Four Years With a Powered Harness

Richard Cobb - 2005

My two main flying partners of 20 years have both retired from the sport. My main flying site, which would often see as many as 10 or 15 pilots on a good day, now has only a hand full of flights in a year. And somehow, it seems every year there are more and more demands on my time.

In early 2001 I bought a Swedish Aerosports Mosquito NRG. While powered harnesses (PH) are not for everyone, there is no doubt that without mine I would no longer be an active hang glider pilot. What I hope to share here is what I have learned in these past four years, and to help you decide whether or not a powered harness might be right for you.

In the Aug 16, 2005 issue of the Oz Report there is a link to a presentation given to the USHGA planning committee. One of the slides lists the main reasons pilots have given for dropping out of the sport. The top 3 reasons, in order, are: not enough time, not enough sites, and sites too far away. Together, those 3 reasons account for two thirds of the responses. All 3 of those reasons *could* be addressed with a powered harness.

The powered harness "solution" is not perfect. Compromises and trade-offs are involved. Only the individual pilot can decide how it balances out for him or her. The first drawback is cost. New units are $6,000 and up. And there is additional complexity in your flying. You will have to deal with the coaxing and maintenance of a small 2-cycle engine, additional weight, and your handling will change. And yes, there is noise.

On the other side of the equation, a huge consideration is the possibility of being able to fly *and* have a life. No crew is required, and your flying site could be as close as your back yard. Wind direction is much less of a factor, and you can soar sites that were previously inaccessible. I think there is also a healthy safety factor for several reasons. You do not have a long drive 'invested' in your flying decisions, so there is not that pressure of "if I don't fly today it may be weeks before I get another chance". If your field is close to your home, you can often assess the conditions without ever leaving home. If you arrive there and the conditions are not good, there is little invested and you can try again tomorrow. If the wind direction changes, depending on your field, it may not matter. And once you are set up you can do multiple takeoffs and landings with ease.

A recent convert to a powered harness, Bruce Decker of Colorado, posted one of his flying days on a discussion list. He took off from his backyard at 7:15 am to motor over to a pancake breakfast sponsored by a General Aviation group at a nearby airport. He took off again after the breakfast, this time in thermic conditions. Shortly after gaining altitude he was able to shut off the engine and had over an hour of soaring flight on his way back home. He landed at noon and went to his son's track meet at 2 pm. If you are thinking that sounds like a pretty good way to spend a day, then you may want to consider a power harness.

I asked other owners "what do you wish you had known" when they bought their harnesses. What follows is condensed from the replies of others and my own thoughts:

What is the flying like

I wrote about launching a powered harness in the March '02 issue of *Hang Gliding* - there is an

online version on my wind-drifter.com website - so I won't repeat that. With the engine off there are some noticeable differences - mainly bar position and extra weight. There are about 40 pounds of additional weight with a PH, much of which is below your feet. Particularly if you lead a turn with your feet you will feel less nimble. In order to balance the weight below your feet in a prone position, the hang strap is moved lower on your body. This means you are positioned further forward with respect to the control frame, thus making it seem the bar has "moved back". The bar has not moved, you have. Personally, I found both of these changes easy to adapt to. I always fly relative to the glider trim position, so I hardly notice the difference in bar position. And with the extra weight I also have more roll authority. While free flying I tend to use the 'lead with the feet' turn method, but when soaring with the PH I use the 'body parallel to keel' method, which makes the extra weight less noticeable.

When using the engine things change quite a bit. You will find the glider has a greater tendency to want to 'wind in' on turns, and on a thermally day, at full throttle, it can become a bit of a wrestling match. However, here too, new techniques can make things a lot easier. With any of the prone PH models you have a variable thrust line - it can work with you or against you. That is a complex topic; the very short version is that some old habits of flying (like leading a turn with your feet) can be counter-productive with a powered harness. But by learning to use the thrust to your advantage you can make the handling a great deal easier under power.

