

Proposed Equivalent Safety Finding for Powerplant controls – System control and monitoring (ATTCS) - CS 25 Appendix I 25.6 (c) (2)

Applicable to EMBRAER 550

Introductory note:

The hereby presented Equivalent Safety Finding to the EASA Certification Basis shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

Statement of issue:

CS 25 Appendix I 25.6 (c) (2) Amendment 5 requires that the manufacturer provides a means for the flight crew to deactivate the automatic function of the Automatic Take-off Thrust Control System (ATTCS) for several reasons, including permitting the crew to revert to normal procedures in the event of erratic system operation.

Embraer EMB-550 has incorporated the ATTCS into the Full Authority Digital Electronic Control (FADEC) system architecture, and does not have a means for the flight crew to deactivate the ATTCS.

The ATTCS incorporated into the EMB-550 is significantly more sophisticated and complex than those that were available when the requirement was adopted, it may still be possible for the system to have failure modes which would require pilot intervention.

The ATTCS (Automatic Take-off Thrust Control System) incorporated into the EMB-550 aircraft is a FADEC (Full Authority Digital Electronic Control) function that automatically increases the thrust on operating engine after engine failure during the take-off and go-around phases. There is no additional hardware to the engine control system due to the ATTCS function.

The ATTCS function is always enabled and there is no means for the flight crew to deactivate the ATTCS function, prior to the flight or in any phase of flight.

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Applicant Proposal

EMBRAER has designed an ATTCS system so that no scenario that would request the flight crew to manually deactivate the ATTCS function during the entire flight was identified. Therefore introducing a means to deactivate the ATTCS function is not necessary and, if implemented, it would only negatively affect the failure probability to provide the ATTCS function when required.

EMBRAER will show that a deactivation means will never be required in order to maintain the same level of safety as that required by the regulation and will demonstrate that the ATTCS system still meets the intent of the requirement Appendix I 25.6(c)(2).

However, EMBRAER considers that a pilot required action during the take-off or go-around phases to change the thrust setting is not desirable in order to show compliance to any certification requirement.

Applicant Safety Equivalency Demonstration

EMBRAER will demonstrate that the ATTCS system still meets the intent of the requirement Appendix I 25.6(c)(2) by showing that:

1. Appropriate FADEC system fault CAS (Crew Alerting System) messages and indication will be provided to the flight crew prior to take-off if the FADEC detect failures in the system that may affect the thrust control.
2. Due to the design of the ATTCS system in the EMB-550 aircraft, failures in this system will automatically go to a fail-safe condition, by maintaining or increasing thrust, without requiring a pilot action and will not be safety-significant.
3. The failure or malfunction of the ATTCS function will meet the others requirements of CS 25 Appendix I and CS 25.1309 Amendment 5.