

Exemption No. 11087

UNITED STATES OF AMERICA  
DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
KANSAS CITY, MO 64106

In the matter of the petition of

**CUB CRAFTERS,  
INCORPORATED**

for an exemption from § 23.629 of  
Title 14, Code of Federal Regulations

**Regulatory Docket No. FAA 2014-0297**

**DENIAL OF EXEMPTION**

By letter dated April 28, 2014, Mr. Daniel Glaser, Certification Manager, Cub Crafters, Incorporated (Cub Crafters, 1918 South 16<sup>th</sup> Avenue, Yakima, WA 98903 petitioned the Federal Aviation Administration (FAA) on behalf of Cub Crafters for an exemption from § 23.629 of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would show compliance to 14 CFR 23.629 without the performance of flight flutter testing.

**The petitioner requests relief from the following regulation:**

Section 23.629 prescribes, in pertinent part, that in order to demonstrate that the airplane is free from flutter, divergence, and control reversal, the applicant must either perform a rational flutter analysis or comply with a simplified prevention criteria. Additionally, regardless of the method chosen, the applicant must specifically perform flight flutter testing utilizing proper and adequate attempts to excite flutter modes.

**The petitioner supports its request with the following information:**

“Cub Crafters proposes the following as mitigating factors regarding safety to support their exemption request:

1. Design cruise speed ( $V_C$ ) is 140 knots, never exceed speed ( $V_{NE}$ ) is 155 knots, and the demonstrated dive speed ( $V_{DF}$ ) is 180 knots. Therefore, it is a slow airplane.
2. The design has high drag. The aircraft was designed to haul large volumes of cargo. It has a large square section fuselage. The landing gear is fixed and the wings are supported by external struts.

ACE-14-276-E

3. The fuselage uses proven and predictable construction of a steel tube frame with aluminum skin. The wings and tails both use thick airfoils (12% thickness to chord ratio). The wings use a NACA 4412 airfoil and the vertical and horizontal tails use a NACA 0012 airfoil. The wings and tails are constructed of aluminum with two spars, ribs, stringers and skins. The structure is very stiff.
4. In its original certification, compliance was demonstrated by performing a ground vibration survey and by analysis. This was carried out by John Baker, a Flutter DER who had over 35 years of experience when he did this analysis. This conservative analysis had ample margins and it was accepted for type certification.
5. The EL-1 is of a group of airplanes for which compliance by analyses for freedom from flutter is applicable due to its methods of construction, high drag, and slow speed. The examples used in the preamble for amendment 48 to justify the requirement for flight tests differ significantly from this case.
6. 23.629(i) (amendment 48) states (emphasis added): "For modifications to the type design that could affect the flutter characteristics, compliance with paragraph (a) of this section must be shown, *except that analysis based on previously approved data may be used alone to show freedom from flutter, control reversal and divergence, for all speeds up to the speed specified for the selected method*". This application for type certification of the EL-1 is unique in the sense that it is a Type Certificate that had been issued previously and then revoked for the reasons mentioned above. It is, strictly speaking, not a modification of an existing design, but rather a new application based on a design which has not been modified since it was issued a Type Certificate. Therefore, while not applicable according to the letter of the law, Cub Crafters posits that the intent of the law is met and 23.629(i) provides technical justification for not having to conduct a flight test.
7. The airplane was designed and built for a maximum gross weight of 4,800 lbs and all certification analyses and ground tests were performed using this weight. In flight test, with the exception of the Part 36 noise certification, the airplane was flown at a maximum weight of 4,500 lbs. The noise certification was done at 4,200 lbs and hence the limitation on the type certificate.
8. In flight tests, the airplane was safely flown at speeds up to VDF = 180 kts. At this speed, the pilot performed controllability and maneuverability checks. There was no trend towards control reversal and no tendency of divergent behavior. Furthermore, while flutter exciters were not employed, the pilot did perform "stick raps" - sharply striking the elevator, aileron, and rudder pilot controls - in an attempt to excite flutter. In all three axes the airplane demonstrated adequate structural damping and no flutter tendency.

9. Cub Crafters intends to recertify the airplane to the same speed, altitude, and weight envelope as the original Type Certificate.
10. The test article was manufactured over 15 years ago for the original certification. It was not outfitted to accommodate flutter exciters and retrofitting it now would be a significant (and prohibitive) burden on Cub Crafters. As discussed in 6, above, this burden would not be placed on Cub Crafters (or other manufacturer) if this were a modification. For commercial reasons, such a retrofit may not make sense for Cub Crafters and could terminate the program.
11. The Type Certificate was revoked per the letter dated March 7, 2008 (Case number 2007EA580002). The reason for the action was that the holder demonstrated that it lacked the qualifications necessary to hold the Type Certificate. It was not due to an airworthiness issue. Had that not occurred, this airplane would be grandfathered and still eligible for production and commercial sale today.

