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# Cross Country

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## THE HEART OF THE MATTER

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## APCO LIFT EZ (PPG)

Marcus King flies the latest leisure reflex paramotor wing from Apco

**A**pco are getting quite a reputation for their paramotor wings, which are now a major part of their product range. The range includes everything from the Prima school wing to the NRG slalom racer and specialist powered parachute wings for large trikes. The Lift EZ is their most accessible reflex wing suitable for beginners up to pilots who regularly fly cross-country.

### Construction

The wing has quite a lozenge shape to it, straight in the middle with fairly rounded wingtips. The construction looks relatively simple with only 44 cells in the medium that I flew. Apco add and remove cells to create the different sizes, as they say it maintains the handling and wing behaviour across the sizes.

Up front you may be surprised to find a lack of sharknose in the design. Apco say they tried various prototypes and concluded that sharknose combined with a reflex profile does not improve performance specifically for this profile. (See the side box for more on that.)

The leading edge is reinforced with Flexon battens that keep it open nicely on the ground. They are strong and not easily bent out of shape so no special packing is needed, although concertina-packing a wing never does any harm.

Also on the leading edge are the HIT valves – these are small mesh-covered openings above the cell openings. Behind each one is a flap of material, which in normal flight is pushed flat against the mesh sealing the opening. However, when the angle of attack is lowered during acceleration, or if the pressure in the wing is reduced after a collapse, they open to allow more air in to pressurise the wing. Apco have been using this technology for a while.

At the back of the wing you'll notice the absence of mini-ribs, especially as Apco were the first to use this technology way back in the '90s. We asked the company's Jonathan Cohn why they are absent and he told us they had tested prototypes with and without ribs and decided with this profile, "there was no performance gain whatsoever".

#### ▲ EASY TO UNDERSTAND

Apco have used plenty of technology in the wing but have also decided 'less is more'. HIT valves in the leading edge, Flexon battens and a reflex profile are there, but you won't find a sharknose or mini-ribs. The ultimate aim is useable performance

#### ► PPG RISERS

Risers are paramotor-specific, with speedbar and trimmer attachments. A nice touch is that the trimmers can be replaced easily should they wear out



The wing is made from Gelvenor cloth with a silicone coating on the front half. This should mean the wing stands up well to general use and being dragged around as you hone your ground-handling skills. All the lines are sheathed, which makes for easy handling on the ground and in the air. They are all nicely colour-coded too, making it easier to find the line you want.

The risers are specific PPG risers rather than adapted PG ones. They have both trimmers and speedbar attachments; a nice touch is that the colour-coded trimmers can be easily replaced should they wear out.

The brake handles are very stiff, and held in place with nice strong neodymium magnets. There are two magnets on the risers to allow for high or low hangpoints, and the pulley position can easily be adjusted.

There is also a separate handle for tip-steering, which is nicely padded for extended periods of use. This is also held in place by a strong magnet. I much prefer magnets to poppers on PPG wings as it makes it much easier to stow the brake handles in flight when trimmed fast – flapping brake handles are a potential recipe for disaster.

## Getting into the air

The wing is very easy on the ground. In a bit of wind a reverse launch will see it come up smoothly and calmly to sit overhead.

As soon as you hit the gas the reason for the name of the wing is self-evident. It produces a good amount of lift and I found I was quickly picked off the ground with a very short run.

I was flying the wing with a Zenith Polini Thor 190 that has plenty of power and there was no need to use all the power to launch with this wing. The amount of lift was also evident when cruising, as I had to use fewer revs than normal, saving fuel and reducing noise: always a good thing.

At neutral trim the wing behaves well on the brakes. I played around flying figures of eights and doing multiple approaches to a target. The wing was easy to control and feels nicely manoeuvrable without feeling overly dynamic. Indeed, it feels pretty undemanding of the pilot and is forgiving of heavy handedness, a great trait for a wing destined for pilots fresh out of school or finishing their training.

Although not a slalom machine, it is fine for playing low down, if your skills are up to it and you have a suitable place to play. It is easy to control when in level flight making foot-dragging a breeze,

## Manufacturer's specifications

**What Apco say:** "A perfect wing which is even better and easier to fly than any wing you knew before."

**Use:** General paramotor flying and touring

**Pilot level:** Pilots leaving school and leisure pilots

**Sizes:** S, M, L

**Flat area (m<sup>2</sup>):** 25.8, 27.5, 29.2

**Take-off weight free flight (kg):** 70-100, 85-120, 110-140

**Take-off weight PPG (kg):** 75-140, 100-165, 125-185

**Cells:** 42, 44, 46

**Aspect ratio:** 4.9, 5.1, 5.32

**Weight (kg):** 5.5, 5.85, 6.1

**Certification:** DGAC

[apcoaviation.com](http://apcoaviation.com)

## WHY NO SHARKNOSE?

Xavier Barral from Apco explains the thinking behind reflex versus sharknose



The way we work at Apco is to always go with at least two prototypes that differ by only one key parameter. In this case the variable was the profile. To ensure good stability and avoid deflation there are currently two methods: either keeping a well pressurised canopy regardless of the trim; or keeping an angle of attack that guarantees good air flow and therefore good pressure in the canopy.

The former behaviour is obtained by applying Sharknose technology and the latter thanks to a reflex profile. A reflex profile is an aerofoil which, in case of decreased angle of attack, automatically tends to have it increased again. On designs it is characterised by an upward tail.

