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SHARING

Hair raising speedriding flights can also be shared on a tandem! Photo: Ueli Kestenholz

Translation by Ruth Jessop

One of the best ways to share our passion is flying tandem.In this edition, along with other tests and information, we review tandem wings and describe ways to share great moments in the sky with friends.

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AMAZING ADVENTURES

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EN / LTF A

KOYOT 3 P

Starting the lightest way

First flights could not be more relaxing, but they could be lighter. With the Koyot 3 P you are free to take off and enjoy the pleasant feeling of flying with a wing which is as accessible as it is exciting, and which has been designed to help you experience your first amazing adventures.

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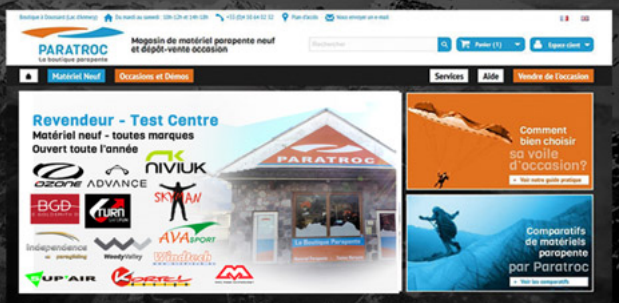

MOONLIGHT SPEEDRIDING

The film on vimeo: https://vimeo.com/249632916

An amazing 2 minute-long film: the French speedrider Valentin Delluc descending the Bossons glacier in Chamonix one magical winter's night...

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Photo: Stef. cande

Photo: Stef. cande

To make this film, which has been broadcast on the main television channels, Valentin Delluc and his team put together the sequences filmed at Avoriaz (for the flights above the trees and houses), at Bonneval-sur-Arc and, of course, most importantly of all, at Chamonix: the descent above the Bossons Glacier. Passing in front of the Aiguille du Midi, they went to the Cosmiques Refuge to wait for the best moment in the middle of the night: the moon was in the ideal position at about 3 o'clock in the morning.

Valentin equipped his Swing Spitfire 2, size 9.5, with four LED bands, 5m each. A battery in the harness provided energy for these 1200 LEDs.

The wing therefore had about 800 grammes extra weight, fortunately compensated for by the low initial weight of the Spitfire, whose internal structure isn't very complex. Because, during inflation on the very short take off (after 20 m, there is a rocky outcrop), the wing mustn't slow too much coming up. Similarly, after a 'touch' with skis on snow, a wing which is too heavy won't stay above the pilot long enough for them to pick up speed again. It is, in any case, an important quality for a speedriding wing: the capacity to remain above the pilot whilst unloaded on the ground. During this flight, the speeds were 50-60 km/h, with moments of 80 km/h. Normally, during his 'runs' during the day, Valentin sometimes boosts his speed to 130 km/h, and the sink rate can go down to 30 m/s in a tight spiral.

The glide ratio when flying varies from 1.5 to 4: Valentin particularly appreciates the large range of glide ratios available using the trimmers on the Spitfire 2.

During this flight, the moonlight gave good vision of the trajectory. Approaching the ground, the LED lit up a distance of about 10 metres.

The variation in luminosity between moonlight and LED lighting was tiring. But the result was there – a fairy tale moment. The sponsor, RedBull, are perhaps a bit too prominent towards the end, but that's the price you pay for this unusual footage…

Valentin Delluc is a pilot and microlight and paramotor instructor. He now also looks after the import of speed riding wings for Swing in France…

Valentin Delluc used four 5m bands: 5M 300 Units SMD 5050 LEDs Waterproof Led Strips Lighting, Multi-coloured LED Tape with 44 Key IR Remote Controller, fed by 5A 12 V, available on Amazon for 17 €-20 € each. They are multi coloured, but the best result is obtained by setting them to 'white'.

For a long time Swing has been very active in Speedriding and Speedflying. Here is the first version of the Mirage in 2013. Both the Spitfire 2 and the Mirage RS can be used for pure (with skis) speedriding as can the speedflying foot launch wings. According to Valentin Delluc, the Swing wings are characterised by a large range of speeds accessible by the trimmers.

SPEEDRIDING

Valentin's film has revived the appetite for Speedriding which never reached the scale it was expected to ten years ago. It is, however, an amazing feat of flying playing with the relief. If the land and the wing go hand in hand with the pilot's abilities, it can be very safe. Different to what paraglider pilots are used to: the wide range of aspect ratios of modern wings when speedriding with skis. The wings let you skim over a small plateau (trimmers closed), but also to follow a very steep slope (trimmers open and/or brakes released).