Performance Considerations

Most pilots are familiar with Density Altitude (DA) which increases as air density decreases. Unpowered, this means that you will have to run faster to launch and will be landing at a higher speed. The effects become much more noticeable under power. The drag force for any angle of attack and weight is constant, but with lower DA it will occur at higher velocity. Because power is force times velocity, the ***power required*** to maintain level flight ***increases***. At the same time, ***available*** engine power ***decreases***. Those two values can come together surprisingly fast. Conditions that might make for an easy takeoff at 70F can become surprisingly hard at 85 or 90F.

First generation PH's all used the same Radne 120cc motor. It is an engine with a proven record and is sufficient for flying at DA below 4-5000 ft (at 2000 ft actual elevation on an 85 degree day the DA is around 4500 ft). For pilots flying at higher altitudes, however, attempts to fly have spawned jokes about Salad Shooters.

That is changing. A new US entry, Hidden Mountain ("there is a mountain hidden in your back yard") has introduced the X1, which has significantly higher levels of power. Bruce Decker had been interested in a power harness for several years, but his Colorado altitude had made it impractical. He became one of the first to buy an X1. The takeoff from the pancake breakfast, which was witnessed by a large number of General Aviation spectators, was uneventful in very light winds and a DA of over 10,000 ft. He has posted a number of flying tales since acquiring the X1, and I can see the grin even here in Virginia.

The British Wasp model offers significant tuning improvements in their Radne engine, and several manufacturers, such as the Doodlebug, are offering improved tuned exhausts and other modifications.

At it's best, however, a powered harness is a low power compromise between powered and free flight. If you just want to motor around, you will probably not be happy with the relatively slow climb rates of a PH - better to consider a trike or other ultra-light. A powered harness is best thought

of as a self-launch device for a hang glider. On a stable, calm day, it can be fun to motor around and see the sights, but it's best use is to simply gain enough altitude to start working whatever lift is available.

Mechanical Stuff

Powered harnesses use small 2-cycle engines. That means you will have to mess with gasoline, oil, spark plugs, and regular maintenance. The motors are reliable mechanically, but they still require fiddling with the details. Vibration loosens things. Fortunately that is confined to the power harness, as the hang strap is pretty effective at isolating the glider from the vibration. Carbs need adjusting and things wear out or break. Some pilots become involved in tuning their engines with carb and exhaust modifications (to increase power and reduce noise). The point is, you will not be spending all your time flying. But you will likely be saving time driving to the mountain, and airtime will be easier to come by.

Other Pilots

One pilot wrote "The most surprising thing I found out about (powered harnesses) that I did not expect is how much negative feedback I would receive from having so much fun." I have come across this as well. I realize many pilots are offended by the noise, and I have chosen not to fly anywhere that I don't feel entirely welcome. Besides, there really isn't much reason to. If I drive all the way to a mountain site I would prefer to free fly anyway. If I want to go powered I can do that much closer to home. So the strength of some of the reactions have surprised me.

Some pilots object to a PH as being "unpure" or cheating. I've heard comments such as "driving mindlessly around the sky". I guess I can understand that, although perhaps if they tried launching from the flats on a warm, light wind day they might rethink the "mindless" part. And for me the cost of remaining "pure" would have been leaving the sport. Using the PH keeps my skills current - if I can launch from the flats in challenging conditions, then a mountain launch - for those rare free flying opportunities - is easy.

Social Aspects

The social aspects are what I miss the most. I fly by myself. I wish it were otherwise, and if enough people started using PH's, it could be great. It could easily be like some tow parks, where you can make it a family affair. Fly for awhile, come back and eat lunch, visit with the spouse, and take off again. Except you don't need a tug or crew and don't need to wait your turn. Or you could plan a group cross country trip where you know you will be flying together. Shut the engine off and thermal when you can, but if you hit a sink cycle, use power until you find lift again. The Brits and French have been doing week-long touring bivouacs with powered harnesses for several years now. I'd love to do that myself sometime. Sure, it is "unpure" and "cheating", but I'm of an age where I no longer have anything to prove. I only have rare opportunities to fly, and when one of those come along, I want to fly, not be frustrated by the conditions.

