

Comment				Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**	EASA comment disposition	EASA response
NR	Author	Section, table, figure	Page						
1	Belinda Swain		3	Rolls-Royce supports the introduction of this Special Condition, using the output of the AIA working group. However it is noted that if it was possible to interpret the previous version of the requirement as 100% of 105% of the highest rotor speed, it would be just as possible to interpret the SC wording as 100% of 105% of the highest rotor speed, <i>with suitable margin</i> , ie making it more stringent than the 3 rd country interpretation.	Don't refer to CS-E 840(b)(3)(i) & (ii) but instead write (i) and (ii) out in full.	Yes	No	Agreed	<p>EASA proposes to further reduce the risk of misinterpretation by modifying the paragraph prescribing the SC condition as follows:</p> <p>“</p> <p>The first paragraph of CS-E 840(d) is not applied, and instead the following specification shall apply:</p> <p>(d)</p> <p>In addition, for each fan, compressor, and turbine rotor, it must be established by test, analysis, or combination thereof, that a rotor which has the most adverse combination of material properties and dimensional tolerances allowed by its type design and which is operated in the Engine for five minutes at 100% of the most critical speed and temperature conditions resulting from any Failure or combination of Failures considered under CS-E 840(b)(3) and (b)(4), will meet the acceptance criteria prescribed below in CS-E 840(d)(1) and (d)(2).</p> <p>In addition, for each fan, compressor, and turbine rotor, it must be established by test, analysis, or combination thereof, that a rotor which has the most adverse combination of material properties and dimensional tolerances allowed by its type design will meet the acceptance criteria prescribed below in CS-E 840(d)(1) and (d)(2) after it is operated in the Engine for five minutes at the highest rotor speed that would result from either-</p> <p>(i) The Failure of the component or system which, in a representative installation of the Engine, is the most critical with respect to over-speeding when operating at any rating condition except OEI ratings of less than 2½-minutes, and</p> <p>(ii) The Failure of any component or system in a representative installation of the Engine, in combination with any other Failure of a component or system that would not normally be detected during a routine pre-flight check or during normal flight operation that is the most critical with respect to over-speeding, except as provided by CS-E 840(c), when operating at any rating condition except OEI ratings of less than 2½-minutes,</p> <p>with a suitable margin above 100% of this speed.</p> <p>“</p>

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2	Rolls-Royce Electrical - Wyczisk ADC - KölmeI	-	3	<p>A Special Condition is not the appropriate legal process to impose generic changes to Certification Specification to all new TC or all Major changes to affected areas.</p> <p>Amdt of Certification Specification is required.</p> <p>The applicability of a special condition shall be project related and the applicability must be verified/accepted (by both sides) for each project in CRI A1.</p> <p>EASA exceeds the scope of Special Conditions</p>	Remove last sentence of EASA position. This is subject of each project Cert. Basis and can not be defined in SC.		Yes	Not agreed	<p><u>EASA response to the first paragraph of the comment:</u></p> <p>EASA has determined that the Proposed SC is within the applicability and scope of 21.B.75(a)(3) which reads as foillows:</p> <p>“</p> <p>21.B.75 Special conditions</p> <p>(a) The Agency shall prescribe special detailed technical specifications, named ‘special conditions, for a product if the related certification specifications do not contain adequate or appropriate safety standards for the product because:</p> <p>...</p> <p>3. experience from other similar products in service or products having similar design features or newly identified hazards have shown that unsafe conditions may develop.</p> <p>“</p> <p>The technical justification that unsafe condition may develop can be found within the paragraph IDENTIFICATION OF ISSUE of the SC: “<i>In view of this, EASA also determined that a safety risk may exist in case an applicant would use insufficiently validated tools to determine the maximum speed resulting from failure, and therefore identified the need for additional margin.</i>” The conclusion can be found within the paragraph EASA POSITION of the SC: “<i>In view of the above, EASA considers that an unsafe condition may develop if a suitable margin to rotor growth following failure conditions of CS-E 840(b)(3)(i) and (b)(3)(ii) is not applied consistently. To address this, EASA considers that the specifications recommended by the AIA WG are adequate, and that a new Special Condition (SC) is required in accordance with point 21.B.75(a)(3).</i>”</p> <p><u>EASA response to the second paragraph of the comment:</u></p> <p>An amendment to the Certification Specifications will be considered for the next CS=E Regular Update, once Special Condition has been applied on a sufficient number of representative projects.</p> <p><u>EASA response to the third paragraph of the comment:</u></p> <p>It is to be noted that the applicability of the SC is provided at the end of the SC: “<i>This Special Condition shall be applied for new turbine engine Type Certification (TC), as well as major changes to TCs of turbine engines where applicable per point 21.A.101 of Part-21 and where the affected areas include rotor elements to be considered under CS-E 840(d).</i>” In relation to the comment about project Certification Basis, for each individual project where the SC is deemed applicable, an EASA Certification Review Item (CRI) will be raised allowing for the Applicant to discuss and record his position.</p> <p>Note: EASA will slightly amend the text as follow: “<i>This Special Condition will be applied for new turbine angine...</i>”</p> <p><u>EASA response to the fourth paragraph of the comment:</u></p> <p>See response to the first paragraph of the comment.</p>

