WaterFlying

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BURT RUTAN TURNS TO SEAPLANES

BEST CABINS IN ALASKA

GWEDUCK, PART III

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COVER: Tonya Rutan, Glenn Smith (center), and Burt Rutan with Smith's PA-12 with the Coeur d'Alene Resort's famous floating green in the background. **Photo by Mike Kincaid**

The Gweduck on Wh

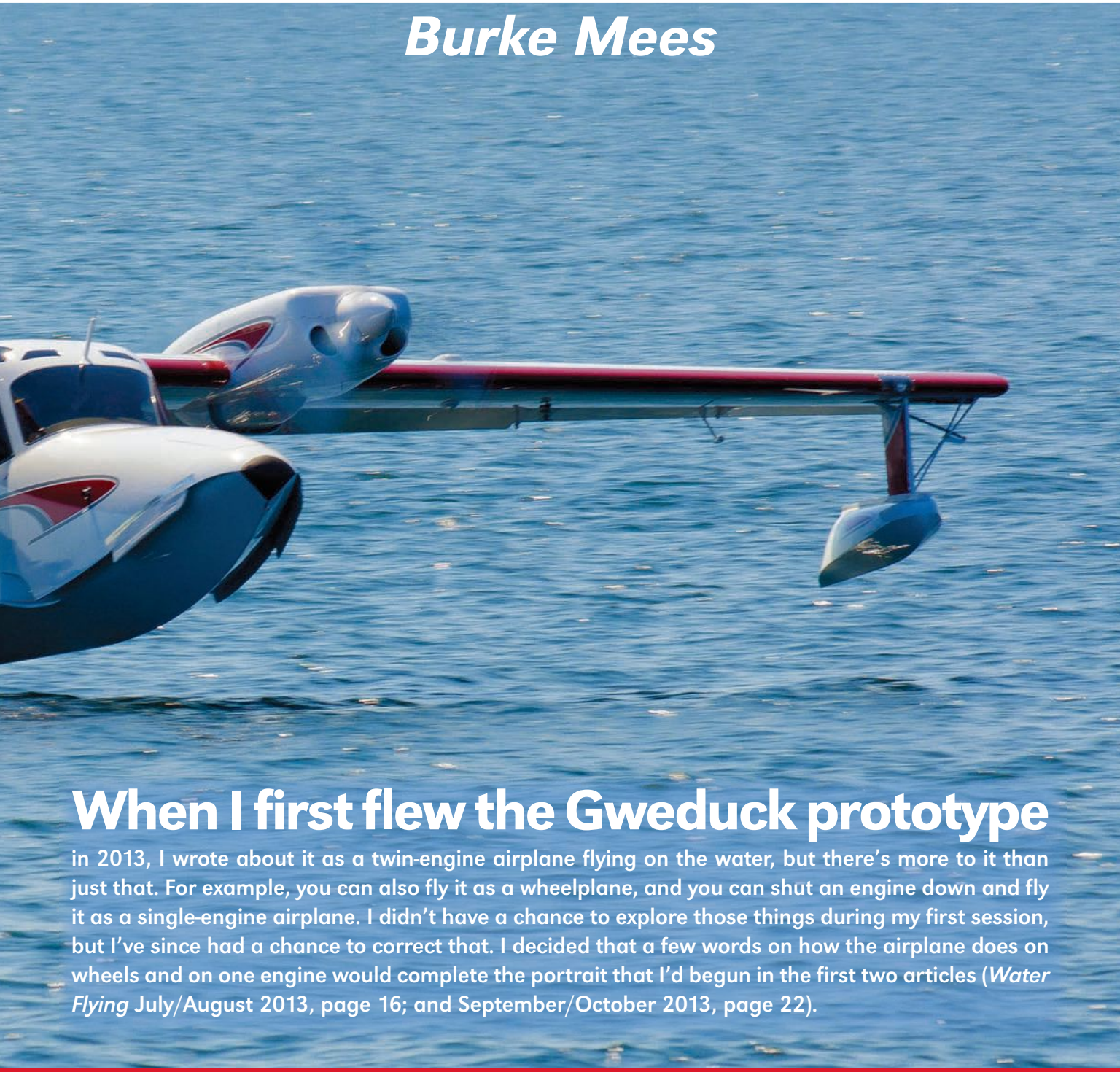
How does this impressive new multi-engine seaplane fare out of the water?

Photo by Jim Schoeggl

eels and One Engine

Story by

Burke Mees



When I first flew the Gweduck prototype in 2013, I wrote about it as a twin-engine airplane flying on the water, but there's more to it than just that. For example, you can also fly it as a wheelplane, and you can shut an engine down and fly it as a single-engine airplane. I didn't have a chance to explore those things during my first session, but I've since had a chance to correct that. I decided that a few words on how the airplane does on wheels and on one engine would complete the portrait that I'd begun in the first two articles (*Water Flying* July/August 2013, page 16; and September/October 2013, page 22).

