



Federal Aviation Administration

Memorandum

Date: May 4, 2015

To: Manager, Project Support Branch, ACE-112

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: J. Mike Kiesov, Project Support Branch, ACE-112

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Korea Aerospace Industries, Limited, Model Naraon KC-100

ELOS Memo#: ACE-15-05

Regulatory Ref: 14 CFR 23.1143(g), amendment 23-59

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of an equivalent level of safety finding for the Korea Aerospace Industries, Limited (KAI) Model Naraon KC-100 airplanes.

Background:

KAI has installed a Teledyne Continental Motors Model TSIOF-550-K engine on their new KC-100 airplane. The KC-100 is a normal category low wing airplane with four seats. It has fixed tricycle landing gear, a composite airframe, a glass cockpit, and an optimized aerodynamic design. The engine is capable of 315 horsepower with Full Authority Digital Engine Control (FADEC) and turbocharging. KAI has proposed a higher level of attachment reliability, established inspection intervals and procedures, and replacement criteria for the throttle linkage attachments.

Applicable regulation:

14 CFR 23.1143(g) Engine controls, states the following:

“For reciprocating single-engine airplanes, each power or thrust control must be designed so that if the control separates at the engine fuel metering device, the airplane is capable of continued safe flight and landing.”

The requirement specifies that the throttle attachment must be designed in a manner that the aircraft remains capable of continued safe flight and landing, despite if the control separates at the engine. Literal compliance with these requirements, dependent on the type design presented,

would normally involve the addition of spring devices on the engine to permit some ability to continue to manage engine power (thrust).

The Federal Aviation Administration (FAA) has granted ELOS findings to § 23.1143(g) in the past without the requirement to add spring devices to the power or thrust throttle controls. The compensating features used to grant an ELOS finding must include the following:

- Throttle control attachment design features, which are not likely to separate in flight, such as a large load-bearing washer adjacent to the outside face of the power control cable rod end fitting that attaches to the fuel-metering device.

- Mandatory inspection intervals
- Inspection procedures
- Component replacement criteria

Regulations requiring an ELOS finding:

14 CFR 23.1143(g), amendment 23-59

Description of compensating design features or alternative Methods of Compliance (MoC) which allow the granting of the ELOS (including changes, limitations, or equipment needed for equivalency):

The proposed design incorporates the following design and maintenance items:

1. Self-locking castellated nut with cotter pin that positively locks the rod ends and levers together.
2. Over-sized washers to retain rod end bearing if the rod end bearing fails and detaches from the rod end body.
3. A 100-hour/annual inspection requirement.

A number of ELOS findings have been issued that have allowed similar linkage designs incorporating positive retention methods when complying with § 23.1143(g). These ELOS findings have required a higher level of attachment reliability, establishment of mandatory inspection intervals, inspection procedures, and replacement criteria for the attachments. This combination has proven to provide a consistently safe standard for previous ELOS findings for § 23.1143(g).

Explanation of how design features or alternative Methods of Compliance (MoC) provide an equivalent level of safety intended by the regulation:

The regulation is fail-safe in that it requires the designer to assume a failure, and then install design features that mitigate the resulting unsafe condition. KAI has chosen to install design features and a maintenance item to achieve an ELOS that effectively prevents a complete failure of the throttle-to-fuel metering interface. This design must meet the requirements of previous ELOS findings. These ELOS findings have required a higher level of attachment reliability, establishment of mandatory inspection intervals, inspection procedures, and replacement criteria for the attachments.

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper P-4. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number must be listed in the Type Certificate Data Sheet under the Certification Basis section Type Certificate (TC) and Amended Type Certificate (ATC) or in the Limitations and Conditions section of the Supplemental Type Certificate (STC). An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation:

14 CFR 23.1143(g) Engine controls
(documented in ELOS Memo ACE-15-05)

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Manager, Small Airplane Directorate,
Aircraft Certification Service

May 4, 2015
Date

ELOS Originated by: Project Support Branch	Manager, Project Support Branch: Jacqueline Jambor	Routing Symbol: ACE-112
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