

## DISPOSITION OF AUTHORITY COMMENTS

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

No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
1	Airbus	General	There are several occurrences of “certification basis” without “type certification basis”.	Increase the precision of wording and facilitate the future harmonisation with EASA GM 21.A.101, as EASA identifies distinctly the “type certification basis” and the “OSD certification basis”.	Reformulate systematically to “type certification basis”	Partially agree. Instead, added to definition of certification basis in paragraph 1.5.2:  “The terms certification basis, type certification basis, and amendment are used interchangeably to refer to the groups of requirements defined above.”
2	Airbus	2.2.2.1	“meets the criteria in § 21.101(b)(1), (2), and (3)”	Criteria in § 21.101(b)(1), (2), and (3) cannot be fulfilled simultaneously.	“meets the criteria in § 21.101(b)(1), (2), or (3)”	Agree. Amended as suggested.
3	Airbus	2.2.2.1	“When design changes involve features or characteristics that are considered novel and unusual (at the time the proposed amendment level of a regulation was codified), and the proposed airworthiness standards do not contain adequate or appropriate safety standards for this feature, later amendments and/or special conditions will be applied.”	The concept of time is misleading, especially the association of “are” (present) with “at the time” (past).	“When design changes involve features or characteristics that are considered novel and unusual as compared to the airworthiness standard at the proposed amendment, more recent airworthiness standards and/or special conditions will be applied for these features.”	Agree. Amended as suggested.
4	Airbus	3.5.1, Note	“staged design changes”	§ 5.13, which is referenced in this paragraph, uses the wording “sequential design changes”	Suggestion is to harmonize the wording	Agree. Amended as suggested.  “Note: If you plan changes in sequence over time, refer to the discussion on “sequential design changes” in paragraph 5.13 of this AC.”
5	Airbus	3.10	“see paragraph 3.10 of this AC”	The reference is on the paragraph itself	Remove or correct this reference	Agree. Amended reference to “paragraphs 3.10.1 and 3.10.2.”

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6	Airbus	5.2	"FAA policy"	It is guessed that "FAA policy" in this context applies to AC (AC 23/25/27/29.XX, etc.), rather than to FAA Policy Papers / Statements.	If this understanding is correct, we suggest replacing "FAA policy" by "AC". Otherwise, if it means more than AC, specify more precisely what is meant.	Agree. This section is referring to FAA policy that is of general applicability, such as advisory circulars and policy statements. Changed to:  "Once the certification basis has been established, the exceptions of § 21.101 are not applicable in determining which policy (e.g., ACs, and policy statements) applies to the design change."
7	Airbus	5.10	Integration of STCs into the Type Design	This section is globally lacking clarity. First of all, scenario 1 is misleading, because it suggests that the STC was originally designed without ensuring compatibility with the original TC, which should not happen (mistake). Normally, such incompatibility should only result from changes applied to the TC after the STC has been designed, which would invalidate the compatibility with the TC. This should be more explicit. Inversely, scenario 3 is realistic, because of possible interferences between several STCs which were not supposed to be applied simultaneously. Also, what is important to consider is the implication on whether § 21.101 has to be applied and how the type certification basis has to be	We suggest fully reviewing section 5.10 the following way. The integration of STCs into the product type design may generate an additional major change in the following cases:- a change is needed to accommodate for interferences between several STCs which were initially not intended to be applied concurrently,- a change is needed to integrate one or several STCs which are not compatible with the current product type design to be amended. If the integration of the STC(s) does not generate an additional major change, the integration is not evaluated pursuant § 21.101. The existing certification basis should be updated to include the later amendments of the STC(s) being integrated. If the integration of	Agree. Amended as suggested, with change of term from "integration" to "incorporation."

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				updated. There are actually 2 cases to be considered:- either the integration does not generate a major change: then § 21.101 does not apply, and the type certification baseline needs to be updated with the amendments linked to the STC(s)- either the integration generates a major change: then § 21.101 applies and type certification baseline needs to be updated additionally with the amendments resulting from the application of § 21.101.	the STC(s) generates an additional major change, the change must be evaluated pursuant § 21.101 and the existing certification basis should be additionally updated to include the amendments possibly resulting from the application of § 21.101.	
8	Airbus	Appendix A	Some examples of substantial, significant and not-significant changes have been appended to the tables, without grouping them by domain.	Grouping the examples by domain would make the use of tables much easier.	Suggestion is to group the examples by domain (e.g. performance, structure, avionics, ...).	Disagree. The format is organized by Part, as established by the Authorities and industry during the first AC publication.
9	Airbus	Appendix A, Table A-5, Example 1	Extensive changes to avionics and aircraft systems. Impact to crew workload and human factors, pilot type rating.	Classification depends on the extent of changes to avionics and aircraft systems.	Airbus proposes the wording: <b>“When it requires</b> extensive changes to avionics and aircraft systems. Impact to crew workload and human factors, pilot type rating.”	Disagree. A reduction of number in flightcrew is in itself significant and will require extensive changes to the way the information will be presented to the pilot and the crew workload. This note is intended to explain why the change is significant.

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10	Airbus	Appendix A, Table A-5, Example 4	Typically, a change greater than 10 percent in operational cabin pressure differential. May require extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc. Invalidates design assumptions.	Clarify that it is significant when it requires extensive airframe changes.	Airbus proposes the wording: "Typically, a change greater than 10 percent in operational cabin pressure differential. <del>May</del> , <b>when it</b> requires extensive airframe changes affecting load paths, fatigue evaluation, aeroelastic characteristics, etc., <b>which</b> invalidates design assumptions."	Partially agree. This example is now Example 5. We clarified the note:  "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."
11	Airbus	Appendix A, Table A-5, Example 5	Requires extensive changes to wing structure, adds aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics.	Clarify that it is significant when it requires extensive changes to wing structure, etc.	Airbus proposes the wording: " <b>When it r</b> Requires extensive changes to wing structure, adds aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics."	Partially agree. This example is now Example 6. We clarified the note:  "The addition of leading edge slats is significant since it requires changes to wing structure, adds aircraft systems, and requires a new airplane AFM to address performance and flight characteristics."
12	Airbus	Appendix A, Table A-5, Example 7	Requires extensive changes to fuselage structure, affects aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics.	Clarify that it is significant when it requires extensive changes to fuselage structure, etc.	Airbus proposes the wording: " <b>When it r</b> Requires extensive changes to fuselage structure, affects aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics."	Partially agree. This example is now Example 8. We clarified the note:  "These types of structural modifications are significant since there are they require extensive changes to fuselage structure, affect aircraft systems, and require a new AFM to address performance and flight characteristics."

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13	Airbus	Appendix A, Table A-5, Example 8	Requires extensive changes to aircraft structure, affects aircraft systems, and requires AFM changes.	Clarify that it is significant when it requires extensive changes to aircraft structure, etc.	Airbus proposes the wording: <b>“When it requires extensive changes to aircraft structure, affects aircraft systems, and requires AFM changes.”</b>	Partially agree. This example is now Example 9. We clarified the note:  “This type of landing gear change with an increase in gross weight is significant since it requires changes to aircraft structure, affects aircraft systems, and requires AFM changes, which invalidate the certification assumptions.”
14	Airbus	Appendix A, Table A-5, Example 10	Requires extensive re-substantiation of aircraft structure, aircraft performance and flying qualities and associated systems.	Weight only is not necessarily driving “extensive re substantiation of aircraft structure”, from a structure point of view. It is the loads aspect that changes the assumptions for certification.	Airbus proposes the wording: <b>“When resulted in significant design loads increase,</b> requires extensive re- substantiation of aircraft structure, aircraft performance and flying qualities and associated systems.”	Partially agree. The commenter's suggestion to add clarification with regard to design load increases is valid. This example is now Example 11. The changed note is as follows:  “Design weight increases of more than 10 percent result in a significant design load increase that invalidates the assumptions used for certification, requiring re- substantiation of aircraft structure, aircraft performance, and flying qualities and associated systems.”

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15	Airbus	Appendix A, Table A-5, Example 11	No text in Notes cell (6th column)	Reason for making installation of winglet significant is the extension of the wing span resulting in the redistribution of the wing loads. If the winglet has already been installed, a change would not lead anymore to this wing span increase.	Airbus proposes to add the following note: "When it involves a wingspan extension resulting in redistribution of wing loads. Modification of existing winglets is not-significant."	<p>Partially agree. This example is now Example 12. Redistribution of wing loads is not the only criteria for determining significance. As such, this change is not adopted. We agree that some modifications of existing winglets may be not significant; however, this may not always be the case. We expanded the example and clarified the criteria. Changed as follows:</p> <p>EXAMPLE: Installation of winglets, modification of existing winglets, or other changes in wing tip design.</p> <p>NOTES: 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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16	Airbus	Appendix A, Table A-5, Example 17	Requires re-substantiation of powerplant installation, and has a marked effect on aircraft performance and flying qualities.	Clarify that it is significant when it requires re-substantiation of powerplant installation, etc.	Airbus proposes the wording: "When it requires re-substantiation of powerplant installation, and has a marked effect on aircraft performance and flying qualities."	<p>Disagree. This example is now Example 19. The example always requires re-substantiation of the powerplant installation, and the specific value of 10 percent was chosen because it has a marked effect on aircraft performance and flying qualities. The revised wording implies the change may not require re-substantiation of the powerplant installation or have a marked effect on aircraft performance and flying qualities. The Note was re-worded as follows:</p> <p>"A thrust or power increase of more than 10 percent is significant because it does have a marked effect on aircraft performance and flying qualities, or requires re-substantiation of powerplant installation. An increase of the nacelle diameter as a result of an increase in the bypass ratio is significant because it results in airframe-level effects on aircraft performance and flying qualities. However, a small increase of the nacelle diameter would not have such an airframe-level effect and would not be considered a significant change."</p>

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17	Airbus	Appendix A, Table A-5, Example 19	Requires changes to airframe, systems and AFM. Results in performance changes.	1/ Clarify that it is significant when it requires changes to airframe, systems and AFM, and results in performance changes.2/ It is not-significant if it is an extension of an already certified installation on a model of the same family	Airbus proposes the wording: "When it requires changes to airframe, systems and AFM, and results in performance changes. Not-significant if it is an extension of an already certified installation on a model of the same family."	Disagree. The example always requires re-substantiation of the powerplant installation, and the specific value of 10 percent was chosen because it has a marked effect on aircraft performance and flying qualities. The revised wording implies it the change may not require re-substantiation of the powerplant installation or have a marked effect on aircraft performance and flying qualities. For clarification, the Note was modified as follows:  "A thrust or power increase of more than 10 percent is significant because it does have a marked effect on aircraft performance and flying qualities, or requires re-substantiation of powerplant installation. An increase of the nacelle diameter as a result of an increase in the bypass ratio is significant because it results in airframe-level effects on aircraft performance and flying qualities. However, a small increase of the nacelle diameter would not have such an airframe-level effect and would not be considered a significant change."

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18	Airbus	Appendix A, Table A-5, Example 21	An expansion of operating capability would normally be a significant change (e.g., an increase in maximum altitude limitation, approval for flight in known icing conditions, or an increase in airspeed limitations). Merely operating a product to an expanded envelope 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.	Clarify that it is significant when it requires extensive changes to airframe, systems and AFM	Airbus proposes the wording: "An expansion of operating capability would normally be a significant change (e.g., an increase in maximum altitude limitation, approval for flight in known icing conditions, or an increase in airspeed limitations), <b>when it requires extensive changes to airframe, systems and AFM.</b> Merely operating a product to an expanded envelope 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."	Disagree. This example is now Example 23. The additional qualifiers are unnecessary, and the word "extensive" may be misinterpreted by applicants to require more changes than what would normally qualify as a significant change.
19	Airbus	Appendix A, Table A-5, Example 26	Whole example 26	This example is redundant with example 14 in table A-5.	Airbus suggests to delete example 26.	Agree. Deleted as suggested.

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20	Airbus	Appendix A, Table A-5, Example 27	For example, an STC applicant wants to replace a life limit (typically pre-Amendment 25-45), with a damage-tolerance-based inspection program. This is considered significant.	For FAR25 post amdt54 aircraft, Damage Tolerance is the basis with approved methods used. By FAR25.571(c), all structures must be damage tolerant, except some limited number of structures (usually landing gear structures) that have so-called fatigue safe life limits. Therefore, in this context the wording damage tolerance life limit used in the description “Replacing the life limit with a damage tolerance based life limit” is not really understood.	Airbus suggests to further clarify this subject.	Agree that clarification is needed. The example may imply that applying a new amendment level is a criterion 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.
21	Airbus	Appendix A, Table A-6, Example 16	Extending an LOV pursuant to § 26.23 without any other change to the airplane is not a significant change. If extending the LOV requires modifications to the airplane, those modifications are to be evaluated to determine if the change is significant. Note that if design approval holders are developing modifications to support an extended LOV, they must also comply with the requirements of subpart E of part 26.	The current note could be misinterpreted by a reader such that any extension of LoV requiring modifications to the structure would be significant. In the case of required modifications, it is not the extension of the LoV but the significance of the modification(s) that need to be reviewed against the Part 21.101 criteria, and that could lead to the decision significant change for those modification(s).	Airbus propose to clarify the text as follows: “Extending an LOV pursuant to § 26.23 without any other change to the airplane is not a significant change. If extending the LOV requires modifications to the airplane, those modifications are to be evaluated <b>case by case</b> to determine if <del>the change is significant</del> <b>those modifications are a Significant change themselves</b> . Note that if design approval holders are developing modifications to support an extended LOV, they must also comply with the requirements of subpart E of part 26.”	Partially agree. This example is now Example 15. Modified the Note as follows:  “Extending an LOV pursuant to § 26.23 without any other change to the airplane is not a significant change. However, if extending the LOV requires a physical design change to the airplane, the design change is evaluated to determine the level of significance of the design change. Note that if design approval holders are developing modifications to support an extended LOV, they must also comply with the requirements of subpart E of part 26.”

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22	Airbus	Appendix A, Table A-6, Example 17	Whole example 17	This example is redundant with example 14 in table A-6.	Airbus suggests to delete example 26.	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
23	Airbus	Appendix A, Table A-8, Example 1 and 20	Example 1 is related to a "Comprehensive flightdeck upgrade ...". Example 20 is related to "An avionics upgrade that changes independent displays to integrated displays".	These examples look redundant. Moreover, a rationale why case 20 invalidates the assumptions used for certification is missing.	Re-evaluate the need to have both examples 1 and 20. If example 20 is kept, a rationale should be provided in column "Notes".	Agree. Amended as suggested. Deleted Example 20.
24	Airbus	Appendix A, Table A-8, Example 15	This example lists as significant "A new Category A certification approval to an existing configuration."	There are cases where a rotorcraft may be initially certificated with limited Category A (according to § 29.1 (d) or (e)) and an extension is done to allow, for example, helipad or helideck Category A operations. Such a change may not be significant.	Proposed resolution is to change the description to: "An initial Category A certification approval to an existing configuration."	Agree. Amended as suggested. This example is now Example 14.
25	ATR	General	§ 21.21(b)(2) § 21.101 (g)	EASA will use this AC to issue its own GM 21.A.101.  Some references to FAA Part 21 paragraphs (or other CFR 14 parts) do not have equivalent in EASA Part 21 or do not correspond to the same § in EASA Part 21.	Reference to 21.A.21(c)(3).  Reference to Part 26	Noted.

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26	ATR	General	foreign authority validation of a change to type design	The AC does not address cross acceptance among the four authorities (FAA, EASA, TCCA, ANAC) of the certification basis exceptions recorded for a change to a type design (I assume that the type/model has already been validated by the importing authority). In particular exceptions granted by one authority, in accordance with §21.101(b)(3) (reversion to existing certification basis for a specific §), should be generally accepted by the other authorities without further investigation. SSD and NSSD considerations do not invalidate the evaluation of the exporting authority on the basis of which an exception has been granted in accordance with §21.101(b)(3). In fact, SSD and NSSD increase the burden of compliance (usually setting stricter requirements), on a matter on which the safety gain is not proportionate to the costs that would be incurred by the applicant.	<p>Add a note, perhaps, in chapter 3 (Overview). Alternatively, address thoroughly the matter in a new chapter 6.</p> <p>Note: Exception granted by one authority, in accordance to §21.101(b)(3), allowing the use of the existing certification basis for a particular airworthiness requirement without upgrade to the latest amendment, should be generally accepted by the importing authorities without further investigation.</p>	Disagree. Out of scope of this AC.

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27	ATR	3.2.2.4	The type certificate for airplane model X lists three series, namely X-300, X-200, and X-100. The X-300 is a derivative of the X-200, which is a derivative of the original X-100 series.	Misunderstandings about what is a model, series, derivative and variant should be avoided as far as possible through a clear definition of those designations and their link with design changes and in particular with substantial design changes. Is “example 2” applicable to different models (a definition is missing) of the same family or just to different series (a definition is missing) of the same model? If it was applicable to different models of the same family, the cumulative effects to be considered could have been much larger.	This example talks about series and derivatives of a model. A clear definition of model, series, derivative, variants, etc. should be given in the AC. The relation between those terms, “design change” and “certification basis update” should be clearer explained.	Partially agree. Amended as indicated below. Note this text was moved to paragraph 5.13.2:  <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 needs to advance.”

