Future Fuels and the Aircraft Fuel System

JETSCREEN Stakeholder Workshop - Session 3

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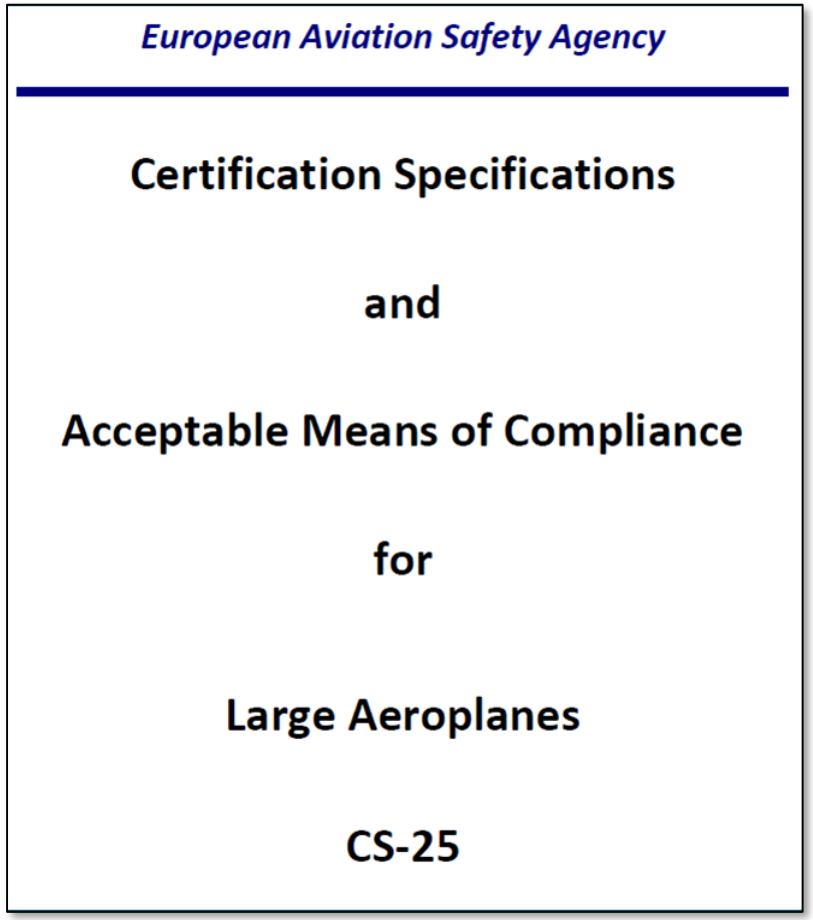
What Drives Fuel System Design?

- Aircraft are designed & certified to operate within set limitations, for example:
  - Flight envelope
  - Altitude
  - Max Take-off / Max Landing Weight
  - Number of passengers
  - …
  - Fuels



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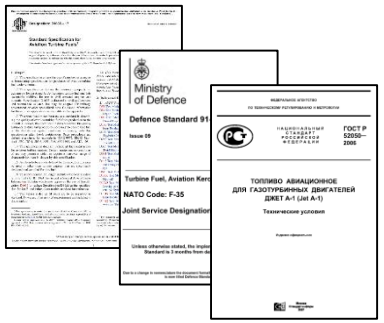
The link between Aircraft & Fuel



Jet A-1, Jet A, JP-5,
JP-8, No.3, TS-1, RT...

Specified Properties

Density, Flash point
Boiling range, Freeze point, Aromatics, Sulphur, Viscosity, Water seperability, Wear characteristics, Electrical conductivity…

Unspecified Properties

Vapour pressure, Air solubility, Flammability limits, Minimum ignition energy, Hot surface ignition temperature, Permittivity…

Design Requirements

- Top Level
  - Range, payload, weight, passengers…
- Fuel Systems (ATA28)
  - Fuel: Capacity, electrical loads, altitude, temperatures…
- Engine (ATA7x)
- APU (ATA49)