Granting this exemption for the Gavilan EL-1 will serve the public interest for the following reasons:

1. It will provide a path for safely establishing compliance with 14 CFR 23 at a cost which makes the project viable.
2. As a single-engine, non-turbine cargo airplane, this airplane serves an important niche that is not well represented in the market. It will have lower acquisition and operating costs than a turbo-prop cargo plane. Some communities in our country (and other parts of the world) depend upon airplanes as a sole or primary means to transport goods and supplies. This airplane will enable operators to cost-effectively serve those communities.
3. This airplane has a sizeable payload and fuel capacity. As such, it is an excellent platform for missions that may require long durations with some specialized equipment, such as search & rescue missions and law enforcement patrol missions. It is clearly in the public's interest that these missions can be conducted cost effectively.
4. The manufacture, sales, and operation of this airplane will provide jobs for many people. Skilled laborers will manufacture the airplanes. Salespeople will broker deals to buy and sell these airplanes. The EL-1 is intended for small commercial operators in rural communities where ground transport is difficult, such as Alaska. Therefore, it has the potential to bring significant economic benefit to these areas. Pilots and A&P mechanics will be needed to operate the aircraft. And owners will no doubt create additional jobs in the support and

conduct of their business activities. These jobs and income will enhance the local, state, and national economies.”

A summary of the petition was published in the Federal Register on June 6, 2014 (79 FR 32807). No comments were received.

**The FAA’s analysis is as follows:**

In consideration of the foregoing proposed mitigating factors regarding safety to support the applicant’s exemption request, the FAA finds the following:

1. Stating the design cruise speed is “slow” only indicates its top speed relative to other airplanes. A “slower” airplane does not indicate that flutter will not occur, or even that it is less likely.
2. The high drag is a description of the airplane design. The salient point being that it has “high” drag. “High” is a relative term and does not indicate that flutter will not occur, or even that it is less likely.
3. The fuselage and steel tube frame with aluminum skin is also a description of the airplane design. The applicant states that proven and predictable construction is used with the salient point being that the airplane is “very stiff”. Very stiff is relative terminology, and stiffness is only a portion of the equation concerning flutter. An object may be “very stiff” (and “slow” as in the previous item), and yet under the right conditions, may still experience flutter. The Tacoma Narrows Bridge (“very stiff” – steel and reinforced concrete) being one example where flutter occurred with a stationary object in approximately 40 mph (“very slow”) winds. This was a slightly different form of flutter than occurs with aircraft, but still flutter. This example is used to illustrate why relativistic arguments regarding “slow” and “rigid” are non-persuasive relative to this phenomenon.
4. Ground vibration survey and analysis is not a mitigating factor that supports exemption from the current regulatory requirement for flight flutter tests in addition to the analysis and Ground Vibration Test (GVT) accomplished previously.
5. The airplane examples discussed in the preamble of amendment 48 may not have been similar to this airplane, but the reason for the rule change was not specific to a particular type of airplane. The rule was changed because there is still a risk due to uncertainty with only analysis. Therefore, it must be validated with flight testing.
6. Section 23.629(i) does not provide technical justification for not performing flight flutter testing. This regulation only applies when an airplane has already shown compliance with the applicable regulations for its certification basis. The EL-1 airplane has not. It was determined for this project that the applicant must apply for a new TC and therefore has not yet complied with all the applicable flutter requirements of § 23.629.

7. Designed maximum gross weight is not a mitigating factor that supports exemption from the current regulatory requirement for flight flutter tests in addition to the analysis and Ground Vibration Test (GVT) accomplished previously.
8. The description of the flight-testing provided by the applicant is anecdotal information to show that flight flutter testing was performed in an informal manner. The flight-testing described was not a dedicated flight flutter test regimen; utilizing proper and adequate attempts to induce flutter as required by the regulations. No engineering data in the form of test reports exist to substantiate the claims that testing occurred in that manner, or even in the manner described by the applicant. If proper flight flutter test data does exist, there is no need for an exemption.
9. Certifying the EL-1 to the same speed, altitude, and weight envelope as the original Type Certificate is not a mitigating factor that supports exemption from the current regulatory requirement for flight flutter tests in addition to the analysis and Ground Vibration Test (GVT) accomplished previously.
10. It is true, that this economic burden may not be placed on a modifier (if certain criteria are met); however, Cub Crafters is not modifying an existing Type Certificated airplane.
11. If the TC had not been revoked, then this airplane would be grandfathered and still eligible for production and commercial sale today. Also, its design, certification basis and compliance showing would be based on the standards and regulations in force when it received its original certification. However, the applicant seeks a new TC and the expectation of the public is that a new Type Certificated airplane will meet the current airworthiness standards that exist today. The current airworthiness standards require a more rigorous and thorough flutter investigation using analysis and formal flight-testing.

In consideration of the petitioner's reasons that granting this exemption serves the public interest, the FAA finds the following:

1. Keeping the projects costs low to make a project viable does not serve the public interest as a whole. Low cost products are of interest to those consumers who buy the product; however, the FAA must consider the safety risk to passengers and the individual's on the ground.
2. Providing a product to a niche market at a lower cost without complying with the required flutter analysis and testing does not serve the public interest as a whole because it may lower the level of safety. This is true for any airplane and any market.
3. We agree search and rescue and law enforcement patrol mission have a public interest. However, providing a product to a niche market at a lower cost without

complying with the required flutter analysis and testing does not serve the public interest as a whole because it may lower the level of safety.

4. We understand, as with any new airplane, jobs will be created which is in the public interest. However, lowering the level of safety through noncompliance with the regulatory requirement to conduct flutter analysis and testing to create jobs is not in the public interest as a whole.

**The FAA's Decision:**

In consideration of the foregoing, I find that a grant of exemption would not be in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 106(f), 40113 and 44701, delegated to me by the Administrator, the petition of Cub Crafters, Incorporated for an exemption from 14 CFR 23.629 is hereby denied.

Issued in Kansas City, MO, on October 20, 2014.

//SIGNED//

Earl Lawrence  
Manager, Small Airplane Directorate  
Aircraft Certification Service