PROJECT

FINCAP

Fuel INjector Coking and Autoxidation Prediction

Funding: European (Horizon 2020)

Duration: May 2017 - Aug 2021

Status: Complete

Total project cost: €999,981

EU contribution: €999,981

Call for proposal: H2020-CS2-CFP04-2016-02

CORDIS RCN : 210006

Objectives:

The aim of this project is to develop a robust theoretical framework to allow the modelling of the build-up of surface carbonaceous deposits in jet fuel injection systems so that fuel injectors for advanced engines such as the VHBR may be designed with an acceptable maintenance frequency and their life span predicted. Given the high heat sink requirement on aviation fuel in geared turbofan architecture, the prediction capability developed within this proposal is essential to a rapid and low cost development of VHBR, lean burn fuel injector systems.

The project team consisting of the Low Carbon Combustion Centre, the Department of Chemistry and the Centre for Advanced Manufacturing in the University of Sheffield will conduct a three-year programme to develop the understanding of fuel injector coking through a combination of experimentation and simulations of various scales and complexities. The proposed programme builds on the significant expertise within the core team.

The objectives of the Proposal are:

1. Construction of an updated and robust autoxidation kinetic mechanism for surrogate hydrocarbons representative of an approved aviation fuel.
2. Validation of the detailed mechanism with autoxidation results for real fuel and surrogate hydrocarbon obtained in a near isothermal plug flow reactor over a range of temperatures. Followed by the automated mechanism reduction through species lumping and reaction grouping.
3. Validation of a mathematical model with respect to the experimental results obtained from low TRL level experiments and parameter optimisation
4. Experimental investigation of surface deposition in a simulated burner feed arm using “Aviation Fuel Thermal Stability Test Unit” and assess the impact of surface roughness in a representative fuel injector at TRL 5 conditions to validate coking model.
5. Incorporate this understanding into a number of modelling tools to permit incorporation of coking calculations within CFD packages.

Parent Programmes:

H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

The University Of Sheffield

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EU Contribution: €999,981

Technologies:

Aircraft propulsion
Lean combustion for ultra-high pressure ratio

Development phase: Validation

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Other specified

Geo-spatial type: Other