A GOOD SPEEDRIDING WING MUST

- Offer a good range of glide ratios through the trimmers,
- but also through the brakes (the trajectory dives as soon as you put your hands back up).
- Have good energy conversion via the brakes to get past an obstacle.
- Be safe at low speeds for (re)launches.
- Support without collapsing, being unloaded when the pilot touches the ground.
- Be pitch stable (and not dive or collapse when you release the brakes to pitch forwards).

It's impressive to note the ease with which you can take off speedriding, even with the wind behind you. However, even the little speedriding wings don't let you ignore the aerology. They are definitely more resistant to collapses than paraglider wings, and they advance better against the wind, but you wouldn't necessarily fly them in stronger conditions: if paraglider pilots put their wings away because it is too turbulent, you wouldn't take a speed riding wing out either. This is because if it collapses, it can be violent thanks to the wing loading and the speed in play.

Lots of speedriding wings can be used for foot launch speedflying. Logically, you play a bit less with the relief. Dedicated Speedflying wings, on the other hand, are trimmed to be less pitched forwards.

THE SIZES AND THE LEVELS

With speedriding/speedflying you choose the size of your wing above all as a function of your level of experience: small sizes for experts, large sizes for beginners and those who don't fly much. Quite simply because the smaller it is, the faster it goes and therefore, the twitchier it is. Obviously, the pilot's weight also has to be taken into account. As Éric Roussell from Neo pointed out, every square metre more or less on a wing of just a few square metres represents a larger modification of the wing loading compared to a 22m² or 23m² paraglider...

In addition, most manufacturers offer two models: one which is more 'docile' and another which is 'hotter'.

These 'expert' models often offer in the same size, an even larger range of glide ratios, but are even twitchier, and sometimes, as a function of the design, more roll unstable.

SPITFIRE 2

For his film, Valentin Delluc used a Spitfire 2 which is the same type as the one in this photo. In size 9.5, his favourite for on skis.
Although strongly aimed at 'ski speedriding', this wing can also be foot launched. With brakes released, the Spitfire 2 offers a very strong pitch. The wing has, nevertheless a good glide ratio and the profile even benefits from 3D-Shaping.

SPITFIRE 2 TECHNICAL DATA							
MANUFACTURER	**SWING** Web: http://www.swing.de/spitfire-2-en.html						
DATE	2014	2014	2014	2014	2014	2014	2014
SIZE	comp*	8.5	9.5	11	13	15	18
CELLS	21	21	21	21	17	17	17
FLAT SURFACE AREA [m^2]	8	8.5	9.5	11	13	15	18
FLAT WINGSPAN [m^2]	5	5.2	5.5	5.9	6.4	6.9	7.5
FLAT ASPECT RATIO	3.2	3.2	3.2	3.2	3.2	3.2	3.2
WEIGHT OF THE WING [kg]	1.8	1.9	2.1	2.3	2.4	2.6	3.1
CERTIFICATION	Shock and load test						

**Only available for members of the Swing speedflying team or on the recommendation of a member of the team.*

Photo: Friedemann Flache


Photo: Swing

The Mirage RS: a speedriding wing which benefits from the RAST system, which has already been tried and tested in Swing paragliders such as the Mito RS and the Arcus RS. A wall with valves lets it maintain internal pressure better in the rear part of the wing.

