



*AircraftFire*

European Union Framework 7  
Research Project

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# Presentation contents

- European Union Framework programme
- Why 'AircraftFire' was established
- What has been achieved
- Future plans

# European Union 'Framework' Programme

- This is the EU's main instrument for funding research in Europe and runs from 2007 to 2013.
- FP7 is the short name for the Seventh Framework Programme for Research and Technological Development.
- The EC budget for the seven years of FP7 is € 50.5 billion
- FP7 is designed to respond to Europe's employment needs and competitiveness.

# AircraftFire

- 3.2 M €, 3 year programme started Jan 2011
- 5 Science Work Packages
  1. **Fire Threat Analysis**
  2. **Fire Prevention**
  3. **Fire Protection**
  4. **Fire growth and Evacuation Modeling**
  5. **Synthesis of the Results + Summer School**

# AircraftFire Main Objectives

- To identify the new fire threats in new generation aircraft
- To assess the resulting fire risks
- To improve prevention, protection and procedure efficiency
- To increase passenger and crew survivability

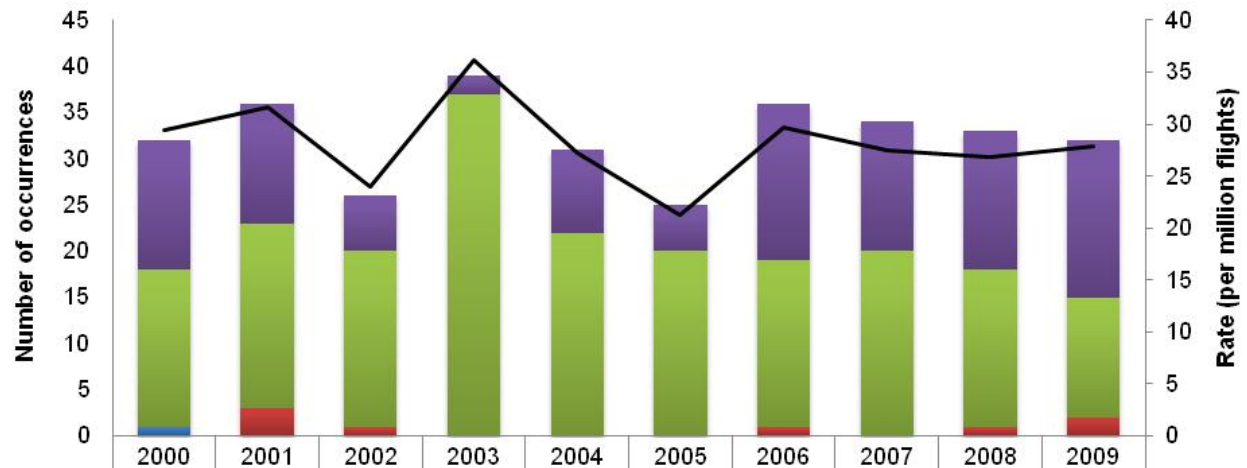
# Consortium Members

- CNRS (France)
- Fraunhofer Institute (Germany)
- Airbus (France)
- EADS (Germany)
- Civil Aviation Authority (UK)
- University of Iceland
- University of Greenwich (England)
- University of Ulster (Northern Ireland)
- CORIA-INSA (France)
- University of Edinburgh (Scotland)
- University of Patras (Greece)
- Technical University Delft (Netherlands)

# Programme

- To explore the possibilities of extracting more information from aircraft incident databases by combining databases and the use of text analysis and data mining
- To characterise the physical/chemical/thermal properties of composites and polymers aboard aircraft
  - For hull, wing and structure
  - Cabin (carpets, seats,....)
- To evaluate the evolution of fire scenarios, fire growth and the passenger evacuation procedures
- To give recommendations for the development of efficient industrial technologies through technological innovation in order to improve fire prevention and protection including detection and suppression