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28	ATR	Appendix A, Table A-5, Example 14 and 6	flightdeck upgrade	Point 14 and 26 are very similar. What's the reason FAA wants to put them both?	Better explain the difference between these two points (if any) or delete one of them.	Agree. These two examples are duplicates. Removed Example 26 from the "not significant" table, and modified Example 14 (now Example 15). Description of change is now:  "A comprehensive avionics upgrade that changes a federated avionics system to a highly integrated avionics system."
29	ATR	Appendix A, Table A-6, Example 14 and 17	flightdeck upgrade	Point 14 and 17 are the same.	Delete one of them.	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
30	Bell	General		Examples for different types of product have inconsistencies	Examples in tables for all aircraft types should be reviewed together to ensure consistency between aircraft types.	Agree. Reviewed examples for consistency and adjusted accordingly, where possible.
31	Bell	Appendix A, Table A-8, Example 4	May be a substantial change depending upon project details	The note does not add any value and should be removed. CPR needs to assess all changes together by definition.	Remove note.	Agree. Deleted note.
32	Bell	Appendix A, Table A-8, Example 8	Extensive primary structure changes from metallic material to composite material.	This could contradict the example under substantial changes for change from all metallic to all composite.	Remove example	Agree. Deleted example.

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33	Bell	Appendix A, Table A-8, 9	Emergency Medical Service (EMS) Configuration with primary structural changes sufficient to invalidate the certification assumptions.	Example is confusing because it does not draw a line between what would or would not be considered significant. Most HEMS STCs would be not-significant.	Clarify example to identify what specifically could make the change Significant or move the example to not-significant.	<p>Agree. This example is now Example 8. Added statement in Note that door addition or enlargement involving structural change would be significant. Now reads:</p> <p>“Many EMS configurations will not be classified as significant. Modifications made for EMS are typically internal, and the general external configuration is normally not affected. These changes should not automatically be classified as significant.</p> <p>Note: Door addition or enlargement involving structural change would be significant.”</p>
34	Bell	Appendix A, Table A-8, 16	Instrument Flight Rules (IFR) upgrades involving installation of upgraded components for new IFR configuration.	Similar example under Part 23 is considered not-significant. Table A-3 Example 14.	Move to not-significant	<p>Partially agree. This example is now Example 15. Added Note:</p> <p>“Changes in the architecture concepts, design philosophies, human-machine interface, or flightcrew workload.”</p> <p>Amended Table A-9 to add new Example 15. Assumption is “no” and Note reads:</p> <p>“No changes in architecture concepts, design philosophies, human-machine interface, or flightcrew workload.”</p>

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35	Bell	Appendix A, Table A-9	After Example A-9 #6	New example to expand on example A-9 #6 to be added.	Add new example, "Change from a single channel FADEC to a dual channel FADEC" with the note: "Change does not change the overall product configuration nor the original certification assumptions"	Agree. Added as Example 6 in Table A-9.
36	Bell	Appendix A, Table A-9, Example 3	Helicopter Terrain Awareness Warning System (HTAWS) for operational credit.	Note should be clear as to reason for being not significant.	Add to the comments: "Does not alter the basic rotorcraft configuration"	Agree. Added suggested text to Note.
37	Bell	Appendix A, Table A-9, Example 4	Health Usage Monitoring System (HUMS) for Maintenance Credit.	Note should be clear as to reason for being not significant.	Add to the comments: "Does not alter the basic rotorcraft configuration"	Agree. Added suggested text to Note.
38	Bell	Appendix A, Table A-9, Example 6	Installation of a new engine type, equivalent to the former one; leaving aircraft installation and limitations substantially unchanged.	Note should be clear as to reason for being not significant.	Add to the comments: "Does not change the rotorcraft overall product configuration"	Partially agree. This example is now Example 7. Added the following text to the Note: "Does not alter the basic rotorcraft configuration, provided there is no additional capacity embedded in the new design."
39	Boeing	General		We endorse the consolidated Industry comments submitted to this proposal. A consolidated set of comments to this AC draft has been coordinated and submitted jointly to the FAA by a number of U.S. and international aviation industry groups, including the Aerospace Industries Association of America (AIA) and the General Aviation Manufacturers Association (GAMA). Boeing has reviewed and wholeheartedly		Noted. Refer to specific sections within the AC for disposition of comments.

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				<p>endorses those comments. We call your attention to the fact that those combined comments address issues of clarification and streamlining of the Changed Product Rule (CPR) process and requests for improvements that were highlighted in previous joint letter from AIA, GAMA, the Aerospace Industries Association of Canada (AIAC), and the AeroSpace and Defence Industries Association of Europe (ASD), submitted in February 2013. Those comments also build on detailed proposals submitted jointly by the industry groups to the CPR Continuous Improvement Team (CIT) in March 2014, with a subsequent requested adjustment in October 2014. The proposed process as is drafted in this new AC revision, however, does not incorporate many of these recommendations and does not improve the ability to establish the certification basis until the design details are fully understood. This means that the regulatory requirements are not fully understood until late in the design cycle. The latest set of proposed changes coordinated by Industry (submitted to this proposed AC revision) are</p>		

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				intended to enable an applicant to establish the regulatory requirements earlier in the design cycle and to streamline the process for establishing the certification basis, while ensuring the change and areas affected by the change comply with the latest amendments to the greatest extent practical.		
40	Boeing	General		We are concerned about the removal of "secondary change" and its effect on the certification process. We note that, in this latest revision of the AC, the FAA has removed all references to "secondary change." In original AC 21.101-1, there was allowance for an applicant to identify both physical and functional change as secondary and thus comply with the existing certification basis for the secondary change. As such, the documentation of certification basis for changes classified as secondary was streamlined. However, in AC 21.101-1A, the FAA eliminated the ability of an applicant to identify functional change as secondary. Thus, for any functional change proposed to comply with an amendment of a regulation that was earlier than was effective on the date of application, the applicant was		Partially agree. Disagree with Industry proposal. Secondary change will be retained in this AC. Functional changes will also be eligible to be classified as secondary changes.

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				<p>required to seek an exception via 14 CFR §21.101(b)(3), either as not contributing materially to the product’s safety or as “impractical.” Proposed AC 21.101-B also removes the ability to treat physical change as secondary, no matter how inconsequential the change. The Industry proposals addressing affected area are intended to somewhat counterbalance the loss of the ability to treat low-level change as secondary. If the FAA does not accept the Industry’s proposal for addressing affected area, then Boeing objects to the elimination of secondary change. The burden on both the FAA and the applicant to negotiate advancement of the certification basis for areas of a product for which the physical change or change to performance/functional characteristics is not appreciable to the product’s airworthiness, is not commensurate with the benefit.</p>		
41	Boeing	General		<p>We have serious concerns about the change to the definition of a baseline product. In this proposed revision of the AC, the FAA has introduced a proposed change to the definition of the</p>		<p>Agree. The definition of a baseline product amended as follows:  “5.3 A Baseline Product Consists of One Unique Type Design</p>

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				<p>baseline product as a single buildable configuration. Boeing understands the type design to be a collection of approved designs in accordance with 14 CFR §21.31. The proposed change in definition, however, seems to limit that to something less than described by regulation. Therefore, Boeing fully endorses the Industry’s recommendation to revise the proposed definition.”</p>		<p>Configuration. As mentioned in paragraph 3.2.1 of this AC, it is important to clearly identify the type design configuration to be changed. The baseline for a changed product consists of one unique type design configuration. This unique type design configuration is an approved product configuration that can be manufactured at one time or may consist of multiple approvals over time. (e.g., airplane model with an approved STC incorporated). The applicant should identify the specific product configuration that will be modified. The FAA does not require an applicant to assign a new model name for a changed product. Therefore, there are vastly different changed products with the same airplane model name, and there are changed products with minimal differences that have different model names. Since the assignment of a model name is based solely on an applicant business decision, the identification of the baseline product, for the purposes of 21.101, is one unique type design configuration, as mentioned above.</p> <p>Note: The type design</p>

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						<p>configuration, for this purpose, could be based on a currently approved configuration or based on a proposed future configuration that is expected to be approved at a later date but prior to the proposed changed product.”</p> <p>Also, the definition in Appendix J, paragraph J.3 remains as follows:</p> <p>“Baseline Product. It is an aeronautical product with a specific, defined approved configuration and certification basis that the applicant proposes to change.”</p>
42	Boeing	3.1.1	<p>“3.1.1. ... The FAA is responsible for determining whether your classification of the change, and proposal for the certification basis, are consistent with the applicable rules and their interpretation, but should not depend on whether the TC holder or applicant for a STC is originating the change. ...”</p>	<p>This text needs clarification. The proposed wording in the draft AC implies that application of the regulation in a consistent manner across all applicants is a best practice rather than a requirement.</p>	<p>“3.1.1. ... The FAA is responsible for determining whether your classification of the change, and proposal for the certification basis, are consistent with the applicable rules and their interpretation, <del>but should</del> <b>The FAA determination</b> must not depend on whether the TC holder or applicant for a STC is originating the change....”</p>	<p>Partially agree. Amended as suggested and changed “must not depend” to “does not depend”:</p> <p>“...The FAA is responsible for determining whether your classification of the change, and proposal for the certification basis, are consistent with the applicable rules and their interpretation. The FAA determination does not depend on whether the TC holder or applicant for an STC is originating the change....”</p>

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43	Boeing	Appendix A, Table A-5, Example 11	<p>Example column: 11</p> <p>Description of Change column: Installation of winglets. Notes column: [blank]</p>	<p>The term “winglet” is not well enough defined to use as a differentiator for whether a change is significant, without some qualification. Some wingtip modifications that may be described as winglets do not require extensive changes to wing structure or AFM changes to address performance or flight characteristics; therefore, these should be considered not significant. The considerations for whether the addition of winglets is a significant change should be the same as for other wing modifications. Our suggested note is similar to Example 12 in the next row of Table A-5, which also addresses wing changes.</p>	<p>Example column: 11</p> <p>Description of change column: Installation of winglets.</p> <p>Notes column: <b>When installation requires extensive changes to wing structure, adds aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics.</b></p>	<p>Partially agree. This example is now Example 12. We expanded the example and added the criteria; however, all of the criteria must not be met for a change to be significant.</p> <p>EXAMPLE: Installation of winglets, modification of existing winglets, or other changes in wing tip designs.</p> <p>NOTES: 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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44	Boeing	Appendix A, Table A-5, Example 13	<p>The proposed text states:</p> <p>Example column: 13</p> <p>Description of Change column: Change in type or number of emergency exits or an increase in the maximum certificated number of passengers.</p> <p>Notes column: [blank]</p>	<p>We suggest adding this note to provide clarification that Example 13 pertains to increase in the number of exits, or max certified number of passengers, and that changes de-rating or deactivation of doors that result in reductions in passenger capacity would be considered not- significant.</p>	<p>Example column: 13</p> <p>Description of Change column: Change in type or number of emergency exits or an increase in the maximum certificated number of passengers.</p> <p>Notes column: <b>Changes in the airplane configuration that include derating doors or deactivating doors with corresponding reduction in passenger capacity would not be considered significant, since the emergency egress requirements would not exceed those previously substantiated.</b></p>	<p>Partially agree. This example is now Example 14. Instead of adding a note, added a new Example 17 to Table A-6 (“not significant” table) as follows:</p> <p>EXAMPLE: Changes in the type or number of emergency exits by de-rating doors or deactivating doors with corresponding reduction in passenger capacity.</p> <p>Other columns: No, No, No</p> <p>NOTES: The new emergency egress does not exceed that previously substantiated because the certificated number of passengers is reduced.</p>
45	Boeing	Appendix A, Table A-5, Example 17	<p>Example column: 17</p> <p>Description of Change column: Typically a thrust increase of more than 10 percent.</p>	<p>We recommend adding the qualifier “takeoff” to clarify which numerical thrust value the 10% increment is to be based on. This is to prevent confusion in application of the determination.</p>	<p>Example column: 17</p> <p>Description of Change column: Typically a <b>takeoff</b> thrust increase of more than 10 percent.</p>	<p>Partially agree. This example is now Example 19. The example is changed as follows:</p> <p>EXAMPLE: Maximum continuous or takeoff thrust or power increase of more than 10 percent or, for turbofans, an increase of the nacelle diameter.</p>

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46	Boeing	Appendix A, Table A-5, Example 26	Example column: 26  Description of Change column: Comprehensive flightdeck upgrade affecting avionics and electrical systems integration, architecture concepts, and design philosophies. Example: Conversion from entirely federated, independent electromechanical flight instruments to highly integrated and combined electronic display systems	This example is redundant to Table A-5, Example 14.	We recommend deleting this example.	Agree. Deleted as suggested.
47	Boeing	Appendix A, Table A-6, Example 17	Example column: 17  Description of change column: Flightdeck replacement of highly integrated and combined electronic display systems with another highly integrated and combined electronic display systems	This example is redundant to Table A-6, Example 14.	We recommend deleting this example.	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
48	Bombardier	General		In many discussions between Industry & the CIT during 2015 & 2015, the suggestion has been made to jointly roll-out the -1B version of the AC to Industry & Agencies in a collaborative effort. Bombardier recognizes this aspect is not a feature of the AC itself, though takes this opportunity to encourage the CIT to recommend collaboration in its report to FAA, EASA, TCCA & ANAC.	Jointly train CPR to Agency & Industry staff who will normally be teamed to run the required CPR process (as a basic course or as a refresher dealing with changes to AC version -1B).	Noted. Out of context for this AC, but the training issue is being dealt with by the Certification Management Team (CMT) - FAA/EASA/ANAC/TCCA.

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49	Bombardier	1.1	<p>PurposeThe guidance describes the process for establishing the certification basis for an amended TC (ATC), supplemental type certificate (STC), and amended STC, detailing the requirements (evaluations, classifications, and decisions) to be made throughout the process.</p>	<p>Bombardier has participated with other representations from Industry in many discussions with the Agencies CPR-CIT throughout development of AC 21.101 draft -1B. Bombardier is pleased to be involved in these discussions and hopes that this multi-national, multi-Agency effort will result in regulatory guidance acceptable in all jurisdictions that enables mutual recognition between bilateral partners of the Certifying Agency determinations required by 21.101. As a result of Industry collaboration, Industry Organizations AIA, AIAB, AIAC, ASD &amp; GAMA have submitted a set of comments to FAA in a letter dated September 15th, 2016 that represents a common Industry position on the draft. Bombardier supports that submission and indicates so throughout this comment form. Additional comments are also provided, to supplement the common position and for FAA to consider experiences with CPR practice unique to Bombardier. One of the principles that guides Industry in presenting feedback to the CPR-CIT is the need for the AC to depict a method (to establish the</p>	<p>Amend the para as follows:This AC provides guidance for establishing the certification basis for changed aeronautical products pursuant to Title 14 of the Code of Federal Regulations (14 CFR) 21.101, Designation of the applicable regulations. The guidance is intended to help applicants and delegated organizations determine <u>early in the development cycle of the product</u> if it will be necessary to apply for a new type certificate (TC) under § 21.19, Changes requiring a new type certificate. The guidance describes the process for establishing the certification basis for an amended TC (ATC), supplemental type certificate (STC), and amended STC, detailing the requirements (evaluations, classifications, and decisions) to be made <del>throughout the process,</del> <u>while respecting the Applicants need to define applicable requirements early in their development cycle.</u></p>	<p>Partially agree. The FAA concurs that the establishment of the certification basis early on in a program is ideal. However, if an applicant has not yet finalized the design, it may be difficult to identify the certification basis at the beginning of a program (e.g., inability to determine the applicable requirements and areas changed and affected). Since the proposed design is an applicant responsibility, the proposed language is not appropriate for this AC.</p>

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				certification basis for changed products) that is both reliable and predictable. In addition, activity & determinations required by the 21.101 must be completed early enough in the Applicant design evolution process so that the applicable airworthiness requirements are defined and form part of the overall product design requirements. As such, Bombardier believes this should be stated as part of the AC purpose.		
50	Bombardier	1.4		Bombardier supports Appendix II, comment # 1, of the Joint Industry submission.		Noted.
51	Bombardier	1.5		Bombardier supports Appendix II, comment # 2, of the Joint Industry submission.		Noted.
52	Bombardier	2.2.1.1		Bombardier supports Appendix II, comment # 3, of the Joint Industry submission.		Noted.
53	Bombardier	2.2.1.1		Bombardier supports Appendix II, comment # 4, of the Joint Industry submission.		Noted.

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54	Bombardier	2.2.2.1	In addition, pursuant to § 21.21(b)(2), if there is a feature or characteristic that would make the changed product unsafe for the use for which certification is requested, the FAA will impose additional requirements.	The reference to 21.21(b)(2) is out of context in 2.2.2.1. Bombardier acknowledges that FAA will impose additional requirements if there are features introduced by the changed product that would make it unsafe. However, 21.101(b) discusses the methods an Applicant can use to become excepted from using the latest published requirements as a matter of the CPR process. The 21.21(b)(2) prerogative is applied at a higher level and in an overall sense. This reminder to Applicants for a changed product is best made in a separate part of the AC, perhaps Section 5, adjacent to the current 5.5 Special Conditions.	Amend [delete] the para as follows:  <del>In addition, pursuant to § 21.21(b)(2), if there is a feature or characteristic that would make the changed product unsafe for the use for which certification is requested, the FAA will impose additional requirements.</del>	Agree. Deleted as suggested.
55	Bombardier	2.2.2.2		Bombardier supports Appendix II, comment # 5, of the Joint Industry submission.		Noted.
56	Bombardier	2.2.5		Bombardier supports Appendix II, comment # 6, of the Joint Industry submission.		Noted.
57	Bombardier	3.1.1		Bombardier supports Appendix II, comment # 7, of the Joint Industry submission.		Noted.
58	Bombardier	3.1.1	The FAA is responsible for determining whether your classification of the change, and proposal for the certification	Bombardier is uncertain as to the exact extent FAA are involved in the day-to-day classification of product design	Amend the para as follows: <u>As a Certifying Agency and as bound by the agreements with its Bilateral partners,</u> the FAA is	Disagree. Out of scope of this AC.