EASA – Proposed Special Condition SC E-20 – Turbine Engines Rotor Integrity – Critical Overspeed resulting from Failure Conditions – Margin for Rotor Growth Assessment
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3	Rolls-Royce Electrical - WyczisK ADC - KölmeI	-	3	The argument of “potential unsafe condition” is questionable unless there is evidence of type certificated engines failing in test or service experiencing speeds beyond the assumed/established/demonstrated 100%. No such AD is found. If potential unsafe condition results from not applying a “suitable margin” all Type Certificated engines without this margin demonstrated may develop the same unsafe condition and shall be assessed (this claimed potential unsafe condition warrants an Airworthiness Directive for all engine TC)	Remove the argument – it will create repercussions.		Yes	Not agreed.	See EASA response to Comment NR 2. In addition, the scope of 21.B.75(a)(3) is not limited to evidences from in-service experience (e.g. reported occurrences), but also includes ‘newly identified hazards’ which may be found from other sources. GM 21.B.75 provides the following: “The term ‘newly identified hazards’ is intended to address new risks that may be recognised in the design (e.g. questionable features) or its operational characteristics (e.g. volcanic ash) for which there is not yet enough in-service experience.” It is also reminded that for products in service, Part 21.A.3B Airworthiness directives and associated AMC/GM are applicable.
4	Rolls-Royce Electrical - WyczisK ADC - KölmeI	-	2	Third country authorities applying additional margin (which is not required by the CS) does not justify a generic Special Condition but only for harmonisation and validation relevant projects	Limit the applicability of SC to projects subject to validation by third country authorities which are applying this “suitable margin” (which is not required).		Yes	Not agreed.	All national authorities participating to the AIA WG, including EASA and FAA, have agreed that the guidance, as provided by the WG report and annexed to the SC, is appropriate and provide for the same and necessary level of safety. The justification of the SC is explained in EASA responses to Comment NR 2 and NR 3.
5	Rolls-Royce Electrical - WyczisK ADC - KölmeI	-	2	The verification of the applicants capabilities of correct tool validation is part of the DOA and must be considered in the LOI of a project. The Part21 framework and concept must be accounted and accepted on project level. A mistrust in this system as argument for issuing a Special Condition is very concerning to read. The argument “safety risk may exist in case an applicant would use insufficiently validated tools to determine...” is not only concerning but invalid to justify an additional margin on one specific topic (rotor growth).	Remove the argument To keep the intension of the argument EASA may write: “Where tools are used with insufficient validation, these must be justified in accordance within the LOI, an additional margin of 105% is applicable.” (Note: “Novelty” in the LOI concept also addresses methods of compliance demonstration that is NEW to the agency”, just in case EASA has concerns of not being able to identify insufficient tool validation; but finally EASA will have to trust the outcome of the LOI definition)		yes	Not agreed.	The variability on tool validation is not related to mistrust. The applicant will have to propose a suitable margin commensurate with the degree of validation of his tool in accordance with the MOC and guidance as annexed to the SC. The EASA LOI for compliance demonstration will be applied in accordance with Part 21 requirements and guidance. This does not need to be further specified in the SC.
6	Fagegaltier	EASA position	3 of 4	The reference found in the sentence “a new Special Condition (SC) is required in accordance with point 21.B.75(a)(3)” imposes to demonstrate that the “experience from other similar products in service or products having similar design features or newly identified hazards have shown that unsafe conditions may develop”.	The identification of issue does not provide the required evidence. The fact that “EASA considers that an unsafe condition may develop” is not in compliance with Part 21 which requires evidence from experience. EASA should provide the data showing the unsafe conditions resulting from the deficiency in CS-E 840 text.		Yes	Not agreed	See EASA responses to Comments NR 2 and NR 3.