New Pilots

The conventional wisdom is that only an experienced pilot could/would want to fly with a powered harness. I have been surprised to learn, however, that at least several pilots have learned to fly because they wanted to fly with a powered harness. I would suggest that these are large numbers of

pilots, but it is more than I thought, and may be more than everyone thinks.

I will make the case however, that just the *existence* of powered harnesses is useful for getting new people into hang gliding. It goes like this: many times I've had conversations about hang gliding with non-pilots who are expressing a passing interest. Where do you fly, who teaches, how long does it take to learn. A great deal of the time there is a blank expression that tells you they are thinking there is no way they could fly, especially if they do not live in the mountains. Then I have mentioned my powered harness and I've seen a striking change of attitude, as if there is the realization that there might be a *reasonable* opportunity for them to fly. And that may be all it takes to get someone to take that first step. Once they start taking lessons and learning the joy of flying a hang glider they may decide that they don't want anything to do with power. But I am firmly convinced, from my own contacts, that people who could not see themselves even trying it changed to an attitude of seeing possibilities for themselves, just because the powered harness concept exists.

Safety

Although I reach this conclusion cautiously, I am coming to believe that a powered harness is a comparatively safe way to fly. There is the spinning prop which could be lethal to a bystander if a mishap sent prop pieces flying, but that is common to any form of powered flight.

The majority of accidents I am aware of result in equipment damage rather than personal injury. That is because you are usually taking off on flat ground, and almost all powered harness mishaps happen during launch, usually without leaving the ground. And as long as you have wheels, even most "blown launches" simply result in grass stains on your harness and a red face.

A number of pilots commented that they feel much safer taking off with a powered harness than by any form of tow launch. The forces are lower and you are in complete control of them. If something starts to go wrong you simply spit out the throttle, there is no need to fumble for a release. And you don't have to worry about following the tow line. Once you are off the ground, and get turned by turbulence, you can continue climbing in the new direction, so long as there are no obstacles.

A major safety consideration is simply having a large enough field that is free of obstructions. You can't afford to depend on any assumptions about how fast you will climb or that the engine won't quit. You need to have a way to turn or land at all times.

Final Thoughts

Speaking only for myself, buying a powered harness is one of the best flying investments I've made since I bought my first glider. The first few times I launched a hang glider from *flat ground* brought back that same sense of magic I experienced nearly 25 years ago when I took my first flights. It still feels like magic, and has added new dimensions and wonder to my flying, while taking away nothing. I am still able to free fly whenever I have the opportunity, but now I've added many more opportunities and conditions for flying. I have been cloud hopping while pilots 20 miles away were sitting on a mountain top kicking rocks hoping for the wind direction to change. I have finally been able to fly 'sites' I have looked at for years, with road access or launch. And yes, I have just motored around under a layer of stratus clouds in glass smooth air enjoying the sights. And even then, the flights ended with a quiet sled ride.

Resources:

Wind Drifter has reprints of my earlier power harness articles, as well as discussions of the effect of power on handling, links, and other information:
http://wind-drifter.com

Flphg (foot launched powered hang glider) Discussion List is a friendly place with a world wide body of knowledge about powered harnesses:
http://groups.yahoo.com/group/flphg/

X1 by Hidden Mountain ("there's a mountain hidden in your back yard") is the new USA entry into the power harness market. A second generation design with the power to fly at higher density altitudes:
http://www.hiddenmt.com/

Swedish Aerosports Mosquito - the original and standard by which all others have been judged:
http://www.swedishaerosport.se/mosquito.htm
American Distributor: http://www.mosquitoamerica.com/

Doodlebug is the only supine version of a powered harness on the market. Many happy owners rave about ease of handling, comfort, and good service:
http://www.flylight.co.uk/doodlebug/index.htm
American Distributor: http://www.moyesamerica.com/doodlebug.htm

The Wasp is a second generation harness design from the UK. Innovative features include a reversed engine, tuned exhaust and optional 3 bladed prop:
http://www.waspsystems.co.uk/

The Raven was an Italian unit that is now made in Germany:
http://www.powerplanes.com/raven.html