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			<p>basis, are consistent with the applicable rules and their interpretation, but should not depend on whether the TC holder or applicant for a STC is originating the change.</p>	<p>changes. Firstly, the implication on FAA responsibility in this para maybe in conflict with delegation options in the US, where the determination of a Minor classification can be undertaken by a qualified certificate holder. Bombardier believes FAA have generalized this statement in order to capture that the determination or agreement to a classification of Significant or Not-Significant is not a delegable decision in the US (as clearly stated in section 3.6.8). Unfortunately, due to the all encompassing language in 21.101(a), all changes [Minor, Major] must pass through the process, despite clarifications in the AC concerning Minor changes and the determination of Significant. Secondly, the option to delegate some of the CPR process to an Approved Industry Organization may be different in non-FAA jurisdictions, including those to which FAA have a bilateral agreement. Therefore, to make a general statement on FAA responsibility in the classification of changes as per 3.1.1 is too broad and may contradict provisions in implementing arrangements amongst the</p>	<p>responsible for determining whether your classification of the change <a href="#">required by 21.101(b)</a>, and proposal for the certification basis, are consistent with the applicable rules and their interpretation, but should not depend on whether the TC holder or applicant for a STC is originating the change.</p>	

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				<p>bilateral partners. Furthermore, Bombardier along with Industry colleagues have discussed an ongoing issue where the FAA acting as a Validating Agency has challenged the Significant, Non-Significant decisions of the Certifying Agency. While the applicability of CFR 14 Part 21 in its entirety is subject to the statements in 21.29, the unbounded nature of the text in 3.3.1 only compounds the issue.</p>		
59	Bombardier	3.1.2		Bombardier supports Appendix II, comment # 8, of the Joint Industry submission.		Noted.
60	Bombardier	3.1.3		Bombardier supports Appendix II, comment # 9, of the Joint Industry submission.		Noted.
61	Bombardier	3.1.3		<p>Bombardier supports Appendix I, comment # 1, of the Joint Industry submission. As FAA will determine by review of these comments, one of the basic needs of Industry is to define the certification basis for changed products in a rapid, reliable and predictable way. The concept that not all areas of a changed product are automatically required to address the requirements in effect on the date of application is a fundamental of CPR. In fact, the need to establish the affected</p>		Disagree. Amended graphic was not accepted. Secondary change will be reintroduced into the AC.

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				<p>and not affected areas of an otherwise significantly changed product is testament to that concept. Therefore, the threshold of what is affected or not becomes an important element of the process - to which the AC needs to be clear and as precise as possible. In draft -1B, Industry believed the AC was lacking in clarity, essentially driving all areas of the design impacted by the change to be defined as the affected area. In discussion with FAA and other members of the CPR-CIT in July 2015, Industry representatives had the opportunity to discuss the best approach to improve the AC. At that time, it was apparent that CIT marginally supported an additional attribute in the assessment of whether an impacted design element was in the affected area or not. This attribute involved the compliance determination and if the design element involved was impacted in an 'appreciable' way; where appreciable would itself have a definition connected with the overall airworthiness of the changed product. The suggested changes to the Figure in 3.1.3 depict that</p>		

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				<p>attribute. However, Bombardier are ready to consider alternative approaches that achieve the same objective. The concept of 'secondary change' when defined and bounded correctly may provide a similar threshold to the appreciable attribute. The notion that all elements of the design impacted by a change fall into one of three categories; the affected area, not affected area or secondary change area, was present in previous versions of the AC and whose roots go back to ICPTF &amp; CPR working groups. What is paramount is that the CPR-CIT recognize the need for such a threshold. Industry has proposed an attribute and definition that can meet the Industry need, as presented in the comments 10 and 20 +. If this proposal becomes untenable for the CIT, Bombardier would welcome continued involvement in the development of alternative approaches to address the issue.</p>		
62	Bombardier	3.2.1 and 5.3 and Appendix H, H2.1		Bombardier supports Appendix I, comment # 2, of the Joint Industry submission		Noted.
63	Bombardier	3.2.2.1 and 3.2.2.2		Bombardier supports Appendix II, comment # 10, of the Joint Industry submission.		Noted.

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64	Bombardier	3.2.2.4	<p>Example 2. The type certificate for airplane model X lists three series, namely X-300, X-200, and X-100. The X-300 is a derivative of the X-200, which is a derivative of the original X-100 series. An applicant proposes a design change to the X-300 series airplane. 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 was granted). Since the amendment level for this particular regulation was not changed for the two subsequent airplane series (X-200 and X-300), the cumulative effects of these two previous design changes that are related to the proposed change and the damage tolerance requirements must now be addressed.</p>	<p>The example falls under Step 1, to identify and describe the changes to the product. It is unchanged from the -1A version of the AC and, at face value, Bombardier agrees that the scenario presented would form part of the discussion to establish the appropriate certification basis for the X300 Model. The question Bombardier has for the FAA and the CPR-CIT is to advise what are the possible outcomes, in terms of making a determination of substantial and (if not substantial) how the scenario plays out in determining the certification basis for the example? In attempting to answer that question, Bombardier feels there is insufficient detail to predict the likely outcome and, thus, challenges the relevance of it as an example, particularly when the trigger (or threshold) of change between the X300 and X200 that brings to light the amendment level of this regulation is not evident in the text (and not specifically linked to the thresholds presented in 3.2.2.2). Some insight from the CIT would be appreciated.</p>	N/A. This s a question.	<p>Noted. Example is limited to illustrating “cumulative effect.” Amended as indicated below. Note this text was moved to 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</p>

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						whether the amendment level needs to advance.”
65	Bombardier	3.2.4		Bombardier supports Appendix II, comment # 11, of the Joint Industry submission.		Noted.
66	Bombardier	3.3.2	A “substantially complete investigation” of compliance is when most of the existing substantiation is not applicable to the changed product. In other words, the design change may be considered substantial if it is so extensive (making the product sufficiently different from its predecessor) that the design models, methodologies, and approaches used to demonstrate a previous compliance finding could not be used in a similarity argument. A change is considered substantial when these approaches, models, or methodologies of how compliance was shown must be re-validated to apply to the changed product . Also, extrapolation from previous data becomes unreliable or impossible, as the new product has changed to the extent that the baseline data is no longer relevant.	Bombardier agrees with the premise of this section, in identifying the parameters that influence the determination of Substantial. However, there is one sentence, revised from the - 1A version of the AC, that may not convey the criteria as intended. As an isolated statement, “a change is considered substantial when these approaches, models, or methodologies of how compliance was shown must be re-validated to apply to the changed product” is not in itself a reason to classify the change as Substantial. A simple validation activity can render previous approaches, models or methodologies equally relevant to the changed product (as stated in section 3.6.2). Bombardier believes that the sentence in question is redundant considering the text of the first sentence. However, if FAA wishes to emphasize the relevancy of validity of previous compliance means, Bombardier	A “substantially complete investigation” of compliance is when most of the existing substantiation is not applicable to the changed product. In other words, the design change may be considered substantial if it is so extensive (making the product sufficiently different from its predecessor) that the design models, methodologies, and approaches used to demonstrate a previous compliance finding could not be used in a similarity argument. A change is considered substantial when these approaches, models, or methodologies of how compliance was shown <b>are not valid for</b> the changed product . Also, extrapolation from previous data becomes unreliable or impossible, as the new product has changed to the extent that the baseline data is no longer relevant.	Agree. Amended as suggested. “A “substantially complete investigation” of compliance is required when most of the existing substantiation is not applicable to the changed product. In other words, you may consider the design change substantial if it is so extensive (making the product sufficiently different from its predecessor) that the design models, methodologies, and approaches used to demonstrate a previous compliance finding could not be used in a similarity argument. The FAA considers a change substantial when these approaches, models, or methodologies of how compliance was shown are not valid for the changed product.”

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				offers a simple grammatical revision.		
67	Bombardier	3.4		Bombardier supports Appendix II, comment # 12, of the Joint Industry submission.		Noted.
68	Bombardier	3.5.1	Even if a new cabin interior is not included in the product level change, the functional effect of the fuselage plug has implications on occupant safety (e.g., the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus the cabin interior becomes an affected area.	If the CIT accepts the idea of a threshold in the determination of affected area, whether it be using the proposed appreciable effect attribute or alternatives like secondary change, the conclusion of this section must be examined. It is the Bombardier position that if an Applicant wishes to use existing cabin interior elements in the extended fuselage (as an example), the cabin interior does not automatically become an affected area. The Applicant could propose that existing methodologies or models remain valid and the effect on airworthiness in not appreciable - and thus not necessarily an affected area. Even if the impact of fuselage length and increase in the number of passengers did have an appreciable effect on emergency evacuation, it may not have an appreciable effect on other design or compliance elements of the cabin interior (such as pax oxygen, emergency lighting, pax seat flammability &	Amend the para as follows: Even if a new cabin interior is not included in the product level change, the functional effect of the fuselage plug has implications on occupant safety (e.g., the dynamic environment in an emergency landing, emergency evacuation, etc.), and thus <u>aspects of</u> the cabin interior <u>may</u> become <u>part of the</u> affected area <u>if there is an appreciable effect on airworthiness at the product level</u> .	Disagree. This section is about grouping related changes. There is no mention in § 21.101 or the AC that if the “effect on airworthiness is not appreciable,” then the area is not affected. As for Bombardier's proposed change, the FAA does not agree that aspects of the cabin interior only become affected when there is an appreciable effect on airworthiness at the product level. The applicant may seek an exception by providing justification that meeting the latest requirement(s) does not materially increase the level of safety, or is impractical, for the change or affected area.

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				fundamental pax seat structural capability). In this regard, the conclusion that the cabin interior, in the general sense, is in the affected area is misleading.		
69	Bombardier	3.6.1.1		Bombardier supports Appendix II, comment # 13, of the Joint Industry submission.		Noted.
70	Bombardier	3.6.1.2 and 3.6.1.3		Bombardier supports Appendix II, comment # 14, of the Joint Industry submission.		Noted.
71	Bombardier	3.6.4		Bombardier supports Appendix II, comment # 15, of the Joint Industry submission.		Noted.
72	Bombardier	3.7.25.8	3.7.2 For transport category airplanes only, § 21.101(g) also requires that you comply with any applicable provision of part 26 (related to the change), which is applicable on the date of the application for the change, unless you elected or were required to comply with later corresponding part 25 requirements. The exceptions under § 21.101(b) do not apply to § 21.101(g).	Bombardier acknowledges that, for regulatory codes which contain Part 26 or equivalent, the applicability of 21.101(g) and the guidance in the AC are valid. However, as this AC is intended to provide guidance across many codes of regulations (applicable in all countries), the question arises as to how those codes that do not contain a Part 26 would be guided by sections 3.7.2 and 5.8. Bombardier asks the question of the CIT how this will be handled.	N/A. This s a question.	Agree. The appropriate guidance material will be adopted by each authority.
73	Bombardier	3.8.1		Bombardier supports Appendix II, comment # 16, of the Joint Industry submission.		Noted.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
74	Bombardier	3.8.3		Bombardier supports Appendix II, comment # 17, of the Joint Industry submission.		Noted.
75	Bombardier	3.9 all paras., Appendix B, Appendix C, and Appendix D		Bombardier supports Appendix I, comment # 3, of the Joint Industry submission.		Noted.
76	Bombardier	3.10 and 3.10.1 and Appendix E		Bombardier supports Appendix I, comment # 4, of the Joint Industry submission.		Noted.
77	Bombardier	5.2		While Bombardier does support Appendix II, comment # 18 of the Joint Industry submission, it is recognized that the section relates to FAA Policy only. In line with similar comment, Bombardier asks the question of the CIT how this will be handled when FAA is not the certifying agency.		Noted. Out of scope for this AC. This will be subject to the bilateral agreement provisions.
78	Bombardier	5.6		Bombardier supports Appendix II, comment # 19, of the Joint Industry submission.		Noted.
79	Bombardier	5.9.2.1		Bombardier supports Appendix II, comment # 20, of the Joint Industry submission.		Noted.
80	Bombardier	Appendix A, Introduction		Bombardier supports Appendix I, comment # 5, of the Joint Industry submission.		Noted.

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81	Bombardier	Appendix H		Bombardier supports Appendix I, comment # 6, of the Joint Industry submission.		Noted.
82	Embraer	General		Embraer support the changes proposed by AIA/GAMA, more specifically, those relative affected area.		Noted.
83	Embraer	3.1.3, Figure 3-1	Step 8: Ensure Proposed Certification Basis is Adequate.	Embraer believes the responsibility to determine that the certification basis is adequate is that of the FAA, not the applicant (as cited in Paragraph 3.11.4). Therefore, Embraer suggests to change the verb "confirm". Consequently, paragraph 3.11 on page 3.-14 should also be modified.	Step 8: <del>Ensure</del> <b>Confirm</b> Proposed Certification Basis is Adequate.	Disagree. The intent is for the applicant to be convinced that the certification basis is adequate prior to submission to the FAA.

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84	Embraer	3.3.2	A “substantially complete investigation” of compliance is when most of the existing substantiation is not applicable to the changed product. In other words, the design change may be considered substantial if it is so extensive (making the product sufficiently different from its predecessor) that the design models, methodologies, and approaches used to demonstrate a previous compliance finding could not be used in a similarity argument. A change is considered substantial when these approaches, models, or methodologies of how compliance was shown must be re-validated to apply to the changed product	14 CFR 21.19 defines a substantial change as changes to “. . . design, power, thrust, or weight . . .” and does not refer to engineering substantiation tools like design models, methodologies, and approaches. The draft AC, by focusing on changes in the methods of substantiation, is requiring something entirely different than the applicable regulation.	Revise paragraph 3.3.2 to focus the substantial determination on the scope of the design change. To be useful, there should be some threshold defined for the phrase “substantially complete.”	Disagree. Out of scope of this AC.
85	Embraer	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 referenced paragraph 5.13 is actually titled “Sequential Design Changes.”	Correct title of referenced paragraph	Agree. Amended as suggested: “Note: If you plan changes in sequence over time, refer to the discussion on “sequential design changes” in paragraph 5.13 of this AC.”
86	Embraer	3.6.7	All changes are considered in light of the magnitude of the type design change.	Use of the word “changes” together with “type design change” is confusing	<del>All changes are considered in light of the</del> <b>Significance is determined by</b> the magnitude of the type design change.	Agree. Amended as suggested. Note that this is now paragraph 3.6.6.
87	Embraer	3.9	Step 6: Prepare your Proposed Certification Basis List As part of preparing your proposed	At the point of preparing an application for design change, it is not practical to identify all the	Use changes proposed by AIA/GAMA relative affected area	Disagree. Section 21.101, and the preamble of the rule, do not define “not affected area” as one

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			<p>certification basis list, you must identify areas, systems, components, equipment, or appliances of the product that are affected by the design change and the corresponding regulatory standards associated with these areas.</p>	<p>individual components or areas that might be affected, specifically the areas that are not physically modified but may experience a minor change in operating environment or condition. As this detailed level of assessment is different from what is described in the section <i>“Use High-Level Descriptors”</i>, Embraer suggests that the changes proposed by AIA/GAMA relative affected area be used.</p>		<p>where “the effect on airworthiness due to the change is appreciable, which in turn typically requires a considerable re-investigation of and revision to the compliance substantiation.” The proposed changes to the “not affected” definition are not what is intended by § 21.101. The preamble of the NPRM states:</p> <p>“This proposed paragraph would provide the second exception to the regulation in proposed paragraph (a), to show compliance with the later applicable regulations. The proposed paragraph would state that the applicant may show compliance with earlier regulations for those areas, systems, components, equipment, and appliances that are not affected by the change.”</p> <p>The plain language reading of “not affected” is that the change has no effect on an area, system, component, equipment, or appliance. There is no mention that the effect has to be appreciable. The commenter does not provide any regulatory basis for making this change. This change would require rulemaking. It should also be</p>

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

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						noted that the term “appreciable” is highly subjective, and could very well lead to debates between the FAA and applicants on what constitutes appreciable, and harmonization issues due to different interpretations. The FAA sees such a change that would further complicate establishing the certification basis instead of the intent by the commenter to establish the certification basis earlier, by “simplifying” the process.
88	Embraer	3.10.2	The additional resource requirements could include those arising from design changes required for compliance and the effort required to demonstrate compliance, but excludes resource expenditures for prior product changes. The cost of changing compliance documentation and/or drawings is not an acceptable reason for an exception.	The cost associated with changing compliance documentation and drawings is part of the effort to demonstrate compliance, so it is not clear what is the difference in the allowed resource consideration in the first sentence and what is not permitted in the second.	Remove reference to documentation/drawing cost or explain better the difference.	Disagree. If an applicant has a labor intensive (costly) process for updating drawings or modifying existing compliance documentation, this is not a factor for the cost. Acceptable resource requirements would be additional testing and analysis. Comment not adopted.
89	Embraer	5.1	5.1 Design Related Operating Requirements. Some rules in other 14 CFR parts (for example, parts 91, 121, 125, 135) impose airworthiness standards that are not required for issuance of a TC or STC. If not already included in the certification basis, any such	Operating requirements usually demand the installation of equipment, but the certification basis is not changed.	Revise paragraph 5.1 to make it clear that operating requirements may demand the installation of equipment, but they do not change the certification basis.	Disagree. Operating requirements sometimes require the installation of equipment; however, the certification basis may change if an applicant elects to meet an airworthiness standard mandated by an operational rule.

