EASA Fire/Explosion Problematics and Rulemaking Activities Overview

Rémi DELETAIN Senior Expert for CS-25 Powerplant & Fuel System Certification

V3 – Oct 2022

10th Triennial International Aircraft Fire and Cabin Safety Research Conference - 17-21 oct 2022

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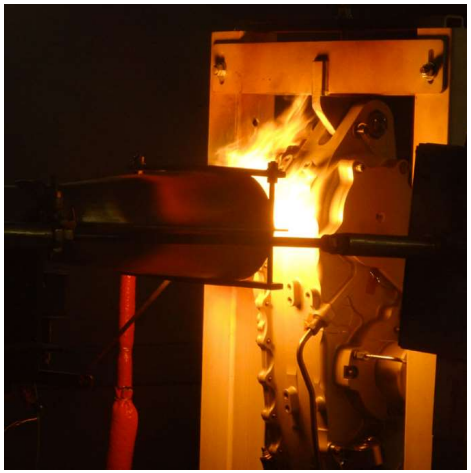
Fire Regulatory Topics

- SAE A22 Powerplant Fire Testing
  - In March 2018, the FAA tasked SAE International to develop industry standards to update AC20-135 Change 1, *Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria*.
  - EASA participation
    - Rémi DELETAIN (CS-25) - Focal
    - Regis ROSSOTTO (CS-23 / VTOL)
    - Angus BRAHAMS (CS-E)



Fire Regulatory Topics

- SAE A22 Powerplant Fire Testing
  - AS6826 Powerplant Fire Test Standards (Draft of 15 Sep 2021) commented on 02 Feb 2022
    - 64 comments
    - Among 10 for regulatory discussion
  - Regular participation to SAE Monthly meeting and regulator meetings (Ad Hoc).
  - Some topics are excluded from the SAE A22 scope (i.e CS 25.863, 25.867, hybrid/electric propulsion, foreseeable fire size, …)
  - Some topics will come in a later AS revision (Rotorcraft, engine case burnthrough, engine mounts fire protection, EWIS, fire modelling,…)

Fire Regulatory Topics

SAE A22 Powerplant Fire Testing (Cont'd)

- Regulatory implementation of AS6826 standard ?
  - Create (*) AMC 20-135 : Multi-product applicability
    - Cross refer to AS6826 into the new AMC.
    - As necessary, arbitration of contents in relation to existing individual product guidance and/or limitations in use.

(*)Subject to EASA Rulemaking validation
AMC : Acceptable Means of Compliance

Fire Regulatory Topics

SAE A22 Powerplant Fire Testing (Cont'd)

- Update individual CS requirements and AMC's relating to powerplant fire testing :
  - with new AMC introduction
  - If any, removing non-relevant or superseded standards/guidance

- Release guidance (CRI , CM or AMC update (above))
  - On items not covered in AS6826 original issue
  - On items scheduled for AS6826 revision 2
  - On subjects under SAE A-22 long-term discussion

CRI: Certification Review Item
CM : Certification Memorandum

Fire Regulatory Topics

- CATA – CWI EASA-001 -2D Nacelle (CS 25.867)
  - Internal (FAA, EASA, TCCA, ANAC) consultations – completed.
  - Disposal of comments within CATA EASA-001 team and CATA Paper update - on-going.
  - CATA Paper release towards CATA : Dec 2022
  - Once adopted by CATA will be published on EASA website
  - Regulatory adoption via:
    - CRI (short term)
    - AMC creation via CS-25 regular update (mid term)

CATA : Certification Authorities for Transport Airplanes
CWI: CATA Worklist Item

Fire Regulatory Topics

- GENERIC GUIDANCE (CRI)
  - Flammable Fluid (25.863) and drainage/ventilation (25.1187)
  - Residual Flame
  - Halon Replacement (HFC125)
  - Halon Replacement (CF3I)

Fire Regulatory Topics

- VTOL
  - Special Condition and Means of Compliance
    - MOC VTOL.2325(b)(1) and (b)(2) Fire Protection: Minimisation of Fire Propagation and MOC VTOL.2330 Fire Protection in designated fire zones
      - MOC-2 SC-VTOL, Issue 1 dated 23 jun 2021
      - MOC-2 SC-VTOL, Issue 1 - Comment Response Document, Issue 1
      - MOC-2 SC-VTOL, Issue 2 dated 29 jun 2022
    - MOC VTOL.2440 Propulsion Batteries Thermal Runaway
      - MOC-3 SC-VTOL, Issue 1, 29 Jun 2022 :
      - Status : Released for consultation on 29 Jun 2022
      - TD : Deadline for comments 12 Aug 2022

VTOL : Vertical Take-Off and Landing (VTOL) aircraft :

- heavier-than-air aircraft in the small category, with lift/thrust units used to generate powered lift and control. The distinction from conventional aeroplanes is based on the VTOL capability of the aircraft while the distinction from conventional rotorcraft is based on the use of distributed propulsion, specifically when more than two lift/thrust units are used to provide lift during vertical take-off or landing.
- with a passenger seating configuration of 9 or less and a maximum certified take-off mass of 3 175 kg (7 000 lbs) or less

Fire Regulatory Topics

- H2, Electrical & Hybrid propulsion
  - Research – TAC - IPC (CS-E, CS-25) and Project application (CS-23, CS-25)
    - Multitude of concepts (Liquid, Gaseous, fuel cell, engine supply)
    - Maturity variations
    - Complex split of responsibilities (A/C vs Engine)
  - Special Condition SC E-19 - Electric / Hybrid Propulsion System
    - Consulted till 19 Jun 2020
    - Released at issue 1 on 13 Apr 2021

TAC: Technical Advice Contract
IPC : Innovation Partnership Contract

Fire Regulatory Topics

- EUROCAE WG-80 on fuel cell Hydrogen Fuel Cell Systems
  - EASA participant : Linda BRUSSARD
  - EASA fire strategy shared by Regis ROSSOTTO

- EASA Approach
  - Maintain level of safety achieved by the regarded product category
  - Maintain fire prevention/protection multilayers concepts
    - Supplementing requirements
    - Overlapping requirements
  - Gap analysis : Equivalent Layer of Protection ?

