Part 21
Design Organisation Approval (DOA)
Implementation Workshop
Industry

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HALL 01/MARITIM Conference Room
MARITIM HOTEL KÖLN
Köln, Germany

Your safety is our mission.
Management of Changes to Jet Fuel Specifications

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Problem description & key messages

Fuel Specifications and changes thereof
- Background
- Record of the limitations
- Changes to the List of approved fuels

DOA aspects

Summary
Problem description:

- Improve awareness by Design Organisations, TCH/OEMs, on changes on Aviation Fuel Specifications and the effect of these at product level.

- What used to be a quiet area is more and more agitated due to alternative fuels.
Key Messages:

1. List of approved fuels at product level (A/C, engine) is an Operating Limitation. A change in this list is a major change to type design.

2. DAH should have a system to ensure proper control of the aspects related to Fuel Specifications and changes thereof. Establishing links to AFC is recommended to be part of this system.

3. EASA policy is described in Certification Memorandum CM-PIFS-009 (currently published for in EASA WEB Page for public consultation)
Concerns with fuel specifications are at aircraft and engine levels.

Intentional and also unintentional changes (fuel contamination) to fuel specifications may affect the Approved Product Design.

Such issues shall be considered by corresponding approved Design Organisations.
Fuel specifications and changes thereof are managed by so-called ‘Fuel Committees’: ASTM (USA), Def Stan (UK), Gost (Russia), etc.

Fuel Committees are supported by a small group of advisors representing:
- fuel producers
- Users
- OEMs and
- regulatory bodies.

Identification of Fuel Specification consists on:
- Fuel Specification name (i.e. ASTM D1655; DEF STAN 91-91)
- Issue suffix number (ASTM D1655-\textbf{11a}; DEF STAN 91-91 \textbf{issue 6})
The list that specifies the approved fuels at product level is regarded as part of the **Operating Limitations of that product.**

For engine and APU,

- List of compatible fuels and fuel additives (especially mandatory additives) should be recorded in the installation instructions established under CS-E 20 or CS-APU 20.
- EASA will refer to it in the TCDS.
- When changes to fuel specs. occur, the TC holder has to inform the aircraft TCH about changes to the installation instructions.
- If use of a certain fuel requires mandatory maintenance actions, these shall be listed in the ALS.
At aircraft level,

Fuel specifications shall be recorded in the aircraft TCDS and the AFM/RFM as a limitation.

Certification requires that the fuel filler openings are marked at or near the filler for possible fuel designations.

Any associated limitations, procedures or instructions for continued airworthiness shall be recorded in approved manuals such as the AFM or the ALS.
EASA relies on Fuel Committees for managing fuel specifications.

The qualification and approval of a complete new type of fuel proposal will result in a new fuel specification name.

A new issue number of an approved fuel spec. will happen in cases as:

- The qualification and approval of a new additive
  - Example: Approval of a new (blend in) additive (like SDA - static dissipater additive) for an existing fuel (like Jet A-1) is usually not a major change. It will be done treated like a normal change to the spec
- Addition of revised information as test methods, data tables, revised annexes, other.

A change in a Fuel specifications is made official after positive ballot and publication by the AFC (ref. ASTM D4054).

It is in this fuel qualification and approval process in which is highly recommended the participation of affected OEMs/TCH.
The List of approved fuels is an Operating limitation

Therefore any change introduced in the list must be treated as a major design change and approved by EASA (GM 21A.91(3.3)(v)).

Such changes include:
- Change to the fuel specification suffix number, if the list of approved fuels includes it.
- The introduction of a new fuel specification at product level

These major design changes have to be processed following defined Design Organisation procedures.

Authority for the use of 100 octane fuel. Source: [http://www.spitfireperformance.com/spit1vrs109e.html](http://www.spitfireperformance.com/spit1vrs109e.html)
The specification root number **and** the issue suffix number or revision level should be recorded when no robust system to follow the specification changes has been implemented (e.g. no participation in aviation fuel committees).

In this case, the Design Approval Holder should apply for a major design change each time the issue suffix number or revision level changes.

EASA will review the implementation of procedures regarding fuel specification changes in the frame of the DOA surveillance.
The aspects to be consider at **DOA level** would be:

- Awareness of the organisation and follow-up changes in fuel specifications which could impact their product design.

- Procedure(s) describing how to validate/account the effect of a change in fuel spec. on the applicable organisation design product.
The aspects to be considered at DOA level would be:

- Specific competences on this subject (CVE function) - relevant technical field of “Powerplant/fuel system”.

- Classification of changes:
  - Major design change, when operational limitations are affected
  - Minor design change (or no design change) in other cases

- Identification of allowable fuel specs to the product design in the approved design data dossier
  - In TCDS explicitly (or by reference to TCH documents)
  - In AFM, CMMs or supplements
  - Other type of ICA for aircraft
Summary

1. List of approved fuels at product level (A/C, engine) is an Operating Limitation. A change in this list is a major change to type design.

2. Publication of Approved Fuels for engines/APUs in installation instructions, for aircraft in AFM/RFM.

3. EASA policy for management of changes to Fuel Specifications is published in Certification Memorandum CM-PIFS-009.

4. At DOA level, DAH shall have a system to ensure proper control of the aspects related to Fuel Specifications and changes thereof. Establishing links to Aviation Fuel Committee is recommended to be part of this system.
Thank you for your attention

Any Question??

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BACK-UP
Jet A & Jet A-1

Jet A is the recognized US specification for jet fuel, Jet A-1 is the internationally recognized specification for jet fuel outside of North America. Both specifications have similar criteria for density, heating values (i.e. energy contents), but Jet-A1 has a slightly lower freeze point than Jet-A

Conventional hydrocarbons

Hydrocarbons derived from the following conventional sources: crude oil, natural gas liquid condensates, heavy oil, shale oil, and oil sands.

Alternative Fuels

Fuels synthesized from alternative sources other than petroleum. Typically are Fischer-Tropsch Synthetic Fuel, Bio-Derived Jet Fuel (ethanol, Biodiesel), Cryogenic Fuels (hydrogen, methanol)

Fuel Additive

Additives are fuel-soluble chemicals added in small amounts to enhance or maintain properties important to fuel performance or fuel handling.

Drop-in fuel

On the evaluation of jet fuel produced from non-conventional sources and the integration of these fuels into the existing supply system and onto existing aircraft, if the new or revised fuel is found to possess performance characteristics and chemical compositions essentially identical to conventional jet fuel, then it is called a “drop-in fuel.”
Examples of situations related to changes to fuel specifications

- Introduction of a new fuel in the list of accepted fuels to a type design. This is a Major change to type design, as the fuel is part of the limitation section in the AFM/RFM.

- Fuel contamination. Non aircraft fuel contaminates fuel delivery system (pipelines or barges) – FAME fatty acid methyl ester, resulting from biodiesel.
  - It may have Airworthiness consequences.
  - It could lead to evolution of fuel specifications, such as revision of allowable limits.
  - How is the response from DO to this type of events/occurrences? Do they trigger design changes at product level?

- Minimum aromatic content in fuel. Some elastomeric materials might need a minimum aromatic content in fuel to work properly. If this minimum is changed, the part may erode or deteriorate faster. This aspect is related to DO awareness of fuel spec. changes themselves.

- Use of alternative fuels (biofuels of HEFA) on Normal aircraft usage,

- Changes in fuel specs. As new additives or change additives quantities, could affect aspects as flammability, fluidity, lubricity, corrosion, compatibility with materials, etc. This could have as a consequence changes to the product design, or changes to maintenance instructions, period of inspections, other