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			<p>applicable airworthiness standards may be added to the type certification basis by mutual agreement between the applicant and the FAA. The benefit of adding these airworthiness standards to the type certification basis is to increase awareness of these standards, imposed by other 14 CFR parts, during design certification and future modifications to the airplane. The use of exceptions under § 21.101 is not intended to alleviate or preclude compliance with operating regulations.</p>			

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
90	Embraer	5.3	As mentioned in paragraph 3.2.1, it is important to identify clearly the type design configuration to be changed. The baseline for a changed product consists of one unique type design configuration. This unique type design configuration is an approved product configuration that can be physically built at one time or may consist of multiple approvals over a time period (e.g., airplane model ABC, serial number 123, with STC XYZ incorporated). The applicant should identify which specific configuration (e.g., model and/or series) within the product that will be modified.	To require the applicant to identify “one unique type design configuration” is overly restrictive and unnecessary to adequately define the baseline type design on which the change is to be applied. There are thousands of different combinations of type designs that can be produced, the vast majority of which are completely unrelated (brakes versus interior configuration for example). To require a single complete build configuration (essentially a single serial number) to be defined as the baseline would require almost every produced aircraft to serve as a new baseline, and hence, another certification basis analysis.	As mentioned in paragraph 3.2.1, it is important to identify clearly the type design configuration to be changed. <del>The baseline for a changed product consists of one unique type design configuration. This unique type design configuration is an approved product configuration that can be physically built at one time or may consist of multiple approvals over a time period (e.g., airplane model ABC, serial number 123, with STC XYZ incorporated).</del> The applicant should identify which specific configuration (e.g., model and/or series) within the product that will be modified.	Partially agree. Did not delete the sentences as suggested. However, amended the last sentence as indicated:  “...The baseline for a changed product consists of one unique type design configuration. This unique type design configuration is an approved product configuration that can be manufactured at one time or may consist of multiple approvals over time. (e.g., airplane model with an approved STC incorporated). The applicant should identify the specific product configuration that will be modified....”
91	Embraer	5.10		It is not clear what is intended by the “integration” of STCs. Embraer believes that you are referring to the incorporation of previously approved STCs into the type certificate by amending the type certificate. It would be helpful to provide more explanation here.		Partially agree. Amended the entire section per suggestion from Airbus, with change of term from “integration” to “incorporation.”

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
92	Embraer	5.12	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.	In the example given, the new installation does not necessarily get a new certification basis. It would depend on the scope of the change of the type design of the new installation compared to whatever the applicant justified as the baseline.	If an applicant chooses to remove an approved installation (e.g., interior installation, avionics equipment) and install a new installation, a new certification basis <b>may be required</b> <del>is established</del> for the new installation, <b>depending on whether the change associated with the new installation is considered significant compared with the baseline configuration that the applicant chooses.</b>	Agree. Amended as suggested: “If an applicant chooses to remove an approved installation (e.g., interior installation, avionics equipment) and install a new installation, a new certification basis may be required for the new installation, depending on whether the change associated with the new installation is considered significant compared to the baseline configuration that the applicant chooses.”
93	Embraer	5.13	The classification of the intended product change will not be evaluated solely on the basis of the first application, but rather on the basis of all the required design changes needed to accomplish the intended product change.	There is no provision in 21.101 that requires evaluation of possible future changes in determining significance, nor is there anything that requires retroactive application of a new certification basis to na existing approved configuration.		Noted.
94	Embraer	Appendix A, Table A-1, Example 7	Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage)	It is not clear what is meant by “all composite primary structure”: all the ones mentioned in brackets or at least one of them. Since it is a substantial change, Embraer believes it would make more sense referring to all of them.	Change from an all metal airplane to all composite primary structures (fuselage, wing <b>and</b> empennage).	Partially agree. Amended as indicated: “Change from an all-metal to all-composite airplane.”

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
95	Embraer	Appendix A, Table A-2, Example 10	Change involving appreciable increase in design speeds $V_D$ , $V_{MO}$ , $V_C$ , or $V_A$ .	Since $V_{MO}$ is not a design air speed, it should be replaced. The <i>Design speed for maximum gust intensity, <math>V_B</math>, (14 CFR 25.335(d))</i> could be used instead.	Change involving appreciable increase in design speeds $V_D$ , $V_B$ , <del><math>V_{MO}</math></del> , $V_C$ , or $V_A$ .	Partially agree. Added $V_B$ , but retained $V_{MO}$ . While $V_{MO}$ is not a structural design speed, it is an important speed for flight characteristics and the part 23 training is based on $V_{MO}$ .
96	Embraer	Appendix A, Table A-2, Example 12	A change in the rated power or thrust is likely to be regarded as significant if the design speeds are thereby changed so that compliance needs to be re justified with a majority of requirements.	This change appears to be a specific example of the change addressed in Example 10, other than the use of the word “appreciable.”	More clarification in both of these examples, or combining the two, would be helpful.	Partially agree. Engines with increased thrust may be installed without taking credit for the increase speed capability. The distinguishing factor here with this example is that an engine with increased thrust/power capability does not always lead to a significant change, unless the design speeds are increased as noted in Example 10.  Agree that these two examples could be combined by referencing Example 10 in Example 12 as follows:  “A change in the rated power or thrust could be a significant change if the applicant is taking credit for increased design speeds as per example 10 of this table.”
97	Embraer	Appendix A, Table A-2, Example 14	A design change that alters the aircraft flight characteristics or performance from the type design would normally be significant if it appreciably changes the kinematics or dynamics of the airplane.	It is not clear what is meant by “the kinematics or dynamics of the airplane.”	Clarify what aircraft level effects are being described here.	Agree. Example deleted.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
98	Embraer	Appendix A, Table A-2, Example 16	Change to airplane’s operating altitude, or cabin operating pressure greater than 10 percent in maximum cabin pressure differential.	It is not clear that the amount of 10 percent in maximum cabin pressure differential refers to airplane’s operating altitude and cabin operating pressure. Therefore, Embraer suggests either removing the comma or separating the two items into different examples.	Change to airplane’s operating altitude, or cabin operating pressure greater than 10 percent in maximum cabin pressure differential. Or separate the airplane’s operating altitude and cabin operating pressure into two different examples.	Agree. This example is now Example 15. Clarified example as follows:  “Change to an airplane’s operating altitude, or cabin operating pressure greater than 10 percent in maximum cabin pressure differential.”
99	Embraer	Appendix A, Table A-2, Example 20	Expansion of an aircraft’s operating envelope.	This example would be more clear if the sentence “appreciable expansion” presented in the “Notes” would also be included in the “Description of change”.	<b>Appreciable</b> Expansion of an aircraft’s operating envelope.	Disagree. This example is now Example 19. All envelope expansions that were not part of the original assumptions will invalidate the assumptions. We acknowledge that the extent of the expansion allows for some subjective determination for this requirement. We removed the word “appreciable” from the Note and harmonized it with the part 25 example (see Example 23 in Table A-5):  “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).”

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
100	Embraer	Appendix A, Table A-2, Example 27	Requires compliance with all commuter regulatory standards. In many cases, this change could be considered a substantial change to the type design. Therefore, a proposed change of this nature would be subject to FAA determination under § 21.19.	Embraer does not believe that the mere fact that a change would result in, or require, certification in commuter category, that there is sufficient justification to consider the project substantial. It would require substantiation of the new commuter-specific requirements, and approval of the affected areas, but it would likely never rise to the level of substantial absent a large number of large physical or functional changes.	Remove the second and third sentences from the remarks.	Disagree. No change. This example is now Example 26. This example was previously in the Substantial determination section. We acknowledge that, in some cases, taking a normal category airplane to commuter would be a significant change. However, the commuter category was adopted at part 23, Amendment 34. In that adoption, the regulatory preamble clearly specified that part 23 at Amendment 34 commuter category encompasses all the regulations of part 23 beginning at Amendment 34. Therefore, those products that precede part 23 at Amendment 34 may require a substantial investigation into the regulatory compliance.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
101	Embraer	Appendix A, Table A-2, Example 6	Replace reciprocating engines with the same number of turbo-propeller engines where the operating envelope is expanded.	The sentence “where the operating envelope is expanded” would go better in the Notes. New AFM would be required to address performance and flight characteristics when the operating envelope is expanded.	<p><b>Description of change:</b></p> <p>Replace reciprocating engines with the same number of turbo-propeller engines. <del>where the operating envelope is expanded.</del></p> <p><b>Notes:</b></p> <p>Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics, <b>where the operating envelope is expanded.</b></p>	<p>Partially agree. Amended Description of Change as suggested. Harmonized the Note with the part 25 example (See Example 18 in Table A-5):</p> <p>EXAMPLE: Replace reciprocating engines with the same number of turbo-propeller engines.</p> <p>NOTES: Requires extensive changes to airframe structure, addition of aircraft systems, and new AFM to address performance and flight characteristics.</p>
102	Embraer	Appendix A, Table A-2, Example 8	The replacement of an engine of higher rated power or increase thrust would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification.	The proposed guidance for Part 23 characterizes any power/thrust increase as significant, while the guidance applicable to Part 25 uses a threshold of ten percent. Embraer believes that the threshold is a better standard for a significant change.	Change the fourth and fifth columns to “No” and add the following to the remarks (same as the guidance for Part 25): “Typically, it is not significant so long as there is not more than a 10 percent increase in thrust or a change in the principles of propulsion.”	Disagree: Ten percent power/thrust increase on a 180 horsepower engine is very small. Changes to part 23 products are generally far above 10% and can have significant impact on the structures and performance. Establishing a limit at 10% would require much more involvement in part 23 projects and cause many more changes to be deemed significant where they are now deemed not significant.
103	Embraer	Appendix A, Table A-3, Example 1	Addition of wingtip modifications (not winglets).	A note to Example 2 of Table A-2 indicates that small changes to wingtips and winglets are not significant, but this example could be understood to categorically exclude any change to the wingtip.	Repeat the Note from Example 2 of Table A-2 here.	Disagree. See Notes of Example 1 defining the “not significant” example.

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104	Embraer	Appendix A, Table A-3, Example 15	Fuel lines, where engine horsepower is increased but fuel flow is not increased beyond the certificated maximum amount.	If the fuel line change was associated to the engine power change, it would be an affected area and would be part of a significant change (assuming the power change was significant as in Example 3 of Table A-2)	Clarify the modification being described here.	Agree. Deleted the example.
105	Embraer	Appendix A, Table A-3, Example 18	Install a quieter exhaust system	Since noise certification is handled outside the scope of 21.101, we believe it would be better to describe the exhaust change in other terms.	Install a <del>quieter</del> <b>different</b> exhaust system	Agree. Amended as suggested. This example is now Example 17.
106	Embraer	Appendix A, Table A-3, Example 20	. . .Jet B to Jet A (although Jet A to Jet B may be considered significant due to the fact that Jet B is considered potentially more explosive).	It is not clear how the fact that Jet B fuel has different flammability limits than Jet A is relevant for the application of 21.101, especially since Part 23 has no requirements on fuel flammability.	Remove the part in parentheses.	Agree. Amended as suggested. This example is now Example 19.
107	Embraer	Appendix A, Table A-4, Example 3	Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage).	It is not clear what is meant by “all composite primary structure”: all the ones mentioned in brackets or at least one of them. Since it is a substantial change, Embraer believes it would make more sense referring to all of them.	Change from an all metal airplane to all composite primary structures (fuselage, wing <b>and</b> empennage).	Disagree. In response to other comments, revised to: “Change from an all-metal to all-composite airplane.”

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108	Embraer	Appendix A, Table A-5, Examples 11 and 12		The installation of winglets and changes to wingtips are essentially the same modification, yet any winglet installation is considered significant while wingtip modifications are significant only if all three of the conditions in the remarks are met. Embraer does not understand why they should be treated differently.	Restore the three conditions in the remarks section of Example 11.	Partially agree. These examples are now Examples 12 and 13. We clarified the note to make it consistent with other notes.  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.
109	Embraer	Appendix A, Table A-5, Example 13	Change in type or number of emergency exits or an increase in the maximum certificated number of passengers	It is Embraer's understanding that exit deactivation associated with a reduction cabin capacity has not been treated as significant.	<del>Change in type or number of emergency exits or an increase in the maximum certificated number of passengers.</del>	Partially agree. This example is now Example 14. We agree that exit deactivation associated with a reduction in passenger capacity is not significant. However, the suggested change would result in other changes, such as an increase in the number of exits, as being not significant, which is not accurate. Therefore, we did not make the suggested change. Instead, we added a new Example 17 in Table A-6 that pertains to deactivating exits with a reduction in passenger capacity as a not significant change.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
110	Embraer	Appendix A, Table A-5, Example 21	Expansion of an aircraft's operating envelope.*	Given the note relative to the extent of the envelope expansion, Embraer believes that the addition of the word "appreciable" to the example, as in the similar example in the Part 23 table, would make this more clear.	<del>Appreciable</del> -Expansion of an aircraft's operating envelope.*	Disagree. This example is now Example 23. The Notes already provide sufficient clarification.
111	Embraer	Appendix A, Table A-5, Example 27	Replacing the life limit with a damage tolerance based life limit.	Damage tolerance certification does not result in a life limit.	Replacing the life limit with a damage tolerance based <del>life limit</del> inspection program.	Agree that clarification is needed. The example may imply that applying a new amendment level is a criterion 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.
112	Embraer	Appendix A, Table A-6, Example 17	Flightdeck replacement of highly integrated and combined electronic display systems with another highly integrated and combined electronic display systems	This seems to be the same as in example 14 of Table A-6 (repeated).	Remove this example.	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
113	GE	Appendix A, Table A-11, Example 1	Example 1	GE does not believe this example (example 1) adds value and recommends it be deleted. GE believes current guidance and rules are adequate. The text does not specify or quantify what a "marked effect on the engine performance.." is, therefore it's application is too subjective and open to varying interpretations.	Delete example.	Agree. Deleted Example 1 from Table A-11.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
114	GE	Appendix A, Table A-11, Example 7	Novel and new materials and /or novel and new material processes introduced to primary or critical component or structure.	GE does not believe this example (example 7) adds value and recommends it be deleted. The definition of new and / or novel as it relates to materials and processes is not sufficiently defined to be interpreted consistently. Similarly the definition of critical component or structure is vague. Just changing a material should not require the change to classified as "Significant" even if damage tolerance assessments are required.	Delete example.	Partially agree. This example is now Example 6 in Table A-11. We revised this example description in response to this comment. The revision clarifies that the change is a product level change, and we retained this example in the "significant" table. Also removed the term "critical." As revised, this example is similar with significant examples in Appendix A for parts 23, 25, 27, 29, and 35.
115	GE	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 significantly less centrifuging and, therefore, more material entering the core; or changes that would reduce the downstream compressor stages' tolerance to foreign material.	GE does not believe this example (example 8) adds value and recommends it be deleted. GE believes current guidance and rules addressing bird ingestion are adequate, in that any changes affecting an engine's capability to withstand an ingestion event, regardless of whether it is ingested into the core or not, is already required to be evaluated. Any change as cited would automatically be assessed and in of itself does not necessarily render it significant or require assessment against later regulations	Delete example.	Agree. The intent of this example was already covered under Examples 3 and 6 of Table A-11, which are now Examples 2 and 5. We rolled the bird ingestion example into the notes of Examples 2 and 5 and deleted the proposed Example 8. This example was recommended by the ARAC working group for bird ingestion in their report titled <i>Turbofan Bird Ingestion Regulation Engine Harmonization Working Group Report</i> , dated February 19, 2015.

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116	GE	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.	GE does not believe this example (example 9) adds value and recommends it be deleted. GE believes current guidance and rules addressing icing capability are adequate, in that any changes affecting an engine's capability to withstand an icing encounter, is already required to be evaluated. Any change as cited would automatically be assessed and in of itself does not necessarily render it significant or require assessment against later regulations	Delete example.	Partially agree. 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. We do not agree with the comment that the example is not needed because "current guidance and rules addressing icing capability are adequate, in that any changes affecting an engine's capability to withstand an icing encounter, is already required to be evaluated." We find that the comment does not recognize the higher level of safety provided by later amendments, which is the concern for § 21.101.

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117	GE	Appendix E, E2.3	E2.3, Step 3	Regarding Appendix E of the proposed AC, GE does not believe it is appropriate to perform a cost-benefit assessment with fatality projections (E.2.3 Step 3: Review the Consequences of the Hazard(s)). Rather GE believes it should be shown that if the pre-change product meets the certification safety intent for the issue at hand and that the change will not make it worse, therefore there is no measurable safety benefit in meeting the new certification standard for the issue, on the post-change product.	Amend text.	Disagree. Step 3 does not include cost-benefit assessments with fatality projections. No change required.
118	Jet Aviation	General		<p>In several places text relates only to text found in FAA 14CFR 21 and are not applicable to EASA Part 21.</p> <p>As EASA members were asked to provide their comment here on the FAA site, it should be identified if any parts are not applicable.</p> <p>Please note that should the parts not contained in EASA Part 21 be adopted by EASA we would have further comments.</p>	Identify sections which are not applicable to EASA GM or explain if changes will be made to EASA Part 21 and GM.	Noted.