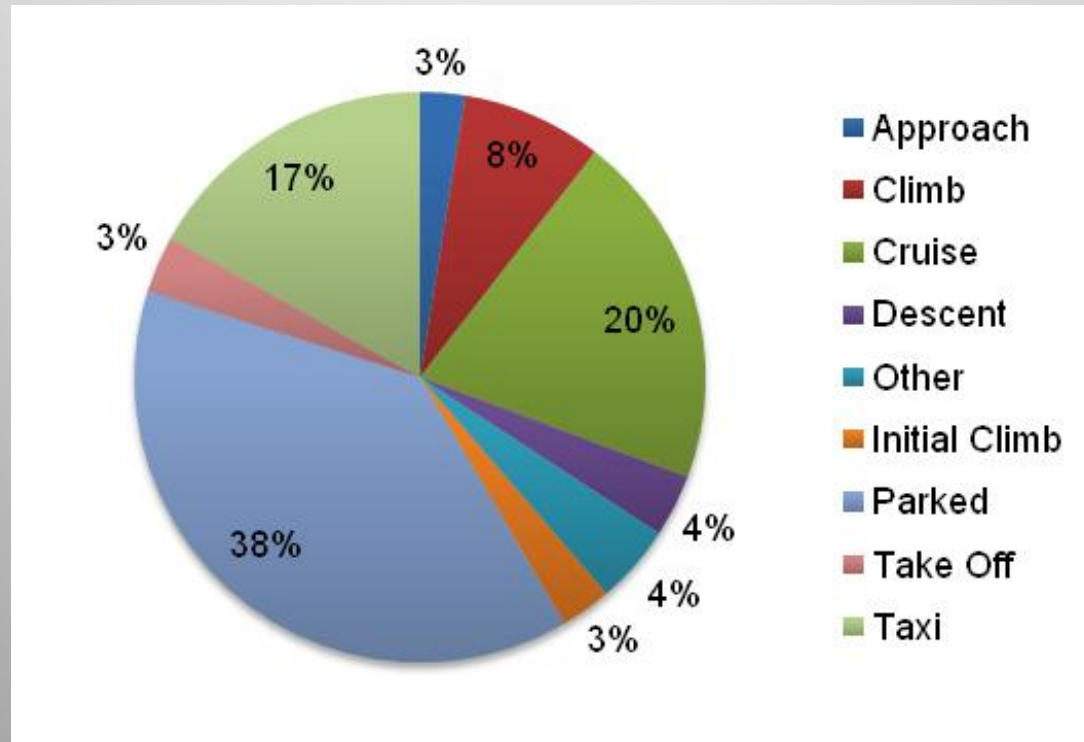
# CAA fire incident data for 10 years



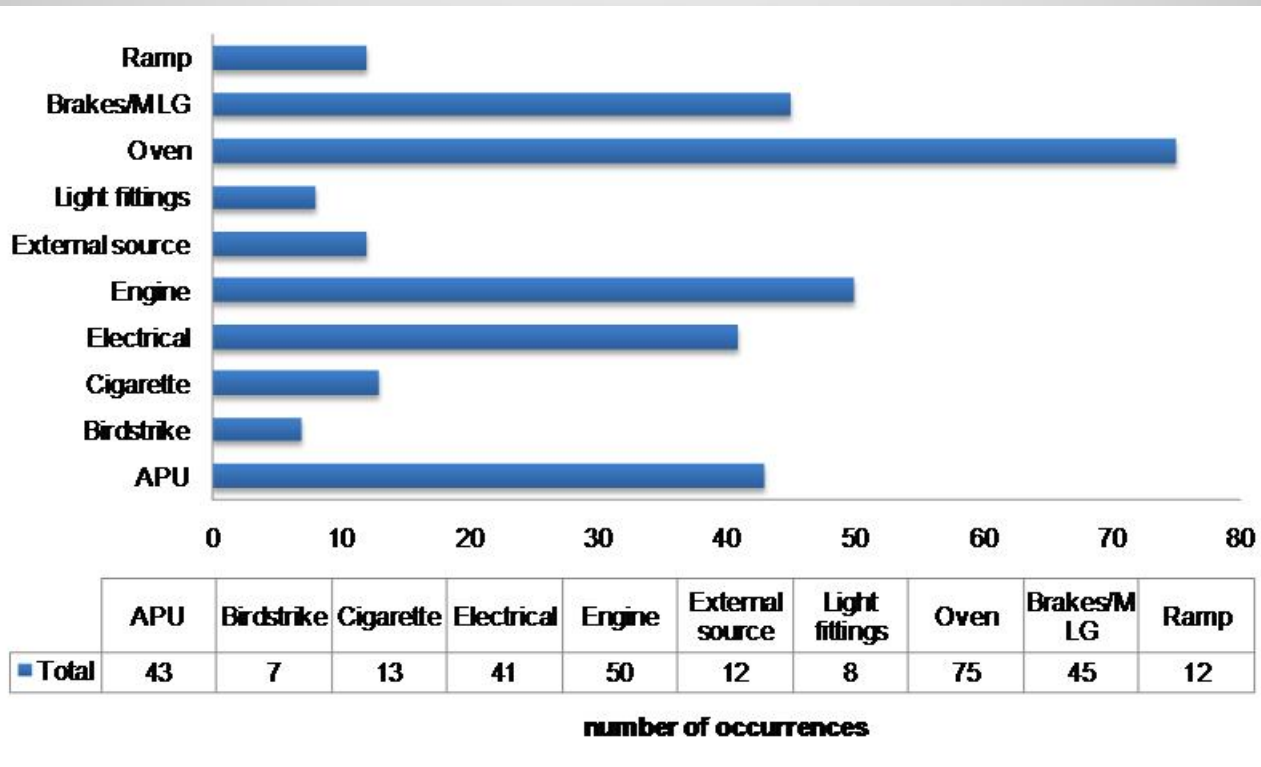
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
D	14	13	6	2	9	5	17	14	15	17
C	17	20	19	37	22	20	18	20	17	13
B	0	3	1	0	0	0	1	0	1	2
A	1	0	0	0	0	0	0	0	0	0
— Rate per million flights	29.42	31.69	24.01	36.17	27.27	21.28	29.74	27.46	26.89	27.82



# Phase of Flight



# Causal Factors



# Advanced data analysis

- Database combination challenging
- Text analysis good results (processing was done with 'Gate' - General Architecture for Text Engineering <http://gate.ac.uk>)
- Data mining used Weka  
<http://www.cs.waikato.ac.nz/ml/weka/>

# Characterisation of Materials

- Focus on composites
- Thermal and toxicological properties
  - Thermogravimetric analysis
  - Differential scanning calorimeter
  - Infrared spectroscopy
  - Pyrolysis mechanisms
- Testing of similar samples in multiple laboratories
- Database for input to fire model

# Fire Model

- The project AircraftFire plans to enhance the SMARTFIRE fire simulation software developed by University of Greenwich
- SMARTFIRE incorporates a range of sub-models
  - flame spread,
  - turbulence
  - radiation
  - toxicity,
  - smoke optical density
- New physical models related to composite materials in new aircraft will be tested, validated by experiments and introduced into the numerical code
- This contribution is intended to complement full-scale testing

# Evacuation Model

- The EXODUS software takes into consideration people – people, people-fire and people-structure interactions. It comprises fire core interacting sub-models:
  - PASSENGER
  - MOVEMENT
  - BEHAVIOUR,
  - TOXICITY
  - HAZARDS
- The project AircraftFire aims to adapt this software to new risks in new generation aircraft



# Detection

- Focus on reduction of false alarms using:
- Sensor signal processing
  - Particle sensors
  - Gas sensors
  - Video indicators
- Fusion of multi-sensor information
  - Sensor suites
  - Background/historical knowledge

# Current Work and Plans

- Materials procured and initial tests about to commence
- Initial materials results to be reviewed in May 2012
- Presentations will be made at Fire & Cabin Safety Research Conference 2013



# Questions?

More information:

[http://www.aircraftfire.eu/front\\_content.php?idcat=3](http://www.aircraftfire.eu/front_content.php?idcat=3)