We know from trials that reflex profiles are much more efficient than sharknoses when it comes to stability, but have less performance. The idea was to try a compromise of these two types of profile to see if it was possible to gain both in stability and performance by combining them.

Apco's designer and test pilot, Adam Wechsler, came up with two different profiles to work on: A new pure reflex profile and a hybrid sharknose/reflex profile.

To evaluate their real performance the R&D pilots flew both gliders side by side and then switched. They could then compare them on different aspects.

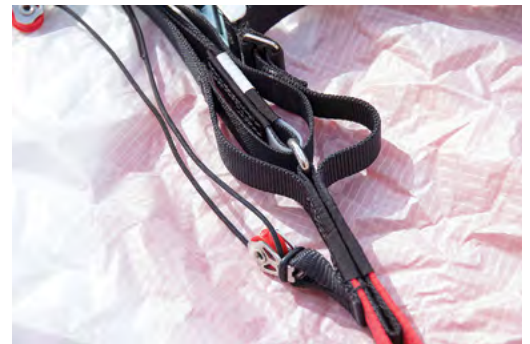
What we learnt was that the performance of both designs was very similar. Their speeds were very close at any trimming, and the difference regarding the fuel efficiency was insignificant. (The pure reflex profile demands on average 100RPM less than the hybrid profile. Out of a range of 5,300RPM to 7,400RPM that's about five extra minutes of routine flying on a 15-litre gas tank). The handling, take-off distance, roll stability and flare was the same, more or less.

The only noticeable difference was actually in the pitching. The pure reflex glider gives a better feeling of safety as the wing has a slightly better rigidity and is less pitchy.

This comparison between these two wings demonstrated that what we lose by reducing reflex behaviour is not necessarily gained by adding a sharknose. In our case, the addition of a sharknose didn't bring the extra performance expected. We did expect a small decrease in pitch stability, but we also thought the performance would be much nicer and therefore that the loss of stability would be worth it. But it didn't happen...

Of course this has been done for a specific blend of sharknose and reflex, and we can wonder if these results can be extrapolated to any hybrid of sharknose with reflex. Is there a way to combine the benefits of both to get the nice glide of a sharknose combined with the safety of the reflex?

What is sure about the Lift EZ is that there is no point in producing a more complicated and thus more costly wing that performs less. Therefore Apco took the bet to go against the sharknose trend with this project, trusting in its R&D work and the quality of the results revealed over the six month project. They decided to go ahead with the reflex version of the new wing, abandoning the sharknose version. Pilots will have to judge the results for themselves.



although the efficiency of the wing means you will have to be precise with your power control.

## On tour

Heading off cross-country I opened the trimmers to get more speed. I was flying in the southern French Alps with quite a bit of wind around so even late in the day there was still a reasonable amount of turbulence. Even at full speed the wing feels nicely solid and cuts through the bumps well. The trimmers themselves are simple to use and don't require much force when closing.

Performance-wise the trimmers gives about 10km/h increase in speed. I measured the trim speed at about 41km/h and opening the trimmers raised the speed to 51km/h. Using the speedbar gives a further increase of about 10km/h. The measurements were taken flying at 1,400m, so are slightly higher than those stated by Apco in their marketing.

For general cruising, using the trimmers only gives a good speed that is higher than non-reflex wings. The wing still seems to be pretty efficient



when flying fast: I was able to maintain level flight without having to use full throttle despite the altitude, making it an efficient wing for cross-country tours. As with some other reflex designs the company advise against using the speedbar unless the trimmers are fully open. When flying trimmers-open it is advised that pilots don't use the brakes – use the tip-steering toggles instead.

Apco have created a wind-scoop system to improve the efficiency of the tip-steering. This pulls down a flap of material in a scoop shape when the tip steering is applied, producing drag with no lift. I found the tip-steering to be very effective, more so than the brakes at low speed. It is easy to get the wing to turn quickly. The pressure on the handles is nice and light making it comfortable to use.

## Coming back down

When landing all that lift comes in useful again, allowing you to easily bleed off the speed and convert to lift so you make a gentle landing. As

in all its flight behaviour the wing is forgiving of timing errors. I managed to land downwind while testing the wing thanks to the wind shifting 180-degrees as I was on my final approach. The lift of the wing meant this was no big drama and I bled the speed off and with a few steps I had stopped.

## Conclusion

This wing does 'exactly what it says on the tin'. As its name suggests this is an efficient wing with plenty of lift to make take-offs and landings easy, as well as making it efficient in flight.

Unlike some paraglider-style wings the reflex technology built into the Lift EZ gives it a good turn of speed when the trimmers are released making it great for cross-country exploration. It's a wing that will happily take you from leaving school to your first forays into competitions; you will only outgrow it if you find yourself pylon racing. As Apco promise, it is an easy-to-fly wing without compromising its cross-country abilities. **EC**

## ◀DETAILS

Colour-coded trimmers

Brakes are held on the risers using very strong Neodinium magnets

Riser detail showing Apco's innovative Stall Recovery System. This works by letting the risers slide so as the centre of pressure moves back in a stall the angle of attack is immediately reduced

## ▲EVENING FLIGHT

This wing will suit many pilots who want a reliable and efficient wing for recreational flying. Take-offs and landings are easy