The Gweduck on Wheels

Ben Ellison commented that whenever they had to compromise between competing considerations in the Gweduck's design, they always considered the project primarily a boat and gave priority to water considerations. That design philosophy didn't stop them from making a good wheelplane along the way. I found the Gweduck to be an easy and well-behaved airplane on wheels.

On the runway, the Gweduck is typical of the old multiengine tailwheel airplanes. Like the original Grummans that inspired the design, it has a non-steerable, free-castoring tailwheel that can be locked straight for takeoff and landing. That is the standard arrangement for the old tailwheel twins, and is what you see on airplanes like the Widgeon, Goose, Beech 18, DC-3 and C46, among others. The Gweduck shares the distinctive characteristics of these old airplanes, which handle differently than the average single-engine taildragger.

For example, maneuvering during taxi is normally done with the tailwheel unlocked, and steering is accomplished with a mix of differential braking and differential power. Differential braking provides the immediate and positive control required for precise steering, and differential power does the rough work of entering and recovering from large turns.

Taxiing requires that you develop a feel for the amount and duration of differential power required to get a desired result and also that you lead your applications of brakes and power to take into account the turning momentum of the airplane.

On takeoff and landing you can lock the tailwheel straight, which makes the airplane less inclined to go astray, but it doesn't relieve you of the burden of steering. At high speeds during the takeoff and landing run the air rudder has sufficient authority for steering, but at low speeds the air rudder is ineffective and steering often requires smooth and judicious use of the brakes. As you pass through the intermediate speed range during takeoff and landing, you have to make the delicate transition from one method to the other. If you're new to this way of doing things, it will take some getting used to, but if you've flown the old airplanes before you'll feel right at home.

When it comes to landing multiengine tailwheel airplanes, wheel landings normally are the preferred method because without tailwheel steering these airplanes usually don't have very good control on three-point landings. This rule doesn't apply to the Gweduck, which handles well on both wheel landing and three-point landings. You can drive it onto the runway and plant the weight on the main wheels just like you do with a Grumman, or you can slow it down and stall it onto the runway in the three-point attitude, which you don't do in a Grumman. Either way you enjoy good control on the rollout with no undue excitement.

This illustrates the fact that the Gweduck is compatible with a wider range of techniques than the Grummans; what you do in the Grummans will produce good results in the Gweduck, but not everything you can do in the Gweduck works in the Grummans. That holds true on both land and on the water, and is a testament to the Gweduck's easy and forgiving nature.

The Gweduck o

To see how an airplane does on one engine, there's no substitute for doing an actual shutdown and feather, which is exactly what I did with Ross Mahon and Jim Knutson in the airplane loaded to its 6000-pound gross weight. What does the Gweduck look like at max gross weight? In this case, the load consisted of three adults, 250 pounds in sand bags, 750 pounds (125 gallons) of gas, and the usual assortment of gear that travels with the airplane.

Flying 3,000 feet above the landable waters of the Hood Canal just west of

Gweduck main wheel configuration is similar to that of Grummans. Both wheel and three-point landings work well.

Water rudder extends from bottom of air rudder. Water rudder and reversing props make for good steering on one engine.


Jim Schoeggl

on One Engine

Gweduck owners who experience an engine failure (not likely) will think nothing of casually taxiing to the dock on one engine.

Seattle on a typical summer day, I reduced power on the left engine for a few minutes to cool it down. There was no particular reason to choose the left side because with counter-rotating props the Gweduck doesn't have a critical engine. Then I pulled the mixture to idle cutoff and experienced an impressive amount of windmilling drag which abruptly disappeared when I feathered the prop. I advanced the right engine to the next higher power setting, which in this case was climb power, and set the pitch to hold Vyse, which we estimated to be about 90 knots. When things settled out the left prop was standing still, the gear, floats and flaps were retracted, and the airplane was having no trouble holding altitude. From there, full throttle only brought a 1.5-inch increase in manifold pressure, but that was enough to produce a shallow climb that brought

us up to 4,000 feet after 10 minutes (a 100-feet-per-minute rate of climb).

We spent 21 minutes with the left engine feathered and the right side turning at climb power or higher, and we didn't have the feeling that we were putting any real strain on the good engine. The oil and cylinder head temperatures stabilized at 185 deg F and 335 deg F respectively, and there was no reason to doubt that that the working engine would continue to keep us aloft indefinitely at the low-level cruising altitudes typical of a saltwater seaplane.

Basically, the Gweduck appears to be a genuine multiengine airplane, one that can have an engine failure at max gross weight and continue flying to a destination of your choice. That's not how things usually work with small twin-engine seaplanes, and even designer Ben Ellison's response to the test was to question whether the numbers were really correct. I was there in person, but don't take my word for it; any prospective buyer is invited to see it for yourself on a demo flight.

Single-Engine Handling

There's more to an airplane's single-engine characteristics than how it performs; how it handles on one engine is also important. For example, after making a single-engine water landing in a Grumman, you're pretty much disabled on the water. With nothing but differential power for steering, your only options are to turn in circles or shut down the other engine and sail downwind. In the Gweduck it's a whole other story. With a water rudder and reversing prop, you have something to work with.