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119	Jet Aviation	2.2.2.2	2.2.2.2 Section 21.101(b)(1)(i) and (ii) pertain to design changes that meet the automatic criteria where the change is significant. For transport category airplanes, you must comply with each applicable provision of 14 CFR Part 26 for the change, unless you have elected or are required to comply with a corresponding amendment to 14 CFR Part 25 that was issued on or after the date of the applicable 14 CFR Part 26 provisions.	As stated, 21.101(b)(i) and (ii) relates to the automatic criteria for significant changes. What is the purpose of mentioning Part 26? Should this be interpreted as for transport category airplanes if you don't show compliance to Part 26 it is automatically significant? Additionally we note that 14 CFR Part 26 is very different in intent and content from CS 26.		Agree. Deleted references to part 26. Note that the text is now in paragraph 2.2.2.4:  "Section 21.101(b)(1)(i) and (ii) pertain to design changes that meet the automatic criteria where the change is significant."
120	Jet Aviation	2.2.7	Section 21.101(g) pertains to regulatory compliance of transport category airplanes with the applicable provisions of part 26 and/or corresponding later amendments to part 25.	The text differs entirely to EASA GM 21.101(g).  Is the intent for EASA to adopt this FAA text into EASA Part 21 GM?	As EASA are using the FAA comment response tool and are not issuing their own NPA on GM, it should be clarified how differences in Part 21 text should be handled with respect to the GM referring to differing text.	Noted. Each authority may have different writing convention but the objective is to maintain harmonized interpretation.
121	Jet Aviation	3.8.1	"You must also comply with the retroactive requirements found in §§ 23.2, 25.2, 27.2, 29.2, applicable on the date of the application for the change."	25.2 does not exist in EASA (assuming it means CS 25.2)	EASA should publish information identifying any sections of the FAA AC which is not applicable and/or which will not be transposed into EASA GM.	Noted.
122	Jet Aviation	5.8	Clarification of § 21.101(g), Part 26 Requirements	As EASA Part 21 has different text for § 21.101(g) do EASA intend to adopt the same text as FAA into basic requirement of Part 21? Or will this text be omitted from EASA GM?	EASA should publish information identifying any sections of the FAA AC which is not applicable and/or which will not be transposed into EASA GM.	Noted.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
123	Jet Aviation	Appendix A, Table A-5, Example 13	<p>Example 13                      (“Change in type or number of emergency exits or an increase in the maximum certificated number of passengers.”)</p> <p>If Yes this results in a classification of Significant.</p>	<p>Performing VVIP interior completions regularly involves the deactivation of existing emergency exits to accommodate the interior arrangement.</p> <p>The proposed text change is to eliminate possible misinterpretation and align with industry standard practice which is accepted by the authority as not being a significant change.</p> <p>The need to amend GM/AC 21.101 was identified during the EASA Executive Interior Rulemaking task, RMT.0264. It is noted that the FAA were also represented in this working group. It is planned to notify of this change request to GM 21.101 in the proposed NPA from this group expected to published end of 2015.</p>	<p>Provide new example in addition the existing example 13. Reading the table from left to right changes would read:</p> <p>“13.(b)” or use the next available example number.</p> <p>“Change in type or number of emergency exits by deactivating existing emergency exits”</p> <p>“No”</p> <p>“No”</p> <p>“No”</p> <p>“The new emergency egress certification specification does not exceed those previously substantiated because the certificated number of passengers demonstrated is reduced.”</p>	<p>Partially agree. This example is now Example 14 in Table A-5. We also added a new Example 17 to Table A-6 (“not significant” table) as follows:</p> <p>EXAMPLE: Changes in the type or number of emergency exits by de-rating doors or deactivating doors with corresponding reduction in passenger capacity.</p> <p>Other columns: No, No, No</p> <p>NOTES: The new emergency egress does not exceed that previously substantiated because the certificated number of passengers is reduced.</p>

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
124	PTY	1.5	“The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, design standards, and airworthiness standards.”	The commenter believes that the additional two (2) terms “certification basis” and “amendment” are equally used throughout the document to indicate the same meaning or subject matter as the other terms included here. Additionally, the term “design standards” can be found in only one location in the remainder of the document and this location it could be replaced with one of the other terms without losing any guidance clarity or intent (also see comment on 5.7.4).	“The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, <del>design standards, and</del> airworthiness standards, <b>certification basis and amendment.</b> ”	Partially agree. Removed the term “design standards,” and amended as indicated:  “1.5.1 The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, and airworthiness standards.  1.5.2 The terms certification basis, type certification basis, and amendment are used interchangeably to refer to the groups of requirements defined above.”
125	PTY	3.1.3, Figure 3.1	Within Step 3 diamond of the flowchart states: “Will you Use the Latest Standards? ...”	The commenter believes that the additional wording is needed in order to differentiate that at this step of the process the applicant is voluntarily choosing, or desires, to apply the latest requirements, whereas, proceeding forward, the requirements of § 21.101 may dictate the use of these requirements regardless of the applicant’s choice/desire.	Within Step 3 diamond of the flowchart state: “Will you <b>Voluntarily</b> Use the Latest Standards? ...”	Disagree. Voluntary use is inferred.

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126	PTY	3.2.2.1	<p>“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, changes to an operating envelope, and/or performance changes. The change can be a single change or a collection of changes.”</p>	<p>The commenter believes that the reader should be directed to the definition of “type design” provided in § 21.31 in order to assist in assuring that this AC’s change process guidance is appropriately applied to all changes in type design.</p>	<p>“The purpose of this process step is to identify and describe the change to the aeronautical product. Changes to a product’s type design can include physical design changes, changes to an operating envelope, and/or performance changes. A review of § 21.31 should be conducted in order to understand what constitutes a product’s type design. The change can be a single change or a collection of changes.”</p>	<p>Disagree. Reference to § 21.31 is out of scope of this AC. Amended paragraph 3.2.2.1 as indicated:</p> <p>“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, 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</p>

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						amendment level of the certification basis used for these changes.”
127	PTY	3.6.9	“At this point, the determination of significant or not significant for each of the groupings of related changes and each stand alone change is completed. For significant changes, if you propose to comply with an earlier requirement, use the procedure outlined in paragraph 3.7 below .”	The commenter believes that the reader should be directed to both applicable follow-up paragraphs rather than only the significant change process paragraph.	“3.6.9 At this point, the determination of significant or not significant for each of the groupings of related changes and each stand alone change is completed. For significant changes, if you propose to comply with an earlier requirement, use the procedure outlined in paragraph 3.7 below. <b>For changes identified as not significant see paragraph 3.8 below.”</b>	Agree. Amended as suggested. Note that this is now paragraph 3.6.8.
128	PTY	3.10	“...affected by the significant change. See paragraph 3.10 of this AC.”	The commenter believes the suggested wording change provides a more direct reference to the appropriate AC content.	“...affected by the significant change. See <a href="#">paragraphs 3.10.1 and 3.10.2 below.</a> ”	Agree. Amended reference to “paragraphs 3.10.1 and 3.10.2.”
129	PTY	3.10.1.3	“Relevant service experience, such as experience based on fleet performance or utilization over time (relevant flight hours or cycles), is one way of showing that a later amendment may not contribute materially to the level of safety, so the use of earlier requirements could be appropriate.”	The commenter believes that the suggested wording provides more consistency of wording to other guidance provide in adjacent AC paragraphs and therefore can assist in the reader’s understanding of the guidance.	“Relevant service experience, such as experience based on fleet performance or utilization over time (relevant flight hours or cycles), is one way of showing that the level of safety will not materially increase by applying the latest requirements, so the use of earlier requirements could be appropriate.”	Partially agree. An exception is typically to a specific requirement or specific amendment level, and not to the “latest requirements.” So, in this context, the proposed change is not accurate. We find it acceptable to change the text as follows:  “...is one way of showing that the level of safety will not materially increase by applying the latest amendment.”

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130	PTY	5.6	“According to § 21.101(e), an application for, or a change to, a TC for transport category aircraft is effective for five years, and an application for a change to any other type certificate is effective for three years. This is intended...”	The commenter believes that the additional wording will provide the reader with a more direct understanding of the application effectivity time span.	“According to § 21.101(e), an application for, or a change to, a TC for transport category aircraft is effective for five years <b>from date of application</b> , and an application for a change to any other type certificate is effective for three years. This is intended...”	Agree. Amended as suggested.
131	PTY	5.7.4	Aircraft type certificated in the restricted category under § 21.25(a)(2) are accepted on the basis of the U.S. military use... earlier regulations are acceptable. They may not predate the equivalent certification basis. If these regulations do not include design standards applicable to the change, later regulations appropriate to the product category will be applied. The goal is to maintain a level of safety appropriate for the aircraft’s intended use.”	This is the sole use of the term “design standards” in the document. The commenter believes that the elimination of the word “design” does not adversely affect the intent or clarify of the guidance, but does allow for some simplification by allowing the term “design standards” to be removed from paragraph 1.5 (see comment #1).	Aircraft type certificated in the restricted category under § 21.25(a)(2) are accepted on the basis of the U.S. military use... earlier regulations are acceptable. They may not predate the equivalent certification basis. If these regulations do not include design standards applicable to the change, later regulations appropriate to the product category will be applied. The goal is to maintain a level of safety appropriate for the aircraft’s intended use.”	Agree. This section was also rewritten as follows:  “5.7.4 <u>Military Aircraft Designs</u> . Aircraft type certificated in the restricted category under § 21.25(a)(2) are accepted on the basis of the U.S. military use and other eligibility factors, instead of showing compliance with airworthiness standards in 14 CFR Chapter 1. (See Order 8110.56, Chapter 4, for additional details.) Many of these aircraft were not certificated to airworthiness standards; therefore, any modifications made to the military configuration must meet an equivalent civil certification basis derived from the airworthiness regulations contained in 14 CFR. This baseline certification basis is the airworthiness regulations (i.e., parts 23, 25, 27, 29, 33, or 35, or CARs, as appropriate) that were

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						<p>in effect on the date that the first military model was accepted for operational use by the U.S. Armed Forces. Section 21.101(f) requires the application of the latest amendments to significant changes to these products. However, since the latest amendments may not be appropriate for the aircraft's intended use, earlier regulations are acceptable. They cannot predate the equivalent certification basis. If these regulations do not include airworthiness standards applicable to the change, later regulations appropriate to the product category will be applied. In addition, any design change to the aircraft must be shown to be "safe for its intended use" as required by § 21.25. See Order 8110.56A for additional details.</p>

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132	PTY	Appendix A, Table A-11, Example 7	Example #7: “Novel and new materials and /or novel and new material processes introduced to primary or critical component or structure.”	The commenter knows of no definition provided by the FAA regarding what constitutes a “primary or critical component” in an engine, however all part 33 applicants and TC holders are aware of what LLP are to be (or have been) addressed by § 33.70 and parts will be at time of TC/ATC, or currently, included in the engine AWL.	Example #7: “Novel and new materials or material processing introduced to a life-limited part (per § 33.70) or part included in the airworthiness limitations section of the engine’s ICA.”	Agree. This example is now Example 6 in Table A-11. We revised this example and removed the terms “primary” and “critical.” It now reads:  “A change from traditional metal to composite materials on an assembly or structure that provides a load path for the engine affecting the engine dynamic behavior and/or the engine inherent strength.”
133	PTY	Appendix A, Table A-11, Example 7	Example #7 states that this engine change example is significant.	The commenter finds an apparent discrepancy between this part 33 change example (#7) categorization and a similar, more general, part 25 change example (#12) found in Table A-6 which is described as: “Novel or unusual method of construction of a component.” The commenter believes that the categorization as not significant for the part 25 example is correct based on that example’s notes that state: “The component change does not rise to the product level. Special conditions could be required if there are no existing regulations that adequately address these features.” And therefore, the subject part 33 example (#7) should also be categorized as not significant.	Example #7 should be identified as an engine change that would be considered not significant.	Partially agree. This example is now Example 6 in Table A-11. We revised this example description in response to this comment. The revision clarifies that the change is a product level change, and we retained this example in the “significant” table. As revised, this example is similar with significant examples in Appendix A for parts 23, 25, 27, 29, and 35.

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134	PTY	Appendix A, Table A-11, Example 8	Example #8: “Changes to the engine affecting its bird ingestion capabilities including but not limited to changes that would result in significantly less centrifuging and, therefore, more material entering the core; or changes that would reduce the downstream compressor stages’ tolerance to foreign material.”	The commenter believes that the example provided should be more specific and that the wording “but not limited to” is not required since the understanding that an example is not all encompassing is intrinsic to the concept of an example. Furthermore, the commenter believes that the modified examples are more relevant to a change affecting the product level and with respect to the existing and changed product’s regulatory assumptions.	Example #8: “Changes to the engine affecting its bird ingestion requirements, such as a change to the engine’s inlet “highlight area” (fan face exposed to an incoming bird) or a change in the LP compressor inlet area ratio such that the potential for bird core ingestion is altered. capabilities including but not limited to changes that would result in significantly less centrifuging and, therefore, more material entering the core; or changes that would reduce the downstream compressor stages’ tolerance to foreign material.”	Partially agree. This example was deleted. In response to several other comments related to this example, we rolled it into Examples 2 and 5 and deleted proposed Example 8. In doing so, the example is now relevant to a product level change.
135	PTY	Appendix A, Table A-11, Example 9	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.”	The commenter believes that the example provided should be more specific and that the current wording could lead to an unnecessary overuse of FAA resources reviewing and evaluating changes that are not intended to be candidate significant changes, such as a change to a LP compressor inlet shroud material with demonstrated improvement to ice adhesion characteristics, or a change in high pressure compressor bleed schedule when the existing § 33.68 compliance demonstration	Example #9: “Expansion or change to the engine’s installed operating envelop that results in an allowance for operation into regimes relevant to icing environments not previously evaluated; or changes to a FAA-approved in-flight or on-ground icing-related operational procedure (reference the engine’s FAA-approved Operating Instructions); or elimination of icing-related engine system (such as a LP compressor inlet anti-ice system); or change to an icing-related operating limit (such as minimum flight idle	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.

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				discounted bleed entirely.	specified/controlled during operations within icing). 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.”	
136	PTY	Appendix B, Table B-1		The commenter believes that the content of Table B-1 is much better formatted than Figure 3-1 and therefore provides more complete and clear information relative to the subject process.	Replace Figure 3-1 with Table B-1.	Disagree. Both are included in this AC and complement one another.

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137	PTY	Appendix E, E.2.3.1	<p>“Once the hazard has been identified, it is possible to identify the types of consequences that may occur because of the presence of the hazard. More than one consequence can be attributed for the same hazard. Typical examples of consequences would include, but are not be limited to—• Incidents where only injuries occurred;• Accidents where less than 10 percent of the passengers died;• Accidents where 10 percent or more passengers died; and• Accidents where a total hull loss occurred.”</p>	<p>The commenter that as currently written, this guidance would lead to most or all engine and propeller candidate changes being deemed not materially improving safety, making the proceeding process to identify changes as significant or not significant moot, while the suggested additional wording will lead to an appropriate vetting of the use of change with respect to improved safety in light of the latest relevant engine/propeller hazard assessment regulation.</p>	<p>“Once the hazard has been identified, it is possible to identify the types of consequences that may occur because of the presence of the hazard. More than one consequence can be attributed for the same hazard. Typical examples of consequences would include, but are not be limited to—• Incidents where only injuries occurred;• Accidents where less than 10 percent of the passengers died;• Accidents where 10 percent or more passengers died; and• Accidents where a total hull loss occurred.” <b>For engines and propellers applicable hazards are limited to those identified in the latest amendment of § 33.75 and § 35.15, respectively.”</b></p>	<p>Partially agree. Amended the paragraph to include a new bullet that says:  “Engine- and propeller-specific hazards.”</p>
138	PTY	Appendix E, Figure E-1		<p>The commenter does not see that including this figure in the AC provides any useful information or process clarity.</p>	<p>Remove Figure E-1.</p>	<p>Disagree. Figure E-1 illustrates the point of paragraph E.1.3.</p>

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139	PTY	Appendix J, J.11	A change to the type certificate to the extent that it changes one or more of the following, but not to the extent to be considered a substantial change: general configuration, principles of construction, or the assumptions used for certification. The significance of the change is considered in the context of all previous relevant design changes and all related revisions to the applicable regulations. Not all product level changes are significant.”	The commenter believes that the inclusion of “the assumptions used for certification”, at least as that category could be applied to engines or propellers, is too broad and non-specific and that limiting the scope of consideration to those assumption that have been approved by the FAA and documented in an OI or IM is appropriate and consistent with the intent of the application of § 21.101.	A change to the type certificate to the extent that it changes one or more of the following, but not to the extent to be considered a substantial change: general configuration, principles of construction, or the assumptions used for certification. The significance of the change is considered in the context of all previous relevant design changes and all related revisions to the applicable regulations. Not all product level changes are significant. <b>For engines and propellers, the applicable assumptions used for certification are those approved by the FAA and documented in the product’s Operating Instructions or Installation Manual.”</b>	Disagree. Assumptions are not approved by the FAA, only the design.
140	Rolls Royce	Appendix A, Table A-11, Example 1	Example 1 - “An increase in power/thrust ratings and/or operating limitations associated with changes in engine design and a marked effect on the engine performance and operating conditions.” and “Typically, a power/thrust increase that requires extensive design changes affecting the engine flow path, rotational speeds, temperatures, etc. Invalidates design assumptions”.	To quote para 3.6.8 of the AC “3.6.8 The final classification of whether a design change is significant or not significant is determined by the FAA. To assist you in your assessment, the FAA has predetermined the classification of several typical design changes that can be used for reference, and these examples are listed in appendix A of this AC.” This means that if a proposed change matches this description, then the change is	We propose that example 1 be removed from the ‘significant’ list.	Agree. Deleted example as suggested.