Detailed Design

- Refuel system
- Engine feed system
- Vent
- Inerting
- Structure
- …

Aircraft Certification & Delivery

Industrialisation & Production

Flight Test

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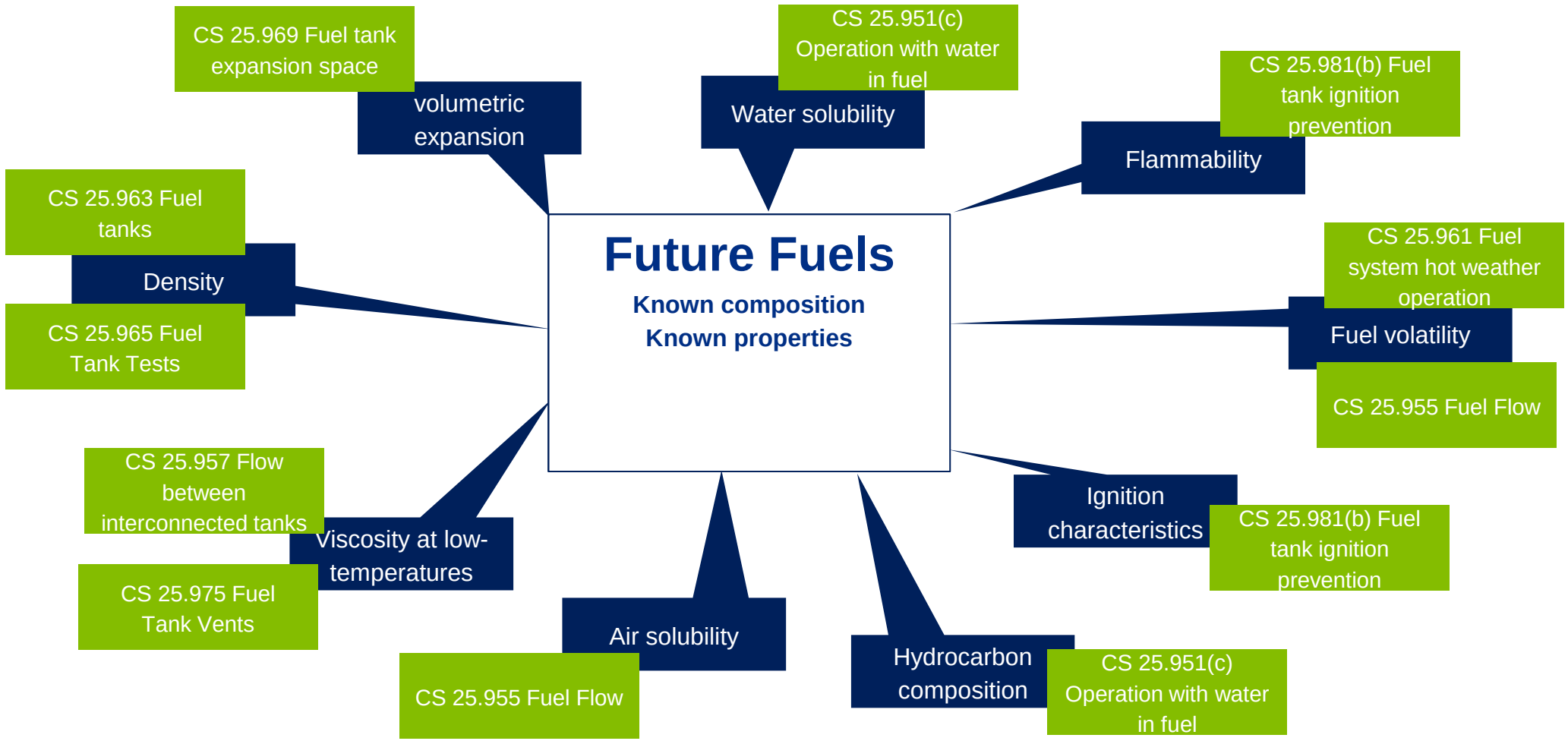
Interdependencies



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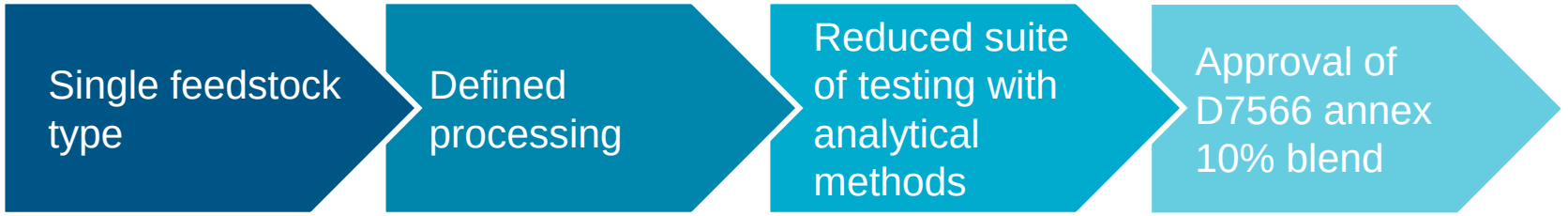
In Summary

- For each new fuel pathway that Airbus analyses, we look indirectly at these requirements:
  - Fuels produced from a proposed pathway are fit for purpose – The current ASTM D4054 process:

- Today, knowledge, experience and test method evolution has progressed industry to:



- To ensure the original certification basis of the aircraft is not impacted by the properties of a new fuel.

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Moving Forward…

- Long aircraft product lifecycles mean the scope for significant departures in fuel properties is limited in scope for current day aircraft
  – E.g. The Airbus A300 went out of production in 2007, but will be supported by Airbus until 2050...

- Iterative advancement of test methods and experience culminating in feedstock and production flexibility:
  – Identification on non-hydrocarbon chemistry → Advances in analytical test methods
  – Potential for a range of different fuel production pathways in one batch of fuel → Experience & confidence
  – Lower dependency on blending to meet specification properties → Experience and new feedstocks

- Future potential for a detailed compositional specification
  – Performance determined by composition → Understanding between properties and composition

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Thank you

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