iCNS Update:
UAS Certification
Considerations

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Paths to Flight
Multiple way to fly UAS for non-recreational reasons

Part 107
• UAS < 55 lbs.
• Class G Airspace*
• Visual Line of Sight*
• At or below 400ft*
• Fly during day*
• Fly at or below 100mph*
• No operations over people*
* Can receive a waiver or airspace authorization to fly beyond requirement

Type Certificate
• Type Certificate required for Standard Airworthiness Certificate
• Standard Airworthiness Certificate needed for Carrying Persons or Property for Compensation or Hire

333 Exemption/FESSA 2210
• Stopgap until Part 107 was Published
• UAS over 55 lbs.
• Pilot reqs. on case-by-case basis
• Requires COA for airspace authorization
• FESSA 2210 expands to BVLOS for Critical Infrastructure
Type Certification

The approval of a design for a product (aircraft, aircraft engine, or propeller). To obtain the approval, an applicant must show compliance to the applicable airworthiness standards, including noise and emissions.
UAS Type Certification

- UAS type certified as a system
  - Aircraft +
  - Required equipment (launch/recovery, etc.) +
  - Control Station +
  - Any engines and propellers can be certified as a part of the UAS +
  - **USS** Critical Services Infrastructure (C2 network, GBDAA, etc.)

USS: UAS Service Supplier
Current FAA Programs: USS certification path evolving

FAA UAS Data Exchange

The FAA UAS Data Exchange is an innovative, collaborative approach between government and private industry facilitating the sharing of airspace data between the two parties.

Under the FAA UAS Data Exchange umbrella, the agency will support multiple partnerships, the first of which is the Low Altitude Authorization and Notification Capability.

What is LAANC?

LAANC is the Low Altitude Authorization and Notification Capability.

It enables drone pilots access to controlled airspace near airports through near real-time processing of airspace authorizations below approved altitudes in controlled airspace.

Drone pilots can use applications developed by approved UAS Service Suppliers to access the LAANC capability.
Challenge – Building Risk Based Approach

- Risk Assessment Process Defines Risks, Risk Mitigations, And
- When Risk Controls Need FAA Validation for Integrity & Safety Assurance vs. Industry Compliance Process
- Must Avoid Overly Constrained Regulations to Enable UAS, and Consider the Aircraft, the Airmen, and the Airspace
Safety Continuum – Managed Risk

Part 25 Transport Category Passenger Aircraft
Large Part 25 Business Jets
Part 23 Commuter Aircraft
Part 23 Business Jets
Part 23 Light Jets, Twins
Part 23 Single Engine
Light Sport Aircraft
Amateur Built
Models
Toys

Level Of Certification Rigor & Oversight

Society’s Demand for Safe Outcomes

Societally Accepted Risk
Desire for Low Cost
Potential for Innovation

Zero Risk
No Operations
No Innovation
Absolute Safety
UAS Safety Continuum & Classification

- 6 Energy Based Risk Classes
- 12 Airspace Encounter Categories (AEC)
- Classifying boundaries for level of airworthiness, equipment approval, operational requirements, and commercial use
12 Airspace Encounter Categories (AEC)
UAS Risk Analysis

- Risk to People on Ground and In Air Determines If Design, Airworthiness, & Risk Mitigations Need Direct FAA Involvement

- Risk Analysis using FAA SRMP and JARUS SORA
- Above a Certain Risk, Need TC/PC
Risk Defines Who Validates Compliance

Small UAS:
- Low risk
- Low involvement from Aviation Authority
- Limitations: <55 lb.
- Visual line of sight, <400 ft. altitude, distance from airports and no ops over people

Specific Use Cases:
- Increased risk
- Operation by Waiver, Certificate of Authorization, Airworthiness
- Specific requirements on drone, personnel, equipment based on safety assessment and using industry standards

Fully Certified
- High Risk
- Fully Integrated Operations
- Risk-based Regulatory Structure similar to manned aviation
- FAA Design and Production Certificates

CFR Part 107
Waivers/Exemptions/Future Part 21 Changes
Typical Level of Certification
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CFR Part 107
Operator Compliance

Waivers/Exemptions/Future Part 21 Changes
Industry Compliance

Typical Level of Certification
FAA Compliance
Type Certification Process

- Concept presented in the **FAA and Industry Guide to Product Certification (CPG)**
- Organized into 5 phases:
  - Conceptual Design, Requirements Definition, Compliance Planning, Implementation, and Post Certification Activities
- Details described in Order 8110.4C, Type Certification
  - www.rgl.gov
- Descriptive Data (Drawings) + Compliance Data (Analysis/Test) = TC
New Type Design

21.17(a) Designate Applicable Regulations

Class
- Airplane
  - Normal: Part 23
  - Transport: Part 25

- Rotorcraft
  - Part 27
  - Part 29

Manned free balloon: Part 31

Category

Special Class
- Glider: AC 21.17-2A
- Airship: AC 21.17-1A
- Tilt-Rotor: 25 + 29 + TR
- Other nonconventional: UAS

Regulatory Certification Basis

Utilize Parts 23, 25, 27, 29, 31, 33, 35 as appropriate

Unique Airworthiness Requirements

+ Part 33, Part 35 As required
+ Special Conditions As required
Why § 21.17(b)?

