U.S. Department of Transportation

Federal Aviation Administration

Memorandum

Subject:	INFORMATION: Equivalent Level of Safety Finding for Airbus Model A380-800 FAA Project Number CP101	Date:	December 5, 2006
		Reg Ref:	§ 25.671(c)
From:	Manager, Transport Standards Staff, Airframe/Cabin Safety Branch, ANM-115	Reply to Attn of:	Rich Yarges ANM-115
To:	Manager, Transport Standards Staff, International Branch, ANM-116	ELOS Memo #:	CP101-A-21

Background

The Model A380-800 airplane will be an all-new, four-engine jet transport airplane with a full double-deck, two-aisle cabin. The maximum takeoff weight will be 1.235 million pounds with a typical three-class layout of 555 passengers.

Airbus has requested a finding of equivalent safety to the requirements of § 25.671(c)(2) based on a proposal from the Aviation Rulemaking Advisory Committee (ARAC). The ARAC proposal provides guidelines on what should be an acceptable risk level after the occurrence of any single failure in the flight control system. The FAA has augmented the ARAC proposal for the A380 to avoid too much reliance on probability analyses when latent failures exist.

Applicable regulation(s)

§ 25.671(c)(2)

Regulation(s) requiring an ELOS

§ 25.671(c)(2)

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

In lieu of existing Section 25.671(c)(2) the following standard applies:

I. The airplane must be shown to be capable of continued safe flight and landing after any combination of failures not shown to be extremely improbable. Furthermore, in the presence of any single failure in the flight control system, any additional failure states that could prevent continued safe flight and landing shall have a combined probability of less than 1 in 1000.

II. Failure conditions that are classified as catastrophic and that occur as a result of two failures, either of which are latent, must be highlighted in the system safety assessment, subject to review by the FAA. This review will ensure that any such failure conditions are, in fact, extremely improbable by assessing 1) the failure rates and service history of each component, 2) the inspection type and interval for any component whose failure would be latent, and 3) any possible common cause or cascading failure modes.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

By adopting a clear definition of acceptable risk level for subsequent failures, the ARAC proposed approach (Roman Numeral I) has the advantage of 1) addressing latency, and 2) eliminating possible dubious judgments in the determination of probable failures. However, the ARAC proposed criteria differs from the existing § 25.671(c)(2), both in probability numbers and in how latency is considered. Therefore, to provide an equivalent level of safety to the existing rule, the Transport Airplane Directorate has added the criteria given in Roman Numeral II.

The additional criteria are derived from guidance material recently developed by ARAC for use in the proposed revision to Advisory Circular 25.1309. This guidance states, "The use of periodic maintenance or flight crew checks to detect significant latent failures when they occur is undesirable and should not be used in lieu of practical and reliable failure monitoring and indications. Where this is not accomplished, the system safety assessment should highlight all those significant latent failures that leave the airplane one failure away from a failure condition classified as catastrophic. These cases should be discussed with the FAA as early as possible after identification."

The combined approach (paragraphs I. and II. above) provide an equivalent level of safety to § 25.671(c)(2).

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding in project issue paper A-21. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s):
§ 25.671(c)(2) Control Systems - General (documented in TAD ELOS Memo CP101-A-21)

Franklin Hongsing

Manager, Transport Standards Staff, Airframe/Cabin
Safety Branch, ANM-115

5 Dec. 2006
Date

ELOS Originated by TSS:	Project Engineer Rich Yarges	Routing Symbol ANM-115