



Is It Safe? Is It Airworthy?

'Safe' and 'airworthy' aren't synonyms

BY MIKE BUSCH

SOMETHING DIDN'T FEEL RIGHT on the landing roll. The Cessna pulled strongly to the left. The pilot had to apply full right pedal and some right brake to keep it on the runway. As the pilot struggled to make the turnoff, it became clear what was wrong: The left main landing gear tire was flat.

Naturally, this happened away from home base, while the pilot was stopping for fuel and lunch in the middle of an important trip. (Doesn't it always?) The pilot needed to get his airplane fixed and back in the air as quickly as possible. He contacted the local shop on the field—one he wasn't familiar with—and asked it to recover his aircraft and fix the flat tire.

The mechanic said he had a new tire in stock for \$200 and a tube for \$50. Labor was estimated at two hours at a shop rate of \$85/hour. It looked like this \$100 hamburger would turn into a \$500 hamburger. Having few options, the aircraft owner approved the work and asked the mechanic to use his best efforts to complete it quickly so he could get on his way. He then headed for the airport restaurant.

WE'VE GOT A PROBLEM

When the owner returned to the shop two hours later, he found that his airplane was on jacks with the left main wheel off. He was not a happy camper and sought out the mechanic to find out what was holding things up.

"We've got a problem," the mechanic told the owner. "Your brake disc is below minimum thickness. If I order one now, I can have it here tomorrow."

The owner explained to the mechanic that he didn't have time for that and directed him to finish installing the tire and tube so the owner could be on his way.

"The Cleveland Wheel & Brake service manual states that the minimum thickness for your brake disc is 0.327 inches, and yours measures 0.324 inches," replied the mechanic, applying a digital micrometer to the disc and demonstrating to the owner that his measurement was indeed correct. He then showed the owner the table of limits in the service manual that specified 0.327 inches as the minimum thickness for the disc. "I'm not going to be able to sign off the work with the disc worn below limits."

The owner was understandably upset. He'd hired the mechanic to change his flat tire, not to inspect his brakes. He couldn't

believe that this mechanic was going to try to hold his airplane hostage over a 0.003-inch discrepancy on the brake disc. Surely this could wait until he got home from his trip, couldn't it?

That's when the owner called me.

CATCH-22

After listening to the owner's blow-by-blow description of what happened, I knew immediately that he wasn't going to like my answer.

I told the owner I agreed that it would almost certainly be safe to defer replacing the brake disc until the owner got home from his trip. I also agreed with the mechanic that he could not properly approve the aircraft for return to service without replacing the disc, because the disc was clearly unairworthy. Both the owner and the mechanic were right.

FAR Part 43.9—which sets forth the requirements for maintenance record entries—says that the mechanic's signature “constitutes the approval for return to service only for the work performed,” and that it denotes that the work “has been performed satisfactorily.” In plain English, this means that the mechanic's signature does not signify that the aircraft is airworthy, only that the *work performed* is airworthy.

For example, if the mechanic who was hired to change the flat tire happened to notice that the airplane's rudder was

damaged, that would not prevent him from signing off the tire change. So long as the mechanic did not perform work on the rudder, the fact that the rudder was damaged would have no bearing on the mechanic's sign-off of the tire change. A conscientious mechanic would point out the rudder damage to the owner, and might even say, “I wouldn't fly the airplane in that condition if I were you,” but he could not reasonably

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withhold his signature on the logbook entry, since the rudder damage is completely unrelated to the work he performed.

In this case, the owner hired the mechanic to fix the flat tire. Changing the tire and tube, removing the wheel from the aircraft, and disassembling it required the brake disc to be removed and reinstalled. Unlike the rudder, the brake disc unavoidably became part of the work performed by the mechanic. I told the owner that in my opinion the mechanic could not reasonably be expected to sign off the work once he knew that the brake disc was unairworthy.

I also told the owner that, legalities aside, it really made sense for him to have the mechanic replace the brake disc and brake linings now. After all, the airplane was on jacks, the wheel was off and split, and changing the disc now would involve no additional labor. Doing it later would require repeating all that work a second time, including demounting and remounting the new tire and tube. It just didn't make sense to defer this work.

In the end, the owner reluctantly accepted my advice, approved the new disc and linings, and checked into a local hotel. The next day he was on his way, a bit poorer and a bit wiser about the difference between “safe” and “airworthy.”


