U.S. Department of Transportation

**Federal Aviation Administration**

ACE-100
#236, 496
1999 JUN 22 AM 8:04

# Memorandum

Subject: ACTION: Project No. SA3157SE-A – Aeronautical Testing Service, Inc., Increase Gross Weight Cessna 441 -- Requesting Review of and Concurrence with Equivalent Level of Safety (ELOS), FAR 23.731(a), Wheels.
**ACE-99-**05

Date: JUN 10 1999

From: Acting Manager, Seattle Aircraft Certification Office, ANM-100S

Ref. No.: 99-190S-392

To: Manager, Small Airplane Directorate, ACE-100
ATTN.: Karl Schletzbaum

Reply to Attn. of: R. Barnett
(425) 227-2598

Background:
The Cessna Model 441 was certified with a maximum static ground reaction on the main landing gear of 4440 lbs. The corresponding Technical Standard Order (TSO) authorization for the wheels approved by Cessna for use on the 441 are also rated at 4440 lbs. The applicant is requesting a gross weight increase that will yield a static rating of 4532 lbs., at the critical center of gravity, 92 lbs. higher than the wheel ratings for this aircraft.

Section 23.731(a) specifies the relationship between static rating of the wheel and the static ground reaction at design gross weight and critical center of gravity. The proposed gross weight results in a ground reaction that slightly exceeds the static rating of the main landing gear wheels.

Applicable Regulations:
FAR 23.731(a), Wheels.

Applicant Position:
ATS would like to submit the following Equivalent Level of Safety proposal:

Rather than attempt to increase the static rating of the wheels, ATS would like to impose a more restrictive wheel inspection requirement to ensure safety. ATS feels this is justified for the following reasons:

(a) The main landing gear static ground reaction / TSO wheel rating is exceeded by a small amount -- (4532/4440)-1 = 2.07%.

(b) The wheel static rating is determined by fatigue testing, per TSO-C26c. A slight increase in static loading of the wheel would not result in an unsafe life decrement. Also, the

Cessna 441 has no history of main landing gear wheel fatigue failures and no Airworthiness Directives (AD) have been issued against the 441 main landing gear wheels. Further, the Cessna 441 Maintenance Manual does not include the main landing gear wheels as time-change items.

(c) The wheel also has a dynamic load rating (FAR 23.731(b)), which is higher than the static load rating. ATS will not exceed the existing TSO dynamic load rating of the wheels.

(d) The static load rating is a fatigue-life limit, while the dynamic load rating is a yield-stress limit. ATS believes that reducing the current 200-hour inspection interval to 100 hours would more than preserve the original level of safety. This maintenance change would be detailed in an ATS maintenance manual supplement.

FAA Position:

The basic rule of thumb for fatigue is that a 10% increase in loads will reduce fatigue life in half. In this case only a 2.07% increase in static loading is computed for this proposed gross weight increase. Thus, a halving of the current inspection interval from 200 hours to 100 hours will be sufficient to assure safety to all of the requirements of FAR 23.731(a). The proposal detailed above in the applicant position section of this memo provides a level of safety that is equivalent to that provided by strict compliance with FAR 23.731(a). Therefore, the FAA agrees that this equivalent level of safety criteria may be used for showing compliance.

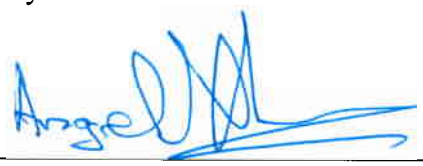
Compensating Features:

As described above, a halving of the current inspection interval from 200 hours to 100 hours will be sufficient to assure safety to all of the requirements of FAR 23.731(a).

Recommendation:

We concur that the ATS proposal detailed above in the applicant position section of this memo provides an equivalent level of safety as envisioned by the regulations and thus meets the requirements of FAR 23. 731(a).

Recommended by:



Acting Manager, Seattle Aircraft Certification Office, ANM-100S

6/10/99
Date

Concurrent by:

for 

Manager, Standards Office, ACE-110

6·24·99
Date

for 

Manager, Small Airplane Directorate,
Aircraft Certification Services, ACE-100

6-24-99
Date