

DISPOSITION OF FAA COMMENTS

AC 21.101-1B, *Establishing the Certification Basis of Changed Aeronautical Products*

Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ACE-112	2.2.1.1	"Section 21.101(a) requires a change to a TC to comply..."	Is it a "change to a TC"? Or a "major change to a type design"?	Reconsider how this is worded maybe? Not a big deal though.	Disagree. Maintain consistency with § 21.101 language.
ACE-112	2.2.6	Section 21.101(f) pertains to aircraft certificated in certain categories and special classes (e.g., gliders, airships, and other nonconventional aircraft), including the engines and propellers installed on them, under the requirements of §§ 21.17(b), 21.24, 21.25, and 21.27 airworthiness requirements.	Add balloons.	Section 21.101(f) pertains to aircraft certificated in certain categories and special classes (e.g., gliders, airships, and other nonconventional aircraft, and balloons certificated under Part 31), including the engines and propellers installed on them, under the requirements of §§ 21.17(b), 21.24, 21.25, and 21.27 airworthiness requirements.	Agree. Amended as suggested.
ACE-112	3.1.1	"...but should not depend on the whether the TC holder or the applicant for a STC is originating the change."	Grammar "a" STC should be "an" STC. Unless silent "sound" rules have change? But that is not the main point. I do not agree that classification for STC and TC is the same when determining "substantiality".	Suggest clarifying that this is for determination of "significant or not significant"... Substantial may require more effort for an STC holder. I think we discussed that ... and since we discuss substantiality in this AC... I think that clarification is important.	Partially agree. Changed "a" to "an." No further clarification required.

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ACE-112	3.11	"...the changed product does not result..."	Not a big deal ... just seems awkward sentence.	Should this be "...the change to the product..." ?? Or "...the change does not result in any unsafe design features or characteristics for the intended use of the product." ???	<p>Agree. Amended as indicated:</p> <p>"The FAA considers a proposed certification basis for any design change (whether it is significant or not significant) to be adequate when—</p> <ul style="list-style-type: none"> • The airworthiness standards provide an appropriate level of safety for the intended change, and • The change and the areas affected by the change do not result in any unsafe design features or characteristics for the intended use."
ACE-112	5.10 to 5.10.5	"A TC amendment..."	We also see some STCs that integrate other STCs integrated into them... so I suggest making the wording more robust to capture this.	for 5.10.1 and after... suggest: "The TC or STC amendment integrates a single STC..."	Partially agree. Amended the entire section per suggestion from Airbus, with change of term from "integration" to "incorporation."
ACE-112	5.9.2.1	"This form is provided in appendix G of this AC and follows the flowchart in figure 3-1 of this AC. It should be submitted along with the certification plan."	It should also be submitted to the Directorate as an attachment to the CPN.	"This form is provided in appendix G of this AC and follows the flowchart in figure 3-1 of this AC. It should be submitted along with the certification plan and the ACO should attach it to the Certification Project Notification to aid the Directorate in their determination of significance.	Disagree. This guidance is in FAA Order 8110.48.

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ACE-112	5.9.3.2	"The FAA will document the certification basis of each product model on an STC..."	Clarification requested... there are "Multi model" STCs as well.	"The FAA will document the certification basis for each product model as changed on any STC, including Approved Model List (AML) STCs ."	Agree. Amended as indicated: "5.9.3.2 The FAA will document the certification basis of each product model on all STCs, including Approved Model List STCs."
AIR-500	Cover page, Header	Date section	In the AC's header, the "Date:" section needs to be filled in once this AC is signed.	Strike "Comment Draft" and replace with "[the date this AC is signed]"	Disagree. Instead, replaced with the issue date for when the AC was signed.
AIR-500	Cover page, Opening paragraph	"This advisory circular (AC) provides guidance for the application of the Changed Product Rule, Title 14 of the Code of Federal Regulations (14 CFR) 21.101 and 21.19...", but the CFR lists different titles for these sections.	Section 21.19 is listed as follows in the CFR: "§21.19 Changes requiring a new type certificate," and section 21.101 is listed as "Title 14: Aeronautics and Space, PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS, Subpart D—Changes to Type Certificates §21.101 Designation of applicable regulations."	Please use the official name of each section and/or clarify that you are using the widely used name of the relevant regulations.	Partially agree. Instead, changed to "guidance for application of the "Changed Product Rule," pursuant to Title 14 of the Code of Federal Regulations (14 CFR) 21.101, <i>Designation of applicable regulations</i> , and 21.19, <i>Changes requiring a new type certificate</i> , for changes made to type certificated aeronautical products."
AIR-500	1.1	In the 6th and 7th lines, the following acronyms are established: "...the certification basis for an amended TC (ATC), supplemental type certificate (STC), and amended STC..."	The first one uses the acronym TC in "amended TC," while the second, "supplemental type certificate," does not.	To be consistent in the use of acronyms, consider striking "type certificate..." and replacing it with "supplemental TC (STC)", or spell it out in each case.	Disagree. "STC" is a commonly used acronym in certification. The "ATC" acronym is less commonly used and typically reserved for use as "air traffic control." Deleted the ATC acronym and left STC as is.

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AIR-500	1.1	In the final sentence of 1-1, the following appears: "...detailing the requirements (evaluations, classifications, and decisions) to be made throughout the process."	Is "made" the proper or best word to use here? Can "requirements" be "made"?	"...detailing the requirements (evaluations, classifications, and decisions) to be made satisfied throughout the process." Or, if "made" is what is meant, perhaps "established" would be a better word.	Agree. Amended as follows: "The guidance describes the process for establishing the certification basis for an amended TC, supplemental type certificate (STC), and amended STC, detailing the requirements (evaluations, classifications, and decisions) throughout the process."
AIR-500	1.2.1	Here the terms defined in 1.1 are listed in the following order: "...applying for STCs, ATCs, or amended STCs," which is a different order than used in 1.1.	Terms listed in different order in 1.1 and 1.2.1	Consider which sentence uses the most logical order to list these terms, if logic applies to such, and then use that same order in both sentences: 1.1 and 1.2.1	Agree. Amended as suggested.
AIR-500	1.2.2	"... References to "design change" includes the design change..."	In the final sentence of 1.2.2, the plural noun "References" does not agree with "includes" that follows (the prepositional phrase is ignored for such noun/verb agreement purposes).	Change "includes" to "include" for: "... References to "design change" include the design change..."	Agree. Amended as suggested.
AIR-500	1.2.3	"...to the level of safety" provision pursuant to § 21,101(b)..."	In the second line, the word "pursuant" is used.	Consider replacing "pursuant" with "established in" or "found in," for: "...to the level of safety" provision found in § 21,101(b)..."	Partially agree. Instead, changed "pursuant to" to "of."

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AIR-500	1.2.5	“The term aeronautical products, or products, means type certificated aircraft, aircraft engines, and propellers.”	There is a noun/verb agreement issues here, along with punctuation that complicates things grammatically.	Consider clarifying this sentence by rewriting as follows: “For the purposes of this AC, the terms “aeronautical products” and “products” refer to type certificated aircraft, aircraft engines, and propellers.”	Partially agree. The sentence, as proposed, is punctuated correctly and grammatically correct. However, we tweaked the sentence to more closely align with the definition of "product" in § 21.1(b)(5) as follows: "1.2.5 The term aeronautical product, or product, means a type certificated aircraft, aircraft engine, or propeller."
AIR-500	1.4.2 and throughout document		In the 2nd line, the word “principals” is used when it seems that “principles” is what is needed.	“Principle” is only ever a noun that refers to a rule, law, or general truth (e.g., the rules or principles of mathematics), so if that is what is meant here, please strike “principal” and replace with “principle.”	Agree. Amended as suggested.
AIR-500	1.4.5 and throughout document		In the first bullet, the first two words should be hyphenated.	Please hyphenate “Design-related” here and elsewhere in the document.	Agree. Amended as suggested.

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AIR-500	1.4.6	"...categorized by the Federal Aviation Administration (FAA) into individual tables according to the classifications to the level of design change —substantial, significant, and not significant."	The phrase is quite a mouthful and seems a bit awkward. Also, should each of the three categories be enclosed with quotation marks?	Please consider rewriting this sentence to improve its readability. Can "to the level" be struck? If appropriate at their first usage, place each of the three terms in quotation marks (with commas inside the quotes).	Agree. Amended as indicated: "Appendix A contains examples of typical type design changes for small airplanes, transport airplanes, rotorcraft, engines, and propellers. The Federal Aviation Administration (FAA) has categorized these examples into individual tables according to the classifications of design change—"substantial," "significant," and "not significant.""
AIR-500	1.4.12	Each of the appendices of this AC is referenced in 1.4.6 through 1.4.13, except for Appendices G and H.	Is there a reason that these two appendices don't need to be referenced here while all the others did merit mentioning?	Please review and consider if Appendices G and H should be listed in this section of the AC.	Agree. Amended as indicated: "1.4.12 Appendix G provides an example CPR decision record." "1.4.13 Appendix H provides examples of documenting a proposed certification basis list."
AIR-500	3.1.1	"If you are proposing exception(s), you should make a preliminary classification whether the change is significant or not significant, and..."	The terms "significant" and "not significant" are used here for the first time in this AC. Should they be in quotation marks to identify them as special categories that will be used in the AC?	If appropriate for this AC, put these terms in quotation marks for their first usage.	Agree. Amended as suggested.

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AIR-500	3.2.1	"The applicant should identify which model or series within that model the specific configuration that will be modified."	In the 2nd sentence, there appears to be a word missing or an extra word ("that") is used where it does not belong.	Strike the word "that" if the meaning of the sentence is clarified by doing so. If not, please fix as appropriate to clarify.	Agree. Amended as indicated: "3.2.1 <u>Identify the Type Design You are Changing (the Baseline Product)</u> . Prior to describing the proposed change(s), it is important to clearly identify the specific type design configuration you are changing."
AIR-500	3.2.3		The words "high level" are used throughout the document to describe "change," or "description," and the use of the hyphen for such is inconsistent. In the title of 3.2.3, "High-Level" is hyphenated. In the paragraph that follows, the hyphen is used once for "high-level" and not used in two cases.	Please pick the FAA-preferred usage of these phrases, and then search the document for all references to "high level" and "high-level" and amend such to make all consistent when the words "high level" are used jointly to describe a noun.	Agree. Changed globally to "high level."
AIR-500	3.10	"...Level of Safety and Are They Practical?"	In the title of 3.10, only significant words should be capitalized.	Change "Are They" to "are they" for: "...Level of Safety and are they Practical?"	Agree. Amended as suggested.
AIR-500	3.10.2.3.1		In the 6th line, the comma after the parentheses interrupts the phrase "that the effort (...) required to comply would..."	Remove the comma after "etc.)" and before the word "required."	Agreed. Amended as suggested.
AIR-500	3.11.3		In the final line of 3.11.3, the word "assure" is used where "ensure" would be more appropriate.	While both are acceptable and used almost interchangeably, the word "ensure" better captures the intent here of guaranteeing a certain outcome.	Agree. Amended as suggested.
AIR-500	3.6.1	"...defines a design change as significant when at least one of three automatic criteria apply:"	In the last sentence, there is a noun/verb agreement error.	Change "apply" to "applies" to make agreement with "one."	Agree. Amended as suggested.

