Grass for gas

Flying a real, renewable fuel

Story: Dave Hirschman Fotos: Remos Aircraft GmbH, AM-Archiv

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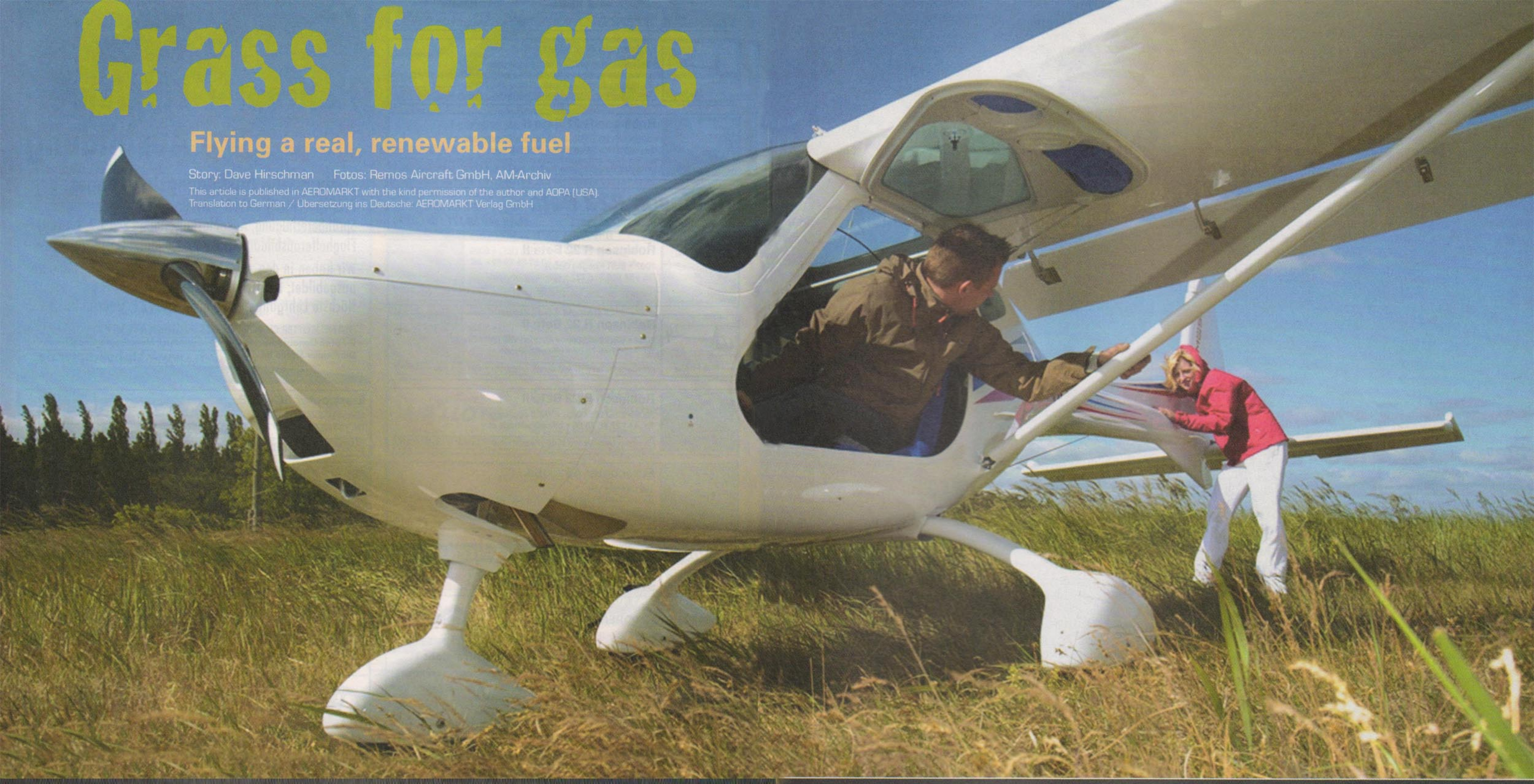
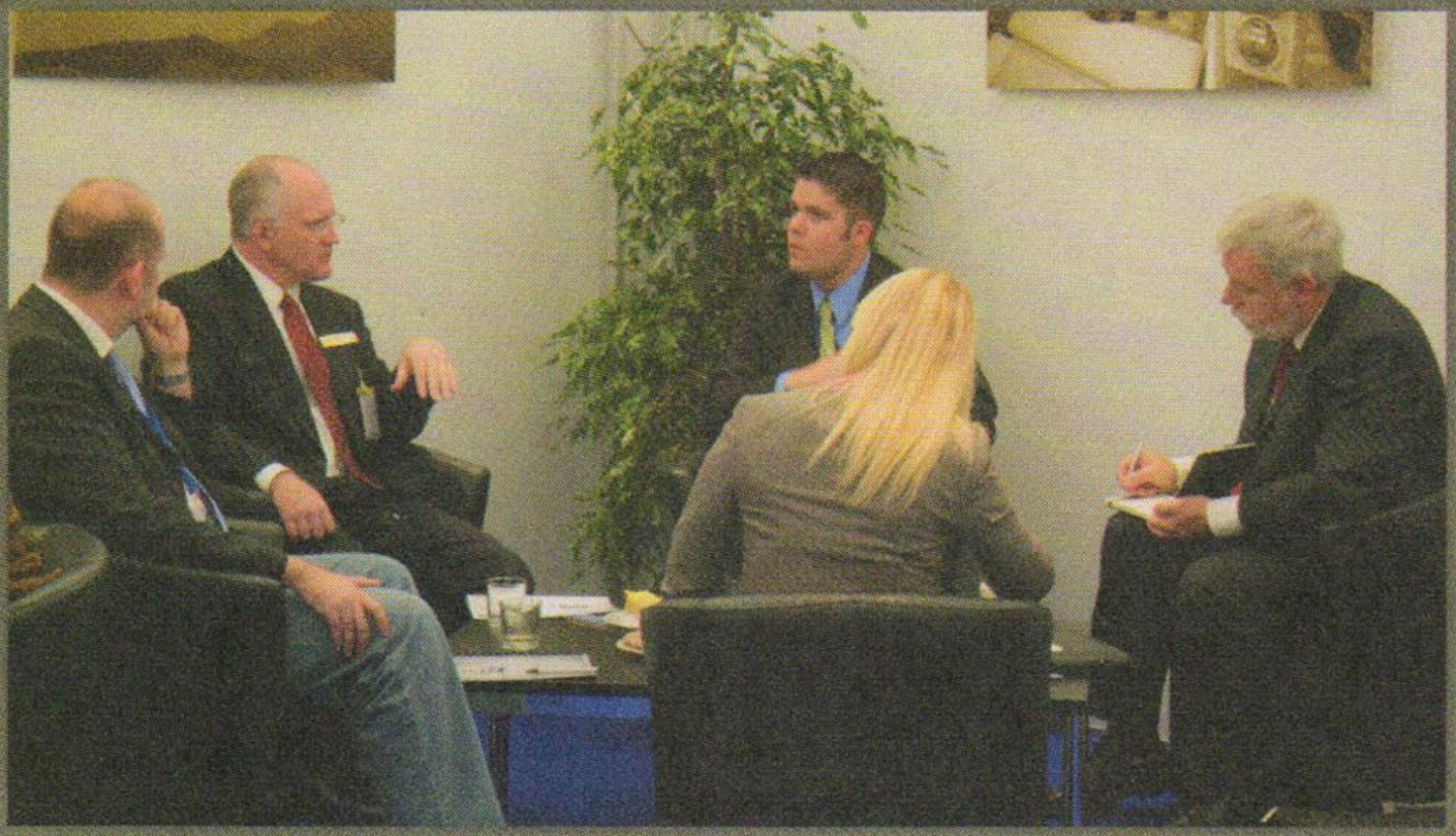


