



Federal Aviation
Administration



Safety Assurance of Associated Elements

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Overview

- Accommodation → Integration
- New Policy Memo Overview
- Moving Forward & Implementation

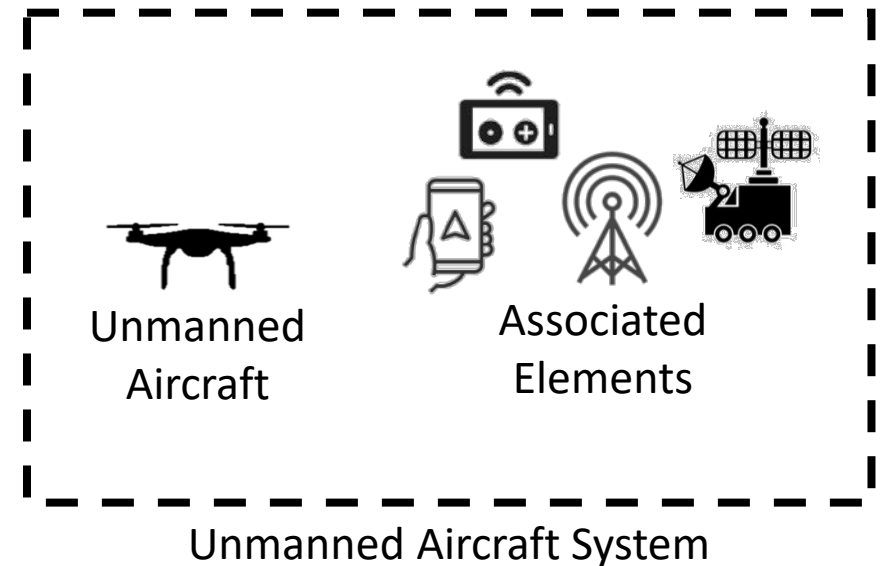


Definitions

“Associated elements” is a term derived from the statutory definition of an unmanned aircraft system.

“Unmanned aircraft system” is defined by statute at 49 U.S.C. 44801(12), Oct. 5, 2018, as: “An unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the operator to operate safely and efficiently in the NAS.”

A similar definition had been previously established in Public Law 112-95, Feb. 14, 2012, Section 331(9).



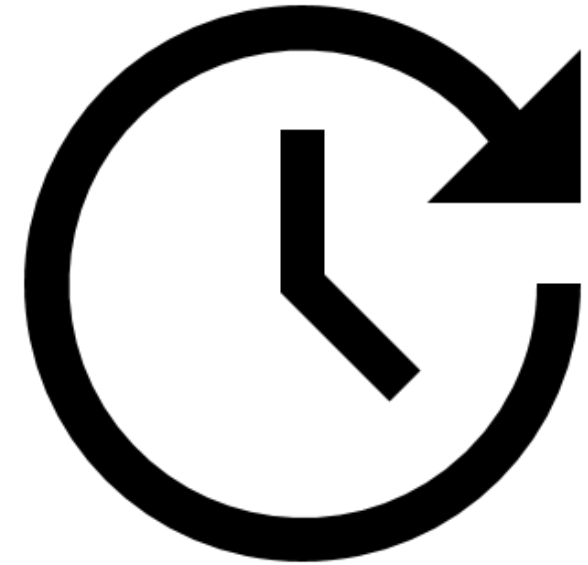
UAS Accommodation Issues

- Part 21 and part 43 were all written for a certificated product with all the systems affecting airworthiness onboard an aircraft and did not consider:
 - Ground control station
 - Direct C2 radio
 - Cloud computing and software
 - Crew communications
 - Internet
 - Cellular/satellite communications
 - Ground radars, radios
 - UTM
- Its impractical to have part 21 oversight (both design and manufacturing) over server farms, interchangeable “portal” devices (cell phones, laptops, etc.), or a “mission control” center overseeing hundreds of UA
- Similarly, it is impractical to invoke part 43 for maintenance on these components



Positioning for the Future

- Want to use our current projects to lay the groundwork for the future
 - Positioning deliberately towards the future to avoid establishing an incorrect precedent
- Have proposals from applicants that already challenge our regulatory framework
 - Current projects are pathfinders helping us to establish this foundation for the future



FAA UA & Associate Elements Approval

- AIR and AFS released a joint Policy Memo in July 2021
- Limited in scope to UA using the Durability & Reliability (D&R) Means of Compliance (MoC)
- Outlines the holistic approach for approval of
 - Unmanned Aircraft
 - Associated Elements
 - Integration of the Unmanned Aircraft System



FAA Aviation Safety

Memorandum

Date: 7/13/2021

To: See distribution list

From: Dr. Michael Romanowski, Director, Policy and Innovation Division,
Aircraft Certification Service, AIR-600
Bruce DeCleene, Director, Office of Safety Standards, AFS-001

Prepared by: Brian Cable, Manager, Systems Policy Branch, AIR-630
Chris Parfitt, Manager, Avionics Maintenance Branch, AFS-360

