

Ethanol and airplanes: A good mix?

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There is an old joke that the definition of mixed emotions is watching your mother-in-law go over a cliff in your new Corvette. It is in this state of mind that I recently read Dr. Dennis Helder's "Investigation of Ethanol as a General Aviation Fuel-Final Report."

First off I applaud Helder's effort to find an alternative to the present 100LL. The future of general aviation depends on continued research and finding new ways to solve old problems. His report discusses the large amount of work that has been done to date on a fuel that contains about 85% ethanol.

However, when I compare this block of work with my personal and work experience with the introduction of 10% ethanol fuel into the automotive fuel system, I feel like screaming "WHAT IN THE WORLD ARE YOU PEOPLE THINKING?"

Ethanol is a polar solvent with three rather problematic characteristics: First, it will absorb water; second, it will clean up dirty fuel systems; and third, it will attack old rubber and composite components.

The water thing is a real problem. The present fuel distribution system is designed to tolerate water. As the temperature of a fuel is increased, it will naturally absorb water from the air. Then when it cools down, the water settles out. If a polar solvent is introduced, the water no longer settles out. The second problem is similar in that ethanol will clean up a dirty fuel system. This will leave the industry with two choices. The first would be to build an entirely new fuel distribution system for ethanol fuel. This would include new piping, tanks, pumps, and filtration equipment at distribution centers and airports. The second option would be to change over the present 100LL system, which is segregated from all other fuels after the lead is added. However, this would mean that 100LL would need to be discontinued, the system totally upgraded and then switched over to ethanol fuel.

Now we come to the really hard part: The fuel distribution system in all of the older aircraft. When the fuel man mistakenly delivered some ethanol-containing fuel to my farm, I had three stalled tractors and an old pickup that never ran right again. The ethanol fuel ruined all of the fuel hoses, caused numerous leaks and necessitated the replacement of two fuel pumps and 11 fuel filters.

Now if you think your old aircraft will handle ethanol better than my old tractors, guess again. Several years ago, another state tried ethanol in one of its Cessna aircraft. In a flight of less than 900 miles, the mechanic claimed that they had to change the composite carburetor float seven times. There were also leaks and problems from other fuel system components.

The Helder report gives the results of a series of fuel compatibility tests that compared the results on ethanol to 100LL. In these tests, the ethanol fuel performed similarly to 100LL in many areas. However, the bottom line is that before any ethanol fuel could ever be marketed, it would be necessary to run compatibility tests on almost every composite fuel component ever used in a general aviation aircraft. Who would do this work? In today's legal environment, who in their right mind would even consider being liable for all of the people using ethanol in their older aircraft?

Again, I do not want to sound too negative to new ideas. In the ethanol work to date, they have demonstrated that, with modification, they have been able to fly several aircraft on ethanol. My concern is that if one understands how fuel is handled today and the problems associated with ethanol, then maybe this effort might be better spent looking at some of the other more promising replacements for 100LL.

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