Exemption No. 15762

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **The Boeing Company** for an exemption from § 25.341(a) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2015-6811**

GRANT OF EXEMPTION

By letter dated November 19, 2015, Mr. David Horn, ODA Lead Administrator, The Boeing Company, 6001 S. Air Depot, Oklahoma City, Oklahoma, 73135, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of § 25.341(a) of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted, would exempt the aerial refueling boom and local attachment structure of 767-2C tanker airplanes that have been modified by supplemental type certificate (STC) for military operations from the tuned discrete gust criteria of § 25.341(a).

The petitioner requests relief from the following regulations:

Section 25.341 – Gust and Turbulence Loads

(a) – Discrete Gust Design Criteria

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The petitioner quoted the equations and text of § 25.341(a) in the request; however, we are omitting that information from this document for brevity. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2015-6811.

Description of Issue

Application of 14 CFR 25.341(a), Tuned Discrete Gust (TDG) to the STC-modified 767-2C aerial refueling boom (ARB) would result in significantly increased loads, causing impractical redesign of the boom and local attachment structure.

Aerial refueling aircraft were not considered when tuned discrete gust criteria were originally derived by the Joint Aviation Authority. Tuned discrete gust criteria were intended for conventional transport aircraft and used conventional transport aircraft accelerations to back out gust velocities using the static gust loads formula. In addition, aerial refueling aircraft were not evaluated for the load effects or economic impact of the tuned discrete criteria, as was done with conventional transport aircraft. Tuned discrete gust criteria have not been used for prior boom design on the KC-10A or KC-135.

Prior to Amendment 25-86, static gust was the discrete gust requirement in 14 CFR 25.341. The replacement of static gust with tuned discrete gust in 14 CFR 25.341(a) at Amendment 25-86 was to provide for harmonization of the discrete gust requirements with the Joint Aviation Requirements (JARs). Tuned discrete gust was incorporated into the Code of Federal Regulations so that the requirements would be common and applicants would not have to comply with multiple discrete gust criteria. The change from static gust to tuned discrete gust was for harmonization and was not done with the goal of increasing safety as stated in the preamble to Amendment 25-86, "The objective was to achieve common requirements for the certification of transport airplanes without a substantive change in the level of the safety provided by the regulations."

Tuned discrete gust simulates the aircraft being hit with an extreme single discrete gust, with gust velocities backed out from the static gust formula using aircraft center of gravity (CG) accelerations that occur once in 70,000 flight hours. This gust velocity is then coupled with the worst possible gust frequency. Loads using this type of criteria are more significantly affected for boom-type structure than for conventional transport aircraft structure (wing, fuselage, and empennage). Because TDG criteria derives gust velocities based on aircraft CG accelerations, the accelerations for structure far away from the CG, which create the majority of the load, have large variations that are analysis-driven and not validated by fleet data. In addition, the boom structure's constant spanwise mass and stiffness properties cause loads to be more affected by tip accelerations, thus increasing the loads significantly higher than past successful design practice. Conventional transport aircraft structure do not have this effect as the distributed mass and stiffness is significantly lower at the tip and increases towards the root, thus reducing the load effect from the high tip accelerations.

As tuned discrete gust criteria were not created for or evaluated on military aircraft and the load effects of this criteria are significantly higher for boom-type structure, this criteria is not appropriate for an aerial refueling boom, which is unique military structure.

Structural Capability

The STC-modified 767-2C boom baseline is the KC-10A. The KC-10A and STC-modified 767-2C booms are structurally similar. They have the same cross-sectional area

and the same basic materials, with the exception of some modern alloys that were implemented on the STC-modified 767-2C. All modern alloys were selected to have equivalent or better properties than the original alloys. The critical frequencies of the first natural bending modes of the two booms are very similar.

The expected usage and gust environment of the STC-modified 767-2C and KC-10A booms are very similar. The KC-10A fleet has an extensive service history with over 34 years and 1.5 million flight hours (59 aircraft). In that time, there have been no incidents of recorded boom damage due to turbulence.

The STC-modified 767-2C boom and local attachment structure is designed to both the static gust requirements used for the KC-10A, in addition to USAF-approved military gust requirements. The STC-modified 767-2C boom design provides the same or better structural capability as the KC-10A boom. Thus, the STC-modified 767-2C boom design provides sufficient and appropriate structural capability needed for USAF operations.

Statement of Public Interest

Application of 14 CFR 25.341(a) at Amendment 25-86 would cause significant modification to the STC-modified 767-2C boom that is utilized only for military missions and has no civil utility. Additionally, the redesign of the boom and local attachment structure would be impractical and provide no net benefit in the configuration and no commensurate increase in safety.

The STC-modified 767-2C will be converted to the KC-46A prior to delivery to the USAF. If the relief is not granted, it could lead to delays in the delivery of the KC-46A to the USAF at a critical time of need. It remains in the public's interest to grant Boeing an exemption to 14 CFR 25.341(a) for the STC-modified 767-2C aerial refueling boom and local attachment structure.

Statement of No Adverse Effect on Safety

Existing aircraft with installed booms such as the KC-10A have a long safety history. The KC-10A was certified in 1981 and the aircraft fleet has 1.5 million flight hours with no gust-related damage affecting the boom. The STC-modified 767-2C and KC-10A booms are structurally very similar. The STC-modified 767-2C boom and local attachment structure is designed to both the KC-10A static gust criteria as well as the USAF-approved military gust criteria. Thus, applying the later gust criteria of § 25.341(a) for tuned discrete gust does not add additional safety.

Conclusion

The Boeing position is that tuned discrete gust criteria in § 25.341(a) were derived for conventional transport aircraft and are not appropriate for the STC-modified 767-2C aerial refueling boom as the boom is unique military structure. The STC-modified 767-2C boom's similarity to the KC-10A boom, the safe history of the KC-10A boom, in addition to the fact that the STC-modified 767-2C boom and local attachment structure is designed to both the KC-10A static gust requirements and the USAF-approved military gust requirements, provides justification for an exemption from § 25.341(a). Based on the rationale above, Boeing hereby requests FAA issuance of an exemption from the

requirements of § 25.341(a), Amendment 25-86, for the boom and its local attachment structure for the STC-modified 767-2C Model airplane, FAA project No. ST00279MC-T.

Federal Register publication

Although the petitioner requested that action on its petition not be delayed for publication in the Federal Register, the FAA found that the petition, if granted, would set a precedent. Therefore, to allow an opportunity for the public to comment on the petition, we published a summary of it in the Federal Register on January 19, 2016 (81 FR 2941). No comments were received.

The FAA's analysis

This airplane is intended for military aerial refueling without any applicability to commercial operations. The design of the refueling boom for the modified Model 767-2C airplane is substantially similar to the one used for the Boeing KC-10A, which has a long and successful service history. The applicant assures the FAA that the boom will comply with USAF-approved gust requirements, and these static gust requirements are at least as stringent as that used for the KC-10A. Since the modified 767-2C airplane will perform the same missions as the KC-10A, this exemption would not adversely impact public safety. It will enhance the United States military by replacing older, less efficient tanker airplanes and ensure consistency within the current USAF fleet. For this reason, we agree that granting this exemption is in the public interest.

The FAA's decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701 delegated to me by the Administrator, I grant The Boeing Company an exemption from 14 CFR 25.341(a), to the extent necessary to install the aerial refueling boom and local attachment structure on STC-modified 767-2C military tanker airplanes. Operations with the aerial refueling boom installed are limited to military use only, as allowed by FAA Order 8110.101A.

Issued in Renton, Washington, on March 25, 2016.

/s/

Michael Kaszycki
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service