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AIR-500	3.6.1.2	"A change at the product level to the materials and/or construction methods that affect the overall..."	There is a noun/verb agreement issue in the sentence if the agreement is intended to go back to "a change" and not "methods".	If accurate for the meaning of the sentence, change "affect" to "affects" for: "A change...that affects the overall..." If "...methods that affect" is what is meant, then no change is necessary.	Agree. Changed to "affects."
AIR-500	5.2		In the 5th line, the words set off in the parentheses are cryptic and incomplete.	Please expand these words to make the statement less cryptic and easier to read and understand, such as: "...level of the rule (where the intent of the regulation may be different)..."	Partially agree. Amended as indicated: "...level of the rule (i.e., the intent of the regulation may be different)."
AIR-500	5.3	"The applicant should identify which specific configuration (e.g., model and/or series) within the product that will be modified."	The sentence starting on the 6th line is awkward and seems to have an extra word that creates confusion:	If the meaning of this sentence is clarified by doing so, strike the word "that" from this sentence, for: "The applicant should identify which specific configuration (e.g., model and/or series) within the product will be modified." If not this specific edit, make the appropriate change to clarify.	Partially agree. Amended as indicated: "...The applicant should identify the specific product configuration that will be modified."

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AIR-500	5.7.1	“For special classes of aircraft (for example, gliders, airships, etc.) including any installed engines and propellers certificated pursuant to § 21.17(b), the applicable requirements will be portions of those other airworthiness requirements in parts 23, 25, 27, 29, 31, 33, and 35 found by the FAA to be appropriate for the aircraft and applicable to the specific type design, or such airworthiness criteria that the FAA may find provide an equivalent level of safety to those parts.”	This is one long sentence, and there seems to be a word missing toward the end.	Would the final phrase be clearer and less awkward of the word “to” was added: “...that the FAA may find to provide an equivalent level of safety...”? Please amend if necessary and as necessary to make clear and easy to read.	Partially agree. Amended as indicated: “...the applicable requirements are portions of those other airworthiness requirements in parts 23, 25, 27, 29, 31, 33, and 35 that the FAA finds appropriate for the aircraft and applicable to the specific type design, or such airworthiness criteria that the FAA finds provide an equivalent level of safety to those parts.”
AIR-500	5.8.2	“However, earlier part 25 requirements, but not earlier than those established in the existing certification basis (containing part 26 requirements) could be justified using the exceptions in § 21.101(b).”	There is a clause set off with an opening comma that requires a comma at the end of the clause as well.	Please insert a comma after the parentheses and before the word “could.”	Agree. Amended as suggested.
AIR-500	5.10.3	“The TC amendment integration more than one (multiple) STCs where resolving interactions between STCs results in a major change in the type design.”	Under Scenario 3, should the word “integrates” be used instead of “integration” (as in 5.10.4) in the referenced text.	Please clarify as needed to make this sentence clear and easy to read. Change “integration” to “integrates,” as is used in 5.10.4.	Partially agree. Amended the entire section per suggestion from Airbus, with change of term from “integration” to “incorporation.”

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AIR-500	5.11	“These design changes will most commonly occur via STC or service bulletin kit.”	The sentence seems awkward and incomplete. Are one or two articles (“an” or “a”) missing?	Consider amending this sentence as follows: “These design changes will most commonly occur via an STC or a service bulletin kit.”	Agree. Amended as suggested.
AIR-500	Appendix A	“The following tables of substantial, significant, and not significant changes are adopted by the FAA...”	For this sentence, consider putting each term in quotation marks to clarify for the reader that these are the names of specific categories.	“The following tables of “substantial,” “significant,” and “not significant” changes are adopted by the FAA...”	Agree. Amended as suggested.
AIR-500	Appendix A, Table A-2 and all Tables below that		The words in each column are left-justified. Each table might look better if each column – or at least the center 3 columns – were centered as per “align center” under “Layout.”	Consider improving the aesthetics of the tables by using the “align center” function under “Layout” for at least the three middle columns.	Disagree. The requested change is a stylistic choice and does not improve the readability of tables.
AIR-500	Appendix A, Table A-2, Example 1		In the “Notes” column for Example 1, the acronym “AFM” is used for the first of 17 times in this AC, but the term is never defined.	To ensure that all readers of this AC will know what “AFM” refers to, please spell out the term and define it at its first usage here.	Partially agree. Instead, defined the acronym upon first usage in chapter 3 of the AC.
AIR-500	Appendix A, Table A-2, Example 11		For Example 11, “STOL,” the “Description of change” does not state whether this STOL kit refers to one being added, removed, or modified.	Please clarify if needed as needed.	Agree. Changed to state the addition of STOL: “Installation of a short takeoff and landing (STOL) kit.” However, not every design change to an existing STOL kit should be automatically declared a significant change. NOTE: 5.11.2 of the Draft AC discusses removable design changes.

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AIR-500	Appendix A, Table A-2, Example 20	"...the results can be applied to cover the changed product with predictable effects or can be demonstrated without significant." ?	Under the "Notes" column for Example 20, the comment seems to end abruptly with a word or two missing.	Please complete this comment so that the sentence is complete and the meaning is clear.	Agree. This example is now example 19. Added words to match part 25 example in Table A-5, Example 23: "Yes* *Some changes may be deemed not significant depending on the extent of the expansion. Notes: An expansion of operating capability is a significant change (e.g., an increase in maximum altitude limitation, approval for flight in icing conditions, or an increase in airspeed limitations)."
AIR-500	Appendix A, Table A-2, Example 24 and throughout document	"Conversion from a safe life design to a damage tolerance based design."	Should one or two of the terms used here be hyphenated? Note: in Table A-5, Example 27 on page A-42, the term is hyphenated as follows: "...with a damage-tolerance-based inspection program."	FAA.gov uses "damage tolerance-based inspections," but there appears to be acceptable variations in how these terms are written. Consider "safe-life design" and "damage tolerance-based design," but whatever you choose, be consistent throughout the AC.	Partially agree. This example is now Example 23. Did not hyphenate "safe life" because it is clear as proposed. Hyphenated "damage-tolerance-based" design for clarity in the description of change.

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AIR-500	Appendix A, Table A-2, Example 24 and throughout document	"If the airframe established safe life limits change to damage tolerance principles and the inspection program invalidates the original assumptions used during certification."	Is the caveat in "Notes" here that begins with "If..." to be read as a stand-alone statement or only in conjunction with the "Description of change" statements? If as a stand-alone statement, then it seems incomplete and insufficient. If such statements in "Notes" must be tied to the "Description," then perhaps no elaboration or clarification is needed as long as this is clear to the reader.	Perhaps each example in these tables is to be read as a three-part statement that starts with (1) the table title, and then (2) the description of change, and then (3) the notes section. If so, and if no guidance is necessary in the "Notes" column, then perhaps no such changes are needed here or elsewhere when such "Notes" are described as cryptic or incomplete.	Partially agree. This example is now Example 23. Amended as indicated: "Where the airframe-established safe life limits change to damage tolerance principles, then use of an inspection program in lieu of the safe life design limit invalidates the original assumptions used for certification."
AIR-500	Appendix A, Table A-2, Example 28	"Installation of a FADEC on an airplane that did not previously have a FADEC installed."	The acronym "FADEC" is used four times in this AC and is never defined. Twice it is used with "/EEC," which is also never defined.	At this first reference to FADEC, spell out the term and define the acronym (FADEC).	Agree. This example is now Example 27. Defined FADEC as "full authority digital engine control" and EEC as "electronic engine control."
AIR-500	Appendix A, Table A-3, Example 4 and 5 and throughout document		The phrase "airplane level change" is used 21 times in this AC. It is never hyphenated.	As per rules of English, such should be hyphenated (airplane-level change), but the AC should follow what is standard within the aviation community and in official FAA documents. If you do make this change, search and replace in all 21 usages of this phrase.	Agree. Amended as suggested.
AIR-500	Appendix A, Table A-3, Example 11	"A new fabric type for fabric skinned aircraft."	It seems that the term used here should be hyphenated.	As per rules of English, such should be hyphenated (fabric-skinned aircraft), but the AC should follow what is standard within the aviation community and in official FAA documents.	Agree. Amended as suggested.

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AIR-500	Appendix A, Table A-3, Example 13 and throughout document		Under the examples of “not significant changes,” Example 13 is “structural strength increases.” Are any caveats needed here? What if such changes add more than 20% to the original weight of the airplane?	Please clarify as needed, providing all necessary parameters to such guidelines so that no wrong assumptions are made regarding safety standards.	Disagree. Structural strength increases are not considered a product level change and weight is covered in Table A-3 at 5%.
AIR-500	Appendix A, Table A-3, Example 30		This example of “not significant changes” lists “increase in fuel tank capacity” with the condition (under “Notes”) “unless it is tied with an increase in gross weight.” Question: how could an increase in fuel capacity not be tied to an increase in gross weight? Is this clear and written as intended?	Please clarify as necessary if necessary.	Agree. This example is now Example 26. Note now reads: “Not an airplane-level change.”
AIR-500	Appendix A, Table A-3, Example 36	“A small increase in c.g. range.”	The abbreviation “c.g.” is used only once in this AC, and it is never defined. Should this be defined for the benefit of all readers?	Please consider spelling out these words for the benefit of all readers. Since this is never used again, the abbreviation does not need to be defined – but it may be if that will clarify the terms being used.	Agree. Changed c.g. to “center of gravity.” This example is now Example 35.
AIR-500	Appendix A, Table A-3, Example 37		The acronym “APU” is used about 17 times in this AC, but it is not defined until Appendix F.	Spell out “Auxiliary Power Unit” at its first usage and establish the acronym (APU) there.	Agree. Amended as suggested. This example is now Example 36.

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AIR-500	Appendix A, Table A-3, Example 41 and throughout document	“Flightdeck replacement of highly integrated and combined electronic display systems with another highly integrated and combined electronic display systems.”	There is an extra space at the end of the 2nd line in the “Notes” column. Also, given the use of the word “another” below, should “display systems” be singular? Perhaps “other” is the word that is needed here.	Remove the space between “concepts” and the comma. Also, if appropriate, change the final word from “systems” to “system,” or replace “another” with “other.” (If you make this edit here, the same edit is needed on page A-49, Table A-6, Example 14, and it 3 other places.)	Agree. Amended as suggested. This example is now Example 40.
AIR-500	Appendix A, Table A-4, Example 3 and throughout document	“Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage).”	Should the terms “all-metal airplane” and “all-composite primary structure” be hyphenated in the referenced text?	If appropriate, hyphenate these terms here and at all places used in this AC.	Agree. Amended as indicated: “Changed from an all-metal to all-composite primary structure.”
AIR-500	Appendix A, Table A-5, Example 1 and 2 and throughout document		The “Notes” in Table A-5 do not appear to include instructions, so it seems unclear for each example given whether or not “substantially complete investigation of compliance with the applicable regulations is required.” See Examples 1 and 2. Are such matters determined and established by the mere title/category of each table such that such specific guidance is not needed under “Notes”?	It seems that the summary statement of each example, one that might begin with “so” or “therefore,” is missing, leaving the reader to make assumptions about the implications of the statement made in the “Notes” section. Also, the statements in “Notes” are often so cryptic that their meaning is not clear. More words or complete sentences could be used to clarify the guidance for the applicant or other readers of this AC.	Partially agree. There is more than one objective for the notes. Sometimes the note is stating why the change is significant and other times conditional (stating when it is significant). Some of the notes have been clarified.