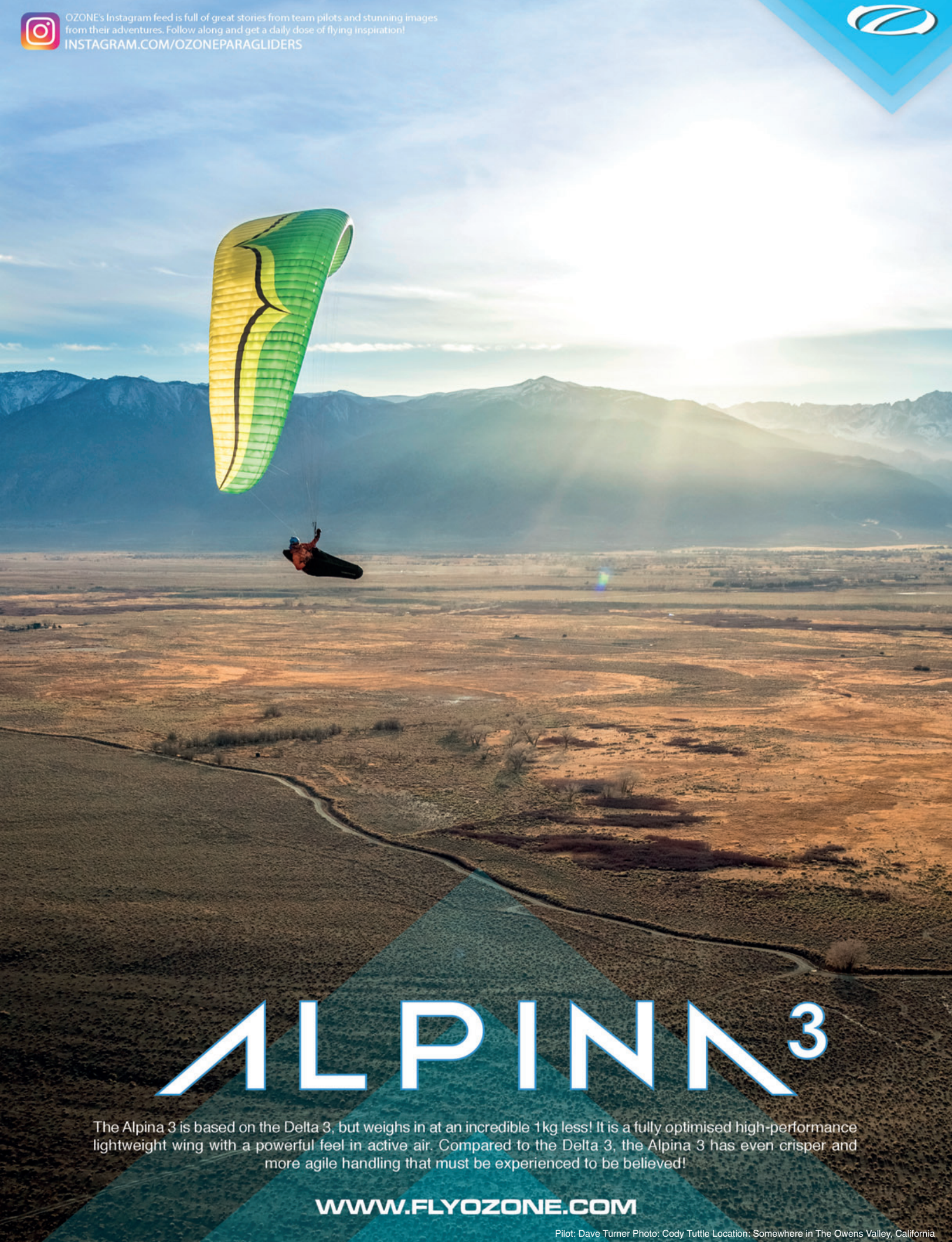
MIRAGE RS TECHNICAL DATA							
MANUFACTURER	SWING Web: http://www.swing.de/mirage-rs-en.html						
DATE	2017	2017	2017	2017	2017	2017	2017
SIZE	pro	8.5	9.5	11	13	15.5	17.5
CELLS	27	27	27	27	27	27	27
FLAT SURFACE AREA [M²]	8	8.5	9.5	11	13	15.5	17.5
FLAT WINGSPAN [M²]	5.38	5.55	5.86	6.31	6.86	7.49	8
FLAT ASPECT RATIO	3.62	3.62	3.62	3.62	3.62	3.62	3.6
WEIGHT OF THE WING [KG]	-	1.96	2.14	-	-	2.80	

*Only available for members of the Swing speedflying team or on the recommendation of a member of the team.

MIRAGE RS

The Mirage RS is eminently suitable for foot launching too. It is designed for experienced pilots and offers a very wide range of glide ratios.


Photo: Swing


OZONE's Instagram feed is full of great stories from team pilots and stunning images from their adventures. Follow along and get a daily dose of flying inspiration!
INSTAGRAM.COM/OZONEPARAGLIDERS
ALPINA 3
The Alpina 3 is based on the Delta 3, but weighs in at an incredible 1kg less! It is a fully optimised high-performance lightweight wing with a powerful feel in active air. Compared to the Delta 3, the Alpina 3 has even crisper and more agile handling that must be experienced to be believed!
WWW.FLYOZONE.COM
Pilot: Dave Turner Photo: Cody Tuttle Location: Somewhere in The Owens Valley, California

NEO SPEEDRIDING

When speedriding on skis, the difficult part is often remaining in contact with the ground whilst doing repeated long hops. Paradoxically, this is what increases the satisfaction of this three-dimensional freedom.

The Body harness from Neo has been specially designed to make the transitions between sitting and standing comfortable.

Price: 485 € without karabiners.

The wing photographed at Val d'Isère in December 2017 is the all new X-Ride 2.0 from Neo, for expert riders and competitors. Sizes: 8 – 9 – 10

Weight: 1.8 to 2.3 kg. Price: 1740 €.