Fire Regulatory Topics

- EASA Approach
  - Concepts of zones ?
    - (Electrical) Fire Withstanding zone
      - elect motor, supercapacitor, transducer/rectifiers, …
    - Designated H2 Fire zone
    - (Battery) Fire Explosive zone
    - Adjacent zones (finite and fictive) same principles as for xx.1182 and 25.867
    - Flammable fluid leakage zone would need some adaption for H2 but would remain applicable for hybrid/classic powerplant installation
    - Designated Fire Zone would remain applicable for hybrid/classic powerplant installation

Fire Regulatory Topics

- EASA Approach
  - H2 tank (+ distribution system?)
    - Mimic of CS 25.981 but opposite objectives
      - Jet Fuel Ignition prevention => H2 ignition minimization?
      - Jet Fuel Flammability exposure minimization => H2 flammability prevention?

      Note: CSFL following explosion could remain an option
  - What about H2 fire/explosion for crashworthiness?
  - What about fire regulation fundamentals?
    - Fire presence latency of 5min / 15min, still true?
    - CS-Definition acknowledge Steel, Titanium and Aluminum fire withstanding capability for Jet fuel. Still true with H2?

CSFL: Continued Safe Flight and Landing

Fire Regulatory Topics

- EASA Approach
  - H2 Fire Testing:
    - Standard threat definition ?
    - H2 combustor burn though same as a H2 standard threat?
    - Combination of testing ?
      - H2 Flame characterization open air? Closed volume?
      - Material H2 fire testing ?
        - What about composite?
      - Full scale fire testing?

In summary, active brainstorming …

Fire Regulatory Topics

… with more to come

EASA
European Union Aviation Safety Agency

CLEAN AVIATION

BRUSSELS, October 7, 2022 – The European Union Aviation Safety Agency (EASA) and the Clean Aviation Joint Undertaking are enhancing their cooperation to make it more strategic, effective and efficient.

Clean Aviation is the European Union's leading research and innovation programme for transforming aviation towards a sustainable and climate-neutral future. EASA and Clean Aviation will cooperate closely in the execution of Clean Aviation's 20 daring new projects, officially adopted in September 2022. EASA representatives will play an active role in the main Clean Aviation bodies such as its Governing Board, the Technical Committee and the Scientific Advisory Body.

CLEAN AVIATION — Co-funded by the European Union

Starting in 2022 Clean Aviation's **daring** new projects

	PROJECT TITLE	PROJECT COORDINATOR	PROJECT TOPIC*
HYBRID ELECTRIC POWERED AIRCRAFT	HE-ART	ROLLS-ROYCE DEUTSCHLAND LTD & CO KG	Multi-MW Hybrid-Electric Propulsion System
	AMBER	GE AVIO SRL	
	TheMa4HERA	HONEYWELL INTERNATIONAL SRO	Thermal Management Solutions
	HECATE	COLLINS AEROSPACE IRELAND, LIMITED	Electrical Distribution Solutions
	HERWINGT	AIRBUS DEFENCE AND SPACE SA	Innovative Wing Design
HYDROGEN POWERED AIRCRAFT	CAVENDISH	ROLLS-ROYCE PLC	Direct Combustion of Hydrogen in Aero-engines
	HYDEA	GE AVIO SRL	
	NEWBORN	HONEYWELL INTERNATIONAL SRO	Multi-MW Fuel Cell Propulsion System
	H2ELIOS	ACITURRI ENGINEERING SL	Large Scale Lightweight Liquid Hydrogen Integral Storage Solutions
	fLHYing tank	PIPISTREL VERTICAL SOLUTIONS DOO PODJETJE ZA NAPREDNE LETALSKE RESITVE	Near Term Disruptive Technologies
	HyPoTraDe	PIPISTREL VERTICAL SOLUTIONS DOO PODJETJE ZA NAPREDNE LETALSKE RESITVE	
ULTRA EFFICIENT SHORT & MEDIUM RANGE AIRCRAFT	OFELIA	SAFRAN AIRCRAFT ENGINES	Ultra Efficient Propulsion Systems
	SWITCH	MTU AERO ENGINES AG	
	HEAVEN	ROLLS-ROYCE PLC	
	UP Wing	AIRBUS OPERATIONS GMBH	Ultra Performance Wing
	FASTER-H2	AIRBUS OPERATIONS GMBH	Advanced Low Weight Integrated Fuselage and Empennage
TRANSVERSAL AREAS	HERA	LEONARDO - SOCIETA PER AZIONI	Aircraft concepts enabling 30 to 50% reduction in emissions
	SMR ACAP	AIRBUS OPERATIONS GMBH	
	CONCERTO	DASSAULT AVIATION	Novel Certification Methods and Means of Compliance for Disruptive Technologies
	ECARE	AEROSPACE VALLEY	Developing a European Clean Aviation Regional Ecosystem (ECARE)

* Official launch of projects is still subject to legal redress and to successful completion of grant preparation

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