Subject: FAA Approval of Unmanned Aircraft Systems (UAS) Special Class UA
Projects and their Associated Elements

Memo No.: AIR600-21-AIR-600-PM01

Digitally signed by MICHAEL C. ROMANOWSKI
Date: 2021.07.13 12:08:13 -0400
BRUCE E. DECLEENE

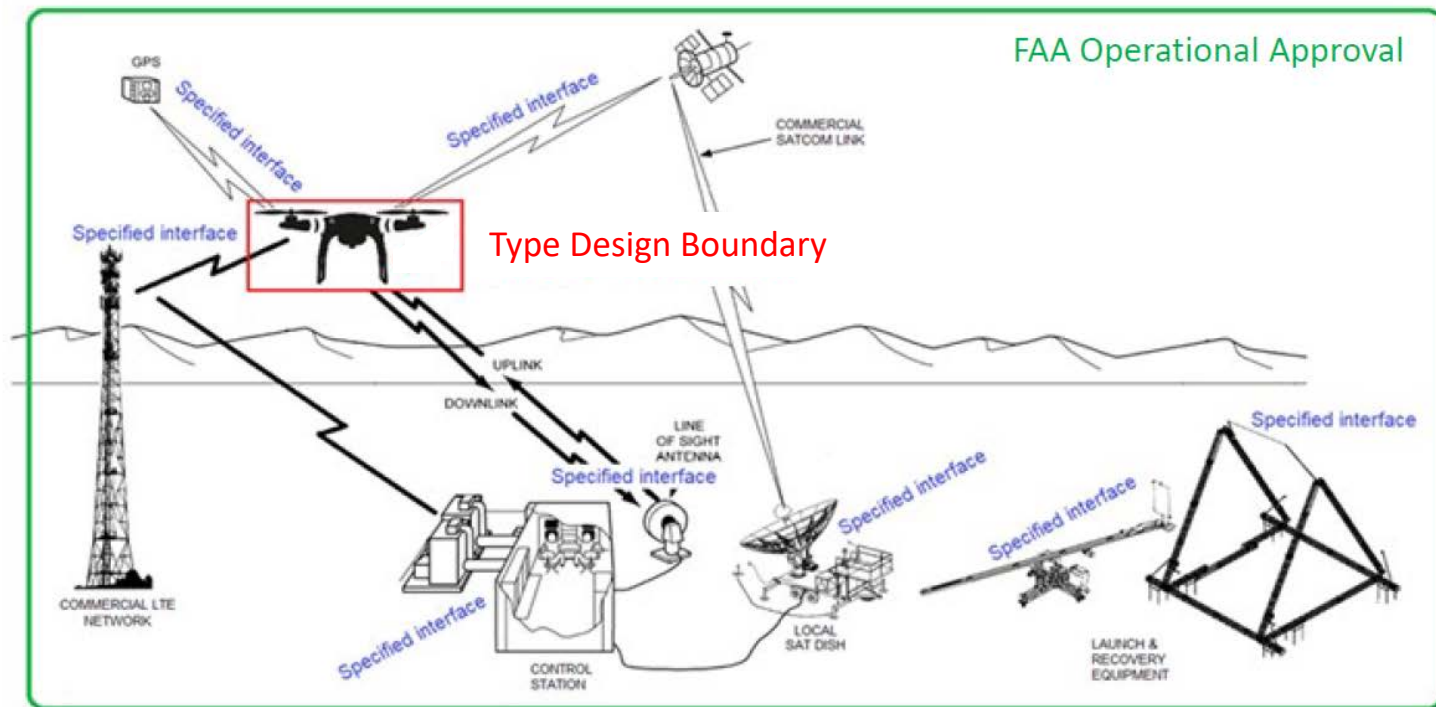
* Available on Dynamic Regulatory System –
<https://drs.faa.gov/browse/excelExternalWindow/115a6df8-5440-438c-ac3b-f31c6797409a>



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Type Certification Boundary

- TC boundary is limited to the Unmanned Aircraft
- AE Specifications part of the TC
- Approval of AE through operating limitations and operational approvals (waivers, exemptions, operating certificates)




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Let's Compare This Approach For AE To Fuel

OEMs Define Fuel Operating Limitations

The FAA Does Not Certify Fuel, We Certify EACH Airplane and Engine to Operate on Specified Fuel


ASTM Fuel Specification (With Additives)



Engine OEM Specifies Operating Limitations

- Includes Fuel Type & Additives



Aircraft OEM Must Specify Engine Fuel/Additive Operating Limitations



Fuel/Additive Operating Limitations Specified in Aircraft Flight Manual (AFM)

- Aircraft Operator Must Comply with Operating Limitations

FAA Flight Standards Service

FAA Aircraft Certification Service



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Operating Limitations are an End-Product of the Type Design

