Areas for Further Technical Confidence Building

First Edition, July 5, 2018

1. Authorization

This document supplements the Implementation Procedures for Airworthiness (IPA) between the CAAC and the FAA.

2. Purpose

This document outlines the CAAC's Areas for Further Technical Confidence Building (AFTCB) with the FAA referenced in 3.5.3.3(0) of the IPA. These AFTCB are one component of the Safety Elements defined in IPA 3.5.3, and are used to determine the applicable validation process, and also to establish both the scope and depth of VA technical review in projects subject to the limited technical validation (LTV) process, as defined in IPA 3.5.5.

3. Areas for Further Technical Confidence Building (AFTCB)

3.0 All products and approvals

3.0.1 New Technology: New technology is technology that is new to the VA as a whole, not just new to VA team members. For example, if technology used by the applicant were new to the VA team but not new to the VA itself, it would not be considered new.

3.1 CCAR-23 aircraft

3.1.1 Acrobatic Airplanes.
Design features: Special aircraft category.

3.1.2 Canard configuration Airplanes.
Design features: Special aircraft general configuration.

3.1.3 Rear propeller configuration for single-engine Airplanes.
Design features: Special aircraft general configuration.

3.1.4 Advanced avionics and related functions not included in US SoD products and approvals during previous validation
Technologies: Application of new electronic technology, including but not limited to: Fly-by-Wire; Remotely Piloted Systems; Synthetic Vision Systems, Enhanced Vision System.

3.2 CCAR-25 aircraft

3.2.1 Super cooled large drops, ice crystal and mixed phase icing certification，including Super cooled large drops, ice crystal and mixed phase icing certification for air data probe.
Airworthiness Standards: FAR 25-140 Amendment.

3.2.2 Development Assurance Process Based on SAE ARP 4754A: Certification Criteria, Level of Involvement, Compliance activities for Development Assurance, including development assurance compliance means for highly integrated complex system/aircraft integration.

Airworthiness Standards: 25.1309.

3.2.3 Flight in icing conditions.

Airworthiness Standards: FAR 25-121 Amendment, Flight in icing conditions related sections: 25.21, 25.103, 25.105, 25.107, 25.111, 25.119, 25.121, 25.123, 25.125, 25.143, 25.207, 25.237, 25.253, Appendix C. FAR 25-140 Amendment, Flight in icing conditions related sections: 25.21, 25.105, 25.111, 25.119, 25.121, 25.123, 25.125, 25.143, 25.207, 25.237, 25.253, Appendix C, Appendix O.

3.2.4 Handling Qualities Evaluation under minimum weight.

Technologies: Compliance method for the Handing Qualities Evaluation under 25.25(b).

3.2.5 Integrated control of single lever of engine and propeller.

Airworthiness Standards: No single provision about this and a SC must be needed, referred terms are 25.1143, 25.1149, 25.1153, 25.1155, etc.

Design Features: Integrated control of single lever of engine and propeller based on FADEC, etc.

Technologies: Electronic control airplane, Full authority digital engine control.

3.2.6 Human Factors Certification.

Airworthiness Standards: 25.1302.

3.2.7 Icing, Vibration, installation, loads, control for propeller

Airworthiness Standards: 25.905、25.907、25.929、25.933、25.937、25.1027、25.1149、25.1153、25.1155 etc.

3.2.8 Fatigue & Damage tolerance: Development of the LOV for metallic structure.

Airworthiness Standard: 25.571.

3.2.9 Loads: Rudder Control Reversal Load Conditions.

Airworthiness Standards: ARAC is considering that it is need to add a new flight maneuver load condition to take account the presence of rudder reversals.

3.2.10 APU compartment fire safety, toxic Gas from Composite APU Tail Cone

Technologies: toxic Gas from Composite APU Tail Cone.

3.2.11 The qualification requirement, separation criteria, safety evaluation process, EWIS component failure rate, particular risk analysis (single wire chafing or arcing event) for EWIS system.

Airworthiness Standards: Subpart H; 25.17XX.

3.2.12 Application of DO-297 or incremental acceptance.

Note: Any new IMA architectures and protocol should treat as general new technologies of AFTCB.

Technologies: Safety analysis and compliance means of distributed integral modular avionics architecture in both platform system level and aircraft level. Especially, when new BUS technology used.

3.2.13 SW/AEH new technologies.

Technologies: SW/AEH new technologies such as formalization method,

special modular method.

3.3 CCAR-27 rotorcraft

3.3.1 Gyrocopter.
Design features: Special aircraft genera configuration.

3.3.2 Tiltrotor aircraft.
Design features: Special aircraft genera configuration.

3.3.3 Composite Rotorcraft Structures Damage Tolerance and Fatigue Evaluation to encompass the methodology including the process for establishing the replacement time, inspection methods, intervals, and thresholds.
Technologies: Application of Damage-tolerance methodology.

