



REDEMPTION AT ISSAQUAH

Reflex profile gives the Kasperwing a different kind of lift.

BY THOMAS A. HORNE

I am driving a Hertz Rent A Car eastbound out of Seattle on I-90 and feeling bad. The memory of what I call the pickup-truck-and-tumbleweed incident is fresh in my mind, and I am beginning to question my ability as a pilot. I mean, here I am, commercial/multi/instrument/flight instructor, and yet I made these mindless blunders in an aircraft designed for pedestrians to fly.

Awful, humiliating realizations are coming to mind. I cannot fly what everyone agrees to be a simple-to-fly airplane, and, worst of all, I maybe—maybe—might not have the Right Stuff for this ultralight business. These thoughts are unbearable.

Suddenly, there it is. The Lake Sammamish State Park exit, and I swerve onto the off ramp. Once past the Holiday Inn, I can see a hangar—the Mighty Mouse hangar.

Issaquah, Washington's Skyport airfield is a soggy grass strip 1,800 feet long that supports the activities of a glider operation, a sky-diving outfit and Cascade Ultralites. After seeing the facilities of several other ultralight manufacturers, it is obvious when you step into Cascade's diminutive shop that this is a company in its earliest stages of

growth. A few jigs, drill presses and some tooling are spread around one room, and an adjoining office has one desk, a drawing table and some kitchen appliances. There are a total of six employees.

The development of Cascade's Kasperwing began five years ago when Steve Grossruck—then a hang-glider enthusiast—began gradual modifications of a Manta Products "Fledgling" hang-glider wing. The idea was to increase lift and permit longer soaring flights. Somewhere along the line, he sought out Witold Kasper, who gave him the idea to use a reflex profile wing, triangular stabilizers at the trailing edges of the wing tips and a special end plate/tip rudder arrangement (see p. 34).

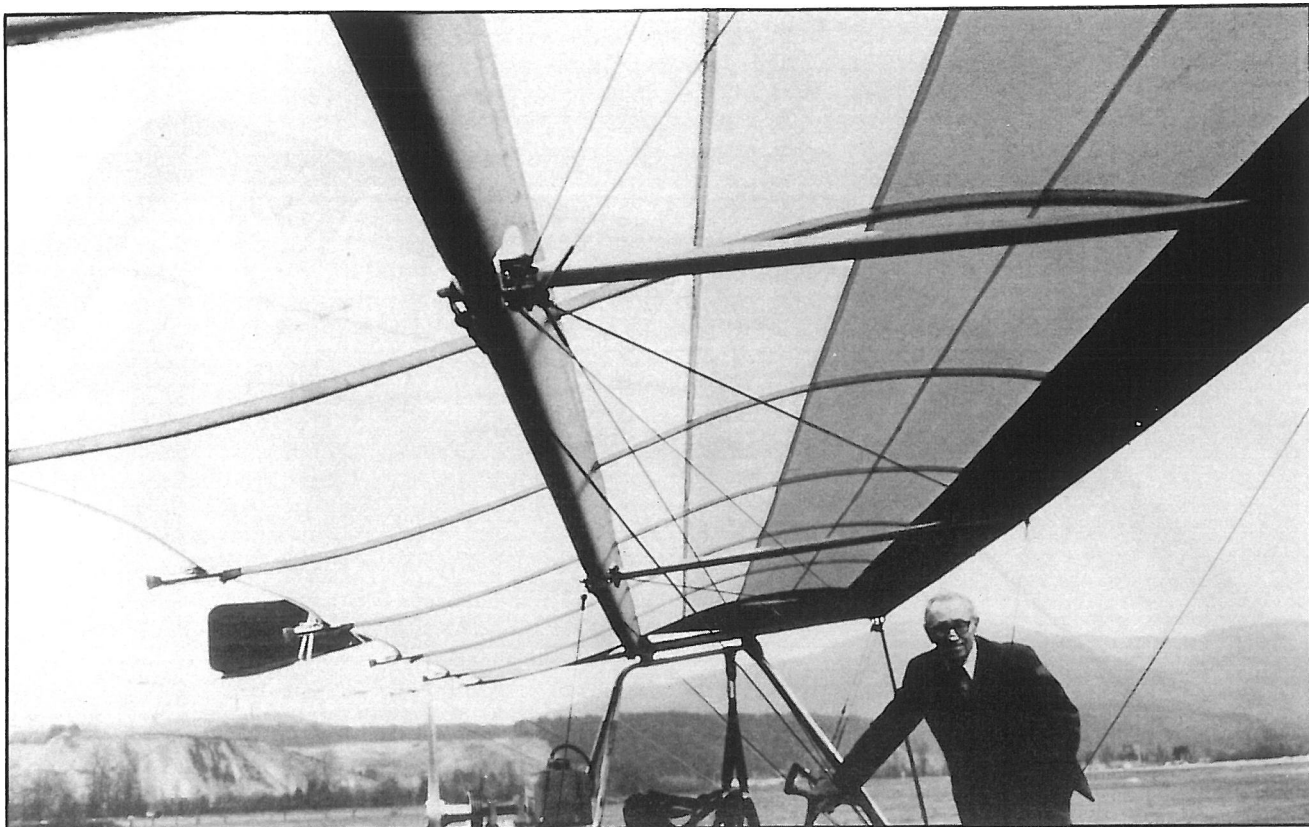
Grossruck found that, as a hang glider, his Kasperwing would outperform any other hang glider he had flown, and he had flown just about all of them. The reflex wing puts out tremendous amounts of lift, and, in competition with others, he consistently found himself going higher and staying up longer than any of the other gliders. The Kasperwing won every regional hang gliding contest in the Northwest in 1976.

