Project #7
MITIGATING
THE RISK OF FIRE
SMOKE & FUMES

Understanding and characterizing the fire behaviour of primary structures composite materials

Objectives

Enhance knowledge concerning the fire behaviour and performance of CFRP primary structure materials

Produce a comprehensive experimental database on a reference composite material (T700GC/M21)

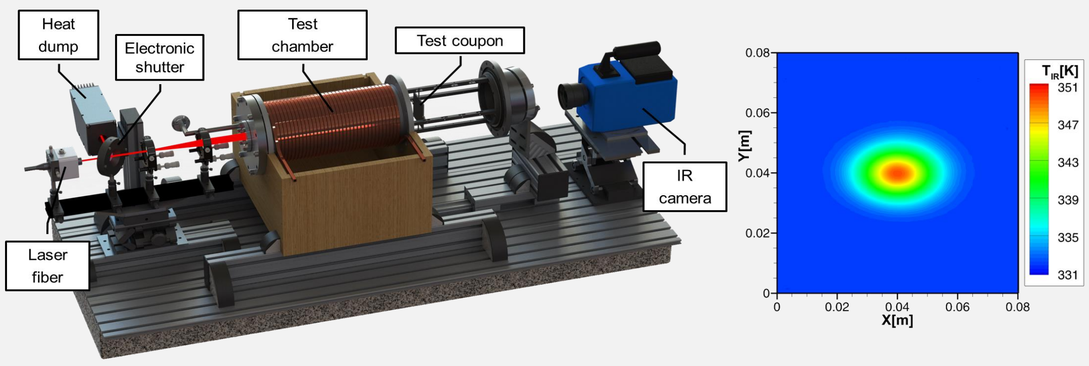
Share the results within the European research community

Confront experimental results to state-of-the-art models and simulation tools

Main achievements

Thermal properties and pyrolysis behaviour:

Experimental characterisation of: Arrhenius coefficients, heat of reaction, stoichiometric coefficients, gas properties, thermal conductivity tensor, specific heat, mass fractions, density….

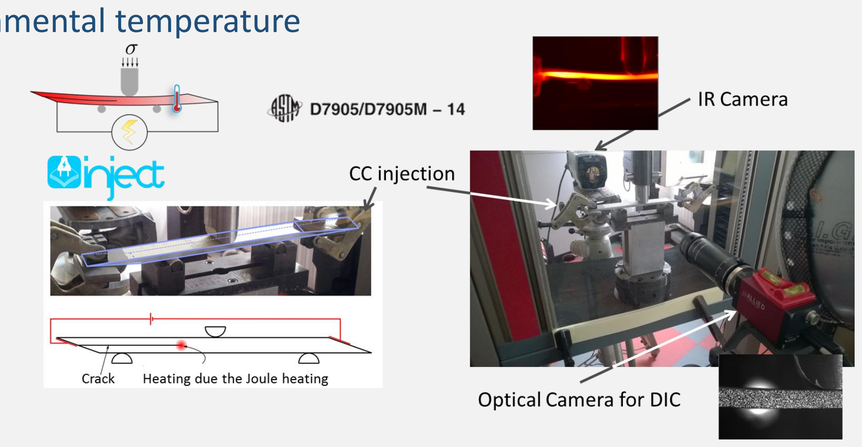


BLADE facility developed at ONERA to characterise thermal properties (thermal conductivity tensor and specific heat) of composite laminates

More details: D7.4 -> G. Leplat, A. Deudon, C. Huchette, G. Portemont, E. Deletombe, G. Roger, J. Berthe. Future Sky Safety – D7.4 Primary structure materials – Test Results (first batch), 2016.