SAFE VERSUS AIRWORTHY

We often treat the words “safe” and “airworthy” as if they were synonyms. They're not. For an aircraft, engine, propeller, appliance, or part to be “airworthy,” it must meet both of the following criteria:

- It must comply with its original or properly altered type design.
- It must be in condition for safe operation.

Thus, an airworthy component is safe by definition, but a safe component is not necessarily airworthy. The brake disc was almost certainly in adequate condition to

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complete the trip safely, but it definitely did not comply with its type design because it was 0.003 inches below the minimum thickness (service limit) prescribed by the manufacturer.

Note that the two components of airworthiness are quite different. One is objective, the other subjective. Whether a component complies with its type design is normally a clear-cut issue: Either it meets specs or it doesn't. On the other hand, whether a component is in condition for safe operation is subjective: It's someone's opinion. Two mechanics might inspect a damaged rudder, and one might feel that the damage is minor and the rudder in condition for safe operation, while the other might disagree.

LEGAL TO FLY?

In a situation like this, how can we know whether we're legal to fly? There are two relevant regulations. The first is FAR Part 91.7:

PART 91.7 CIVIL AIRCRAFT AIRWORTHINESS

- (a) No person may operate a civil aircraft unless it is in an airworthy condition.
- (b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. ...

This is a subtly worded regulation. Paragraph (a) says that we can't fly an aircraft unless it is in an airworthy condition, but it does not explain how pilots are supposed to know whether the aircraft they are about to fly is airworthy. As pilots, are we responsible for determining the airworthiness of the aircraft? Are Cessna pilots expected to micrometer the brake discs before each flight? The regulation doesn't say, but it doesn't seem like a reasonable expectation. I think the FAA expects aircraft owners to hire mechanics to make these airworthiness determinations—at least once a year—and then abide by those determinations.

Paragraph (b) states that the pilot in command (PIC) is *responsible for determining* whether the aircraft is in condition for safe flight. It doesn't say that the PIC is required to determine if it's airworthy, only whether it's safe to fly. What this suggests is that the PIC is expected to make a subjective determination about safe condition before he flies the aircraft, but is expected to rely on mechanics to make the objective determination about conformance to type design. In short, I don't think the FAA expects a pilot to use a micrometer, but it does expect a mechanic to do exactly that.

[NOTE: Experimental aircraft have no type design, so we can't properly use the word "airworthy" in connection with such an aircraft. All we can say about an experimental is that it "is in condition for safe operation." That's why experimentals don't have an "annual inspection" each year; they have a "condition inspection."]]

The second relevant regulation is FAR Part 91.407:

PART 91.407 OPERATION AFTER MAINTENANCE

- (a) No person may operate any aircraft that has undergone maintenance ... unless—
 - (1) It has been approved for return to service by a person authorized under §43.7 of this chapter; and
 - (2) The maintenance record entry required by §43.9 or §43.11, as applicable, of this chapter has been made.

An aircraft is grounded by the very act of committing maintenance upon it. It is ungrounded thereafter only by a maintenance record entry signed by an authorized person (usually an A&P mechanic or a certified repair station).

A THOUGHT EXPERIMENT

This Cessna owner wasn't exactly the hands-on, wrench-swinging type, but let's imagine that he was. For purposes of this thought experiment, imagine further that the owner decided that he absolutely had to continue his trip without delay and simply could not remain overnight waiting for the new brake disc to arrive. Perhaps our imaginary owner could have offered to change the tire himself.

A tire change is classified in FAR Part 43 Appendix A(c) as preventive maintenance and is a task the pilot would therefore be permitted to perform and sign off without A&P supervision. He could have offered to perform the tire change himself with the mechanic's guidance, pay him for his time and parts, and, of course, not ask him to sign off the work and be held responsible for the aircraft's airworthiness.

If the mechanic was in a generous mood, perhaps he might agree to this. If the shop was an FAA-certified Part 145 repair station, then most likely he could not agree to it. But that's another issue for another column. **EAA**

Mike Busch, EAA 740170, was the 2008 National Aviation Maintenance Technician of the Year and has been a pilot for 44 years, logging more than 7,000 hours. He's a CFI and an A&P-IA. E-mail him at mike.busch@savvyaviator.com. Mike also hosts free maintenance webinars on the first Wednesday of each month at 8 p.m. (Central). To sign up or access the archives, visit www.SavvyMX.com/webinar.