Last July, Grossruck got the idea to add power to the Kasperwing. A Honda "Odyssey" engine was chosen, the same engine that Honda uses on its balloon-tire ATV (All-Terrain Vehicle). This engine has 250 cc and puts out 20 horsepower. A 3:1 reduction drive sends power to a wooden pusher propeller, giving 150 to 170 pounds of thrust—enough to give the Kasperwing a 52-knot top speed. A TBO (time between overhauls) of 100 to 150 hours is mentioned. But this figure can vary, depending on the amount of time a pilot flies around using full power.

It is a very work-intensive airplane. After all the parts have been fabricated and drilled, they are sent out to be anodized and de-burred. There are 10 fittings that have to be machined by a lathe or a milling machine. The sails are cut and stitched in a sail loft in the Mighty Mouse hangar, which is adjacent to the main building.

It takes one week for the crew to make up a Kasperwing kit, 40 hours or so for a purchaser to assemble it and about 30 minutes to set one up in the field.

Cascade is a bare-bones outfit. No big advertising or public relations campaigns, just



work, work, work. Between September 1980 and February 1981, 35 Kasperwings had been sold and 10 delivered, with more orders every day. The company hopes to get production up to one a day by spring.

A distribution network is in its infancy, so most sales come from word of mouth in the ultralight subculture. Even so, the company cannot keep up with orders. That is why Cascade is all go and no show.

Well, let me retract that statement. The Kasperwing ultralight's unique properties enable Grossruck to demonstrate a pretty bizarre maneuver. Power-off, the Kasperwing can be made to descend vertically in mushing flight, due to the vortex-lift characteristics of its reflex-profile wing—at zero forward airspeed. It is controllable in this condition, and 360-degree turns can be made.

Grossruck had his first powered Kasperwing at last year's Experimental Aircraft Association convention at Oshkosh, Wisconsin. When he did his vertical mush routine—with a few turns thrown in for good measure—the tower had a conniption and sent someone to bawl him out. Fear was the first impression the authorities had when they saw the mush. There was a collective "My God, he's going to stall" running through their brains. It took some reassuring, but Grossruck managed to convince the EAA that the maneuver was a normal one for the Kasperwing and endangered no one.

The Kasperwing went on to win the EAA's Best New Design award for 1980.

"Doing the vertical mush takes some practice—about an hour—but it is easy to do," said Grossruck. "Hell, I make ap-

proaches like that all the time out here at Issaquah: It's fun."

As a pilot, I wondered, how does he do it? Carefully, as it turns out. First you cut the power to idle. This starts you slowing down. Then you slowly—maybe two or three inches at a time—start moving your weight back. This slows you down even more.

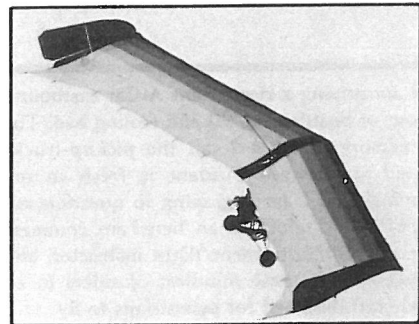
"There is a gray area between forward slow flight and the vortex mush you have to pass through," Grossruck continued. This gray area sounds an awful lot like a stall to me, and he admitted that, yes, it can be made to stall, but not in the conventional sense. There are no drastic stall breaks or pitch-overs. The Kasperwing—even in its worst configuration, with a fear-frozen pilot—will continue only to bob its nose gently up and down. An aggravated whip stall with no corrective actions, he claimed, results in a series of whip stalls, but no divergent tendencies. He said he has tried that.