3.3.4 Advanced avionics and related functions not included in US SoD products and approvals during previous validation.
Technologies: Application of new electronic technology), including but not limited to: Fly-by-Wire; Remotely Piloted Systems; Synthetic Vision Systems, Enhanced Vision System.

3.4 CCAR-29 rotorcraft

3.4.1 Tandem helicopter.
Design features: Special aircraft genera configuration.

3.4.2 Tiltrotor aircraft.
Design features: Special aircraft genera configuration.

3.4.3 Composite Rotorcraft Structures Damage Tolerance and Fatigue Evaluation to encompass the methodology including the process for establishing the replacement time, inspection methods, intervals, and thresholds.
Technologies: Application of Damage-tolerance methodology.

3.4.4 Advanced avionics and related functions not included in US SoD products and approvals during previous validation.
Technologies: Application of new electronic technology, including but not limited to: Fly-by-Wire; Remotely Piloted Systems; Synthetic Vision Systems, Enhanced Vision System.

3.5 CCAR-33 engine

3.5.1 Certification requirement for additive manufacturing technology not previously validated in US SoD products. Specific areas of interest include additive manufacturing process and component forming technology, and the process for component verification and validation.
Airworthiness Standards: 33.15.
Design Features: Fuel nozzle, other component producing by additively manufacturing method.
Technologies: Additively manufacturing process and component forming technology, the process of additively manufacturing component

verification and validation technology.

3.5.2 Interaction between fan blade and fan case induced Sympathetic vibratory failure mode.
Airworthiness Standards: 33.83.
Design Features: Fan blade and fan case design feature.
Technologies: Sympathetic vibratory assessment and verification technology.

3.5.3 Probabilistic risk assessment for damage tolerance assessment of Nickel based alloy and other alloys used in the turbine rotor.
Airworthiness Standards: 33.70.
Technologies: Damage tolerance assessment and verification technology.

3.5.4 Probabilistic risk assessment for damage tolerance assessment of manufacture induced anomaly other than drilling hole.
Airworthiness Standards: 33.70.
Technologies: Damage tolerance assessment and verification technology.

3.5.5 Certification Requirements, and Compliance activities for Fuel burning thrust augmenter.
Technologies: The control of fuel burning thrust augmenter, the certification of influence of its problem and failure.

3.5.6 The determination of power extraction required is accomplished through appropriate analytical means for operation test. 33.89(a) (4).
Technologies: How to use analytical means to determine the power extraction.

3.5.7 Super cooled Large Droplet/Mixed Phase/ice crystal icing.
Technologies: These icing topics are international problems. At present, it's difficult to show compliance through engine test, as the test conditions are difficult to simulate. Main compliance method is in flight experience combined with relevant analysis.

3.5.8 Show compliance by analysis instead of ice ingestion test.
Airworthiness Standards: 33.77.

3.5.9 Control system control laws.
Airworthiness Standards: 33.28(b).

3.5.10 Control system protection function and architecture.
Airworthiness Standards: 33.28(f).

3.5.11 Control system fault accommodation logic.
Airworthiness Standards: 33.28(d), (e), (h), and (i).

3.5.12 Control system environment test and local event.
Airworthiness Standards: 33.28(b) (d).

3.6 CCAR-35 propeller

3.6.1 Certification requirement for additive manufacturing technology not previously validated in US SoD products. Specific areas of interest

include additive manufacturing process and component forming technology, and the process for component verification and validation.

Airworthiness Standards: 35.17.

Design Features: Unknown design feature, potential use on the propeller component.

Technologies: Additively manufacturing process and component forming technology, the process of additively manufacturing component verification and validation technology.

3.6.2 Certification Criteria, Level of Involvement, Compliance activities for propeller electric control system software certification DO-178C certificate 71 objective requirement and 5 supporting document, and all related technology not previously validated in US SoD products.

Airworthiness Standards: 35.23.

3.6.3 Certification Criteria, Level of Involvement, Compliance activities for propeller electric control system hardware certification (simple and complex hardware), and all related technology not previously validated in US SoD products.

Airworthiness Standards: 35.23.

3.7 CCAR-31 Manned Free Balloons

The CAAC will conduct a full technical validation (FTV) of the first FAA application for a CCAR-31 CAAC VTC or VSTC. After the conclusion of the first program the CAAC will document any areas for further technical confidence building under this paragraph.

3.8 Special Class - To include but not limited to:

3.8.1 Gliders (standard and motorized)

3.8.2 Unmanned Aircraft (payload and/or passenger carrying)

3.8.3 Powered Lift/Hybrid Vertical Takeoff and/or Landing (VTOL) Aircraft

The CAAC will conduct a full technical validation (FTV) of the first application for a CAAC VTC or VSTC for each special class of aircraft. After the conclusion of the first program the CAAC will document any areas for further technical confidence building under this paragraph.

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