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				<p>already pre-determined as significant. In this example, the description identifies a wide range of potential changes, depending on interpretation, including many which should not be considered significant, in respect of their effects on the engine, or the basis for its cert, and therefore is unsuitable as an example. For example, on many occasions, relatively minor changes in thrust ratings are introduced following engine cert, as a result of feedback from flight testing in support of aircraft cert and optimizing performance. Changes to the ratings to account for operation in particular alt/temp regimes, such as 'hot and high' airfields, that are also occasionally introduced in support of particular operators' route structures (often called 'bump ratings') are also covered by this description, but are also properly identified (including the description of typical enabling design changes) in the non-significant list of examples in this AC. Aside from changes to the rating, design change to increase an engine operating limit is a relatively routine activity over the lifetime of the</p>		

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				<p>type design, to maximize the service life of the design – in such a case, the redesign of an engine will permit increased temperatures and stresses for increased temperature and speed limits, and the calculation of these limits will be entirely consistent with that of the baseline limits. No assumptions have been invalidated – the rules used are just as effective in establishing an acceptable level of safety. The Notes appear to identify a limited number of the changes included in the description, where in fact they should explain why the changes in the description are automatically significant. Limitations should be included in the description. It is not clear which ‘design assumptions’ are invalidated by this logic, nor whether this is intended to be the same as an invalidation of the assumptions used for cert. We would argue that the cert assumptions remain valid. If the term ‘marked effect on engine performance and operating limitations’ is intended to be a limit on the sub-set of the possible changes included in the description, this will lead to significant differences in</p>		

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				interpretation, and will therefore lead to inconsistency of application.		
141	Rolls Royce	Appendix A, Table A-11, Example 2 and throughout document	Example 2 - "Increase/decrease in the number of compressor/turbine stages with resultant change in approved operational limitations."	We propose that the deleted exclusion for life limits is retained. Rationale: The introduction of a new compressor or turbine stage will require a new critical part and therefore a new life limit. The opposite is also true. The description establishes that the need to change approved operational limitations is to be used to differentiate these types of change, then for self-consistency, the exception for life limits is needed.	We propose that the deleted exclusion for life limits is retained as was in previous AC 21.101-1A	Disagree. This example is now Example 1 in Table A-11. This example is significant and, if the life limits fall within affected areas, they cannot be excluded. For a significant change under § 21.101(a), the latest airworthiness standards for certification of the design change and areas affected by change apply, unless one of the exceptions provided in § 21.101(b)(2) and/or (3) is justified. Refer to paragraph 3.6.5.1 of this AC. The commenter's proposal would exclude an affected area without justification, thus being in contradiction with § 21.101 and this AC.

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142	Rolls Royce	Appendix A, Table A-11, Example 3	Example 3 - "Change is associated with other changes that would affect engine thrust/power and operating limitations and have 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. If there is a diameter change, installation will be also affected."	Rationale: The proposed Notes imply that the reason for the change being significant is that it requires further design changes to the engine beyond those in the description. We believe that the decision on significance is based on associated changes to the engine rating and limitations, and the effect on dynamic behavior, and the reversion to the text similar to the original makes this clearer	Change is associated with other changes to the engine that would affect engine thrust/power and operating limitations and have 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. If there is a diameter change, installation will be also affected.	Agree. This example is now Example 2 in Table A-11. We revised the example as recommended with changes as indicated below. In addition, we identified the foreign object ingestion events and added induction system icing. This revision resulted from comments recommending removal of Examples 8 and 9 in Table A-11. It now reads:  "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."

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
143	Rolls Royce	Appendix A, Table A-11, Example 6	Example 6 - "Replace gas generator (core, turbine/compressor/combustor) with a different one in conjunction with changes in approved operating limitations."	Rationale: The introduction of a new compressor or turbine design may introduce a different number of stages, requiring new life limits for the revised number of stages, as with example 3 above. The description establishes that the need to change approved operational limitations is to be used to differentiate these types of change, then for self-consistency, the exception for life limits is needed.	We propose that the deleted exclusion for life limits is retained as was in previous AC 21.101-1A	Disagree. This example is now Example 5 in Table A-11. This example is significant and, if the life limits fall within affected areas, they cannot be excluded. For a significant change under § 21.101(a), the latest airworthiness standards for certification of the design change and areas affected by change apply, unless one of the exceptions provided in § 21.101(b)(2) and/or (3) is justified. Refer to paragraph 3.6.5.1 of this AC. The commenter's proposal would exclude an affected area without justification, thus being in contradiction with § 21.101 and this AC.
144	Rolls Royce	Appendix A, Table A-11, Example 7	Example 7 - "Novel and new materials and /or novel and new material processes introduced to primary or critical component or structure."	Rationale: The example presents the possibility that any new material or change to material processing, of whatever nature, in the listed components, is significant. We contend that this cannot be the intended effect of introducing this example, since it includes a wide variety of adjustments to material composition or manufacturing methods. The introduction of new materials or processes does not automatically imply that the certification basis on which the original was certified is	We propose to remove Example 7 completely,	Partially agree. This example is now Example 6 in Table A-11. We revised this example description in response to this comment. The revision clarifies that the change is a product level change, and we retained this example in the "significant" table. As revised, this example is similar with significant examples in Appendix A for parts 23, 25, 27, 29, and 35.

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				<p>insufficient or inadequate, as the behavior of the original material is evaluated in terms of its properties, and demonstrated capability, as is any subsequent change. Similarly, we contend that the replacement of a component with one of a different material does not automatically change the principles of construction, or the behavior of the engine. The implication of such a position would potentially imply that every design change affects the principles of construction. Clearly, any change requires re-evaluation of its effects, and the gathering of appropriate evidence to characterize the 'new' material/process, and quantify its behavior, as the original required such evaluation, but we contend that this broad description does not serve as a good example of a significant change.</p>		

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
145	Rolls Royce	Appendix A, Table A-11, Example 8	Example 8 - "Changes to the engine affecting its bird ingestion capabilities including but not limited to changes that would result in significantly less centrifuging and, therefore, more material entering the core; or changes that would reduce the downstream compressor stages' tolerance to foreign material."	Rationale: The bird ingestion requirements identify a threat level (weight and number of flocking and single birds), in which compliance is shown by demonstration of the engine's capability. The requirements do not assume any division of the bird material between the core and the bypass – the engine demonstrates this as part of its overall compliance demonstration. Any change potentially affecting the engine's capability against the threat will require that such compliance is re-evaluated, but we contend that the level of threat assumed should not automatically be called into question, and the assumptions used in certification have not been invalidated by the introduction of a change of the nature described in the example.	We propose to remove Example 8 completely,	Agree. The intent of this example was already covered under Examples 3 and 6 of Table A-11, which are now Examples 2 and 5. We rolled the bird ingestion example into the notes of Examples 2 and 5 and deleted the proposed Example 8. This example was recommended by the ARAC working group for bird ingestion in their report titled <i>Turbofan Bird Ingestion Regulation Engine Harmonization Working Group Report</i> , dated February 19, 2015.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
146	Rolls Royce	Appendix A, Table A-11, Example 9	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."	Rationale: We agree with the Notes on this example, that a change of this nature requires a re-assessment of compliance with the icing requirements, but we do not agree that this is a basis for identifying it as an example of a significant change, since any change may require a re-evaluation of its compliance with a number of certification requirements. The need to evaluate the effect of the changes in the areas described does not call into question the appropriateness of the icing certification requirements, or assumptions of engine behavior or capability, noting that compliance is also based on the engine's demonstrated capability, similar to the bird ingestion example above (Example 8).	We propose to remove Example 9 completely,	Agree. Deleted this example. 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.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
147	Textron	Appendix A, Table A-2, Example 2	<p>Description of change Changes in wing configuration such as change in dihedral, changes in wing span, flap or aileron span, addition of winglets, or increase of more than 10 percent of the original wing sweep at the quarter chord</p> <p>Notes Change in general configuration. Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics.</p> <p>Note: Small changes to the wingtip or winglet are not significant changes. See table for not significant changes.</p>	<p>The term “winglet” is not well enough defined to use as a differentiator for whether a change is significant without some qualification. Some wingtip modifications that may be described as winglets do not require extensive changes to wing structure or AFM changes to address performance or flight characteristics and should therefore be considered not significant. The considerations for whether addition of winglets is a significant change should be the same as for other wing modifications.</p>	<p>Description of change “Changes in wing configuration such as change in dihedral, changes in wing span, flap or aileron span, addition of <b>structurally or aerodynamically consequential</b> winglets, or increase of more than 10 percent of the original wing sweep at the quarter chord”</p> <p>Notes “Change in general configuration. Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics.</p> <p>Note: Small changes to the wingtip or <b>existing winglet or addition of small winglets that do not require extensive changes to wing structure or AFM changes to address performance and flight characteristics</b> are not significant changes. See table for not significant changes.”</p>	<p>Partially agree. Winglets and their effect on the assumptions used for certification are evaluated on a case-by-case basis for the product being changed. No change to the text.</p>

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
148	Textron	Appendix A, Table A-3, Example 1	<b>Description of change</b> Addition of wingtip modifications (not winglets).	The term “winglet” is not well enough defined to use as a differentiator for whether a change is significant without some qualification. Some wingtip modifications that may be described as winglets do not require extensive changes to wing structure or AFM changes to address performance or flight characteristics and should therefore be considered not significant. The considerations for whether addition of winglets is a significant change should be the same as for other wing modifications.	<b>Description of change</b> “Addition of wingtip modifications <del>that are not structurally or aerodynamically consequential (not winglets).</del> ”	Disagree. See Notes of Example 1 defining the “not significant” example.
149	Textron	Appendix A, Table A-5, Example 11	<b>Description of change</b> Installation of winglets.  <b>Notes</b>	The term “winglet” is not well enough defined to use as a differentiator for whether a change is significant without some qualification. Some wingtip modifications that may be described as winglets do not require extensive changes to wing structure or AFM changes to address performance or flight characteristics and should therefore be considered not significant. The considerations for whether addition of winglets is a significant change should be the same as for other wing modifications.	<b>Description of change</b> “Installation of winglets.”  <b>Notes</b> “When installation requires extensive changes to wing structure, adds aircraft systems, and requires a new airplane flight manual to address performance and flight characteristics.”  Proposed note is similar to Example 12 in the next row of Table A-5 which also addresses wing changes.	Partially agree. This example is now Example 12. We expanded the example and added the criteria; however, all of the criteria must not be met for a change to be significant.  EXAMPLE: Installation of winglets, modification of existing winglets, or other changes in wing tip designs.  NOTES: 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,

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
						fuel tank ignition source prevention, and fuel tank flammability exposure.
150	Textron	Appendix A, Table A-6, Example 14 and 17	Example 14 and 17	Exactly the same	Remove Example 17	Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
151	United Airlines	Appendix A, Table A-6, Example 14 and 17		Examples 14 and 17 in Table A-6 are duplicates.		Agree. We deleted both 14 and 17 as duplicates, and replaced with two new similar examples proposed by EASA.
152	Industry Appendix II	1.4	The proposed text provides description of each of the Appendices except for G and H.	Consistency of documentation.	It is recommended that similar descriptions to those for the other Appendices be added for Appendices G and H.	Agree. Added the following new paragraphs: "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."
153	Industry Appendix II	1.5 and all other locations of the deleted nomenclature	The proposed text states: "Terms Used in this AC. The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, design standards, and airworthiness standards."	The terms used in 14 CFR 21.101 are limited to "airworthiness requirement" and "regulation," one excerpt from the preamble to Part 21 amendment 77 in the proposed comments includes the term "standard." Use of the term requirement on its own, or design standard may lead to confusion with requirements and standards which are not regulatory in nature.	We recommend the terms used to reference the applicable airworthiness requirement be limited to those called out by 14 CFR 21.101 and excerpts from the preamble to Part 21 amendment 77 used in this AC. This paragraph is therefore recommended to be revised to read:  "Terms Used in this AC. The following terms are used interchangeably and have the same meaning: <a href="#">airworthiness</a> requirements, regulations,	Partially agree. Removed the term design standards and revised as follows:  "1.5.1 The following terms are used interchangeably and have the same meaning: requirements, regulations, standards, and airworthiness standards.  1.5.2 The terms certification basis, type certification basis, and amendment are used interchangeably to refer to the groups of requirements defined

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
					standards, <del>design standards,</del> and airworthiness standards." All other instances of the deleted nomenclature within this AC need to be revised in accordance with this recommendation.	above."
154	Industry Appendix II	2.2.1.1	The proposed text states: "2.2.1.1 Section 21.101(a) requires a change to a TC to comply with the latest requirements, unless the change meets the criteria for the exceptions identified in § 21.101(b) and (c)."	As written the text implies that only the change must comply with the latest applicable airworthiness requirements rather than the change and the area affected by the change. The recommended change aligns the text of this paragraph with that of section 14 CFR 21.101(a).	We recommend revising the text as follows:  "2.2.1.1 Section 21.101(a) requires a change to a TC <a href="#">and the area affected by the change</a> to comply with the latest requirements, unless the change meets the criteria for the exceptions identified in § 21.101(b) and (c)."	Agree. Amended as suggested Note that text is now in paragraph 2.2.1:  " <a href="#">Section 21.101(a)</a> . Section 21.101(a) requires a change to a TC and the area affected by the change to comply with the latest requirements, unless the change meets the criteria for the exceptions identified in § 21.101(b) or (c). The intent of § 21.101 is to enhance safety by incorporating the latest requirements into the type certification basis for the changed product to the greatest extent practicable.

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
155	Industry Appendix II	2.2.1.1	<p>The proposed text states:</p> <p>“...The intent of § 21.101 is to enhance safety by incorporating the latest requirements into the type certification basis for the changed product, to the greatest extent practicable.”</p>	<p>The text as written provides no context of the intended importance of maintaining good service experience with changed products. The added excerpt from the preamble to Part 21 Amendment 77, Docket No. 28903, provides added context of the intent.</p>	<p>We recommend revising the text as follows:</p> <p>“... The intent of § 21.101 is to enhance safety by incorporating the latest requirements into the type certification basis for the changed product, to the greatest extent practicable. <u>When establishing the highest practicable level of safety for a changed product, the FAA has determined that it is appropriate to assess the service history of a product, as well as the later airworthiness standards. It makes little sense to mandate changes to well understood designs, whose service experience has been acceptable, merely to comply with new standards. The clear exception to this premise is if the new standards were issued to address a deficiency in the design in question, or if the service experience is not applicable to the new standards.</u>”</p>	<p>Partially agree. We agree to add the suggested. However, we determined it is more appropriate to add it as new paragraph 3.10.1.3.2.</p>

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156	Industry Appendix II	2.2.2.2	The proposed text states: “Section 21.101(b)(1)(i) and (ii) pertain to design changes that meet the automatic criteria where the change is significant. For transport category airplanes, you must comply with each applicable provision of 14 CFR Part 26 for the change, unless you have elected or are required to comply with a corresponding amendment to 14 CFR Part 25 that was issued on or after the date of the applicable 14 CFR Part 26 provisions.”	The text pertaining to Part 26 is redundant with paragraph 2.2.7.	We recommend revising the text as follows:  Delete the sentence pertaining to Part 26 so that the text reads as follows. “Section 21.101(b)(1)(i) and (ii) pertain to design changes that meet the automatic criteria where the change is significant. For transport category airplanes, you must comply with each applicable provision of 14 CFR Part 26 for the change, unless you have elected or are required to comply with a corresponding amendment to 14 CFR Part 25 that was issued on or after the date of the applicable 14 CFR Part 26 provisions.”	Agree. Deleted references to part 26. Note that the text is now in paragraph 2.2.2.4:  “Section 21.101(b)(1)(i) and (ii) pertain to design changes that meet the automatic criteria where the change is significant.”
157	Industry Appendix II	2.2.5	The proposed text states: “Section 21.101(e) prescribes the effective period that an application will remain valid for a change. This section is consistent with the requirements of § 21.17 for a new TC.”	The comparison with section 21.17 does not add clarity and is therefore unnecessary.	We recommend revising the text to delete the comparison with section 21.17. The text is recommended to read as follows: “Section 21.101(e) prescribes the effective period that an application will remain valid for a change. This section is consistent with the requirements of § 21.17 for a new TC.”	Agree. Amended paragraph 2.2.5 as suggested:  “ <u>Section 21.101(e)</u> . Section 21.101(e) prescribes the effective period that an application will remain valid for a change.”

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
158	Industry Appendix II	3.1.1	The proposed text states: “The applicant and the FAA each have a responsibility under § 21.101(a) and (b). As an applicant for the certification of a type design change, you must show that the change complies with the latest applicable airworthiness requirements unless you propose exception(s) under § 21.101(b). If you are proposing exception(s), you should make a preliminary classification whether the change is significant or not significant, and propose an appropriate certification basis.”	As written the text implies that only the change must comply with the latest applicable airworthiness requirements rather than the change and the area affected by the change. The recommended change aligns the text of this paragraph with that of section 14 CFR 21.101(a).	We recommend revising the text as follows: “The applicant and the FAA each have a responsibility under § 21.101(a) and (b). As an applicant for the certification of a type design change, you must show that the change <u>and area affected by the change comply</u> <del>complies</del> with the latest applicable airworthiness requirements unless you propose exception(s) under § 21.101(b). If you are proposing exception(s), you should make a preliminary classification whether the change is significant or not significant, and propose an appropriate certification basis.”	Agree. Amended paragraph 3.1.1 as suggested: “The applicant and the FAA each have a responsibility under § 21.101(a) and (b). As an applicant for the certification of a type design change, you must show that the change and areas affected by the change comply with the latest applicable airworthiness requirements unless you propose exception(s) under § 21.101(b). If you are proposing exception(s), you should make a preliminary classification whether the change is “significant” or “not significant,” and propose an appropriate certification basis.”
159	Industry Appendix II	3.1.2	The proposed text states: “The tables in appendix A of this AC identify the classifications of typical type design changes. See paragraph 3.6.4 of this chapter for instructions on how to use those tables.”	The tables in appendix A describe the entries as “example” type design changes. The addition of the qualifier “(example)” is recommended for consistency with the nomenclature and intent of the data in appendix A.	We recommend revising the text as follows: “The tables in appendix A of this AC identify the classifications of typical <u>(example)</u> type design changes. See paragraph 3.6.4 of this chapter for instructions on how to use those tables.”	Agree. Amended paragraph 3.1.2 as indicated: “The tables in appendix A of this AC are examples of classifications of typical type design changes. See paragraph 3.6.4 of this chapter for instructions on how to use those tables.”