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AIR-500	Appendix A, Table A-5, Example 4	"Typically, a change greater than 10 percent in operational cabin pressure differential. May require extensive airframe changes..."	The period after "differential" seems to break up the flow of the comment here.	If so, strike the period and change "May to "may" for: "Typically, a change greater than 10 percent in operational cabin pressure differential may require extensive airframe changes..."	Partially agree. This example is now Example 5. We clarified the note as follows: "A change greater than 10 percent in operational cabin pressure differential is a significant change since it requires extensive airframe changes affecting load paths, fatigue evaluation, or aeroelastic characteristics, invalidating the certification assumptions."
AIR-500	Appendix A, Table A-5, Example 14		There is an extra space in the 8th line of the "Notes" section after the word "machine."	Delete the space after the word "machine."	Agree. Amended as suggested. The referenced example is now Example 16.
AIR-500	Appendix A, Table A-5, Example 17	"Typically any thrust increase of more than 10 percent." Or, clarify as needed using other words.	Does the word "Typically" belong in the "Description of change" column? It seems misplaced.	For a less vague description, strike "Typically a" and replace with "Any" for: "Any thrust increase of more than 10 percent." Or, clarify as needed using other words.	Agree. This example is now Example 19. Deleted "Typically" and changed the example as follows in response to another comment: "Maximum continuous or takeoff thrust or power increase of more than 10 percent, or for turbofans, an increase of the nacelle diameter."

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AIR-500	Appendix A, Table A-6, Example 9		For “Examples of Not Significant Changes” under “Description of change” for Example 9, it states “Redesign floor structure.” Under “Notes” for this, it says: “By itself, not a significant product change.” How can redesign of a floor system – with no parameters given -- not potentially be a significant product change?	Does this need to be spelled out for better clarification?	Disagree. This is consistent with the significant example that, if you are changing from a passenger floor to a cargo floor, it would be significant. This is clarified in the note section of this "not significant" example.
AIR-500	Appendix A, Table A-6, Example 11	“...lavs, closets, etc).”	In column one, “etc” is used without a period.	Please add a period to “etc”	Agree. Amended as suggested.
AIR-500	Appendix A, Table A-6, Example 13	“Initial installation of a non-essential APU. Auxiliary Power Unit (APU)”	Here, the term is spelled out and abbreviated. As per comment #41 in AIR-500 submission, this acronym should be defined and established on page A-26.	Change to: “Initial installation of a non-essential APU.”	Disagree. Example 13 only contains the acronym. No change is needed.
AIR-500	Appendix A, Table A-6, Example 13	“A stand-alone initial APU installation on an airplane originally designed to use ground/airport supplied electricity, and air-conditioning.”	Hyphens are need, and a comma should be removed. Also, why is “air-conditioning” hyphenated?	Since “airport-supplied electricity” should be hyphenated, change the following by adding hyphens to both words: “...designed to use ground-/airport-supplied electricity and air-conditioning.” Also, it seems that the hyphen in “air-conditioning” should be removed.	Partially agree. Incorporated the requested changes and additionally replaced the “/” with “or.”
AIR-500	Appendix A, Table A-6, Example 16	“Extending limit of validity (LOV) pursuant to § 26.23.”	There is an extra space before the section symbol.	Remove one space from before the section symbol so that just one space remains between “to” and the section symbol.	Agree. Amended as suggested. This example is now Example 15.

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AIR-500	Appendix A, Table A-8, Example 1		In the “Notes” section, there is an extra space after “machine.”	Remove one space between “machine” and the comma that follows.	Agree. Amended as suggested.
AIR-500	Appendix A, Table A-8, Example 4		Here, the “addition of an engine” or the “reduction of the number of engines” “[m]ay be a substantial change.” In this example, how can the adding or removing of an aircraft engine be in the category of “may be substantial”? Who is to make the final safety call in such situations? Is there sufficient guidance and instruction in these tables to guide all readers to the proper conclusion or to the proper authorities?	By this point in the AC, after reviewing many tables, there appears to be no consistency in the level of detail in these tables. Perhaps different SMEs wrote different sections using different approaches, but it seems that the “Description” and “Notes” sections are often so cryptic or incomplete that they may not be useful to all readers. Also, many “Notes” boxes are left blank.	Noted. See public comment from Bell where note was removed since any project to change number of engines would need to be individually assessed.
AIR-500	Appendix A, Table A-8, Example 5	“A change of rotor drive system primary gearbox splash type lubrication system to a pressure lubricated system...”	The referenced text contains a long string of nouns.	If appropriate to improve the readability of this point, please rewrite this section with fewer nouns strung together. Should “splash-type” be hyphenated?	Agree. Amended as indicated: "A change of the rotor drive primary gearbox from a splash type lubrication system to a pressure lubricated system due to an increase in horse power of an engine or changing from a piston engine to turbine engine."
AIR-500	Appendix A, Table A-8, Example 17	“Must comply with the latest HEC Certification requirements in order to obtain operational approval.”	In the “Notes” column, “Certification” is capitalized (as shown), but in the “Description” column, it is lower case.	Pick the official usage (I suggest lower case in both instances), and modify to make consistent.	Agree. Amended as suggested. This example is now Example 16.
AIR-500	Appendix A, Table A-9, Example 10	“Not a rotorcraft level change.”	In the “Notes” column, the referenced text appears. A hyphen is needed between “rotorcraft” and “level”.	Change to: “Not a rotorcraft-level change.”	Agree. This example is now Example 11. Amended as suggested.

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AIR-500	Appendix A, Table A-9, Example 13	“Not significant if the architecture concepts, design philosophies,...”	There is an extra space in the “Notes” column after the word “concepts,” and it seems that the word “and” is missing.	Delete extra space after “concepts.” Also, should the word “and” be inserted before the last noun in the string of nouns?	Agree. This example is now example 14. Amended as suggested.
AIR-500	Appendix A, Table A-11, Example 1	“Typically, a power/thrust increase that requires extensive design changes affecting the engine flow path, rotational speeds, temperatures, etc. Invalidates design assumptions.”	Is this to be read as two separate comments separated by a period, or is it to be read as one sentence?	If this is to read as once sentence (which makes the most sense), then “Invalidates” must be converted to lower case for: “Typically, a power/thrust increase that requires extensive design changes affecting the engine flow path, rotational speeds, temperatures, etc. invalidates design assumptions.”	Agree. Example 1 of Table A-11 was deleted in response to the comments.
AIR-500	Appendix A, Table A-11, Example 2 and throughout document	“Change is associated with other changes that would affect the rating of the engine and the engine dynamic behavior, such as backbone bending, torque spike effects on rotors and casing, surge and stall characteristics, etc.”	[This is essentially a repeat of the comment/concern previously expressed.] For a change described as “Increase/decrease in the number of compressor/turbine stages...,” the corresponding comment under “Notes” is shown in the referenced text. Question: is this comment under “Notes” helpful? Does it provide clear guidance to help applicants and delegated organizations determine if it will be necessary to apply for a new TC or seek other FAA approval for such a change? It seems to leave the reader hanging, asking “so...what is the ruling here?” Or, does the mere fact that this is listed under a table entitled	Please review this comment under “Notes” and, if appropriate, all Notes in this AC to see if the comments in the “Notes” column are sufficient without any guidance being provided. Fix as appropriate to clarify the regulatory standards and the corresponding instructions for applicants. See Example 9, page A-75, Table A-11, for an example in the “Notes” section of some actual guidance being provided. Is that example what each note should be like?	Noted.

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			“Examples of Significant Changes for Engines” tell the applicant how to handle such changes (and, if so, is such guidance spelled out in this AC in the sections above)? * As mentioned above, this is one of countless comments under “Notes” that seems to contain only comments and no guidance for the applicant. If that is the intent, then no major edits are needed.		
AIR-500	Appendix A, Table A-11, Example 3	“...affected the dynamic behavior of the engine in terms of backbone bending, torque spike effects on casing, foreign object ingestion behavior, burst model protection for the aircraft.”	In this excerpt from the “Notes” column, is the word “and” missing before “burst”?	If appropriate, add the word “and” before “burst” for: “...affected the dynamic behavior of the engine in terms of backbone bending, torque spike effects on casing, foreign object ingestion behavior, and burst model protection for the aircraft.”	This is now Example 2, which was reworded as follows: "Change is associated with other changes to the engine thrust/power, ratings, and operating limitations; engine dynamic behavior in terms of backbone bending, torque spike effects on casing, foreign object ingestion behavior (birds, hail, rain, ice slab); blade-out test and containment; induction system icing capabilities; and burst model protection for the aircraft. If there is a diameter change, installation will be also affected."
AIR-500	Appendix A, Table A-11, Example 7	“...and/ or novel...”	There is an extra space between “and” and “/or” in the 2nd line.	Delete the extra space for: “...and/or novel...”	Disagree. This example is now Example 6 in Table A-11. It was revised in response to another commenter, so this comment is no longer applicable.

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AIR-500	Appendix A, Table A-11, Example 8	“Changes to the engine affecting its bird ingestion capabilities including but not limited to changes that would result in...”	A hyphen and two commas should be added.	Change to: “Changes to the engine affecting its bird-ingestion capabilities including, but not limited to, changes that would result in...”	Disagree. This example was deleted in response to other commenters, so this comment is no longer applicable.
AIR-500	Appendix A, Table A-11, Examples 6 and 8 and all Tables below that		In Table A-1 and in all the Tables that follow, the “Notes” section appears to be incomplete, with many “Notes” boxes left blank.	If needed, please fill in the “Notes” section for Examples 6 and 8, along with all such blank boxes in the Tables below.	Agree. We verified that either there was no need for additional notes or we added notes in response to this and other comments.
AIR-500	Appendix A, Table A-12, Example 15	“Bump ratings within the product’s physical capabilities that may be enhanced with gas path changes such as blade restaggered, ...”	Should the word in the referenced text be “restaggered” or “restaggering”? Are other words missing that would make this more readable? * As previously referenced, many sections of this AC’s tables have no comments in “Notes.”	Please fix as appropriate if appropriate. Fill in the “Notes” sections if appropriate.	Partially agree. Changed "re-staggered" to "re-staggering." No note is needed for this example.
AIR-500	Appendix A, Table A-13, A.5.1	“Table A-13 contains examples of changes that are “Substantial” for propellers (part 35).”	Since Table A-13 contains only one example, changes are needed.	With just one example listed in Table A-13, the singular should be used: “Table A 13 contains an example of a change that is “Substantial” for propellers (part 35).”	Agree. Amended as suggested.
AIR-500	Appendix A, Table A-14, Example 3	“A hub configuration change such as a split hub to a one piece hub.”	Two hyphens seem to be needed.	If appropriate, add 2 hyphens as shown below: "A hub-configuration change such as a split hub to a one-piece hub."	Partially agree. Did not hyphenate "hub configuration" because it is clear as proposed. Added hyphen to "one-piece."