§ 21.17(b) - For special classes of aircraft, including the engines and propellers installed thereon (e.g., gliders, airships, and other nonconventional aircraft), for which airworthiness standards have not been issued under this subchapter, the applicable requirements will be the portions of those other airworthiness requirements contained in Parts 23, 25, 27, 29, 31, 33, and 35 found by the [FAA] to be appropriate for the aircraft and applicable to a specific type design, or such airworthiness criteria as the [FAA] may find provide an equivalent level of safety to those parts. [Amdt. 21-92]

- Allows the FAA to tailor the certification basis for each product
- Can include
  - FAR’s (14 CFR Parts 23, 25, 27, 29, etc.)
  - Other airworthiness criteria
    - Special Conditions
    - Other Tailored Requirements
    - Standards
Type Certification Process

**Conceptual Design**
- Process Orientation
- Pre-Project Guidance
- Familiarization Briefing
- UAS Conceptual Design
- CONOP
- Risk Classification*
- Preliminary TCBM
- Operational Risk Assessment
- Certification Basis Established

**Requirements Definition**
- FAA Involvement-LOPI
- Preliminary TCBM
- Conformity Inspection Plan
- Applicant’s Responsibility
- Oversight and Delegation
- Conformity
- Interim TCBM

**Compliance Planning**
- Compliance Data Generation
- Compliance Substantiation
- Compliance Showing
- ATO/AFS Coordination

**Implementation**
- Type Inspection Report
- Data Retention
- Required Documents at Delivery
- TC Holder Info
- Continued Airworthiness
- ICA Changes
- Post Certification Evaluation

**Post Certification Activities**
- Compliance Data Generation
- Compliance Substantiation
- Compliance Showing
- ATO/AFS Coordination
Conceptual Design

• Must Define Clear Design, Intended Use, and Airspace for Intended Operation
• Requirements for Certification Driven by Specific Use Case – Concept of Operation
• Operational Risk Assessment Is Key Part of Process
• Risk Mitigation Strategy and “Safety Assurance” Come From Design, Operational Requirements, Maintenance, Training, Etc.
CONOPS

• Gives FAA clear understanding of proposed operations
• Includes
  – Description of UAS
  – Details of Intended Use
  – Proposed Area of Operations
  – Intended Classes of Airspace
• Enables development of ORA
Operational Risk Assessment

- Section 21.17(b) allows type design approval with cert basis developed from any source of airworthiness requirements deemed acceptable by FAA
- § 21.17(b) process will leverage existing aviation standards and practices as appropriate for risk class of UAS by tailoring applicable certification requirements
- Applicant should mitigate all hazards associated with design and CONOPS to acceptable level of safety through airworthiness requirements and operational limitations
Operational Risk Assessment

• ORA process identifies hazards associated with each UAS function and mitigations for each hazard
• Mitigations for specific hazard can include airworthiness requirements, operational limitations, or combination
• Contains all hazards for UAS and CONOPS, and proposal for airworthiness requirements and operational limitations that will mitigate the hazards
• Airworthiness requirements and operational limitations will be output to G-1 Issue Paper (IP) to define cert basis for project
Operational Risk Assessment

- To verify completeness of ORA, a Rule-by-Rule Evaluation is performed
  - Review existing manned aircraft, engine, and propeller regulations and determine applicability of regulation and hazard
  - For Risk Classes 1 and 2, utilize ASTM F2910-14
Operational Integration

- Type Certification does not grant Operational Approval
- Existing Operational Rules are still Applicable
  - §§ 61, 91, 119, 135, etc.
- Exemptions or waivers may be required for operational approval
  - Requires coordination with FAA Flight Standards Service (AFS) and Air Traffic Organization (ATO)
Requirements Definition

• All requirement contained in the G-1, and Method of Compliance in our G-2 Issue Papers
• Certification Basis is Published in Federal Register
• Public comments Indicate Public Acceptance/Concerns
• Final requirements published in Federal Register
• Seeking to Leverage Industry Standards As Much as Practicable – ASTM, SAE, RTCA, etc.
Compliance Showing

• **Purpose**
  
  FAA finds compliance with specific paragraphs of the applicable airworthiness standards, and aircraft noise and emissions requirements

• **Activities in this sub-phase include** –
  
  FAA data approvals after all inspections, analyses, and necessary tests are accomplished with satisfactory results.
Key Goal - Event Mitigation

• Actively Managing Risk
  – Proactively evaluate/mitigate risk – design and operational
  – Help FAA and Industry understand system/integration

• Avoid Regulating by “accident”
  – Fixes case-by-case, informal, temporary, & inconsistent
  – Often solved locally w/o standardization
  – Resident with local expert
  – Not timely/permanent - Policy, Reg., etc.
Partners, not Adversaries

• Open and timely communication
• Commitment to meeting schedules
• Early identification of potential issues
• Strive to resolve issues quickly at the project level
• Respect each other’s role on the team
• Develop an amicable working relationship
Partnership for Safety

• We’re on the same team
  – FAA view: The certification process is a team effort
  – Our goals are the same: To field a compliant, safe, and reliable product

• We each have our own roles
  – You are responsible for producing a compliant, safe, and reliable product
  – We are responsible, on behalf of the public, to verify that you have shown compliance

• We strive to work as partners, not adversaries
Summary & Contact

- Type Certification manages risk through Safety Assurance
- Collaboration on Certification Process is the Key to Success
- Operational Integration is still a Large Challenge
- The Los Angeles Aircraft Certification Office is the focal for UAS certification applicants
  - 3960 Paramount Blvd, Lakewood, CA 90712
  - Ph: (562) 627-5200