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7	Fagegaltier	all		<p>It is believed that the grammar of CS-E 840 is clear.</p> <p>In CS-E 840(b), opening sentence, speeds are defined for compliance with CS-E 840 (a) and (c). In particular, a 105% factor appears in the definition of these speeds.</p> <p>In CS-E 840(d), failures cases are defined by reference to CS-E 840 (b)(3) and (4). The factor is 100%.</p> <p>Therefore, it appears that EASA was correct when reading the harmonised text. It should be noted that, before the harmonisation effort, the FAR 33.27 interpretation was acceptable growth at 105%</p> <p>The complete history of the rotor integrity requirements can be found in the justification part of the JAA NPA-E-13.</p>	It would be interesting to know why the FAA deviates now from the harmonised text and seems to revert back to the prior interpretation of FAR 33.27.		Yes	Not agreed	See EASA responses to Comments NR 1 and NR 4.
8	Fagegaltier	all		<p>Notwithstanding the other comments, it is probably correct to state that all of the designers have not the same capability for determining the speeds in failure cases.</p> <p>It would seem logical, technically, to take a margin depending on the quality of the assessment.</p> <p>This new objective could be understandable considering that some designers have better design and verification tools than others : they would benefit from their investment in such tools.</p>	<p>But this should be openly explained and based on the appropriate rationale : what could be “good” from a technical point of view is not always necessary with regard to the safety level.</p> <p>See all the other comments.</p>		yes	Not agreed	<p>The criteria to assess the degree of validation of the analysis tool are provided in the MOC and guidance as annexed to the SC.</p> <p>See also EASA response to Comment NR 5.</p>

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9	Fagegaltier	all		<p>The current texts of FAR 33.27 and CS-E 840 result from the harmonisation work, published by means of the JAA NPA-E-13 on the European side.</p> <p>The change to the harmonised text which is proposed by this special condition (SC) must be better explained and placed in the overall picture described below.</p> <p>CS-E is built around the following principles :</p> <p>The worst engine effect is a Hazardous Engine Effect (note : this is a defined wording).</p> <p>Blade shedding does not result in a Hazardous Engine Effect : see CS-E 520 (d)(1). Note that the AIA paper is not correct when it states that “the principal consideration in the acceptable growth calculations is considered to be blade release” because this is not the subject of CS-E 840 at all.</p> <p>Shaft failures (note : such failures lead to loss of load condition) does not result in a Hazardous Engine Effect : see CS-E 850 (a)(1).</p> <p>Discs must be designed with margins to burst (CS-E 840 (a)).</p> <p>An engine achieving rotational speeds higher than those certified (including the Maximum Over-Speed considered under CS-E 830) must be capable of continued safe flight and landing (see CS-E 840 (d)(1)).</p> <p>It should be noted that some of these CS-E references have no direct equivalent in FAR 33.</p> <p>Therefore, it is not 100% sure that the AIA proposal in response to a FAA request referencing FAR 33.27(d) and 32.27(b)(3) (note : of course this is understood as 33.27) could adequately address these differences.</p>	<p>It is considered that such a significant change to the harmonised rules should not be made by means of a special condition with a very short comment period.</p> <p>It would be better issued as a proposed NPA which would consider this CS-E 840 among all other related paragraphs which are noted here.</p>		Yes	Not agreed	See EASA responses to Comments NR 2, NR 3 and NR 4. None of CS-E requirements other than E 840 are affected by the SC.
10	Fagegaltier	Proposed CS-E 840(d)	3 of 4	<p>Reference to an AIA document in an EASA text is quite abnormal.</p> <p>Usually the interpretation of “vague” words, such as “unacceptable change in thrust or power” found in CS-E 50(g), is provided in the section 2 of CS-E.</p>	<p>It is quite unusual to refer to an US industry paper in CS-E.</p> <p>Is it legally possible to do this ? This means that CS-E can be modified by a change made in the USA without control by EASA.</p>		Yes	Not agreed	See EASA response to Comment NR 4

* Please complete this column using the word “yes” or “no”
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