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AIR-500	Appendix B, Table B-2. Third section	“The existing TC basis, including elects to comply.”	In the 3rd section of this table, the referenced text is used. Will the reader understand “elects to comply”? Should this be spelled out more? Should this phrase be in quotation marks to indicate that it is a specific category?	Amend as needed if needed, perhaps by putting “elects to comply” in quotation marks. The same phrase is used elsewhere in this table, so if any changes are made here, consider what is needed for all similar phrases.	Partially agree. The term "elects to comply" is understood by the intended audience of the AC. For clarity, added quotes around first occurrence in the table. Other instances do not need to be changed.
AIR-500	Appendix C, Figure C-1		For the figure listed in C-1, are the instructions outlined clearly, and is this flow chart useful in determining change vs. affected areas?	If needed, please clarify how this making of charts and combining of lists really helps the applicant determine anything. Are more instructions needed for this figure?	Noted. Existing figure is conceptual, no change required.
AIR-500	Appendix C, Table C-4		Will it be intuitively obvious to all readers of this AC how to read and understand Table C-4? (Are the alpha designations (e.g. “ddd”) clear as to what they represent or how this table would be filled in?)	Please clarify if necessary as necessary.	Noted. No change required.
AIR-500	Appendix D, D.2	“Within areas affected by a change, there may “sub-areas” of the area that are not affected.”	There appears to be a word missing from the first sentence.	Please correct as necessary to complete this sentence, perhaps by adding the word “be” as follows: “Within areas affected by a change, there may be “sub-areas” of the area that are not affected.”	Agree. Amended as suggested.
AIR-500	Appendix E, E.1.1	“The basic principal of enhancing the level of safety of changed aeronautical products is to apply the latest regulations for significant design changes, to the greatest extent practical.”	There are two errors in the first sentence.	“Principal” is not the word needed here; strike that and replace with “principle.” Also, the comma after “...design changes” needs to be removed to allow the sentence to read as intended.	Agree. Amended as suggested.

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AIR-500	Appendix E, E.1.2	“The acceptance of results through the use of these procedures may vary from State to State.”	Does “State to State” refer to states of the United States or to nation states? If to individual U.S. states, then capitalized words are not needed.	To clarify, perhaps the following edits could be made, inserting “domestically” and changing “States” to lower case: “The acceptance of results through the use of these procedures may vary domestically from state to state.” If “nation states” are what is meant, then clarify as needed.	Disagree. "State to State" means nation states, so no change is needed.
AIR-500	Appendix E, E.2.1 and throughout document		In the subtitle of E.2.1, the word “Being” is capitalized even though it is a minor word in the title.	Change “Being” to “being” in the subtitle.	Agree. Amended as suggested.
AIR-500	Appendix E, E.2.5 and E.2.6		As per the CFR, these sections of this AC tell the applicant that “subjective determinations” and cost/benefit analysis may be used in determining if “full compliance with the latest amendment” is appropriate for their circumstances in these aviation safety matters. In Example 2, found in paragraph E.3.2.9, a compliance standard seems to be suggested that allows for “nearly...full compliance with Amendment 25-54” that “would adequately address the hazard at an acceptable cost.” I see that 14 CFR 21.101 states: (a) An applicant for a change to a type certificate must show that the change and areas affected by the	Amend and clarify as necessary if necessary. On page F-1, in Paragraph F-1, the following clarification is made that addresses this issue, in part: “[Exception may be made]...if, in conjunction with the applicable service experience and other compliance measures, the earlier standard provides a level of safety comparable to that provided by the latest requirements.” This is a good clarification, and such appears in sections of this AC. Are such clarifications spelled out in the AC at all appropriate points to ensure the applicant understands the standard? Also, who makes this safety call? Who is authorized or qualified to	Disagree. Text is appropriate for the intended audience.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
			change comply with the airworthiness requirements applicable to the category of the product in effect on the date of the application for the change and with parts 34 and 36 of this chapter. Exceptions are detailed in paragraphs (b) and (c) of this section.	determine that “Compliance to the regulation would not contribute materially to the level of safety (§ 21.101(b)(3)).”? The applicant? Is this matter sufficiently clear in and throughout this AC?	
AIR-500	Appendix E, E.3.2.1	“This example is a passenger to freighter conversion STC.”	In E.3.2.1, the highlighted text in the referenced text should be hyphenated.	Add a hyphen on each side of the word “to” for: “This example is a passenger-to-freighter conversion STC.”	Agree. Amended as suggested. Note that the paragraph numbers were deleted and renumbered.
AIR-500	Appendix F, F.2.5.6. third bullet	“...as required. (Editorial correction by IIT.)”	The referenced text appears in the text of this AC. Does it belong in the final version of the AC?	Strike “(Editorial correction by IIT.)” if this does not belong in the final version of the AC. If it does belong in the final AC, explain what this phrase means to the reader.	Agree. Amended as suggested.
AIR-500	Appendix G, Step 8	“Step 8: Ensure the proposed certification basis adequate.”	In Step 8, there appears to be a word missing.	Insert the word “is” for: “Step 8: Ensure the proposed certification basis is adequate.”	Agree. Amended as suggested.
AIR-500	Appendix J, Paragraph J.12	“A change in an area is significant if the general configuration or the principals of construction...”	The wrong word is used here.	Please strike “principals” and replace with “principles.”	Agree. Amended as suggested.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANE-110	All	Throughout the AC the terms "change" and "modified" are used interchangeably, while at times are used as distinct descriptors. For example, refer to page 3-3 paragraphs 3.2.1 where the title refers to "change" and the text refers to "modified", thus using "modified" in lieu of "change", and 3.2.2.2 that refers to "changes being proposed as part of a modification"	The terms "change" as in change in design and "modified" as for a product modification, have different meaning under part 21	Suggest revising to use "change in design" and "product modification" consistent with part 21.	Agree. Amended as suggested.
ANE-110	1.5	"The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, design standards, and airworthiness standards."	The definitions of these terms are different. Requirements are necessary conditions; regulations are determined by law; standards refer to a level of quality; design standards have more than a minimum standard.	The audience is the applicant and these words are and their FAA meaning are not obvious to a non-FAA person. To avoid confusion recommend using one term if, indeed, the "same" meaning is intended. Recommend defining the terms individually.	Partially agree. Amended as indicated (the term design standards has been removed): "1.5.1 The following terms are used interchangeably and have the same meaning: requirements, regulations, and airworthiness standards. 1.5.2 The terms certification basis, type certification basis, and amendment are used interchangeably to refer to groups of the requirements defined above."

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANE-110	2.2.1.2.4	Note: Earlier amendments may not precede the regulatory amendment level of the identified baseline product's type certification basis and any requirement found in 14 CFR 23.2, 25.2, 27.2, and 29.2 or the applicable provision of part 26 that is related to the change.	Why is this statement as a "Note"?	Recommend explanation of why these (special retroactive) requirements yield this statement.	Partially agree. Text moved to paragraph 2.2.2.3 and reads as follows: "2.2.2.3 Earlier amendments may not precede the regulatory amendment level of the identified baseline product's type certification basis and any requirement found in 14 CFR 23.2, 25.2, 27.2, and 29.2 or the applicable provision of part 26 that is related to the change."
ANE-110	3.2.2.1 and 3.2.2.2		Not clear whether there is a difference between the guidance in these two paragraphs; seems both apply to changes in design and seems the guidance is the same	Suggest merging the two paragraphs and clarifying it applies to changes in design, including those changes proposed as part of a modification.	Partially agree. Amended as indicated: "3.2.2.1 The purpose of this process step is to identify and describe the change to the aeronautical product. Changes to a product can include physical design changes and functional changes (e.g., operating envelope or performance changes). You must identify all changes and areas affected by the change, including those where you plan to use previously approved data. The FAA considers all of these changes and areas affected by the change part of the entire proposed type design and are considered as a whole in the classification of whether the proposed design change is substantial, significant, or not significant. The change

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
					<p>can be a single change or a collection of changes. In addition to the proposed changes, consider the cumulative effect of previous relevant design changes incorporated since the last time the certification basis was upgraded. An applicant for a type design change must consider all previous relevant design changes and the amendment level of the certification basis used for these changes."</p> <p>Disagree with proposed change to paragraph 3.2.2.2. Restricting the evaluation to only when a change was determined to be not significant is not appropriate. Paragraph 3.2.2.2 reads:</p> <p>"3.2.2.2 When you identify the proposed changes, consider previous relevant design changes that create a cumulative effect, as these may influence the decisions regarding the type of design change later in the process. By "previous relevant design changes," the FAA means changes where effects accumulate, such as successive thrust increases, incremental weight increases, or sectional increases in fuselage length. You must account for any previous</p>

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					relevant design changes in the area affected by the proposed change that did not involve an upgrade of the certification basis in the proposed design change."
ANE-110	3.6.1.3	"A change to the product level assumptions of the baseline product associated with the compliance demonstration, performance, or operating envelope that by itself is so different that the original assumptions or methodologies of demonstrating compliance are invalidated."	The sentence is long and difficult to understand. Other areas of the AC are difficult to understand because of the long sentences.	Revise for plain language	Agreed. Amended as indicated: "3.6.1.3 <u>Product Level Changes that Invalidate the Assumptions used for Certification of the Baseline Product.</u> Examples include— <ul style="list-style-type: none">• Change of an aircraft from an unpressurized to pressurized fuselage,• Change of operation of a fixed wing aircraft from land-based to water based, and• Operating envelope expansions that are outside the approved design parameters and capabilities. For additional examples, see appendix A in this AC."
ANE-110	3.9.4.2	Another example is changing turbine engine ratings and operating limitations resulting in the rotors' life limits being affected.	The term "rotor" is not clear.	Recommend using the phrase, the life limits of life-limited parts may be affected.	Disagree.
ANE-110	Appendix A, Table A-10		The notes column is blank.	A sentence for each explaining why each example is a substantial change for engines.	Agree. Explanatory notes were added.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANE-110	Appendix A, Table A-11, Example 9	Changes to the engine affecting its induction system icing capabilities, including but not limited to changes that affect fan and core flow path design; compressor/combustor changes affecting engine surge or flameout, material changes affecting ice adhesion; and engine controls changes affecting compressor air bleeds, vane schedules.	This example is too broad and encompasses changes that only require re-certification to the existing type certification basis.	Change to "Changes to the engine that adversely affect its demonstrated capability to withstand ice crystal icing or super-cooled liquid droplet icing ingestion" In this case, an applicant who certified the engine to pre-Amendment 34 would be required to comply with §33.68 at Amendment 34, as a minimum.	Partially agree. This example was deleted. The intent of this example is already covered under Examples 2 and 5 of Table A-11. We rolled the induction system icing example into Examples 2 and 5, and deleted the proposed Example 9. The wording addressed in this comment no longer exists.
ANE-110	Appendix A, Table A-14, Example 6	The propeller will require special conditions under § 21.16.	Part 35 Amendment 8 included composite materials so special conditions are no longer needed.	Delete the referenced text. The propeller will require special conditions under § 21.16.	Agree. Amended as suggested.
ANE-110	Appendix A, Table A-14, Example 7	The propeller will require special conditions under § 21.16.	Part 35 Amendment 8 included electronic controls so special conditions are no longer needed.	Delete the referenced text. The propeller will require special conditions under § 21.16.	Agree. Amended as suggested.
ANE-142	3.5.1	Note: Where the changes are planned in sequence over time, refer to the discussion on "staged design changes" in paragraph 5.13 of this AC.	The words 'staged design changes' do not appear in paragraph 5.13.	Incorporate the words "staged design changes" in paragraph or remove it from paragraph 3.5.1.	Agree. Revised note as follows: "If you plan changes in sequence over time, refer to the discussion on "sequential design changes" in paragraph 5.13 of this AC.
ANE-142	3.10	See paragraph 3.10 of this AC.	Why does this need to be there as you are already in paragraph 3.10.	Delete sentence.	Disagree. Amended reference to "paragraphs 3.10.1 and 3.10.2."
ANE-142	5.13		The words "staged design changes" do not appear in paragraph 5.13. I expected to see the words 'staged design changes' in paragraph 5.13.	Incorporate the words "staged design changes" in paragraph or remove it from paragraph 3.5.1.	Agree. Removed from paragraph 3.5.1.