Watching the clear fluid being poured into my airplane's fuel tank was disconcerting to say the least. We all know that 100LL is blue, of course. And instead of the familiar smell of leaded avgas, this stuff carried the odor of a dank locker room, or a musty basement.

For more than five years, Swift Enterprises, a small start-up firm founded by Purdue University Professor John Rusek and largely staffed by grads, has been designing and producing its own form of renewable fuel meant as an unleaded replacement for 100LL. (AEROMARKT has repeatedly introduced this company and its product to our readers on various occasions over the last two years – The ed.). Independent laboratories including the FAA's fuel and engine center have tested Swift fuel and determined it performs as well as—and, in some areas, better than—100LL, in a variety of piston aircraft engines. More detailed tests are planned.

Teledyne Continental Motors have performed flight tests using Swift fuel in an IO-550-equipped Bonanza, and General Aviation Modifications Inc. (GAMI) has performed extensive ground tests.



Swift Enterprises' John Ziulkowski explaining his product to industry leaders in AEROMARKT's business lounge at ILA, Berlin 2008. Left to right: Dr. M. Erb (director AOPA Germany), Bob Gibbs (Cessna's director of International Sales), Jon Ziulkowski (Swift's Vice President of Renewable Fuels and Head of Corporate Flight Operations), Dieter Stricker (CEO and publisher AEROMARKT).

Now, I was at Purdue University Airport to meet with Swift officials and—perhaps more important—to fly home to Maryland on a tank of Swift's sorghum-derived fuel. My airplane, a Van's RV–3 licensed in the Experimental category, is equipped with a stock 150-horsepower Lycoming O-320 with a fixed-pitch prop—a combination virtually identical to those found on ubiquitous Cessna, Piper, and Beech airplanes ranging from 172s to Super Cubs.

Swift is about to enter an exhaustive data-gathering period in which it will collect thousands of hours of test data from many airplanes using its fuel in flight. But my 450-nm trip from Lafayette, Indiana, to Frederick, Maryland (with a planned stop in Mansfield, Ohio) would be the longest point-to-point flight to date on Swift's fuel. "We'll be following you on FlightAware," said Jon Ziulkowski, a Swift officer, researcher, and pilot. "But call us when you land. We want to know every detail."

Engine start and runup were completely normal. There's no special technique for starting an aircraft with the new fuel, and the pretakeoff procedures were the same as ever. Acceleration on takeoff was as brisk as usual, and the rate of climb was a typically robust 1,500 fpm at 110 KIAS—even though the 20 gallons of Swift fuel added about 10 pounds compared to the six-pound-per-gallon weight of regular avgas. (Swift fuel weighs about 6.5 pounds per gallon.)

The RV–3 has single-point EGT and CHT probes, and the EGT consistently read about 75 degrees F higher than normal in cruise, while the CHT was 25 degrees F lower than normal. Swift officials attribute the differences to their fuel's higher octane rating (about 104), which causes Swift fuel to burn slower and later in the combustion process. Level at 7,500 feet in cruise (20 inches manifold pressure, 2,450 rpm, 65 degrees OAT), I enriched the mixture slightly more than usual to keep the EGT at 1,400 degrees F or below. The CHT was 325 degrees F, and fuel burn on the 90-minute flight averaged 8.5 gph. Swift fuel is designed to mix seamlessly with avgas, so I stopped about halfway home in Mansfield, Ohio, to blend the two. With slightly more avgas than Swift fuel in the 24-gallon tank, the hot start procedure was identical to avgas. Acceleration and climb performance were unchanged. In cruise at 9,500 feet (19 inches manifold pressure, 2,450 rpm, 60 degrees OAT), I leaned the mixture a bit more aggressively to keep the EGT at 1,400 F or below. The CHT climbed to 340 degrees, and fuel burn on the second 90-minute flight averaged 8.2 gph. The spark plugs in the RV–3 had been cleaned and gapped just before the flight with Swift fuel. After three hours of flying, they appeared totally unaffected.

It would have been nice to have a full engine monitor capable of measuring and collecting more detailed and precise engine performance parameters, and Swift intends to collect vast amounts of such data in future tests. The company also has acquired a twin-engine aircraft with two engine monitors and plans to fly with 100LL feeding one engine and its own fuel supplying the other. The company is seeking to show that its fuel meets 100LL performance standards and can safely replace avgas throughout the GA fleet. Swift officials estimate the process of defining, revising, and meeting those specifications with its unleaded fuel will take up to four years. In the meantime, Swift is exploring partnerships with a variety of energy firms capable of manufacturing its product. The manufacturing process, company officials say, is far simpler than refining oil and can be done just about anywhere in the world. Sorghum, switch grass, garbage, or petroleum can be used as raw materials and distilled into the chemicals used in Swift fuel.

Swift has a pilot manufacturing plant in Indiana capable of producing about 200 gallons of its fuel a day, and company officials say they are convinced it can be manufactured in industrial quantities at a cost well below leaded avgas. Giving Swift fuel its own color is a simple matter of adding dye, but the locker-room smell is going to stay.

It's one thing to read lab or news reports on the merits of renewable fuels—but it's especially exciting to put such a fuel in an airplane and fly it on a real cross-country trip. Swift fuel has made the leap from the purely theoretical to a real product, and it appears to hold great promise for shifting GA to an unleaded, non-petroleum-based future.

E-mail the author:
dave.hirschman@aopa.org