



FAA
Aircraft Certification Service

Changed Product Rule Recommendations

Aircraft Certification, Safety, and Accountability Act (ACSAA)

Section 117, Changed Product Rule

International Authorities Working Group

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Executive Summary

In December 2020, the Aircraft Certification, Safety, and Accountability Act (ACSAA) was signed into law. Section 117 of ACSAA, focused on the Changed Product Rule (CPR), requires the Federal Aviation Administration (FAA) to revise and improve the policy and standards related to the amended type certificate process. The FAA was tasked to reevaluate the existing assumptions and practices inherent in the amended type certificate process and assess whether such assumptions and practices are valid, including current practices to ensure that proposed changes to an aircraft are evaluated from an integrated whole aircraft system perspective. The FAA was specifically tasked to consider whether a fixed time beyond which a type certificate may not be amended would improve aviation safety and whether certain design characteristics, such as a new or revised flight control system, should preclude the issuance of an amended type certificate.

The CPR has significant importance to not only those authorities that are States of Design (SoD), but also to those authorities who have a substantial stake in the validation of SoD products and those that engage in the practical application of their own design changes. In an effort to reduce multiple international certification approaches, it is imperative that authorities work collectively to harmonize their respective rules and associated guidance. The ACSAA mandates the FAA to form an international team to address areas of concern related to the CPR. Therefore, the FAA established the CPR International Authorities Working Group (IAWG), consisting of civil aviation authorities engaged in the certification and validation of aviation products. Participating authorities include the Federal Aviation Administration (FAA), European Union Aviation Safety Agency (EASA), Transport Canada Civil Aviation (TCCA), National Civil Aviation Agency of Brazil (Agência Nacional de Aviação Civil) (ANAC), CAAC (China), and Japan Civil Aviation Bureau (JCAB).

1. International Authorities Working Group Charter Objectives

In response to ACSAA, the FAA chartered and led an IAWG to review and recommend improvements to CPR implementation based on the requirements and recommendations in the ACSAA, Department of Transportation (DOT) Special Committee (SpecComm) and Joint Authorities Technical Review (JATR) reports. The IAWG also applied lessons learned based on more than a decade of harmonized application of CPR to formulate their recommendations for improvement, as well as seeking input from the public through existing advisory venues and public meetings.

The CPR IAWG finalized the charter in June 2021 with identified objectives:

- Review and respond to U.S. legislation on CPR and other relevant congressional reports
- Review and analyze all JATR and DOT Special Committee recommendations related to CPR and develop a proposal to address the recommendations for FAA review and approval
- Review relevant lessons-learned from authorities who have operational experience in the application of CPR
- Consider the full range of necessary changes to include; harmonized rulemaking proposals, policy changes, and training
- Consider system safety concepts and how they may play a role in change product outcomes
- Evaluate joint international policy and training and make recommendations as needed for assessing design changes to one system that affect other unchanged systems (including operations)
- Recommend criteria for determining when a new type certificate is warranted (as an example; taking into consideration cumulative changes over time)
- Identify technical, procedural, and standardization gaps and develop a path for addressing these gaps
- Short-term – To achieve maximum benefit and efficiency, focus proposals on policy and training changes that can be implemented as in impactful short-term win
- Long-term – If necessary, propose significant changes and rule making considerations that would be implemented over a longer period
- Focus outcomes on harmonization and consensus to the fullest extent possible.

2. IAWG Approach and Considerations

Since September 2021, the IAWG has been meeting on a weekly basis to discuss three sub-areas specific to the CPR process and regulatory requirements, 1) Title 14 Code of Federal Regulations (CFR) 21.19 (Substantial changes), 2) § 21.101 (Significant changes) and 3) other regulatory means for advancing certification basis.

The IAWG, with extensive in-depth discussions and research, has come to a consensus in several areas, which propose both rulemaking and guidance improvements. The IAWG has identified a few areas where the IAWG has determined that additional review is needed in order to achieve alignment to the fullest extent possible. The IAWG also recommends engagement with industry in specific areas for advice and additional information.

3. Outreach

The IAWG made specific requests for input from the public, and other nonmember authorities through use of the Safety Oversight and Certification Advisory Committee (SOCAC). At the December 2021 SOCAC meeting, the FAA provided an overview of the IAWG charter and activities, a summary of the associated legislation, and an expectation of the type of feedback

that the IAWG would like SOCAC to provide. The IAWG obtained immediate feedback on CPR IAWG activities and progress to inform the FAA's approach throughout the process.