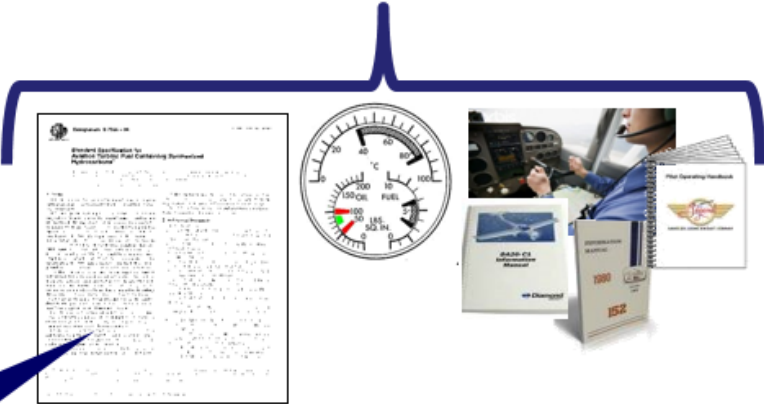
**“Operating Limitations are Established by the Administrator”
33.7(a)**

We’re using this same approach for the Associated Elements

**21.31
Type Design**
(Data Defining Configuration, Airworthiness Limitations, Noise/Emissions/Airworthiness Data)



**33.7, 23.2620, 25.1583
Operating Limitations**
(**Fuel specification**, airspeed, gross weight, rated thrust, oil temp, etc.)



Regulations Treat Fuel as an Operating Limitation

ASTM Fuel Specification



Looking back at AE

The approach to fuel serves as an example to the approach for Associated Elements

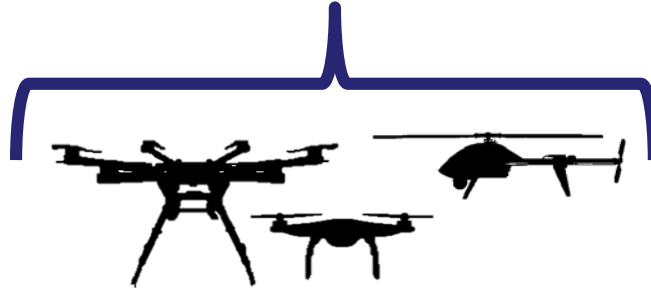
Operating Limitations are an End-Product of the Type Design

The FAA will establish the approved AE or minimum specifications as operating limitations

21.31
Type Design
 (Data Defining Configuration, Airworthiness Limitations, Noise/Emissions/Airworthiness Data)

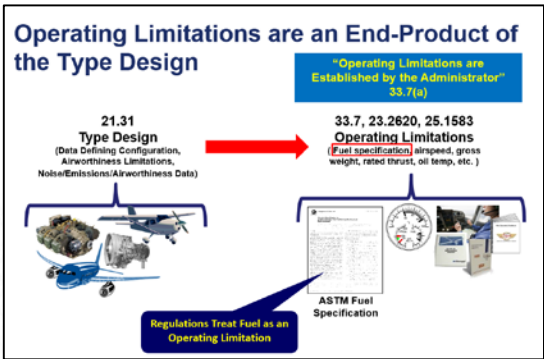


D&R Airworthiness Criteria
Operating Limitations



Associated Elements Specification

Airworthiness Criteria Treat AE as an Operating Limitation

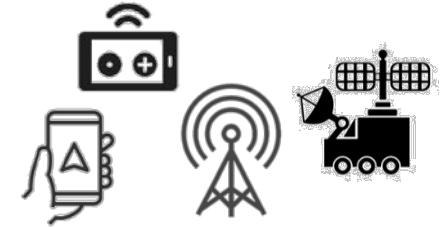


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OEMs Define AE Operating Limitations

One area of difference is there currently exist many consensus standards for fuel specifications – this does not exist for AE yet – the TC applicant will provide their own specification

The FAA Does Not Certify AE, We Certify the UA to Operate with Associated Elements



AE Operating Limitations Specified in Unmanned Flight Manual (UFM)

- Aircraft Operator Must Comply with Operating Limitations

FAA Flight Standards Service

The approach to fuel serves as an example to the approach for Associated Elements

Associated Element Specification

UA OEM Specifies Operating Limitations

FAA Aircraft Certification Service



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Implementation

- Holistic approach, with AIR and AFS engagement
 - While although the AE Specification is approved by AIR through the TC, AFS must be engaged to ensure the AE will be suitable for the operation
 - AFS and AIR working together to detail specific process
- AFS will generate conditions and limitations for waivers and exemptions necessary for safe operation of the UAS
- First 10 D&R UAS Airworthiness Criteria Notices were published in the Federal Register in November 2020
 - AIR is finalizing the adjudication of comments that also reflect updates per the policy memo



Moving Forward

- This policy is limited in scope to UA using the Durability & Reliability (D&R) Means of Compliance (MoC)
- The FAA is working on development of additional policy for larger, more complex UA
- Information Paper submitted to ICAO RPASP WGWHL/2, additional information will be provided at RPASP/18



Questions?



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FAA Aircraft Certification Service

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