

More About Ethanol; What About the Roadliner Engine?

More reader questions answered

Q. Regarding the “Ethanol and Rotax Engines” article in the June issue, we have been warned by several authorities, including the Rotax manuals, that alcohol mixes must *never* be used in two-cycle engines because water in the fuel can corrode the crankshaft and piston-pin bearings. Unlike a four-cycle engine, fuel is pumped through the lower end of two-cycle engines before reaching the cylinders for combustion. I’ve received no other information from Rotax approving the use of such fuel in the 503DCDI engine installed in my Challenger II.

Frank E. Millis Sr. • Via e-mail

A. As stated in the article, fuel without alcohol is preferred but not available in all parts of the world or the United States. Make no mistake, I am not endorsing the use of E10.

Rotax makes no mention of fuel with alcohol in the most current version of the two-stroke operator’s manual dated May 1, 1999, except to say (on page 10-8) that operators should avoid using gasoline refined for use in cold weather climates in the summer because of the increased chance of vapor lock. Winter fuels frequently have larger quantities of oxygenate (alcohol) added to help engines burn cleaner in cold weather. Using this highly oxygenated fuel in hot summer weather will increase the chance of fuel vapor forming in the fuel lines.

The only official printed material I can find from Rotax is in the form of a service bulletin from 1994, SI-13-1994. It refers only to two-stroke engines and states that operators must avoid using fuels with more than five-percent alcohol. Most people are unknowingly using fuel containing some percentage of alcohol, specifically methanol. The fact that some are operating on E10, successfully, is interesting. We will monitor the fuel situation and make information available as it becomes available.

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Using fuel with more than five-percent methanol could increase the chance of crankshaft bearing corrosion in two-stroke engines that are not used in a dry climate and are not run regularly. Thanks for making a good point.

Phillip Lockwood

What About the Roadliner?

Q. I wonder if you have an opinion about the suitability of the new Star Motorcycle (Yamaha) Roadliner engine for light-sport aircraft (LSA) in the 8- to 9-pound/square foot wing loading range. If you are not familiar with the engine, let me provide the specifications: Platform: V-Twin, single pin, Displacement: 1854 cc, Compression Ratio: 9.5, Cooling: Air & oil (an oil cooler is used), Valves: four per cylinder, Dual electronic ignition, Electronic fuel injection, Twin balance shafts, Dry sump, EXUP valve.

The peak torque at the crankshaft is 125 foot-pounds at 2500 rpm. The peak horsepower is 101 somewhere between 4400 and 5000 rpm. This is a modern, large displacement, air-cooled motorcycle engine designed for low-end torque. My estimates suggest it could be de-rated to about 75 hp for takeoff and run a direct-drive, two-bladed prop in the neighborhood of a 64-inch diameter.

The output of the Roadliner is almost identical to the Lycoming O-145-C2. The low-end torque would seem to bypass the difficulty found in VWs of similar displacement. The V-Twin design creates some installation challenges, but probably makes for simplified engine cooling. I doubt that many Roadliner engines will be available for two to three years, so my question may be premature.

Wayne Gelfand

Torello Responds

A. The use of motorcycle engines in aircraft dates back to the 1920s. Henderson Motorcycles marketed one of its four-cylinder inline engines specifically for aircraft use. The early Heath kit planes were designed around Henderson as well as Harley-Davidson engines.

Motorcycle engines have excelled in air-cooled engine design. These engines, despite their power outputs, need little maintenance.

However, the Roadliner may not be such a good choice. Certainly it has all the latest technological advances, but it may be a daunting experiment to adapt it to an aircraft for one simple reason—weight.

The Roadliner motorcycle weighs in around 705 pounds dry, and I can assure you that at least 50 percent of that weight is the engine and related components. Remember its transmission is integral. Some portion could possibly be used for a prop reduction, which would allow the engine to deliver 125 hp, its maximum horsepower. Most aircraft engines of that power output are far lighter and simpler, albeit not as sophisticated. Weight is most important with LSA.

As to converting it to direct drive, there will be a power loss because of the slower crankshaft rotation speed. At 113 cubic inches displacement, by my calculation, with reasonable prop speed, it should deliver 65 to 75 hp. Of course, the engine would have to undergo severe weight reduction for a viable aircraft application.

The Roadliner would make an interesting conversion, a reliable one, and one laced with modern technology if weight can be kept to acceptable numbers. The only hurdles would be the complexity of the conversion and cost.

Torello Tacchi