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ANE-170	3.1.3, Figure 3-1, Step 4	Step 4 of Figure 3-1 was changed from rev A. It now reads, "Arrange Detailed Changes into Related and Unrelated Groups." The word "Detailed" was added and is the only change.	What are we looking for with the addition of the word "Detailed?" If this is an important change, then it's recommended that we be crystal clear about what we seek. (Also, compared "Detailed" to paragraph 3.2.3, which directs the applicant to stay away from technical details.) Also note that the instructions for Step 4 defined in paragraph 3.5 have not been changed from revision A.	None provided	Agree. The word "Detailed" removed from graphic.
ANM-100	All	All	There is a large amount of passive voice. It would be clearer to directly identify who is required to perform the action.	Revise document to reduce the use of passive voice. See attached revision to AC for suggestions.	Agree. Amended as suggested.
ANM-100	1.2.1	This AC is intended for applicants and delegated organizations applying for STCs, ATCs, or amended STCs.	Delegated organizations don't apply for changes. Holders of delegated organizations apply for changes.	Change "delegated organizations" to "holders of delegated organizations."	Agree. Amended as suggested: "1.2.1 This AC is for applicants and holders of delegated organizations applying for amended TCs, STCs, or amended STCs."

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ANM-100	3.1.3, Figure 3-1	Step 3	There is no provision for a new type cert. Sometimes changes are so significant it requires a new type cert rather than amended. Referring to the regulation 25.19 (NOTE 1) is not adequate as the reg does not step you through this determination process. While it is addressed in text later on, omission from the flow chart is a loopholes.		Disagree. Step 2 is already annotated to address 21.19.
ANM-100	3.1.3, Figure 3-1	Step 5. Is Each Related or Unrelated Group a Significant Change?	The wording is misleading. The intent is to evaluate each change grouping on its own merits.	Change to "Step 5. Is Each Separate Group a Significant Change?"	Disagree. Separation between related and unrelated is already addressed in Step 4. For consistency, terminology is continued in Step 5.
ANM-100	3.1.3, Figure 3-1, Note 2	Note 2. Process and propose each applicable requirement individually.	Provide a best practice or example of how to do this. Since we need to see the relevant information to make the proper certification basis determination, it's helpful to ask for it upfront and to be clear of our expectations.	Change note 2 to read: "Process and propose each applicable requirement individually. For example, it is helpful to use a table with columns labelled 14 CFR Section, TCDS Amendment, Amendment at Date of Application, Proposed Amendment Level, & Applicant Justification for Lower Amendment Level and Comments.	Disagree. Examples are contained in section 3.9 and Appendices C and H.

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ANM-100	3.2.1	The applicant should identify which model or series within that model the specific configuration that will be modified.	Wording is confusing.	You should identify the specific configuration (i.e., model, series within a model, modified model, or modified series within a model) that you will modify.	Agree. Amended as indicated: "3.2.1 <u>Identify the Type Design You are Changing (the Baseline Product)</u> . Prior to describing the proposed change(s), it is important to clearly identify the specific type design configuration you are changing."
ANM-100	3.2.2.1	Note: All changes and areas affected by the change, including those where you plan to use previously approved data, are identified.	This should be rewritten as a directive.	Note: All changes and areas affected by the change, including those where you plan to use previously approved data, are must be identified.	Partially agree. "Must" is in the rule language. Amended as indicated: "3.2.2.1 The purpose of this process step is to identify and describe the change to the aeronautical product. Changes to a product can include physical design changes and functional changes (e.g., operating envelope or performance changes). You must identify all changes and areas affected by the change, including those where you plan to use previously approved data. The FAA considers all of these changes and areas affected by the change part of the entire proposed type design and are considered as a whole in the classification of whether the proposed design change is substantial, significant, or not significant. The change can be a single change or a collection of changes. In addition to the proposed changes,

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					consider the cumulative effect of previous relevant design changes incorporated since the last time the certification basis was upgraded. An applicant for a type design change must consider all previous relevant design changes and the amendment level of the certification basis used for these changes."
ANM-100	3.2.2.2	When identifying the changes being proposed as part of a modification, consider previous relevant changes that create a cumulative effect, as these may influence the decisions regarding substantial and significant changes later in the process.	This paragraph should not be limited to just modifications. A modification might be viewed differently than an OEM introduced type design change. See also comment related to section J.5 below.	<p>Option 1: When identifying the changes being proposed as part of a modification, (e.g., modifications installed subsequent to previous modifications, or cumulative OEM type design changes), consider previous relevant changes that create a cumulative effect, as these may influence the decisions regarding substantial and significant changes later in the process.</p> <p>Option 2: When identifying the changes being proposed as part of a modification, consider previous relevant changes that create a cumulative effect, as these may influence the decisions regarding substantial and significant changes later in the process.</p>	Agree. Amended as indicated: "3.2.2.2 When you identify the proposed changes, consider previous relevant design changes that create a cumulative effect, as these may influence the decisions regarding the type of design change later in the process. By "previous relevant design changes," the FAA means changes where effects accumulate, such as successive thrust increases, incremental weight increases, or sectional increases in fuselage length. You must account for any previous relevant design changes in the area affected by the proposed change that did not involve an upgrade of the certification basis in the proposed design change."

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ANM-100	3.2.2.4	The whole paragraph.	<p>This is not only a weak example, it's not accurate. 21.101 DOES allow the change to the X-300 to be made at the same amendmant level as the previous models as the X-300 has already been certified to this very level. A better example would be a new derivative, the X-400. The last sentence is wordy, hard to understand, and not clear. I had to read it three times and I still am not clear.</p>	<p>Either re-state the example as the X-300 being a new derivative, not a pre-existing certified airplane, or come up with the X-400, a new derivative. Break up the last sentence into more than one sentence.</p>	<p>Partially agree. Amended as indicated below. Note this paragraph was renumbered as paragraph 5.13.2:</p> <p><u>"Example: Cumulative Effects—Advancing the Certification Basis.</u> The type certificate for airplane model X lists three models, namely X-300, X-200, and X-100. The X-300 is derived from the X-200, which is derived from the original X-100 model. An applicant proposes a design change to the X-300 airplane model. During the review of the X 300 certification basis and the regulations affected by the proposed change, it was identified that one regulation, § 25.571 (damage tolerance requirements), remained at the same amendment level as the X 100 original certification basis (exception granted on the X-200). Since the amendment level for this particular regulation was not changed for the two subsequent airplane models (X-200 and X-300), the applicant must now examine the cumulative effects of these two previous design changes that are related to the proposed change and the damage tolerance requirements to determine whether the amendment level</p>

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					needs to advance."
ANM-100	3.3	New Paragraph	All agreed that the 777-9X should have been a new type cert. The guidance listed in Section 3.3 is accurate, but it doesn't address the cumulative effect of many changes. Para 3.3.2 goes a long way to plug this loophole, but not far enough. There needs to be a "yardstick" paragraph that gives the applicant guidance as to when they can "push" for an ATC, or when they must step up and go for a new TC.	Add Paragraph 3.3.5 as follows: 3.3.5. When determining if changes are substantial or not, the cumulative effect of changes being made must be considered. While it is difficult to specify an overall minimum quantity of changes to define the breakpoint, the cumulative effect of multiple changes must be calculated to determine if the guidance of paragraph 3.3.2 can be met. The applicant should show the analysis of the cumulative effect of multiple changes, the interaction between changes, the interaction between changed portions and unchanged portions, and the effect on showing compliance to regulations for these interactions.	Disagree. Out of scope of this AC.

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ANM-100	3.3	New Paragraph		3.3.5.1 A change in fuselage rib material on its own may not be a substantial change, but when combined with a fuselage extension plug, an additional passenger door and a new cargo door, the cumulative effect of each change on showing of compliance for the other changes, as well as the structural integrity of the unchanged parts of the fuselage, may dictate a substantial change to the airplane fuselage per paragraph 3.3.2.	Disagree. Out of scope of this AC.
ANM-100	3.3	New Paragraph		3.3.5.2 A change from one supplier's flight control computer to another supplier's unit again may not be substantial, but when combined to a new internal architecture, a replacement of mechanical linkage with fly-by-wire, a change from aluminum to composite wing structure and a new modal suppression function may dictate a substantial change to the airplane fuselage per paragraph 3.3.2.	Disagree. Out of scope of this AC.
ANM-100	3.6.1	3.6.1 It is your responsibility to propose the classification of groups of related design changes or unrelated design changes as significant or not significant.	Avoid the use of "it" and use plain language to be more concise.	Change "It is your responsibility . . ." to "You are responsible to . . ."	Partially agree. Amended as indicated: "The applicant is responsible for proposing...."

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ANM-100	3.6.2	3.6.2 A change proposing the expansion of the operating envelope of a product, which was already accounted for during development of the baseline design is not a significant change. In this case, the assumptions used for certification of the baseline product remain valid when compliance can be demonstrated without physical changes to the product.	What is a change related to the expansion of an operating envelope? We should be clearer about what we mean by an operating envelope of a product because 'operating envelope' may be misunderstood and the determination of significance may be misapplied. Concern is that perceived operating envelope design changes such as 10%+ increase in aircraft weight, increase in maximum passenger capacity, flight envelope of mach 1.0, etc., which may have been considered during development of the baseline aircraft but were never certified, would be considered not significant when in fact they are significant changes because they were never certified.	Delete or clarify to minimize the possibility of improperly determining the significance of the design change.	Agree. Language could be misunderstood. Paragraph deleted.

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ANM-100	3.6.2	In this case, the assumptions used for certification of the baseline product remain valid when compliance can be demonstrated without physical changes to the product.	Disagree with statement in this context. You can still have a significant change even without physical change to the product such as an increase in maximum passenger capacity when using the same compliance data to show compliance. If the assumptions use for certification of the baseline product remain valid, then there should not be any change related to the operating envelope.	Delete or clarify to minimize the possibility of improperly determining significance of a change due to the misunderstanding of "operating envelope." If this section is kept, please define "operating envelope." Also, we need to be careful that we are not setting a precedent in other areas. For example, we have discussed that increasing the gross weight of an airplane and no physical change is required is still an affected area and evaluated for significance. This is true even when the previous analysis accounted for the greater weight increase.	Agree. Language could be misunderstood. Paragraph deleted.
ANM-100	3.6.8	3.6.8 The final classification of whether a design change is significant or not significant is determined by the FAA.	Use active voice and plain language to be more concise.	Change 1st sentence to: "The FAA determines the final classification of whether a design change is significant or not significant."	Agree. Amended as suggested. Note this is now paragraph 3.6.7.
ANM-100	3.8.1	However, you should be aware that your proposal for the type certification basis will be reviewed by the FAA to ensure that the certification basis is adequate for the proposed change under Step 8.	Use active voice and plain language to be more concise.	Change sentence to: "However, you should be aware that the FAA will review your proposal for the type certification basis to ensure that the certification basis is adequate for the proposed change under Step 8."	Agree. Amended as suggested.