For the May 2022 SOCAC agenda, the FAA employed the use of a structured panel to gain feedback from SOCAC members on two contentious topics, 1) use of "impracticality" exceptions, and 2) application of objective criteria for determining "substantial" and "significant" changes. Five subject matter experts were selected due to their product development experience and the diversity of product and projects types when complying with the CPR requirements.

Materials from the SOCAC activities can be found at:

https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/committee/browse/committeeID/717

4. Independent Study – MITRE Report

The MITRE Corporation's Center for Advanced Aviation System Development, at the request of the FAA, completed an assessment of two reforms to the aircraft type certification process that were proposed in Section 136 of the Act. This tasking included reviewing two elements, 1) whether or not aviation safety would improve as the result of institution of a fixed time beyond which a type certificate may not be amended and 2) requiring the FAA Administrator, when issuing an amended or supplemental type certificate for a design that does not comply with the latest amendments to an applicable regulation, issue an exemption in accordance with section 44701 of title 14, United States Code, or make a finding of an equivalent level of safety in accordance with § 21.21(a)(1).

In both cases, MITRE did not recommend the implementation of the two proposals. They cited their assessment including the cost and benefits of each. They also noted that in the course of that assessment, they identified an alternative approach to achieve a similar outcome at lower cost. Though they did not recommend Element 2, they did highlight inconsistencies in the content and format of the type certification data sheets (TCDS), both between aircraft and internally between models. They cited limited guidance on the content and format of the TCDS and on the documentation of exceptions.

MITRE's alternative approach for Element 1 included identifying safety-critical certification standards and then customizing the negotiability within the CPR process as appropriate for each identified standard.

The IAWG has similarly evaluated these two aspects and reached consistent conclusions. As part of the collection of lessons learned at the start of the IAWG, the authorities agreed that improvement were needed to the TCDS and supplemental type certificate (STCs) in documenting a clear certification basis to include CPR exceptions as permitted by § 21.101(b). Additional information and further detailed discussions are provided specific to proposal 1BG6, documentation of certification basis on certificates.

Also, the concept of identifying safety-critical certification standards and then customizing the negotiability were similarly discussed within proposals 1BG3, use of system safety methodologies to improve the process in determining the certification basis and also within Subgroup 1C for exploring other means to advance the certification basis.

The IAWG recommends improvements to the CPR process and the policy and guidance materials consistent with the principles outlined within the MITRE report.

5. Recommendations

5.1 Short-Term Recommendations

The IAWG recommends developing new policy and training based on those recommendations that have been proposed and are approved by each of the Authorities (short-term – See Table 1). This also included those recommendations, which do not require updates to existing policy or guidance to implement (e.g., implementation of an advisory board).¹

Table 1 – Short-Term Policy Recommendations

Section 21.19 of Title 14 CFR: Substantial Changes		
<i>Proposal 1A3 – Substantially complete investigation vs. threshold for extensive change</i>	Most IAWG members identified that an extensive design change would always require a substantially complete investigation of compliance and supported retaining the existing language within the rule without modification. The overall recommendation is to clarify, within the guidance materials, the existing intent of the rule with no change.	Recommend to Adopt - Policy/Guidance Updates
<i>Proposal 1A5 – Establish a Changed Product Project Advisory Board</i>	The IAWG recommends the establishment of an Advisory Board (scalable to the Authority) to evaluate §§ 21.19 & 21.101 determinations, promoting consistency and standardization both internal and external to the Authority.	Recommend to Adopt – No rulemaking or policy/guidance updates
Section 21.101 of Title 14 CFR: Significant Changes		
<i>Proposal 1BG1 – Secondary changes</i>	Remove concept of secondary changes within guidance material.	Recommend to Adopt - Policy/Guidance Updates
<i>Proposal 1BG3 – Use of system safety methodologies to improve the process in determining the certification basis</i>	Change Impact Assessment/safety documentation – Review of systems/structure, other systems / integration, and aircraft-level requirements A comprehensive integrated system-level analysis recognizing that in this complex interactive system, every change could interact with other parts of the system The assessment of the proposed design changes on existing systems at the aircraft level includes using development assurance principles, system safety principles, and validation & verification techniques. The level of assessment should be proportional to the impact of the change at the aircraft level The IAWG recommends that this proposal be further reviewed within Stage 2 to develop policy and guidance information.	Recommend to Adopt – Policy and Guidance Updates