The Kasperwing will tip stall, too, but Grossruck said it takes a lot of provoking. The tip rudders act more as spoilers than as drag rudders. This creates less drag on the down wing during the turn. But if your weight is all the way back in a steep (beyond 30 degrees) turn at low airspeeds, the tip will stall, and you will end up in a spin. "Well, not really a spin. More like a real tight spiral," he said. He has tried this, too. "I did it a dozen times or so. It scared the hell out of me, so I don't do it any more."

Anyway, back to the vertical descent.

"Moving from the gray area to the mush is when the ship is least stable. Ten to 12 mph [nine or 10 knots] is not a good place to fly.

Witold Kasper poses with the first production airplane using his technology. Note the wing's reflex profile and reinforced twin spars. Below, the Kasperwing, with Grossruck at the controls, executes a high-speed pass. The triangular trailing-edge extensions at the wing tips help provide additional pitch stability.



So, slowly, you rock the control wheel up, opening both tip rudders. Then you move all the way back. Just move to the aft cabin. Then you will lock into the vortex mode. Then you move the control wheel back down, closing the tip rudders. That's it."

Descending like this results in an 800-fpm vertical descent, vortexes churning. You cannot land like this without breaking something; so, to land, you move your weight forward and/or apply power so that there will be enough airspeed for the flare.

Gustiness can upset the delicate balance that a vortex-augmented descent requires. A gust can blow the vortex off the top of the wing, dumping lift and causing the nose to drop. A normal stall-type recovery must

be made—weight forward, apply power.

"But there's no problem. I could do the mush perfectly after only about 10 tries. It scared me at first, because it got so quiet and here I was moving my weight back and all. All I could think about was a stall. But all you have to do is hang in there, and the machine will do it. It's fun! Hell, I'll show ya!" And we leave the office. The wind is blowing about 13 knots, with some gusts.

I watch him climb out, attentive to his show, but distracted by thoughts of an impending solo. Maybe the wind will stay rough, and I will not be able to fly, one side of my brain is saying. Then the other side resurrects the truck-and-tumbleweed and tells me that if I do not fly today, I forever will consider myself a gutless wimp—a nonpilot filled with nothing but Wrong Stuff. It is then that I make up my mind to fly this thing—today, soon—and I do not care if a 50-knot gale comes up. I will fly. I swear on it.

Now Grossruck is performing his mushing descent. God, it is uncanny. He kills the engine and comes straight down. If the wind blows him one way or another, he opens a tip rudder to correct for it. Twenty feet or so above the turf, he yanks on the starter cord—situated directly in front of the pilot, down by the feet—gets some airspeed, flares and lands with a ground roll of 10 feet, max. He stops right in front of me.

We go back inside and talk some aerodynamics. Grossruck keeps boasting that his "antiquated" single-surface wing is better than the trendier switch most designers have made to double-surface leading edges. Then he looks out the window. "Saay, the wind looks like it's died down. I was just looking at that puddle out there and the wind sock, and—well, maybe not. I guess. . . ." He is being diplomatic. He is leaving it up to me. For one frail, timid moment, I think of opting out, based on wind and all the scary things I know it can do to ultralights with low-time pilots. This brings on a burst of resolution. This opportunity will not pass. There is some wind. There will be no intensely structured training program. It will be just me and the machine. I like that.

"I always wear a parachute, so you will, too," says Grossruck. Now I am wearing a hang-glider-type parachute. It rides on your chest. "To deploy it, grab the handle underneath and pull. Then you will be holding what looks like a silk purse. Take it and throw it clear of the airplane—not into the prop, okay?"

I get into the Kasperwing and am shown the throttle lever and the kill switch. The kill switch is mounted on the yoke, within reach of my left thumb. The throttle is down near where the right hand naturally falls. Mounted alongside of it is a red-knobbed choke lever. The harness is more of a cocoon, and, while weight shift is the primary means of pitch control, the entire

harness can be slid fore and aft along an overhead tube. This provides "trimming" for any attitude the pilot may desire. You feel snug and comfortable in the cocoon.

As if on cue, Kasper himself appears next to us. I only can imagine what is running through his mind. I guess that he feels he has been through so much and witnessed so many crashes, that he figures one more probably will not make much of a difference.