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ANM-100	3.9.1	For a type design change, it is important that the effects of such change on other areas, systems, components, equipment, or appliances of the product are assessed properly because areas that have not been physically changed may still be considered part of the affected area.	Use active voice and plain language to be more concise.	Change to: "For a type design change, it is important you properly assess the effects of such change on other areas, systems, components, equipment, or appliances of the product because areas that have not been physically changed may still be considered part of the affected area."	Agree. Amended as indicated: "For a type design change, it is important you properly assess the effects of such change on any areas, systems, components, equipment, or appliances of the product because areas that have not been physically changed may still be considered part of the affected area."
ANM-100	3.9.4.2	These characteristics may be affected by a product level change.	Use active voice and plain language to be more concise.	Change to: "A product level change may affect these characteristics."	Agree. Amended as suggested.
ANM-100	3.10	Acceptable justification to support your rationale for the application of earlier amendments must be provided for areas affected by a significant change to document that compliance with later requirements in these areas would not contribute materially to the level of safety or would be impractical.	Use active voice and plain language to be more concise.	Change to: "You must provide acceptable justification to support your rationale for the application of earlier amendments for areas affected by a significant change to document that compliance with later requirements in these areas would not contribute materially to the level of safety or would be impractical."	Partially agree. Amended as indicated: "The applicant must provide acceptable justification to support the rationale...."
ANM-100	3.10	See paragraph 3.10 of this AC.	This sentence refers the reader to the current paragraph. Since this is the appropriate place for information a reference is unnecessary.	Remove sentence.	Disagree. Revised reference to "paragraphs 3.10.1 and 3.10.2."

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ANM-100	3.10.1	In cases where design features provide a level of safety greater than the existing certification basis, service experience or other acceptable data may be used to establish the effectiveness of those design features at mitigating the specific hazards intended to be addressed by a later amendment.	Use active voice and plain language to be more concise.	Change to: "In cases where design features provide a level of safety greater than the existing certification basis, you may use service experience or other acceptable data to establish the effectiveness of those design features at mitigating the specific hazards intended to be addressed by a later amendment."	Agreed. Amended as suggested: "In cases where design features provide a level of safety greater than the existing certification basis, you may use acceptable data, such as service experience or other acceptable data to establish the effectiveness of those design features at mitigating the specific hazards intended to be addressed by a later amendment."
ANM-100	3.10.1.1	The example refers to 25.981 at Amendment 25-102	The text refers to Amendment 25-102 as the latest for 25.981. Section 25.981 was amended since the last AC 21.101-1A was published. The example is still relevant, only referring to Amendment 25-102 as the "latest" is incorrect.	Recommended revision "Assuming that the latest applicable amendment of § 25.981 is Amendment 25-102, which requires structural lightning protection. The applicant could propose an exception from ..."	Agreed. Amended as suggested: "Assuming that the latest applicable amendment of § 25.981 is Amendment 25-102, which requires structural lightning protection, the applicant could propose an exception from...."
ANM-100	5.2	In general, you should use the latest FAA policy in effect at the date of application.	This statement needs clarification. Application of policy is independent of the classification of the change (significant or non significant) and is based on the date of application to the FAA unlike the certification basis is based on the application date to the CA (In case of EU)	In general, independent of the classification of the change , you should use the latest FAA policy in effect at the date of application.	Agree. See revised paragraph 5.2.

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ANM-100	5.3	The applicant should identify which specific configuration (e.g., model and/or series) within the product that will be modified.	Wording appears to limit the explanation in the previous sentence to model and/or series.	Change to "The applicant should identify the specific product configuration that will be modified."	Agree. Amended as indicated: "...The applicant should identify the specific product configuration that will be modified."
ANM-100	5.6.1	5.6.1 If a design change has not been approved, or if it is clear that the change will not be approved, within the time limit, the applicant may do either of the following: (1) file for a new application, or (2) file for an extension to the original application.	Filing for a new application is obvious, however, filing for an extension is no always obvious to applicants. Need additional explanation on filing an extension.	Add a new paragraph "5.6.1.1 When filing an extension, the applicant must choose a completion date, then apply the applicable effectivity from § 21.101(e) to determine an effective application date. The effective application date must not precede the original date of application for the proposed design change and must not be later than the filing date for an extension."	Agree. Added new paragraph 5.6.2 as follows: "5.6.2 When filing an extension, the applicant must choose a completion date, then apply the applicable effectivity from § 21.101(e) to determine an effective application date. The effective application date must not precede the original date of application for the proposed design change and must not be later than the filing date for an extension."
ANM-100	5.9.1	Add additional step for description of area, system, component "affected" by change. Revise the Appendix H Table to add a column for description of area, system, component "affected" by change.	It is important for STC applicants to understand the applicability of regulation in context of changed area, system, component "affected" by the change.	Add additional step for description of area, system, component "affected" by change. Revise the Appendix H Table to add a column for description of area, system, component "affected" by change.	Agree. Amended as suggested. Added new bullet in 5.9.1: "Description of the affected area." Also added new column "Affected Area" to Table H-1 in Appendix H.

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ANM-100	5.9.2.1	5.9.2.1 The FAA determines whether the design changes are significant or not significant, and this decision is documented on the Certification Project Notification according to FAA Order 8110.115, How to Establish the Certification Basis for Changed Aeronautical Products.	Incorrect order subject.	Change "How to Establish the Certification Basis for Changed Aeronautical Products" to "Certification Project Initiation and Certification Project Notification."	Agree. Amended as suggested.
ANM-100	5.9.3.1	For further information on documenting the certification basis, see FAA Order 8110.48, Certification Project Initiation and Certification Project Notification.	Incorrect order subject.	Change "Certification Project Initiation and Certification Project Notification" to "How to Establish the Certification Basis for Changed Aeronautical Products."	Agree. Amended by deleting title: "For further information on documenting the certification basis, see FAA Order 8110.48."
ANM-100	5.10	"Integration of STCs into the Type Design. There are four possibilities to consider when integrating STCs into the product type design."	Consider removing the 4 possibilities from 5.10.1 through 5.10.4 that may create confusion when an updated cert basis is required or not for a single STC or multiple STCs. Also, when a TC applicant applies for an amended TC to incorporate an STC to a TC, the amended TC application date should be used as the cert basis as indicated in "5.12 The Certification Basis is Part of the Design Change Compliance Record. A new design change may be installed in a product in production or via a service bulletin or STC. In terms of § 21.101, each of the approved design changes has its	"5.10 Integration of STCs into the Type Design. Incorporation of an STC into a TC is considered as an amended Type Certification. Amended TC applicant should review the STC data to determine whether the STC complies with the amended TC certification basis per § 21.101, and for any non-compliances that might have been overlooked when the STC was issued. All non compliances must be addressed before an amended TC is issued. All environmental requirements are applicable with the amended TC application date.	Partially agree. Amended the entire section per suggestion from Airbus, with change of term from "integration" to "incorporation."

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			own basis of certification. If an applicant chooses to remove an approved installation (e.g., interior installation, avionics equipment) and install a new installation, a new certification basis is established for the new installation."		
ANM-100	5.10.3 & 5.10.4	Scenarios 3 & 4	It is not clear what is meant by "interaction between STCs." For example, an airplane manufacturer may want to incorporate multiple STCs into production where there is no interaction between the STCs.	Recommend that this section include examples of what is intended by "interaction between STCs" for clarification. Examples should be of both when there is interaction between STCs and when there is no interaction between STCs.	Partially agree. Amended the entire section per suggestion from Airbus, with change of term from "integration" to "incorporation."
ANM-100	5.12	For example, a transport category airplane is produced in a "green" configuration. The airplane certification basis does not include § 25.562. An interior is installed under an STC, and the applicant elects to include § 25.562 (dynamic seats) in the certification basis to meet specific operational requirements. At a later date, the airplane is sold to a non-part 121 operator (i.e., does not have the same operating requirements). A new interior is installed, and there is no requirement for § 25.562 to be included in the new certification basis.	Consider revising the example to clarify the operational requirement from § 121.311(j) for not having to comply with § 25.562 when an aircraft is produced before October 28, 2009. STC limitation may specify § 25.562 as the cert basis for aircraft produced after October 27, 2009 when operating under 121 requirements.	For example, a transport category airplane is produced in a "green" configuration prior to October 28, 2009 . The airplane certification basis does not include § 25.562. An interior is installed under an STC, and the applicant elects to include § 25.562 (dynamic seats) in the certification basis to meet specific operational requirements. At a later date, the airplane is sold to a non-part 121 operator (i.e., does not have the same operating requirements). A new interior is installed, and there is no requirement for § 25.562 to be included in the new certification	Partially agree. Amended as indicated: "For example, a transport category airplane is certified as a "green" configuration. The airplane certification basis does not include § 25.562 if it was manufactured prior to October 28, 2009...."

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				basis.	
ANM-100	Appendix A, Table A-4	Table	Using this table, we would not have been able to determine the Boeing 777-9X was substantial. Yet in our letter to Boeing approving their application for ATC, we stated that had the FAA adequate guidance, we would find the changes to the airplane a substantial change and therefore a new type cert. These examples are too simple, and singular in their content. A better example would be one that combines several changes and shows how they are substantial.	Provide more and better "real world" examples, such as changes to systems architecture (i.e. going from a federated systems airplane to an integrated systems airplane), or changes leading to a new means of compliance (ex: using flight control software to show compliance to a structures regulation, as in the 747-8 MLA function in the flight controls being used to meet flutter requirements. See comment 9.	Partially agree. The FAA acknowledges that examples and guidance for substantial changes is lacking. However, this AC's primary purpose is to provide guidance for § 21.101. Note that the FAA is working to develop separate guidance for § 21.19.
ANM-100	Appendix A, Table A-4	Example 3	(fuselage, wing, empennage)	(fuselage, wing, or empennage)	Partially agree. Amended as indicated: "Change from an all-metal to all-composite airplane." Referenced text was deleted in response to another comment.