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160	Industry Appendix II	3.1.3	The proposed text states: “If your proposed change is not in the examples provided in appendix A, use the following steps in conjunction with the flowchart in figure 3-1 of this AC to develop the appropriate certification basis for the type design change. For clarification, the design change discussed in the flowchart also includes areas affected by the design change pursuant to § 21.101. See appendix C of this AC.”	Appendix C is identified as optional elsewhere in the AC. This paragraph of the AC should reference where guidance is provided on defining affected area. That guidance begins in paragraph 3.9.1.	We recommend revising the text as follows:  Replace “See appendix C of this AC” with the text “see <a href="#">paragraph 3.9.1</a> of this AC”	Agree. Amended as follows:  “See paragraph 3.9.1 of this AC for guidance about affected areas.”
161	Industry Appendix I	3.1.3, Figure 3-1		The change to Figure 3-1 is linked with the Industry proposal for the change in approach to the determination of “Affected Area” with respect to certification basis as is proposed for Paragraph 3.9, Appendix B, Appendix C and Appendix D. It must, therefore, be considered together with those comments (see comment #3 in this Appendix).	Remove Figure 3-1 and replace with graphic provided in PDF file.	Disagree. Amended graphic was not accepted. Secondary change will be retained in the AC.
162	Industry Appendix I	3.10 and 3.10.1 and Appendix E	All 3.10 and 3.10.1 and Appendix E	Area of change so large, content not included in this Excel file. Refer to Word file “Industry-Comments-Darft-AC-21-101-1B-Appendix1.doc”	Multiple amendments	Partially agree. Accepted editorial changes in Appendix E that clarified the text. Other proposed changes relating to new concepts were not accepted.

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163	Industry Appendix I	3.10.1.1	<p>“For example, an applicant proposes to install winglets on a part 25 airplane, and part of the design involves adding a small number of new wing fuel tank fasteners. The latest § 25.981 at Amendment 25-102 requires structural lightning protection. The applicant proposes an exception from these latest structural lightning protection requirements because the design change uses new wing fuel tank fasteners with cap seals installed. The cap seal is a design feature that exceeds the requirement of § 25.981 at a previous amendment level, but does not meet the latest Amendment 25-102. If the applicant can successfully substantiate that compliance with Amendment 25-102 would not materially increase the level of safety of the changed product, then this design feature can be accepted as an exception to compliance with the latest amendment.”</p>	<p>Adoption of NPRM 14-09 will modify § 25.981 with regards to lightning protection. This will have an effect on the pertinence of the example, since the cap seal would now enable demonstration of compliance with § 25.981.</p>	<p>We recommend replacing the example with a different example.</p>	<p>Disagree. Amended as indicated:            “...For example, an applicant proposes to install winglets on a part 25 airplane, and part of the design involves adding a small number of new wing fuel tank fasteners. 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 an exception from these latest structural lightning protection requirements because the design change uses new wing fuel tank fasteners with cap seals installed...”</p>
164	Industry Appendix II	3.2	<p>The proposed text states:            “• Identity proposed change.”</p>	<p>Typographical error.</p>	<p>We recommend revising the text as follows:             Change the word “<del>Identity</del>” to “<u>Identify</u>” in the bullet shown above.</p>	<p>Agree. Amended as suggested.</p>

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No.	Commenter	Paragraph No.	Referenced Text	Question/Comment/Rationale	Suggested Change	Comment Resolution
165	Industry Appendix I	3.2.1, 5.3 and Appendix H, H2.1	All 3.2.1, 5.3, Appendix H, H2.1	Area of change so large, content not included in this Excel file. Refer to Word file "Industry-Comments-Darft-AC-21-101-1B-Appendix1.doc"	Multiple amendments	Multiple dispositions and changes per final draft but not detailed in this disposition of comments.
166	Industry Appendix II	3.2.2.1 and 3.2.2.2	<p>The proposed text states:</p> <p>"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, changes to an operating envelope, and/or performance changes. The change can be a single change or a collection of changes. In addition to the proposed changes, consider the cumulative changes incorporated since the last time the certification basis was upgraded from that of the original type design. 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>Note: All changes and areas affected by the change, including those where you plan to use previously approved data, are identified. All of these changes and areas affected by the change</p>	<p>As written the text of 3.2.2.1 does not address functional changes and it misses capturing the importance of cumulative effects of relevant design changes. The text as written is not clear where the starting point is for measuring relevant effects of relevant change. The proposed text clarifies these aspects. The proposed changes to the note clarify it is applicable to the decision of substantial. The proposed changes to 3.2.2.2 clarify when accumulation of relevant changes need to be taken into account .</p>	<p>We recommend revising the text as follows:</p> <p>"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, <a href="#">functional changes</a>, changes to an operating envelope, and/or performance changes. The change can be a single change or a collection of changes. In addition to the proposed changes, consider the cumulative <a href="#">effect of previous relevant design</a> changes incorporated since the last time the certification basis was <del>upgraded</del> <a href="#">established for the area under consideration</a> <del>from that of the original type design</del>. 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>Note: All changes and areas affected by the change, including</p>	<p>Partially agree. Amended paragraph 3.2.2.1 as indicated:</p> <p>"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, consider the cumulative effect of previous relevant design changes incorporated since the last time the certification basis was</p>

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			<p>are considered part of the entire proposed type design and are considered in the classification of an applicant’s proposed change.</p> <p>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. By “previous relevant design changes,” the FAA means changes whose effects accumulate, such as successive thrust increases, incremental weight increases, or sectional increases in fuselage length. Any previous relevant design changes in the area affected by the proposed change that did not involve an upgrade of the certification basis must be taken into account for the proposed design change.”</p>		<p>those where you plan to use previously approved data, are identified. All of these changes and areas affected by the change are considered part of the entire proposed type design and are considered <a href="#">as a whole</a> in the classification of <a href="#">whether</a> an applicant’s proposed change <a href="#">is substantial</a>.</p> <p>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. By “previous relevant design changes,” the FAA means changes whose effects accumulate, such as successive thrust increases, incremental weight increases, or sectional increases in fuselage length. Any previous relevant design changes in the area affected by the proposed change that <del>did not involve an upgrade</del> <a href="#">were not part of a significant product level change</a> <del>of the certification basis</del> must be taken into account for the proposed design change.”+E100</p>	<p>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 the suggested 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 now reads as follows:</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 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.”</p>

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167	Industry Appendix II	3.2.4	The proposed text states: “Evolutionary changes that occur during the course of a certification program may require re-evaluation of the certification basis and may result in re-classification of the change.”	It is important to make the distinction that only evolutionary changes which have a product level impact would cause a re-evaluation of the certification basis later in the program. A fundamental principle of 21.101 per the preamble is that the certification basis for a product needs to be established early in the product’s development. Early in the product’s development cycle the design is conceptual. The detailed design commences after that point. It is essential that the detailed design follows the established certification basis.	We recommend revising the text as follows:  “Evolutionary changes that occur during the course of a certification program <a href="#">which have influence at the product level</a> may require re-evaluation of the certification basis and may result in re-classification of the change.”	Partially agree. Amended as indicated:  “Evolutionary changes that occur during the course of a certification program may require re-evaluation of the certification basis, and those changes that have influence at the product level may result in re-classification of the change.”
168	Industry Appendix II	3.4	The proposed text states: “Step 3. Will you Use the Latest Standards? You can use the latest requirements for your proposed type design change. If you use the latest requirements, you will have met the intent of § 21.101 and no further classification (significant or not-significant) and justification is needed. Even though an applicant elects to use the latest certification requirements, the applicant will still be able to apply § 21.101 for future similar changes, and use the exceptions under §21.101(b). However, the	The proposed text is intended to capture and document certification basis changes. When the applicant agrees to meet the latest amendment of the regulations, where those amendment levels are later than those recorded as the certification basis of the baseline product, the new certification basis and area it is applicable to needs to be agreed with the FAA and then documented appropriately in the TCDS or STC. The recommended note is intended to clearly communicate the expectations to the applicant. Thus, if the latest	We recommend revising the text as follows:  “Step 3. Will you Use the Latest Standards? You can use the latest requirements for your proposed type design change <a href="#">and the area affected by the change</a> . If you use the latest requirements, you will have met the intent of § 21.101 and no further classification (significant or not-significant) and justification is needed. Even though an applicant elects to use the latest certification requirements, the applicant will still be able to apply § 21.101 for	Partially agree. Added the following text as suggested.  “...type design change and the area affected by the change. If you use....”  However, the suggested note is more appropriate elsewhere. Added the following text as new paragraph 3.9.6:  “The applicant should document the change and area affected by the change using high level descriptors along with the applicable regulations and their associated amendment levels. The applicant proposes this

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			<p>decision to comply with the latest requirements sets a new regulatory basis for all future related changes in the same affected area.</p> <ul style="list-style-type: none"> <li>• If you are using the latest requirement, proceed to Step 8 (in paragraph 3.11 of this AC).</li> <li>• If you are not using the latest requirements, then proceed to Step 4.”</li> </ul>	<p>amendments are to be used, the process needs to proceed to Step 6 in paragraph 3.9 rather than Step 8 in paragraph 3.11.</p>	<p>future similar changes, and use the exceptions under § 21.101(b). However, the decision to comply with the latest requirements sets a new regulatory basis for all future related changes in the same affected area.</p> <ul style="list-style-type: none"> <li>• If you are using the latest requirement, proceed to Step <del>8</del>6 (in paragraph <del>3.11</del>3.9 of this AC). <u>Note: The change and area affected by the change should be documented using high level descriptors along with the applicable regulations and their associated amendment levels. The applicant should propose this change in certification basis and it has to be agreed by the FAA for documentation in the TCDS or STC if they are different from that recorded for the baseline product in the TCDS.</u></li> <li>• If you are not using the latest requirements, then proceed to Step 4.”</li> </ul>	<p>change in certification basis that the FAA will consider for documentation in the type certificate data sheet (TCDS) or STC, if they are different from that recorded for the baseline product in the TCDS.”</p>

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169	Industry Appendix II	3.6.1.1	<p>The proposed text states:</p> <p>“Changes where the general configuration is not retained (significant change to general configuration). A change to the general configuration at the product level that distinguishes the resulting product from other product models, for example, performance or interchangeability of major components. Typically, for these changes, an applicant will designate a new product model or series number, although this is not required. For examples, see appendix A of this AC.”</p>	<p>The recommended text is to correct a grammatical error and to provide additional clarity.</p>	<p>We recommend revising the text as follows:</p> <p>“Changes where the general configuration is not retained (significant change to general configuration). A change to the general configuration at the product level <u>is one</u> that distinguishes the resulting product from other product models, for example, performance or interchangeability of major components. Typically, for these changes, an applicant will designate a new product model or <u>model</u> series number, although this is not required. For examples, see appendix A of this AC.”</p>	<p>Partially agree. Amended to include “is one” as suggested. Did not include “model” as suggested because “series number” was deleted in response to another comment.</p>
170	Industry Appendix II	3.6.1.2 and 3.6.1.3	<p>The proposed text states:</p> <p>“3.6.1.2 Changes where the principles of construction are not retained (significant change to principles of construction). A change at the product level to the materials and/or construction methods that affect the overall product’s operating characteristics or inherent strength and would require extensive reinvestigation to show compliance. For examples, see appendix A of this AC.</p>	<p>The changes are proposed to provide clarity.</p>	<p>We recommend revising the text as follows:</p> <p>“3.6.1.2 Changes where the principles of construction are not retained (significant change to principles of construction). A change at the product level to the materials and/or construction methods that affect the overall product’s operating characteristics or inherent strength and would require extensive reinvestigation to show compliance <u>is significant</u>. For examples, see appendix A of</p>	<p>Disagree. The proposed language may result in confusion rather than provide clarity.</p>

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			<p>3.6.1.3 Changes or effects of changes that invalidate the assumptions used for certification of the baseline product (significant change to the assumptions used for certification). 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. Examples include—</p> <ul style="list-style-type: none"> <li>• Change of an aircraft from an unpressurized to pressurized fuselage,</li> <li>• Change of operation of a fixed wing aircraft from land-based to water based, and</li> <li>• Operating envelope expansions that are outside the existing design parameters and capabilities. For additional examples, see appendix A in this AC.”</li> </ul>		<p>this AC.</p> <p>3.6.1.3 Changes or effects of changes that invalidate the assumptions used for certification of the baseline product (significant change to the assumptions used for certification). 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 <a href="#">is significant</a>. Examples include—</p> <ul style="list-style-type: none"> <li>• Change of an aircraft from an unpressurized to pressurized fuselage,</li> <li>• Change of operation of a fixed wing aircraft from land-based to water based, and</li> <li>• Operating envelope expansions that are outside the existing design parameters and capabilities. For additional examples, see appendix A in this AC.</li> </ul> <p><a href="#">Note: A case where you are validating previously approved data would not constitute a significant change to the</a></p>	

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					<a href="#">assumptions used for certification.</a> ”	
171	Industry Appendix II	3.6.4	<p>The proposed text states:</p> <p>“Appendix A of this AC includes tables of typical changes for transport airplanes, small airplanes, rotorcraft, engines, and propellers that meet the criteria for a significant design change. The appendix also includes typical design changes that are classified as not significant. The tables can be used in one of two ways—”</p>	<p>The changes are recommended to follow the table structure provided in appendix A.</p>	<p>We recommend revising the text as follows:</p> <p>“Appendix A of this AC includes tables of typical changes <a href="#">(examples)</a> for <del>transport airplanes</del>, small airplanes, <a href="#">transport airplanes</a>, rotorcraft, engines, and propellers that meet the criteria for a significant design change. The appendix also includes <a href="#">tables of</a> typical design changes that are classified as not significant. The tables can be used in one of two ways—”</p>	<p>Agree. Amended as suggested. Note that text is in now in paragraph 3.6.3.</p>
172	Industry Appendix II	3.8.1	<p>The proposed text states:</p> <p>“When the type design change is classified not significant, the rule allows compliance with earlier amendments but not prior to the existing certification basis. Within this limit, the applicant is allowed to propose an amendment level for each certification standard for the affected area. 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</p>	<p>Providing clarity as to the types of changes for which a test of certification basis adequacy is appropriate. It is easy to lose sight of the applicability statement and read this paragraph as written to say that all changes including those that are Minor are subject to a test of cert basis adequacy.</p>	<p>We recommend revising the text as follows:</p> <p>“When the type design change is classified not significant, the rule allows compliance with earlier amendments but not prior to the existing certification basis. Within this limit, the applicant is allowed to propose an amendment level for each certification standard for the affected area. 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</p>	<p>Disagree. Did not add the note to this paragraph.</p>

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			change under Step 8. (See paragraph 3.11 of this AC.) You must also comply with the retroactive requirements found in §§ 23.2, 25.2, 27.2, 29.2, applicable on the date of the application for the change.”		adequate for the proposed change under Step 8. (See paragraph 3.11 of this AC.) You must also comply with the retroactive requirements found in §§ 23.2, 25.2, 27.2, 29.2, applicable on the date of the application for the change.  <a href="#">Note: According to paragraph 1.2.3, for Minor type design changes, the existing certification basis is considered adequate for approvals under § 21.95.”</a>	
173	Industry Appendix II	3.8.3	The proposed text states:  “You may comply with a specific airworthiness requirement or a subset of airworthiness requirements at later amendments. In such a case, you should consult with the FAA to ensure the certification basis includes other airworthiness requirements that are directly related.”	The proposed change clarifies that the higher amendment level will be applicable to the affected area of the change and needs to be recorded as part of the certification basis on either the TCDS or the STC.	We recommend revising the text as follows:  “You may comply with a specific airworthiness requirement or a subset of airworthiness requirements at later amendments. In such a case, you should consult with the FAA to ensure the certification basis includes other airworthiness requirements that are directly related.  <a href="#">Note: If you comply with a later amendment you need to proceed to Step 6 (3.9) to propose the amendment level and affected area to be documented in the TCDS or STC.”</a>	Disagree. The document flows directly into Step 6 after this paragraph.