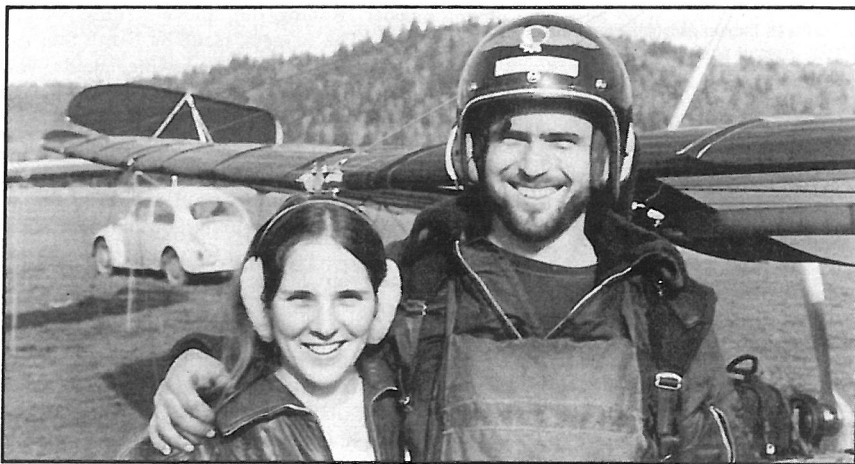
Slow taxi, fast taxi. The nosewheel is very responsive to foot inputs and steering is easy. Just remember the sled. Your feet push on a bar linked directly to the nosewheel fork. At fast taxi, the control yoke can be used for turning. As the tip rudders open and close, I weave around, getting the feel. Like a conventional airplane yoke, you turn the yoke left and the airplane turns left.

and I pop up enough to give a comfortable margin twixt me and trees.

The rush is fantastic. Cabinless, I swing an easy left turn, feeling strangely at ease. This is *all right*. I forget the noise, the anxiety and myself. It is just the wing, powerful body chemicals, a new perspective and the Holiday Inn below.

Half power now, and I am on downwind for my first real landing. Opposite the point of intended landing, I reduce power more and shift weight forward. Now it is base leg in a glide, a glide that seems steep but is not. When it is your body aimed down, glide angle takes on a new perspective.

Final now and the power is reduced more. Plenty of altitude to clear the power lines, and I can see Grossruck writhing around in anticipation of the landing. Kasper is mo-



Leslie and Steve Grossruck, top management of Cascade Ultralites.

This thing feels good. I give it more power, lift off and land several times. In between sailplane launches and landings, Grossruck says I am doing fine. He keeps saying, "Now when you decide to go for it. . . ."

A few more short hops and landings. "Now when you decide to go for it. . . ." Our eyes meet and he turns to Kasper. "Hah! He's nervous," he says, like he cannot believe it. He must have seen The Look.

Down at the end of the runway, I figure this is it. Heart a-hammering, body pumping hot slugs of adrenaline, I go to full power. While zooming on the takeoff roll, I hit a puddle. Mud hits me in the left eye. Needs a fender on that nosewheel, but I do not care in the slightest.

In seconds I am airborne, watching the field drop away. Every face is upturned.

Coming toward the tree line, I realize that the trees are *not* dropping away. I check full power and move my weight back more. This helps, but not much. I am level with the treetops. Then it strikes me. Idiot! The tip rudders! I have allowed the control yoke to creep upward, opening both rudders and wrecking my chances of a clean climb. A shove down on the yoke, the rudders close

tionless. I cut the power to idle at what seems the right altitude and make the nicest flare you ever would want to see. Grossruck is jumping around and Kasper is smiling. I taxi over to them. Great Zen screaming, whooping and belly laughs take place. I no longer have The Look.

"Can I take it up again?"

"Sure, sure, do what you want; but just don't fly over the lake, in case the engine quits or something."

I take off again, this time without the tip rudders deployed, and head immediately to the lake. Something happens when you fly an ultralight. When you merge with the elements like that, your ordinary pilot constitution evaporates somehow. Instead of wondering about altitudes and headings, you start to wonder what that guy has inside that boat over there. Or what it is like over near that ridge. Things like that. Pretty soon, you lose track of time. And everything. It is a great cathartic.

The phenomenon reminds me of the difference between driving a car and driving a motorcycle. In a car, you are encapsulated from the outside world, surrounded by steel and glass, maybe even lulled to sleep by a

KASPERWING

radio or a tape recorder. In a motorcycle, you feel the road. The pavement whizzes by right below your feet. The motorcycle dips into a valley, and you feel the air become suddenly colder. No one falls asleep driving a motorcycle.