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ANM-100	Appendix A, Table A-4	New example	There is no mention of extensive systems changes. Airplanes are more and more software-driven. Even simple stuff like brakes, fire detect, hi-lift controls are complex hardware and software. We have gotten past the age when "avionics" was two radios, an ILS and WXR. Compliance to structural regs are now shown by flight controls systems, the EICAS has replaced the Flight Engineer, and predictive software orders up replacement LRUs at the next airport. It is time that changes to systems need to be elevated from Table A-5.	Copy Example 14 from Table A-5 to table A-4, and change to read as follows: Comprehensive systems upgrade, such as conversion from entirely federated and independent electro-mechanical systems to highly integrated and combined electronic systems with extensive use of software and/or complex electronic hardware, or change from electro-mechanical flight controls to a full fly-by-wire flight control system.	Disagree. For a substantial change, the primary structure of the fuselage, wing, and empennage would need to be changed from all metal to all composite. Note that if fuselage, wing, or empennage were changed from all metal to all composite, it would be a significant change.
ANM-100	Appendix A, Table A-5, Example 2	Description of change column entry states: "Modify an airplane for flight in known icing conditions by adding systems for ice detection and elimination."	This text has been confusing in the past and raises questions. For part 25, either the airplane is certified for flight in icing conditions (ref part 25 TCDS) or it is not. How this has been applied is if an airplane is not certified for flight in icing and you want it to be, that is a significant product level change. As noted in the non-significant table, modifying an ice protection system is not considered as a significant product level change. Suggest using terminology consistent with existing regulations and guidance. For example, not all airplanes certified for flight in	Suggest revising the sentence to read as follows: "Modify an airplane to add certification for flight in known icing conditions by adding systems for such as ice detection and elimination ice protection ."	Agree. Amended as suggested.

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			<p>icing have an ice detection system. If an airplane is certified for flight in icing and an ice detection system is added, is that a significant product level change? It may be a significant change to the ice protection system but it should not be a significant product level change.</p>		
ANM-100	Appendix A, Table A-5, Example 12	Description of change column entry states: "Wing changes in span, sweep, tip designs or wing chord."	The wings of transport airplanes are also fuel tanks. These significant changes therefore affect fuel tank lightning protection ignition prevention and flammability. This should be clearly identified so applicants know the fuel system is affected and part of the significant change.	Recommend revising the Notes column entry to: "When it requires extensive changes to wing structure, adds aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics. These changes typically affect the wing fuel tanks, including fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure. "	<p>Partially agree. This example is now Example 13. We agree with the wording, but made editorial changes that are not intended to change the meaning. In addition, it was determined that this language should also be added to the note section of Example 12:</p> <p>"EXAMPLE: Installation of winglets, modification of existing winglets, or other changes in wing tip designs.</p> <p>NOTE: Significant if it requires extensive changes to wing structure, or aircraft systems, or if it requires a new AFM to address performance and flight characteristics. It may also affect the wing fuel tanks, including fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure."</p>

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ANM-100	Appendix A, Table A-5, Example 13	Add a note clarifying that change in one exit will result in evaluation of its effect on entire exit systems of airplane.	Change in Type C exit may have impact on evacuation through the OWE	Add a note clarifying that change in one exit will result in evaluation of its effect on entire exit systems of airplane.	Disagree. The example states that a change in any type of exit is a significant change. As such, there it is not a need for clarification in the Notes section.
ANM-100	Appendix A, Table A-5, Example 15	Example 15	A change from a totally electro-mechanical flight control system to a totally fly-by-wire systems is substantial.	Revise to read as follows: Change in portions of an electro-mechanical primary flight control system to fly by wire (FBW) architecture. (Retain the note.)	Disagree. This example is now Example 17. This type of system change alone is not so extensive that a substantially complete investigation of compliance with the applicable regulations is required. Thus, it is not a substantial change.
ANM-100	Appendix A, Table A-5, Example 19	Description of change column entry states: "Installation of a new fuel tank, (horizontal stabilizer tank or auxiliary fuel tank in the fuselage outside the wing in conjunction with increased maximum takeoff weight and takeoff thrust)."	The qualifier in parenthesis has resulted in confusion and inconsistent application. Installation of a new fuel tank itself is a significant change therefore the extra information should be removed. An additional clarification that installing a fuel tank in what was a dry bay (e.g., center wing box) is a new fuel tank and reference the appropriate policy (AC 25.981-2A, p. A-39). This is consistent with the existing policy of requiring the latest amendment level of section 25.981 for all new fuel tanks since the adoption of Amendment 25-102 in 2001. In addition, section 26.35 of part 26, CONTINUED AIRWORTHINESS AND SAFETY IMPROVEMENTS FOR	Recommend revising description of change entry to: "Installation of a new fuel tank, which includes converting a dry bay to a fuel tank (refer to AC 25.981-2A, page A-39) (horizontal stabilizer tank or auxiliary fuel tank in the fuselage outside the wing in conjunction with increased maximum takeoff weight and takeoff thrust). "	Partially agree. This example is now Example 21. Example is reworded as follows: "EXAMPLE: Installation of a new fuel tank, e.g., an installation of an auxiliary fuel tank in a cargo bay or installation of an auxiliary fuel tank that converts a dry bay into a fuel tank (such as a horizontal stabilizer tank). NOTE: Requires changes to airframe, systems, and AFM. Results in performance changes. These changes typically affect the fuel tank lightning protection, fuel tank ignition source prevention, and fuel tank flammability exposure."

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			<p>TRANSPORT CATEGORY AIRPLANES, requires new auxiliary fuel tanks installed on affected models comply with Amdt. 25-125. Sections 121.1117, 125.509, and 129.117 also require all auxiliary fuel tanks installed after December 26, 2017 comply with Sec. 25.981, Amdt. 25-125.</p>		
ANM-100	Appendix A, Table A-5, Example 21	In the notes column, there is a reference to certification for flight into "known" icing conditions.	Flight into "known" icing conditions is an operational term generally used as an operational limitation for airplanes that are not certified to operate in icing, it is not a term used for certification in part 25. The term "known" is subjective since it requires a pilot determination so it is not included in the approval made on the TCDS for part 25.	Revise text to remove the term "known" from the notes. Either the airplane is certified to be operated in icing conditions or it is not.	Agree. This example is now Example 23. Amended as suggested.

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ANM-100	Appendix A, Table A-5, Example 22	Conversion from a passenger floor to a cargo floor and installation of a cargo handling system	The change is staying within the original load capability of the airplane. The description does not include changing the floor beams, stringers or frames. Therefore, this change is not changing the assumptions for certification. This is a cabin interior change. There is another example where a cabin interior change is classified as not significant.	This change should be classified as "Not Significant"	<p>Disagree. This example is now Example 24. The certification assumptions at the product level have been invalidated when converting from a passenger floor to a cargo floor. If converting a passenger floor to a cargo floor (e.g., new floor beams), the original load distribution is invalidated. Typically, a cabin interior change may drive changes to the floor panels or seat tracks, which we agree is a not significant change. For clarification, we modified the example:</p> <p>“EXAMPLE: Changing the floor from passenger carrying to cargo carrying capability.</p> <p>NOTE: Completely new floor loading and design. Redistribution of internal loads, change in cabin safety requirements, system changes. If a cargo handling system is installed, it would be a related change.”</p>

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Committer	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix A, Table A-5, Example 27	Replacing the life limit with a damage tolerance based life limit	Under the notes section, add verbiage that typically we would only require amendment 25-54 because later amendments require full scale fatigue testing and we would not require that for a change from safe-life to damage tolerant.	Add: Typically the FAA agrees to amendment 25-54 because later amendments require full scale fatigue testing which would not contribute materially to the level of safety for this change. Amendment 25-54 requires an airworthiness limitations section which would contribute materially to the level of safety and would be practical.	Agree that clarification is needed. The example may imply that applying a new amendment level is a criteria for a significant change, which is not accurate. As such, this example has been removed and these changes will be evaluated on a case-by-case basis.
ANM-100	Appendix A, Table A-5, Example 28	New Example	The installation of a FADEC engine on an airplane originally designed with a mechanical fuel control can be an extensive change and should be considered significant.	Recommend adding an example. Description of change column entry: "Installation of an engine with a Full Authority Digital Engine Control (FADEC) on an airplane that did not previously have a FADEC engine installed." "No" for 21.101(b)(1)(i) and (ii). "Yes" for 21.101(b)(1)(iii). Notes column entry: "A change from a mechanical control engine to a FADEC engine may be so extensive that it affects basic aircraft systems integration and architecture concepts and philosophies. This drives a complete reassessment of flightcrew workload, handling qualities, and performance evaluation, which are different from the original design assumptions."	Agree. Amended as suggested. This is now Example 29.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix A, Table A-5, Example 29	New Example	There are no examples for Extended Operations (ETOPS) changes. There should be an example of a significant change for ETOPS.	Recommend adding an example. Description of change column entry: "Request for extended operations (ETOPS) type design approval for a type design change of a product with an existing ETOPS type design approval." "No" for 21.101(b)(1)(i), (ii) & (iii). Notes column entry: "A change to a product with an existing ETOPS type design approval without a change in diversion capability would normally not be significant. However, if the existing ETOPS type design approval was based on cancelled ACs120-42 or 120-42A, then there is not an adequate certification basis to evaluate the type design change for ETOPS. In this case, the change is not significant and 14 CFR 25.1535 at Amendment 25-120 would apply."	Partially agree. The ETOPS recommendation is covered in Example 28 of Table A-5 for a significant design change and Example 18 of Table A-6 for a not significant design change.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix A, Table A-6, Example 1	Description of change column states "Alternate engine installation or hush kit at same position."	It should be clear that changes to the position of the engine to accommodate a different engine, such as a larger diameter fan, does not automatically meet the criteria for not significant.	Recommend adding in the Notes Column after the existing sentence: "A change in position to accommodate a different size engine could influence airplane performance and handling qualities and result in a significant change."	Agree. Changed Note to read: "It is not significant so long as there is less than a 10 percent increase in thrust or there is not a change in the principles of propulsion. A change in position to accommodate a different size engine could influence airplane performance and handling qualities and result in a significant change."
ANM-100	Appendix A, Table A-6, Example 14 and 17	Flightdeck replacement of highly intergrated and combined electronic display systems with another highly integrated and combined electronic display systems	These examples are duplicates	Delete one	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix A, Table A-6, Example 19	New Example	There are no examples for Extended Operations (ETOPS) changes. There should be an example of a not significant change for ETOPS.	Recommend adding an example. Description of change column entry: "Request for extended operations (ETOPS) type design approval for: a.) Airplanes without an existing ETOPS type design approval, and b.) Extension of an airplane's diversion time." "No" for 21.101(b)(1)(i) and (ii). "Yes" for 21.101(b)(1)(iii). Notes column entry: "An expansion of diversion capability for ETOPS would normally be a significant change. = However, expanding the diversion capability for which it was originally designed is generally not a significant change. In this case, the assumptions used for certification of the basic product remain valid and the results can be applied to cover the changed product with predictable effects or can be demonstrated without significant physical changes to the product."	Agree. Note that there was an error in logging the comment Example 28 was added to Table A-5 as a significant change: Example: Request for extended operations (ETOPS) type design approval for: (a) airplanes without an existing ETOPS type design approval, and (b) extension of an airplane's diversion time. "No" for 21.101(b)(1)(i) "Yes" for 21.101(b)(1)(ii). Notes: An expansion of diversion capability for ETOPS would normally be a significant change. However, expanding the diversion capability for which it was originally designed is generally not a significant change. In this case, the assumptions used for certification of the basic product remain valid and the results can be applied to cover the changed product with predictable effects or can be demonstrated without significant physical changes to the product.

