maintenance and overhaul, modification, reconfiguration, refurbishment, ageing aircraft programmes, corrosion prevention, repairs, stripping and painting on Boeing B737, B757 and B767, McDonnell Douglas DC-9 and MD80 Aircraft, and Airbus A319, A320 and A321
- **PWAI** - Provides overhaul and repair services for jet engine cases
- **LUFTHANSA AIRMOTIVE IRELAND** - Provider of jet engine overhaul and repair services specialising in CFM56-2, -3 and -7, JT9D -7/ 7J, JT9D -7Q/ 59A/ 70A, JT8D – STD
- **LUFTHANSA SHANNON TURBINE TECHNOLOGY** is a wholly owned subsidiary of Lufthansa Technik, specialising in the repair of CFM56 (-3/ -5/ -7), CF6-50 and CF6-80C turbine components (blades, vanes and shrouds) and combustors
- **SIFCO TURBINE GROUP** manufactures, repairs and overhauls turbine components for the Aerospace, Industrial and Power Generation markets

IT/Aeronautics Companies – Some Examples

- **AIRCRAFT MANAGEMENT TECHNOLOGIES** - Information systems technology covering all aspects of aircraft operations and maintenance. Flightman™ sets the standard for aircraft information management solutions by providing a world leading software environment to enable rapid high quality solution development and deployment onto airborne hardware.
- **AIRTEL ATN** - A developer of data communications solutions for the aerospace industry. The company supplies ATN compliant software for airborne and ground systems. Products include ATN Routers and Data Link Servers supporting **CM**, **CPDLC**, **PM-CPDLC**, and **ADS**.
- **SKYTEK COMPUTING** – Specialises in Process Compliance and Electronic Manual Software for the management of complex operations in the space, oil & gas and aerospace sectors
- **PARALLEL GRAPHICS** - Its Virtual Manuals™ technology is an open standard solution that enables manufacturing companies to reuse existing 3D CAD and PDM data to produce Web-enabled interactive 3D simulations that can significantly enhance their maintenance, training and spare part distribution processes.
- Many other companies operate at the IT/Aeronautics interface in the areas of IT, data management and communications technology.

Financial Services

- Ireland has substantial aircraft financial services capability with 27 companies including:
 - Airbus Financial Services
 - Aergo Capital
 - A & L Goodbody
 - Bank of Scotland
 - Boeing Capital Corporation
 - GECAS
 - KBC Finance Ireland
 - Matheson Ormsby Prentice
 - Orix Aviation
 - Parc Aviation
 - Pembroke Group
 - RBS
 - Sunrock Aviation





Aeronautics RTD Support Organisations

The Federation of Aerospace Enterprises of Ireland, Enterprise Ireland\Invest NI and University Degree Courses

- The Federation of Aerospace Enterprises of Ireland (FAEI) is the industry representative organisation. R&D is included within its wide-ranging suite of aeronautics industry promotion activities
- Enterprise Ireland is the state agency whose role is to develop the indigenous industry sector. That said, it oversees national R&D grant awards for both multinational and indigenous industry. There is no national R&D programme that is specific to Aeronautics. Invest NI fulfils a broader related role for Northern Ireland.
- In the context of R&D support it is worth mentioning the Aeronautical Engineering degree courses at Queen's University Belfast and the University of Limerick.
- Engineering departments at NUI-Galway, Trinity College, University College Dublin University College Cork all have significant Aeronautics related activities too and have participated in Framework

The Irish Aeronautics & Space Research Network (IASRN)

- The Irish Aeronautics & Space Research Network (IASRN) was established in mid-2002 with support from Enterprise Ireland
- It has grown organically and now has over 180 participants from industry, academia and the public sector
- IASRN fulfills the National Contact Point Role for FP6 Aeronautics & Space
- It actively promotes Aeronautics R&D via email circulation, events and by participating in the ECARE+ and SCRATCH SSAs
- FP6 in turn acts as a driving force for IASRN – it is by far the most significant reason for the high level of participation in IASRN