It is the same way with ultralight flying. You feel thermals, and, because there is no cabin, you are a part of everything. You can draw tremendous amounts of energy from your surroundings in a situation like this, and the fact that your brain chemistry probably is, no, *must be*, altered by your new condition heightens your senses incredibly.

I try steep turns, slow flight, climbs and glides. The controls are very responsive, with no lag between input and reaction. In a turn, it helps to put some weight forward. Somehow, this helps coordinate the turn better and bring the outside wing around faster. Rolling out, move a little weight back. The harness, made by North Star especially for the Kasperwing, holds you snug, is fully padded and has an internal spreader design that eliminates pressure in any one area. The sides of the harness come right up to your ribs. No—no fear of falling.

Being a flying wing, I am ready for all sorts of pitch sensitivity, but no cigar. Your range of movement fore and aft is so great that you cannot move far enough, fast enough to cause any radical pitching.

At first I fly with my feet on the nosewheel ground-steering foot rests. The foot rests have bicycle handle bar grips on them. They look comical. The finger-ridges, though, give your boots something to grab.

You can fly along with your feet on these foot rests, but it is much more comfortable to move them back to the tubes that run fore-and-aft directly beneath you. These tubes are coated with a sandpaper-like friction-grip surface, so you do not have to worry about your feet suddenly slipping off raw aluminum tubes. Flying this way, your knees make a 90-degree bend. Together with the cocoon, it is very comfortable, even if you do look like some kind of hanging monkey from the ground.

The friction-grip surface on those tubes serves a definite purpose: positraction for when you decide to do the vortex mush and "walk to the aft cabin."

For my part, I felt I did not have the experience level to attempt the vortex mush that day. Some of the time I flew it like an airplane, some of the time I flew it like a glider. Either way, I was at home.

If you motor up, kill the engine and soar, your eventual restart is easier than in most of the other ultralight airplanes. The starter cord is right in front of you, so there is no need for contorting yourself to get at the aft-dangling cords that most others have.

The area east of Seattle is beautiful country, graced by the piney western reaches of the Cascade Range's foothills, unspoiled lakes and verdant meadows. Even in Febru-

ary, the land seems kind, and greener than you might expect.

On my second landing, I fly a tighter pattern. There is no real need for a complete downwind/base/final routine of the proportions we are accustomed to; but the etiquette is appreciated, and it is still a good habit to hold on to.

The landing is good, but not as good as the first one. The nosewheel touches down first. "Ach, you flew it on like an airplane," Kasper says.

I can think of only a few bad things about the Kasperwing. The first would be the tendency for air loads to force the tip rudders open. In the model I flew, you forcibly had to hold the control yoke in its Down position, lest the rudders creep open and, quite literally, spoil your performance. Grossruck replies that, henceforth all Kasperwings will have fixed end plates in front of the tip rudders, an innovation Cascade used at first but later discarded. The end plates will hold the rudders closed without the pilot's aid, make turning smoother and help lessen the possibility of a tip stall by reducing induced drag at low airspeeds.

The landing gear appear to be spindly for the load the Kasperwing carries, and it seems a sure bet that a hard landing would collapse the mains without much effort.

Control cables run from the nosewheel area up to the leading edges of the wings. When you move your feet from the foot rests to the friction-coated bar in front of you, it is possible to snare one of your boots' quick-lace eyelets in the cables. This happened to me with no big problem as a result, but I do not like the idea of shoes interfering with a control system.

We all walk back to the office where we pry open a few Lucky beers and talk some more. That beer is awful—too watery—but it tastes good anyway, know what I mean? Grossruck gets all hyper talking about new ideas for the Kasperwing. A sharp leading edge to boost top end and flatten its normal-glide sink rate from 200 fpm to 150. Kasper nods knowingly; "This is what the stupid bird uses exclusively, a sharp leading edge. Hah!" Another innovation will be a pod to enclose the pilot. This would cut down parasite drag.

Soon it is time for me to leave—I have another airplane to catch. But I do not want to leave. I like these people. I like this place. And I liked flying the Kasperwing. My thoughts of what flying was, is and could be have been spun around and sent in 40 different directions.

The rental car's door is shut.

"Ain't it great when you love what you're doing?" I ask. Big smiles all around. There is unanimous agreement.

I point the Hertz back toward I-90, roll down the windows and turn the radio up real loud. I feel a lot better □