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AC 21.101-1B, Establishing the Certification Basis of Changed Aeronautical Products

Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix B, Table B-1	New certification basis using the latest regulatory standards with earlier approved amendments, and special conditions if required.	Two boxes under FAA Resultant Type Certification Basis ("Impractical" and "No material contribution to safety" columns) have same wording and should be placed in one box.	Combine two boxes under FAA Resultant Type Certification Basis ("Impractical" and "No material contribution to safety" columns) into one box with the following wording: "New certification basis using the latest regulatory standards with earlier approved amendments, and special conditions if required."	Agree. Amended as suggested.
ANM-100	Appendix B, Table B-2	"A later amendment designated by the FAA including Special Conditions and including elect to comply."	The applicable requirement for when the change is significant and materially contributes to safety and is practical defined in Table B-2 text is not consistent with the one defined in Figure 3 flowchart on page B-2. The text in Table B-2 says " A later amendment....." where the text in the Figure 3 flowchart says: "Latest requirements."	Change the test in Table B-2 from " A later amendment....." to: "The latest amendment.....".	Agree. Amended as suggested.
ANM-100	Appendix B, Table B-2	(Not significant in an area.)	Parentheses are unnecessary.	Remove parentheses.	Agree. Amended as suggested.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix B, Table B-2	The existing TC basis. If inadequate, the first appropriate later amendment. If not appropriate, add special conditions, including elects to comply.	Three boxes under FAA Resultant Type Certification Basis ("Impractical," "No material contribution to safety," and "Not significant in an area" columns) have same wording and should be placed in one box.	Combine three boxes under FAA Resultant Type Certification Basis ("Impractical," "No material contribution to safety," and "Not significant in an area" columns) into one box with the following wording: "The existing TC basis. If inadequate, the first appropriate later amendment. If not appropriate, add special conditions, including elects to comply."	Agree. Amended as suggested.
ANM-100	Appendix D, D.1, Item 6	" Is the existing compliance for the area invalidated?"	This condition for determining the affected area can be confusing. It can be interpreted as: For any area (even if it's not within the scope of the change) if the existing compliance is invalidated it could be considered affected area. It could leave any area of the product subject to investigation, even though the area may not be related to the changed area.	Clarify that the only areas within the scope of the changed area should be subject to this condition.	Disagree. If existing compliance finding is invalidated due to the change then it is an affected area.
ANM-100	Appendix D, D.2	...However, the seat fabric is not affected, so the amendment level for § 25.853 (flammability) may remain at the existing certification basis, and a new compliance would not be required.	This section appears to be missing a word.	However, the seat fabric is not affected, so the amendment level for § 25.853 (flammability) may remain at the existing certification basis, and a new compliance showing or finding or determination would not be required.	Agree. Amended as indicated: "...and a new compliance finding would not be required."

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix E, E.1.1	It is recognized that the existing fleet and newly produced airplanes, engines, and propellers are safe, and any unsafe condition is immediately addressed through the airworthiness directive process.	This statement is not entirely correct. There are often unsafe conditions that do not rise the level requiring corrective action (condition is likely to exist or develop in other products of the same type design) under part 39 that may be practical to implent in a subsequent design change. This statement may mislead an applicant into believing that if we do not issue an AD then they do not need to address an unsafe feature or characteristic.	Recommended revision: "It is recognized that the existing fleet and newly produced airplanes, engines, and propellers are safe. Additionally, the FAA identifies and addresses and any unsafe conditions is immediately addressed through the airworthiness directive process under part 39. However, there may be features or characteristics that do not require immediate corrective action under part 39 that may be practical to address within the scope of a proposed design change."	Partially agree. Deleted the entire sentence rather than amend it. It was determined that it was not appropriate to discuss the AD process in this section.
ANM-100	Appendix E, E.2.3.1, Fourth bullet	Accidents where a total hull loss occurred.	Using the phrase "total hull loss" could be misleading since a hull loss could occur independent of the loss of life.	Recommend removing the word "hull."	Disagree. We intended that it did not include loss of life because that is addressed in the following bullets: <ul style="list-style-type: none"> • Accidents where less than 10 percent of the passengers died. • Accidents where 10 percent or more passengers died....

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix E, E.3	Examples	<p>There have been several lengthy discussions between applicants and the FAA regarding the certification basis for changes affecting fuel tank systems. An example would provide additional clarification to applicants and reduce FAA workload. Recommend adding an example for determining the amendment level of section 25.981 for designs that affect fuel tank ignition prevention. This should explain the incremental requirement of 25.981, Amdt. 25-102, compared to the requirements to properly comply with sections 25.901 and 25.1309, Amendment 25-40 or 25-46. The preamble to Amdt. 25-102 documents the treatment of failure conditions (single failures, single failures plus latent failures and combinations of failures) is the same under 25.981(a)(3), Amdt. 25-102 and 25.901 and 25.1309 at Amdts. 25-40 or 25-46.</p>	<p>Recommend an additional example for § 25.981, Fuel Tank Ignition Prevention. Refer to attached for proposed example.</p>	<p>Noted. The addition of this new example is taken under advisement and will be reviewed further by CPR-CIT.</p>

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix E, E.3.1	Example 1	Example 1 is a good example of the process; however, it is a poor example in that part, specifically 121.316, requires compliance with 25.963(e). The FAA also required compliance with the requirements in 25.963(e) via 21.21(b)(2) on the A330 program.	Recommend adding references to 121.316 and 21.21(b)(2) as an additional reason the FAA would require compliance with 25.963(e), regardless of the applicant's determination.	Disagree. Citation of operating rules and § 21.21(b)(2) are not relevant for the purpose of this example.
ANM-100	Appendix F, F.3	Example	This example reads more like an equivalent safety finding. It isn't clear that there is a difference between being fully compliant and the proposed design.	Recommend either removing example or adding clarification to what the incremental level of safety is between the proposed design and a fully compliant design would be.	Agree. Amended F.3.2.3 as indicated: "...provide a level of safety that approaches yet is not fully compliant with the latest regulations. The APU fuel..."
ANM-100	Appendix F, F.3.2.3	"Amendment 25-11 of § 25.1141(f)."	Section 25.1141(f) was introduced at Amdt. 25-40 (as stated earlier in the example). It is not possible for the design to comply with this paragraph at Amdt. 25-11 since it didn't exist.	Recommend either removing "f" and just stating the regulation or either removing the second half of the sentence because it doesn't add anything: "The APU fuel shut-off valve and actuator are unchanged from those used on the current family of airplanes, and have been found to comply with the earlier Amendment 25-11 of § 25.1141(f)."	Agree. Deleted "(f)" from the regulatory citation.
ANM-100	Appendix F, F.3.2.3	"In addition, the system design for the changed product incorporates features that increase the level of functionality and safety."	This last sentence is not about service experience and is discussed further in the next paragraph.	Recommend removing or adding this sentence to paragraph F.3.2.4.	Agree. Deleted the referenced text.

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Committer	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ANM-100	Appendix H, H.3.1	"Proposed Certification Basis"	Any optional part 25 requirements elected should be clearly identified.	Recommend adding a section under 3.1 to identify optional part 25 requirements.	Disagree. Optional requirements are out of scope of this AC.
ANM-100	Appendix H, H.3.1	"Proposed Certification Basis"	Any regulations required by operating rules of affected areas should be identified in the example.	Recommend adding a section under 3.1 to identify operational requirements.	Disagree. Operating requirements are generalized in section 5.1.
ANM-100	Appendix H, H.1.5	"Best Practices"	Add the best practice of including regulations required by operating rules of affected areas. This is discussed as an option in Chapter 5.	Recommend adding: "H.1.5.5 Include airworthiness regulations required by other 14 CFR parts (for example, parts 91, 121, 125, 135) of affected areas."	Disagree. Operating requirements are generalized in section 5.1.
ANM-100	Appendix I, I.2	<ul style="list-style-type: none"> Order 8110.48, Certification Project Initiation and Certification Project Notification. 	Incorrect order subject.	Change "Certification Project Initiation and Certification Project Notification" to "How to Establish the Certification Basis for Changed Aeronautical Products."	Agree. Amended as suggested.
ANM-100	Appendix I, I.2	<ul style="list-style-type: none"> Order 8110.115, How to Establish the Certification Basis for Changed Aeronautical Products. 	Incorrect order subject.	Change "How to Establish the Certification Basis for Changed Aeronautical Products" to "Certification Project Initiation and Certification Project Notification."	Agree. Amended as suggested.
ANM-100	Appendix J, J.5	A change in the type design of an aeronautical product. In the context of this document, the terms "change," "design change," and "type design change" are synonymous.	Consider adding the terminology for "modification" in this list. See also comment regarding section 3.2.2.2 above.	A change in the type design of an aeronautical product. In the context of this document, the terms "change," "modification," "design change," and "type design change" are synonymous.	Agree. Amended as suggested.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ASW-112	Appendix A, Table A-9, Example 14	New Non Significant Example	The FAA recognizes that improvements to the overall safety of the Part 27 and 29 VFR Rotorcraft fleet, can be made through the integration of new technology into a legacy rotorcraft. (Please add adobe into the "notes" block in the table.)	Flightdeck replacement or upgrade of avionics systems in Non-Appendix "B" (IFR) and or Non-CAT "A" Rotorcraft that can enhance safety and or pilot awareness. (Please add above into the "description of Change" block in the table.)	Agree. This example is now Example 16. Amended as indicated: "Flightdeck replacement or upgrade of avionics systems in non-appendix "B" (IFR) or non-CAT "A" rotorcraft that can enhance safety or pilot awareness. / No / No / No"
ASW-112	Appendix A, Table A-9, Example 15	New Non Significant Example	The applicant may voluntarily demonstrate partial compliance to 27/29.952. However, unless compliance to 27/29.952 in its entirety is demonstrated, the certification basis for the design change must not include 27/29.952. (Please add adobe into the "notes" block in the table.)	Modifications to non-crashworthy fuel systems intended to improve its crashworthiness. (Please add above into the "description of Change" block in the table.)	Agree. This example is now Example 17. Amended as suggested.
ASW-112	Appendix A, Table A-9, Example 16	New Non Significant Example	These fluids are interchangeable and do not require any further qualification. However, these fluids are NOT compatible with phosphate-ester based hydraulic fluids and therefore should not be intermixed. (Please add adobe into the "notes" block in the table.)	Changing the hydraulic system from one type of fluid to another, for example a fluid change from a highly flammable mineral oil based fluid (MIL-H-5606) to a less flammable synthetic hydrocarbon based fluid (MIL-PRF-87257)(Please add above into the "description of Change" block in the table.)	Partially agree. This example is now Example 18. Added the word "similar" in front of word "type" in proposed change.

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Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
ASW-112	Appendix A, Table A-9, Example 17	New Non Significant Example	A complete showing for 29.562 and 29.561 at Amendment 29-29 or later would require substantial redesign of the subfloor and possibly other structure on an older amendment level helicopter. Installing TSO C-127 seats while maintaining the lower 29.561 loads, and not meeting the 29.562 requirements is an acceptable approach. The TC change or STC could not be given credit for later certification basis for 29.561 or 29.562; however, the addition of the TSO'd dynamic seat may well increase occupant survivability in the case of an emergency crash condition. (Please add adobe into the "notes" block in the table.)	A TSO C-127 dynamic seat installed in a helicopter with an existing certification basis prior to addition of 29.562, Dynamic Seat Systems. (Please add above into the "description of Change" block in the table.)	Agree. This example is now Example 19. Amended as indicated: "A TSO C-127 dynamic seat installed in a helicopter with an existing certification basis prior to addition of § 29.562, <i>Emergency landing dynamic conditions.</i> "