On a separate flight I made a single-engine landing in the Gweduck on Lake Washington with a propeller feathered. When the airplane came off the step, I lowered the water rudder and was able not only to taxi straight ahead—impressive enough by Grumman standards—but also to turn the airplane into the working engine and against the weathervaning of a 5- to 8-knot wind. In light winds I could basically maneuver at will in circumstances where the Goose would have been helplessly adrift. I imagine stronger winds would complicate this scenario, and in that case judicious use of reverse pitch on the operating propeller would provide another tool for maneuvering the airplane.

This is big, but exactly how big it is will probably be lost on the average Gweduck owner. By the time they get

At gross weight with one propeller feathered, the good engine at full power, gear and flaps retracted and airspeed at Vyse, the Gweduck was able to climb at about 100 fpm.

around to having an engine failure, (not an everyday occurrence with IO-540s) they'll probably take it for granted that casually taxiing to the dock on one engine is what everybody does in this situation. They'll never understand that the rest of us have to contend with a disabled airplane drifting in the tide while waiting for a tow. The ability to maneuver on the water with an engine feathered is the finishing touch of generally good single-engine characteristics.

that burns a lot of gas to go slow. When it comes to flying long distances, the large fuel load required for a long trip doesn't leave much room for payload. For that reason, they tend to be practical as short-range airplanes where light fuel loads leave room for more passengers and freight.

Also consider that the typical multiengine seaplane loaded to gross weight can't quite hold altitude on one engine. For that reason we usually try to stay within

New Capabilities

After this last session it occurred to me that the Gweduck doesn't have some of the limitations that usually come with this kind of airplane; unlike most piston-twin amphibs, the Gweduck can carry respectable payloads over long distances with real multiengine reliability.

Most piston-twin seaplanes are used in the short-range, near-coastal role, and the reason for that has to do with their poor fuel efficiency and poor single-engine performance. To explain this, first consider that the typical multiengine seaplane is a high-drag airplane

driftdown range of a landable surface and stay poised to head that direction at the first sign of trouble. That prevents us from venturing too far from protected water and keeps these airplanes operating in the near-coastal areas.

This combination of payload and single-engine considerations restricts the usefulness of most piston-twin seaplanes to shorter flights near coastal protected waters, but that's not the case with the Gweduck. To see how the Gweduck is different, first consider that it is an impressively fuel-efficient airplane. A low-cruise power setting (50 percent)

moves it along at 120 knots while burning only 21gallons per hour. Because the fuel load for a given flight weighs less in a more efficient airplane, the Gweduck can carry a meaningful payload on long trips.

Also, because the Gweduck has good single-engine performance at max gross weight, it can venture out over open water far from shore without worrying about an engine quitting.

This puts the Gweduck in a class above the average piston-twin amphib. The Gweduck is not only useful in the coastal areas, but it is also suitable for longer trips in the island archipeligoes where landing areas are separated by long distances of open water, such as certain parts of the South Pacific. This opens up new territory since there is a lot of seaplane country that is too spread out for the average piston-twin amphib, but that can be safely and reliably served by the Gweduck.


Mitchel Overton

New Developments

Some new developments in the Gweduck project have come about since I first wrote about the air-


Mitchel Overton

Unlike most multiengine seaplanes, the Gweduck's composite construction and thus relatively light empty weight, good aerodynamics, fuel-efficient Lycoming engines, and good single-engine performance enable it to fly relatively long distances over water.

plane. Significant advances in composite construction have occurred since the prototype was made, and some of those will be incorporated into future production to make the airframe both lighter and stronger.

If composite airframes are the wave of the future, then so are aircraft engines that don't use avgas, and in this respect the Gweduck is poised to stay on the leading edge of things to come. A couple of turbocharged diesel aircraft engines are under development in the 300-horsepower range that would be suitable for the Gweduck, and both are projected to be available in 2017. Also, there's a very efficient auto-fuel aircraft engine that would be a potential candidate.

These engines would make it easier to operate the Gweduck in the undeveloped island archipelagoes where avgas is getting hard to find. For now, the Gweduck will continue to be built with Lycoming IO-540s, but the design will be adjusted so the airframe can easily be retrofitted with these new engines when they become available.

At this point, I have about a dozen hours in the Gweduck, and the more time I spend in it the more it grows on me. With a saltwater-compatible composite airframe, good flying characteristics on land and water, good performance and handling on one engine, and good fuel efficiency, the Gweduck is a significant advance over the capabilities and utility of the piston-twin amphib. The airplane addresses the shortcomings of multiengine seaplanes that I have confronted while flying them for a living.

What is the status of the Gweduck project at this point? It is ready to go into production as a home-built experimental while leaving open the possibility of eventually producing it as a certified airplane if sales justify that. Manufacturing on the first airframe parts has begun, a builder-assist program is in place, and it is ready for the first launch customer. Hopefully it won't be long before we start to see them around.

For more information see www.gweduck.com and compositecreations.net.

Burke Mees flies for a major U.S. airline, and is a frequent contributor to Water Flying.