¹ The CPR IAWG report is available upon request. Make requests to 9-AVS-DAH-Info@faa.gov

<i>Proposal 1BG4 – Baseline product</i>	Proposal 1BG4 proposes to revise the guidance material on the baseline product (aircraft/engine/propellers) to be consistent with the interpretation of § 21.101.	Recommend to Adopt - Policy/Guidance Updates
<i>Proposal 1BG5 – Cumulative effect and related changes</i>	The IAWG recommends that guidance and policy improvements be developed and incorporated within the Order 8110.48 and AC 21.101-1 and addressed within Stage 2 of the IAWG charter.	Recommend to Adopt - Policy/Guidance Updates
<i>Proposal 1BG6 – Documentation of certification basis on certificates</i>	The IAWG recommended that guidance information should be developed to include requirements to ensure complete documentation of the certification basis, including the regulations, applicable amendments, special conditions, equivalent level of safety (ELOS) findings, improved design features (EASA and FAA), § 21.21(b)(2) requirements, exemptions, and exceptions. The IAWG also recommends that a common format for the certification basis would be helpful.	Recommend to Adopt - Policy/Guidance Updates
Other Means to Advance the Certification Basis		
<i>Proposal 1C3 - Introduce a process to systematically evaluate new or amended rules to determine whether to adopt a time limit, after which reversion or exception would not be granted.</i>	The IAWG recommends that Authorities introduce within their regulatory framework, if not already in place, a process for the systematic evaluation of newly adopted or amended design standards for eligibility to become the minimum acceptable level of safety for future design changes, for future production aircraft, or for retrofit for in-service aircraft. The IAWG acknowledges there are means within their current regulatory framework that could be utilized for implementing this recommendation. These current regulations include Part 26, CFR/CAR/CCAR 2X.2 (Special Retroactive Requirements), and operational rules e.g., Part 121.	Recommend to Adopt - Policy/Guidance Updates

5.2 Long-Term Policy Recommendations

The IAWG recommends that any rulemaking activities and significant policy requirements be identified as long-term actions. Those areas that have been identified as requiring rulemaking actions, it is recommended that a dedicated rulemaking team be formed to develop an NPRM and rulemaking package. A rulemaking advisory committee may or may not be warranted to provide advice and recommendations concerning a full range of CPR-related recommendations. Additionally, the following policy changes have been identified as significant and are proposed as long-term policy changes. See Table 2 for a summary of the seven recommended long-term actions. Two proposals are included within this table as a consensus of the team could not be reached and as such are identified as significant policy aspects that would necessitate additional deliberation and potential public input.

Table 2 – Long-Term Significant Policy Recommendations and Rulemaking Tasks

Section 21.19 of Title 14 CFR: Substantial Changes		
<i>Proposal 1A1 – Establish</i>	When establishing objective criteria, the IAWG recommended to allow proportionality in § 21.19 (similarly to that already allowed in § 21.101(c)).	Recommend to Adopt - Rulemaking and