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174	Industry Appendix I	3.9 and sub-paragraphs, Appendix B, C and D	All 3.9, Appendix B, C and D	Area of change so large, content not included in this Excel file. Refer to Word file "Industry-Comments-Darft-AC-21-101-1B-Appendix1.doc"	Multiple amendments	<p>Disagree. Section 21.101, and the preamble of the rule, do not define "not affected area" as one where "the effect on airworthiness due to the change is appreciable, which in turn typically requires a considerable re-investigation of and revision to the compliance substantiation." The proposed changes to the "not affected" definition are not what is intended by § 21.101. The preamble of the NPRM states:</p> <p>"This proposed paragraph would provide the second exception to the regulation in proposed paragraph (a), to show compliance with the later applicable regulations. The proposed paragraph would state that the applicant may show compliance with earlier regulations for those areas, systems, components, equipment, and appliances that are not affected by the change."</p> <p>The plain language reading of "not affected" is that the change has no effect on an area, system, component, equipment, or appliance. There is no mention that the effect has to be appreciable. The commenter does not provide any regulatory</p>

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						<p>basis for making this change. This change would require rulemaking. It should also be noted that the term “appreciable” is highly subjective, and could very well lead to debates between the FAA and applicants on what constitutes appreciable, and harmonization issues due to different interpretations. The FAA sees such a change that would further complicate establishing the certification basis instead of the intent by the commenter to establish the certification basis earlier, by “simplifying” the process.</p>
175	Industry Appendix II	5.2	<p>The proposed text states:            “5.2 FAA Policy. Once the certification basis has been established, the exceptions of § 21.101 are not applicable in determining which policy applies to the design change. In general, you should use the latest FAA policy in effect at the date of application. However, there might be cases where policy may differ depending on the amendment level of the rule (intent of regulation may be different). It is acceptable to use another means of compliance, provided it is agreed upon by the</p>	<p>It is recommended that the reference to the relevant regulatory reference regarding application of policy to type certification projects should be included here to point the reader to that information.</p>	<p>We recommend revising the text as follows:            “5.2 FAA Policy. Once the certification basis has been established, the exceptions of § 21.101 are not applicable in determining which policy applies to the design change. <a href="#">Guidance on use of policy is found in Order 8110.4</a>. In general, you should use the latest FAA policy in effect at the date of application. However, there might be cases where policy may differ depending on the amendment level of the rule (intent of regulation may be</p>	<p>Partially agree. Amended text as indicated:            “...Guidance on the use of policy is found in FAA Order 8110.4C, <i>Type Certification</i>, and Order 8110.48A, <i>How to Establish the Certification Basis for Changed Aeronautical Products</i>.”</p>

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			FAA, which is typically documented via an issue paper.”		different). It is acceptable to use another means of compliance, provided it is agreed upon by the FAA, which is typically documented via an issue paper.”	
176	Industry Appendix II	5.6	<p>The proposed text states:</p> <p>“5.6 Effective Period for an Application to Change a Type Certificate, § 21.101(e). According to § 21.101(e), an application for, or a change to, a TC for transport category aircraft is effective for five years, and an application for a change to any other type certificate is effective for three years. This is intended to ensure that the certification basis for the changed product is as current as practicable. This is consistent with the requirements of § 21.17 for a new type certificate and defines the process of updating the certification basis if these time limits are exceeded.”</p>	<p>The comparison with section 21.17 does not add clarity and is therefore unnecessary.</p>	<p>We recommend revising the text as follows:</p> <p>“5.6 Effective Period for an Application to Change a Type Certificate, § 21.101(e). According to § 21.101(e), an application for, or a change to, a TC for transport category aircraft is effective for five years, and an application for a change to any other type certificate is effective for three years. This is intended to ensure that the certification basis for the changed product is as current as practicable. <del>This is consistent with the requirements of § 21.17 for a new type certificate and defines the process of updating the certification basis if these time limits are exceeded.”</del></p>	<p>Agree. Deleted the text from paragraph 5.6 as suggested.</p>

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177	Industry Appendix II	5.9.2.1	The proposed text states:  “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. However, the FAA provides an optional decision record for the applicant to make a predetermination to facilitate the FAA decision. 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.”	To clarify that as it is optional, that this paragraph does not establish a requirement to submit appendix G with the certification plan. To correct a typographical error in the call out of the figure.	We recommend revising the text as follows:  “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. However, the FAA provides an optional decision record for the applicant to make a predetermination to facilitate the FAA decision. This form is provided in appendix G of this AC and follows the flowchart in figure 3-1 of this AC. <u>If used, it</u> should be submitted along with the certification plan.”	Agree. Amended as suggested, as well as corrected the title of the Order:  “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, <i>Certification Project Initiation and Certification Project Notification</i> . However, the FAA provides an optional decision record for the applicant to make a predetermination to facilitate the FAA decision. This form is provided in appendix G of this AC and follows the flowchart in figure 3 1 of this AC. If used, you should submit it along with the certification plan.”
178	Industry Appendix I	Appendix A, Introduction	“The following tables of substantial, significant, and not significant changes are adopted by the FAA, Agência Nacional de Aviação Civil (ANAC), European Aviation Safety Agency (EASA), and Transport Canada Civil Aviation (TCCA) through international collaboration. The classification may change due to cumulative effects and/or combinations of individual changes. The “NA” in the	The Notes provide useful guidance to indicate what principles are affected and hence why the example for the change scenario in question is in the specific table (why the example is Significant, Not significant etc.). However, in some examples, the brevity of the text in the Notes column could be misunderstood and taken that the data, artifact or activity itself is a required attribute in the	“The following tables of substantial, significant, and not significant changes are adopted by the FAA, Agência Nacional de Aviação Civil (ANAC), European Aviation Safety Agency (EASA), and Transport Canada Civil Aviation (TCCA) through international collaboration. The classification may change due to cumulative effects and/or combinations of individual changes.	Partially agree. The “N/A” column was removed for clarity. Additional notes were added for clarity.

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			<p>substantial example tables indicates that the automatic classification criteria in the heading are “Not Applicable” at the “21.19 Substantial Evaluation” phase.”</p>	<p>compliance demonstration and approval of the change. It is believed that a Note in the introduction to Appendix A can help the reader understand the purpose of the Notes column in the Tables.</p>	<p><u>Notes:1.</u> The “NA” in the substantial example tables indicates that the automatic classification criteria in the heading are “Not Applicable” at the “21.19 Substantial Evaluation” phase.”</p> <p><u>2. The addition of the “Notes” column in the Tables is to provide the rationale why and how the example may fall in the Substantial, Significant or Non-Significant category. It does not preclude alternative categorization for similar examples, neither is it prescriptive as to what must be performed to certify the type of change. For example, where the Notes state “...requires AFM changes,” it is not meant to imply that an AFM change is required when performing the change, it is to indicate that if the change actually involves AFM changes, it is likely that the change will be categorized according to the specific table.”</u></p>	

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179	Industry	Appendix A, Table A-11, Example 1	<p>The proposed text states:</p> <p>“Example 1. Description of change = An increase in power/thrust ratings and/or operating limitations associated with changes in engine design and a marked effect on the engine performance and operating conditions. Notes = Typically, a power/thrust increase that requires extensive design changes affecting the engine flow path, rotational speeds, temperatures, etc. Invalidates design assumptions.”</p>	<p>We propose that this example is deleted from the ‘significant’ list. (see below)</p>	<p>To quote para 3.6.8 of the AC “3.6.8 The final classification of whether a design change is significant or not significant is determined by the FAA. To assist you in your assessment, the FAA has predetermined the classification of several typical design changes that can be used for reference, and these examples are listed in appendix A of this AC.” This means that if a proposed change matches this description, then the change is already pre-determined as significant, and the reason for this is given in the “Yes/No” answers in the three criteria columns. In this example, the description identifies a wide range of potential changes, depending on interpretation, including many which should not be considered significant, in respect of their effects on the engine, or the basis for its certification, and therefore is unsuitable as an example. For example, on many occasions, relatively minor changes in thrust ratings are introduced following engine certification, as a result of feedback from flight testing in support of aircraft certification and optimizing performance. Changes to the</p>	<p>Agree. Example 1 Table A-11 was deleted in response to the comments.</p>

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					<p>ratings to account for operation in particular altitude/temperature regimes, such as 'hot and high' airfields, that are also occasionally introduced in support of particular operators' route structures (often called 'bump ratings') are also covered by this description, but are also properly identified (including the description of typical enabling design changes) in the non-significant list of examples in this AC. Aside from changes to the rating, design change to increase an engine operating limit is a relatively routine activity over the lifetime of the type design, to maximize the service life of the design – in such a case, the redesign of an engine will permit increased temperatures and stresses for increased temperature and speed limits, and the calculation of these limits will be entirely consistent with that of the baseline limits. No assumptions have been invalidated – the rules used are just as effective in establishing an acceptable level of safety. The Notes appear to identify a limited number of the changes included in the description, where in fact they should explain</p>	

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					<p>why the changes in the description are automatically significant. Limitations should be included in the description. It is not clear which 'design assumptions' are invalidated by this logic, nor whether this is intended to be the same as an invalidation of the assumptions used for certification . We would argue that the certification assumptions remain valid. If the term 'marked effect on engine performance and operating limitations' is intended to be a limit on the sub-set of the possible changes included in the description, this will lead to significant differences in interpretation, and will therefore lead to inconsistency of application..).</p>	

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180	Industry	Appendix A, Table A-11, Example 2	<p>The proposed text states:</p> <p>“Example 2. Description of change = Increase/decrease in the number of compressor/turbine stages with resultant change in approved operational limitations. Notes = 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..”</p>	<p>The introduction of a new compressor or turbine stage will require a new critical part and therefore a new life limit. The opposite is also true. The description establishes that the need to change approved operational limitations is to be used to differentiate these types of change, then for self-consistency, the exception for life limits is needed.</p>	<p>We propose that the deleted exclusion for life limits is retained.</p>	<p>Disagree. This example is now Example 1 in Table A-11. This example is significant and, if the life limits fall within affected areas, they cannot be excluded. For a significant change under § 21.101(a), the latest airworthiness standards for certification of the design change and areas affected by change apply, unless one of the exceptions provided in § 21.101(b)(2) and/or (3) is justified. Refer to paragraph 3.6.5.1 of this AC. The commenter’s proposal would exclude an affected area without justification, thus being in contradiction with § 21.101 and this AC.</p>

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181	Industry	Appendix A, Table A-11, Example 3	<p>The proposed text states:</p> <p>“Example 3. New design fan blade and fan hub, or a bladed fan disk to a blisk, or a fan diameter change, that could not be retrofitted. Notes = Change is associated with other changes that would affect engine thrust/power and operating limitations and have 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. If there is a diameter change, installation will be also affected..”</p>	<p>The proposed Notes imply that the reason for the change being significant is that it requires further design changes to the engine beyond those in the description. We believe that the decision on significance is based on associated changes to the engine rating and limitations, and the effect on dynamic behaviour, and the reversion to the text similar to the original makes this clearer.</p>	<p>We propose revising the text in the notes column as follows:</p> <p>Change is associated with other changes to the engine thrust/power and operating limitations, 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. If there is a diameter change, installation will be also affected.</p>	<p>Agree. This example is now Example 2 in Table A-11. We revised the example as recommended with changes as indicated below. In addition, identified the foreign object ingestion events and added induction system icing. This revision resulted from comments recommending removal of Examples 8 and 9 in Table A-11. It now reads:</p> <p>“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.”</p>

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182	Industry	Appendix A, Table A-11, Example 6	The proposed text states: “Example 6. Description of change = Replace gas generator (core, turbine/ compressor/combustor) with a different one in conjunction with changes in approved operating limitations. Notes = Change is associated with other changes that would affect engine thrust/power and operating limitations, and have affected the dynamic behavior of the engine. Assumptions used for certification may no longer be valid.”	The introduction of a new compressor or turbine design may introduce a different number of stages, requiring new life limits for the revised number of stages, as with example 3 above. The description establishes that the need to change approved operational limitations is to be used to differentiate these types of change, then for self-consistency, the exception for life limits is needed.	We propose that the deleted exclusion for life limits is retained.	Disagree. This example is now Example 5 in Table A-11. This example is significant and, if the life limits fall within affected areas, they cannot be excluded. For a significant change under § 21.101(a), the latest airworthiness standards for certification of the design change and areas affected by change apply, unless one of the exceptions provided in § 21.101(b)(2) and/or (3) is justified. Refer to paragraph 3.6.5.1 of this AC. The commenter’s proposal would exclude an affected area without justification, thus being in contradiction with § 21.101 and this AC.
183	Industry	Appendix A, Table A-11, Example 7	The proposed text states: “Example 7. Description of change = Novel and new materials and /or novel and new material processes introduced to primary or critical component or structure.. Notes = Change in principles of construction and design from conventional practices; changes in assumptions if consideration of damage tolerance assessment is needed. For example, material changes from metallic to composite materials, novel alloys	The example presents the possibility that any new material or change to material processing, of whatever nature, in the listed components, is significant. We contend that this cannot be the intended effect of introducing this example, since it includes a wide variety of adjustments to material composition or manufacturing methods. The introduction of new materials or processes does not automatically imply that the certification basis on which the original was certified is insufficient or	We propose that this example is deleted from the ‘significant’ list. (see below)	Partially agree. This example is now Example 6 in Table A-11. We revised this example description in response to this comment. The revision clarifies that the change is a product level change, and we retained this example in the “significant” table. As revised, this example is similar with significant examples in Appendix A for parts 23, 25, 27, 29, and 35.

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			and material processes requiring consideration of damage tolerance assessments.”	<p>inadequate, as the behaviour of the original material is evaluated in terms of its properties, and demonstrated capability, as is any subsequent change.</p> <p>Similarly, we contend that the replacement of a component with one of a different material does not automatically change the principles of construction, or the behaviour of the engine. The implication of such a position would potentially imply that every design change affects the principles of construction.</p> <p>Clearly, any change requires re-evaluation of its effects, and the gathering of appropriate evidence to characterize the ‘new’ material/process, and quantify its behaviour, as the original required such evaluation, but we contend that this broad description does not serve as a good example of a significant change.</p>		

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184	Industry	Appendix A, Table A-11, Example 8	<p>The proposed text states:</p> <p>“Example 8. Description of change = Changes to the engine affecting its bird ingestion capabilities including but not limited to changes that would result in significantly less centrifuging and, therefore, more material entering the core; or changes that would reduce the downstream compressor stages’ tolerance to foreign material. Notes = Changes that would make the core more susceptible to damage..”</p>	<p>The bird ingestion requirements identify a threat level (weight and number of flocking and single birds), in which compliance is shown by demonstration of the engine’s capability. The requirements do not assume any division of the bird material between the core and the bypass – the engine demonstrates this as part of its overall compliance demonstration. Any change potentially affecting the engine’s capability against the threat will require that such compliance is re-evaluated, but we contend that the level of threat assumed should not automatically be called into question, and the assumptions used in certification have not been invalidated by the introduction of a change of the nature described in the example.</p>	<p>We propose that this example is deleted from the ‘significant’ list. (see below)</p>	<p>Agree. The intent of this example was already covered under Examples 3 and 6 of Table A-11, which are now Examples 2 and 5. We rolled the bird ingestion example into the notes of Examples 2 and 5 and deleted the proposed Example 8. This example was recommended by the ARAC working group for bird ingestion in their report titled <i>Turbofan Bird Ingestion Regulation Engine Harmonization Working Group Report</i>, dated February 19, 2015.</p>

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185	Industry	Appendix A, Table A-11, Example 9	The proposed text states:“Example 9.Description of change = 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.Notes = Change requires a re assessment of compliance with the induction system icing requirements due to increased potential of engine damage, or loss of stall or flameout margin.”	We agree with the Notes on this example, that a change of this nature requires a re-assessment of compliance with the icing requirements, but we do not agree that this is a basis for identifying it as an example of a significant change, since any change may require a re-evaluation of its compliance with a number of certification requirements. The need to evaluate the effect of the changes in the areas described does not call into question the appropriateness of the icing certification requirements, or assumptions of engine behaviour or capability, noting that compliance is also based on the engine’s demonstrated capability, similar to the bird ingestion example (item 8) above.	We propose that this example is deleted.	Agree. Deleted example as suggested.
186	Industry Appendix I	Appendix H	All Appendix H	Area of change so large, content not included in this Excel file. Refer to Word file “Industry-Comments-Darft-AC-21-101-1B-Appendix1.doc”As noted in comment #3 in this Appendix, Industry had requested the Agencies Changed Product Rule Continuous Improvement Team (CPR CIT) during 2014 to address a number of concerns. One of those was to streamline the	Multiple amendments	H.1.1 - Agree. H.1.2.1 - Agree H.1.2.2 - Disagree. This is an optional tool. For significant changes, it is helpful to understand the existing product certification basis, which includes all airworthiness requirements. H.1.2.4 - Disagree. It should be

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				<p>documentation/justification of a product’s certification basis when undergoing a significant change. In March of 2014, Industry proposed a template as a means to standardize and streamline the expectations for documentation/justification. The template was based on a combination of proposals at the time. As this draft AC draft did not incorporate most of the proposals industry put forward at the time it was modified to fit the current draft. The changes requested are to bring the template in line with the recommendations industry is making via these comments, in particular the comments to paragraphs 3.1.3 , 3.2.1, 3.4, 3.9 and sub-paragraphs, 3.10 and sub-paragraphs, 5.9.2.2, Appendices B, C, D and E.</p>		<p>noted that the term “appreciable” is highly subjective, and could very well lead to debates between the FAA and applicants on what constitutes appreciable, and harmonization issues due to different interpretations. The FAA sees such a change that would further complicate establishing the certification basis instead of the intent by the commenter to establish the certification basis earlier, by “simplifying” the process.</p> <p>H.1.5.1 - Disagree. It is not a best practice to only include the applicable requirements (that actually is necessary). It is a best practice to include all requirements.</p> <p>H.1.5.2 - Disagree. It is not a best practice to only include the applicable requirements (that actually is necessary). It is a best practice to include all requirements.</p> <p>2.1 - Disagree. A line number/serial number is necessary to understand what is being changed.</p> <p>2.3.1 - Disagree. It should be noted that the term “appreciable” is highly subjective</p>

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						<p>and could very well lead to debates between the FAA and applicants on what constitutes appreciable and to harmonization issues due to different interpretations. The FAA sees such a change that would further complicate establishing the certification basis instead of the intent by the commenter to establish the certification basis earlier, by “simplifying” the process.</p> <p>3.1.2 - Disagree. Rationale is desirable.</p>