Thermo-mechanical properties:

Study of the evolution of the mechanical properties with respect to the environmental temperature



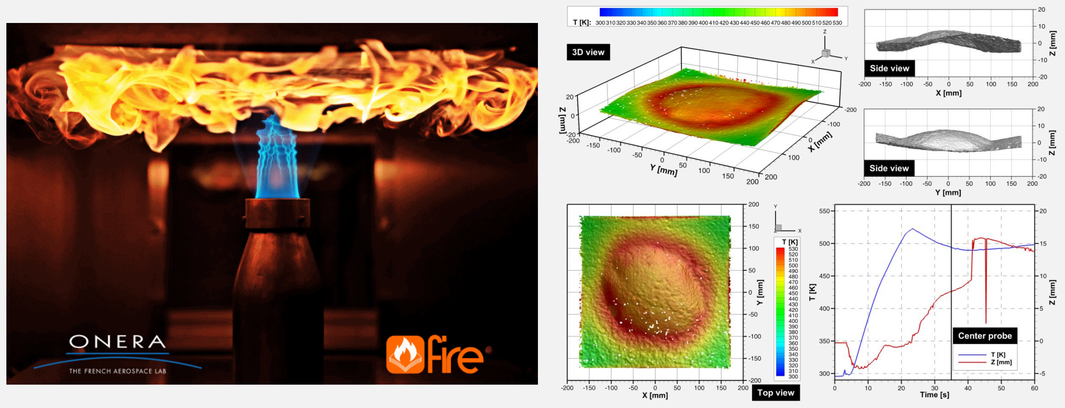
Inject facility used to study the influence of the high temperature on the fracture toughness of composite materials

More details: D7.7 -> T. Batmalle, J. Berthe, P Beauchêne, V. Biasi, A. Deudon, C Huchette, P Lapeyronnie, G. Leplat, A Mavel, G. Portemont, P. Reulet, A. Palacios, R. Tejerina, J. Hodgkinson, C. Lourenço. Future Sky Safety – D7.7 Primary structure materials – Test results (2nd batch), 2017.

Production of a comprehensive experimental database on a reference material (T700GC/M21)

Fire behaviour:

- Thermo-mechanical response of composite panels exposed to fire
- Standard fire tests
- Analysis of the effect of combined structural loadings: tyre debris impact/structural loads + FIRE exposure.

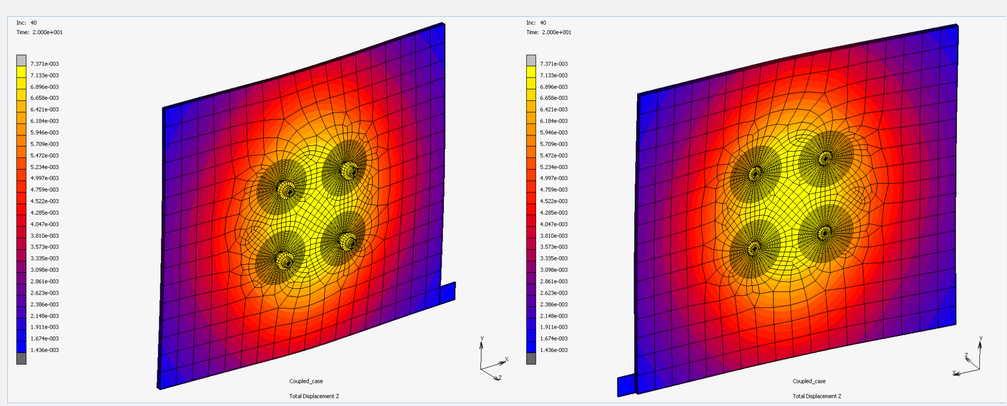


3D reconstruction of temperature measurements on the back surface of a composite laminate exposed to fire (FIRE facility @ONERA)

More details: D7.7 -> T. Batmalle, J. Berthe, P Beauchêne, V. Biasi, A. Deudon, C Huchette, P Lapeyronnie, G. Leplat, A Mavel, G. Portemont, P. Reulet, A. Palacios, R. Tejerina, J. Hodgkinson, C. Lourenço. Future Sky Safety – D7.7 Primary structure materials – Test results (2nd batch), 2017.

Numerical simulation tools:

- Confrontation of experimental fire tests results to state-of-the-art models and simulation tools.
- Particularisation of modelling to specific structural fire tests (ISO 2685, required for certification) to minimise testing loops.



Example of a thermomechanical simulation performed with state-of-the-art simulation tools

More details: D7.9 -> A. Palacios, R Tejerina, V. Biasi, G. Leplat, M.L. Rodriguez. Future Sky Safety – D7.9 Primary structures materials - Models for fire behavior, 2017.

Assessment of Numerical simulation tools

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www.futuresky-safety.eu

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