<i>Objective Criteria</i>	Historical data should be used as the basis for determining these differences that may be warranted across product types. The team has developed an initial list of products (see Appendix 5) for consideration. The team has also developed additional guidance for each of the areas defined within § 21.19 (design, power, thrust, and weight) for consideration.	Policy/Guidance Updates
<i>Proposal 1A2 – Establish Reference Type Design Configuration Definition</i>	The IAWG recommends the following definition to be established for the reference type design configuration: Reference Type Design Configuration: The configuration to be identified when completing the § 21.19 evaluation is the type design configuration of the initial type certification. A reference type design configuration may be established to a later basis if the applicant demonstrates compliance with all the airworthiness requirements applicable to the category of the product in effect on the date of the application for the whole aircraft without any reversion (exception) granted. (See Appendix 2, Cases 3 and 4 for examples).	Recommend to Adopt - Policy/Guidance Updates
Section 21.101 of Title 14 CFR: Significant Changes		
<i>Proposal 1BR1a – Eliminating Impractical Exception</i>	The majority of the authorities were supportive of removal of the impractical exception; however, a few authorities had concerns with the removal based on limitations within their regulatory system in granting exemptions in lieu of exceptions.	Recommend to Solicit Public Input and evaluation of concepts developed by IAWG. Potential for rulemaking and/or policy and guidance changes.
<i>Proposal 1BR1b – Combining Impractical and DNCMLS Exceptions</i>	Two authorities proposed combining the does not contribute materially to the level of safety (DNCMLS) and impractical exceptions as interpreted by some authorities in the current Appendix E to GM 21.A.101 and revising the labor/dollar criteria with a “level of effort” approach. Most authorities were supportive of the principles behind this alternative approach, but the IAWG recommends further discussion to better identify implementing the practicality of the concept with specific attention to identification of the impacts, documentation expectations (to include potential for public review/transparency for exceptions), the benefits that would be introduced and review of specific examples for improving comprehension.	Recommend to Solicit Public Input and evaluation of concepts developed by IAWG. Potential for rulemaking and/or policy and guidance changes.

<i>Proposal 1BR3 – Structuring Rule language to be Consistent with Current Process</i>	<p>Proposal 1BR3 adds new language to § 21.101(a) as follows. The added text is shown in brackets. Note the rule language may be slightly different for each authority, although the intent would be the same.</p> <p>(a) An applicant for a change to a type certificate [that does not require an application for a new TC under § 21.19] must show that the change and areas affected by the change...</p>	Recommend to Adopt - Rulemaking and Policy/Guidance Updates
<i>Proposal 1BR4 – Product Level Evaluation for Significant Determination</i>	<p>Proposal 1BR4 changes § 21.101(b)(1) as follows. The added text is shown in brackets. A change that the FAA finds not to be significant [at the product level]. In determining whether a specific change is significant [at the product level]...</p>	Recommend to Adopt - Rulemaking and Policy/Guidance Updates
<i>Proposal 1BR5 – Adequate Certificate Basis</i>	<p>Proposal 1BR5 adds new language to § 21.101(b) as follows. The added text is shown in brackets. Note rule language may be slightly different based on the authority.</p> <p>Except as provided in paragraph (g) of this section, if paragraphs (b)(1), (2), or (3) of this section apply [and the certification basis is adequate], an applicant may show that the change and areas affected by the change comply with an earlier amendment of a regulation required by paragraph (a) of this section...</p>	Recommend to Adopt - Rulemaking and Policy/Guidance Updates
<i>Proposal 1BR6 – Significant Change Criteria</i>	<p>Proposal 1BR6 modifies § 21.101(b)(1) as follows.</p> <p>(1) A change that the FAA finds not to be significant. In determining whether a specific change is significant, the FAA considers the change in context with all previous relevant design changes and all related revisions to the applicable regulations incorporated in the type certificate for the product. Changes that meet one of the following criteria are automatically considered significant:</p> <p>[(i) The general configuration is not retained, or (ii) The principles of construction are not retained, or (iii) The assumptions used for certification of the product to be changed do not remain valid.]</p>	Recommend to Adopt - Rulemaking and Policy/Guidance Updates
<i>Proposal 1BG2 – Additional design requirements and conditions (ADRCs)</i>	<p>Further review of the use of (improved design features) ADRCs is necessary to ensure that there is an aligned approach when one authority uses them and how those requirements translate into another authority's system. If alignment can be determined (e.g., use of special conditions, equivalent levels of safety, rules of particular applicability, etc.), the IAWG proposes to update the guidance material to further clarify the use and documentation of additional design requirements and conditions (ADRC) for improved design features in the certification basis as currently used by some authorities.</p>	<p>Recommend to Solicit Public Input and evaluation of concepts developed by IAWG.</p> <p>Potential for rulemaking and/or policy and guidance changes.</p>

6.0 Conclusion

The IAWG makes several proposals for adoption and further exploration within Stages 2 and 3 of the IAWG. Each authority will have the opportunity to review and provide comments prior to finalizing the recommendations.

The FAA is committed to improvements to the CPR Process and continuing to monitor our regulations, policy and guidance materials to ensure appropriate certification of products and their changes to include the introduction of novel and usual designs and safety critical design features. These efforts are consistent with the FAA's on-going commitment to its safety mission