Irish Participation in Aeronautics Research

Some R&D Facts & Figures

- The Irish government recently announced that it will commit €3.8Bn to industry oriented R&D over the next 7 years
- An Industry led competence centre in Composites Technology is planned
- 30% est. of Ireland's participation in the FP6 Aeronautics priority (measured in cash returned) was secured by SMEs
- In general the MRO companies do not perceive Framework as strategically relevant.
- Bombardier in Belfast plans to strengthen its involvement in FP7
- The most successful Aeronautics researcher in Ireland is a Psychologist at Trinity College Dublin who works in the area of Human Factors

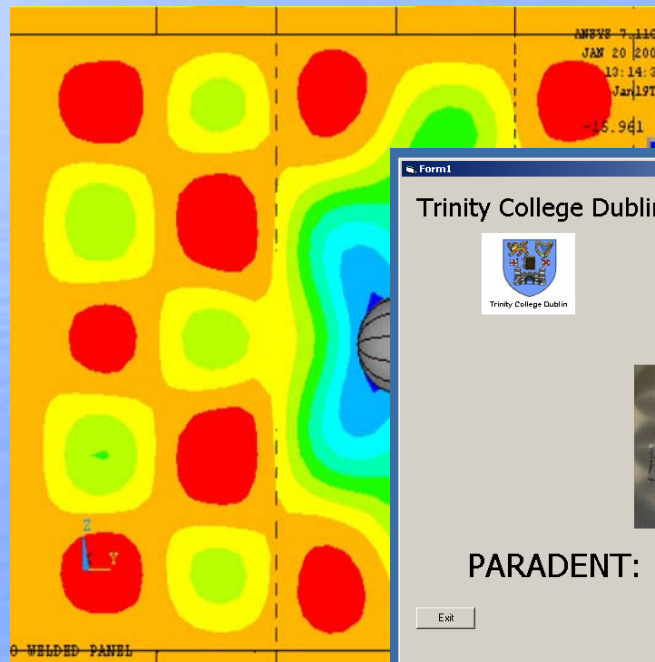
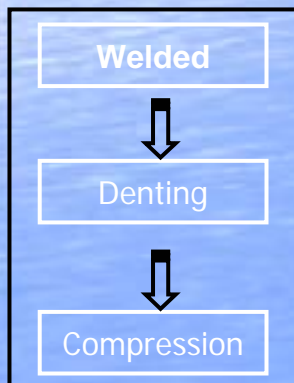


Example 1: HILAS (Human Integration into the Life-cycle of Aviation Systems)

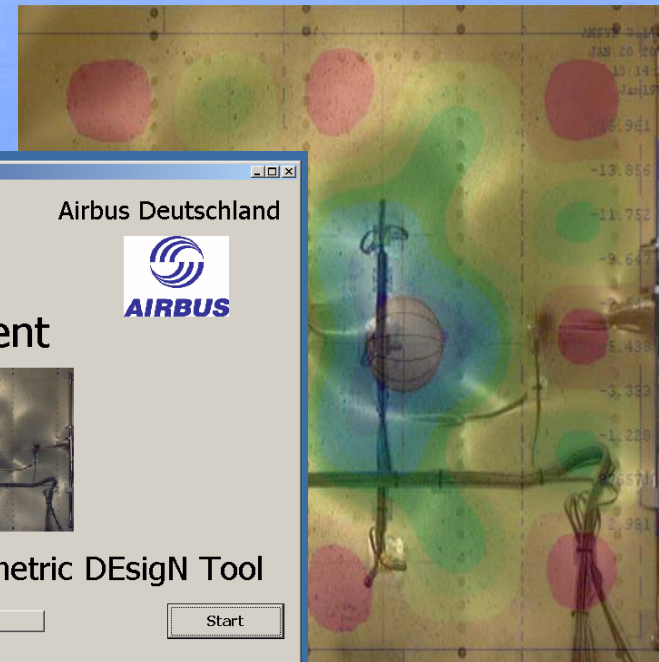
The 28M€ **HILAS** Integrated Project aims to develop a model of good practice for the integration of human factors across the life-cycle of aviation systems. The project is coordinated by **Trinity College Dublin** and includes Irish companies such as **Aircraft Management Technologies, FLS Aerospace (now SR Technics, Dublin)** and **Shevlin Technologies**. It contains four parallel strands of work:

1. the integration and management of human factors knowledge
2. the flight operations environment and performance
3. the evaluation of new flight deck technologies
4. the monitoring and assessment of maintenance operations

Example 2: Metal Forming at TCD - FEA vs. Experimental Buckling Mode on an Aircraft Panel



A screenshot of the PARADENT software interface. The window title is "Form1". The interface features the logos of Trinity College Dublin and Airbus Deutschland. The text "And Present" is centered above a small image of a buckled aircraft panel. Below the image, the text "PARADENT: PARAMetric DEsign Tool" is displayed. At the bottom, there are three buttons: "Exit", "About", and "Start".



Example 3

From space experimentation to aerospace applications of new high-performance intermetallic alloy



The Intermetallic Materials Processing in Relation to Earth and Space Solidification (**IMPRESS**) is an Integrated Project in the EC's 6th Framework Programme (**FP6**) comprising a large multi-disciplinary consortium of 42 partners, among them a research team from **Engineering and Materials Science Centre UCD**, and companies like Rolls-Royce. The European Space Agency (**ESA**), as the coordinator, is responsible for the management of the project, as well as, the implementation of all space activities.

Main goals of the IMPRESS project:

- novel γ -TiAl based high-temperature & performance intermetallic alloy,
- high-quality advanced investment cast γ -TiAl **turbine blades** with length up to 40 cm to be used in aero-engines



UCD contribution to the IMPRESS project:

applied materials research in the field of numerical modeling of solidification phenomena in γ -TiAl, based on a novel **Front Tracking Model** and in-house code for space experiments aboard the International Space Station (**ISS**) and sounding rockets.

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Successful EC FP6 Participations

| | | | |
|-----------------------------|--|------------------------|--|
| TATEM - IP | TCD, SKYTEK COMPUTING, FLS AEROSPACE | ALCAS IP | IRISH COMPOSITES |
| SAFE E - IP | AIRTEL ATN | HILAS IP | TCD, AMT, FLS AEROSPACE, SHEVLIN TECH. |
| MESEMA – STREP | TACT TECHNOLOGIES | HISAC – IP | TCD, Mech. Eng. |
| CoJeN – STREP | TCD, Mech. Eng. | NACRE - IP | TCD, Mech. Eng. |
| AROSATEC – STREP | SKYTEK COMPUTING | COMPACT - STREP | UNIVERSITY OF LIMERICK |
| DINAMIT – STREP | COMPOSITES TESTING LAB | ASPASIA - STREP | AIRTEL ATN |
| MOET - IP | MOOG, CORK | HEATTOP-STREP | FARREN TECHNOLOGIES |
| BEARINGS - STREP | TCD | XNOISE - CA | TCD, Mech. Eng. |

Summary

- Ireland has a strong tradition in Aeronautics with home grown companies such as Aer Lingus, Guinness Peat Aviation and Ryanair all making a disproportionate mark on the international stage. It has a strong Aircraft Financial Services sector.
- Ireland is a true Aviation Island with over 10,000 people directly employed
- The Irish Aeronautics & Space Research Network (IASRN) acts as the point of contact for European R&D activity
- Industry Framework R&D in Aeronautics is undertaken by SMEs in the IT sector such as Aircraft Management Technologies, Airtel ATN, ESIL, Shevlin Technologies, Skytek Computing. Eire Composites is a notable manufacturing SME participant. Of the larger companies only Bombardier, Belfast is beginning to view Framework as strategically important.
- University R&D has been most successful in the area of Human Factors (HILAS, TATEM) but successful groups exist in Fluids, Acoustics, Turbine Materials, Composites and Metal Forming. The Aeronautics priority in FP6 was generally unwelcoming to university researchers that do not have a big industry brother.

Thank You

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