Clearly visible, the extensive work on the leading edge of this modern wing.
http://www.flyneo.com/en/x-ride/

Photo: Jérome Maupoint / NEO

A Neo X-Ride 2.0 at take-off. Photo : Jérôme Maupoint

An S-Ride 2.0: from beginners to experienced riders.
Sizes: 10 – 11.5 – 13 – 14 – 16
Weight range: 1.9 to 2.6 kg. Price: 1590 €.
Below, a detail on the leading edge: clearly visible on this modern wing, the manufacturer has put the emphasis on the stability of the nose profile
http://www.flyneo.com/en/s-ride/

Photo: Jérome Maupoint / NEO

GIN SPEEDRIDING

Photo: Jérome Maupoint / GIN

The Speedriding wing for experts from Gin is the Fluid 2, released two years ago. It comes in 8.5, 9.5 and 11 m². Weight 2.2-2.5 kg. Price: 1 640 €. The Fluid 1 was designed uniquely for speedriding with skis. The Fluid 2 can be used for foot launched speedflying too, thanks to having a better glide ratio.
http://gingliders.com/speedflying/speedriding-gliders/fluid-2/

Photo: Jérome Maupoint / GIN

The Gin Nano 4 is aimed either for beginners or more experienced riders, depending on their size. It is made from Dominico 30-41 g/m²
Sizes: 9 – 10.5 – 12 – 13.5
Weight: 2.25 kg to 2.85 kg.
Price: 1540 €.
http://gingliders.com/speedflying/speedriding-gliders/nano/.

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LEVEL WINGS

Photo: D.Sougey/Level Wings

François Bon has just created his own brand, "Level Wings".
There are two Speedriding models and one Speedflying/Miniwing.
http://www.speedfly.org/en/
This photo shows the speedriding wing for experts, the "Fury". Price: 1595 €.

OZONE RAPI-DOS

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At the beginning of February, Ozone announced that they would soon be launching a very radical new speedflying/speedriding wing, the Rapi-Dos. It's mind blowing! The most accessible Speedriding wing (ski and foot launching) is the Fazer 3 (below). It comes in 4 sizes: 8,10,12 and 14. Price: 1 750 €.
Photo: Rebecca Bredehoft / Ozone Rider: Cade Palmer..

RADICAL SHARING

The Swiss pilot, Ueli Kestenholz, regularly shares his ground shaving runs with passengers…

FROM SNOWBOARDING TO FLIGHT SHARING

Ueli Kestenholz, bronze medallist in snowboard giant slalom in the 1998 Olympic Games, runner up in the 1999 World Championships and World Champion in 2000 and 2001, has also got into speedriding. He offers tandem flights, with and without skis, in the Berne region and in the Valais.

He mainly uses a Swing Spitfire 2 Twin (17 cells, 18 m2, wingspan 7.5 m, aspect ratio 3.2 and weight 31 kg).
www.instagram.com/uelikestenholz

FLYING TECHNICS

When tandem speedriding or speedflying, naturally everything happens faster than on a tandem paraglider; sometimes you go at more than 100 km/h. You need to anticipate more, both the route as well as the roll movements. 'You really need to study the terrain and make a flight plan accordingly,' explained Ueli Kestenholz. 'And, obviously, you need to be 110% sure of your solo speedriding before doing it tandem. It isn't enough to be a good tandem paraglider pilot.'

The only obligation for his passengers: 'Know how to ski fast in a straight line.' A half/full day with Ueli, including photos and videos, costs 650/980 Swiss francs. Several passengers can take it in turns and share the cost of a full or half day.

http://viptandem.ch/Speedflying/

With each passenger, he does a succession of 'runs' before progressively moving to more radical manoeuvres.

WHEN A BLIND MAN FLIES

An adventurous, partially sighted Scot asked Ueli to take him speedriding. After thinking about it, he accepted...


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Photo: Mario Eder / NOVA

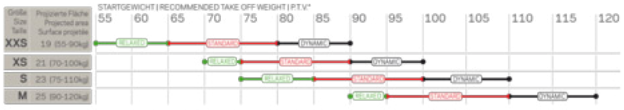
NOVA IBEX 4

The fourth generation of this wing which gave rise to a whole new category of paragliders.

In 2007, Nova invented a new category of paragliders: little wings which aren't speed riding or speed flying wings, but smaller versions of very accessible classic models, designed to be heavily loaded and remain relatively well behaved so that they can be certified.

The Ibex 1 was DHV2-3 in size 15 and 17 and DHV 2 in size 19. The Ibex 2 in 2011 was EN D in both sizes. The Ibex 3 in 2015 was the first EN A in this category of mini wings, except in size XXS where it was EN C.

The Ibex 4 is EN A in all sizes and with a very wide weight range. It's a total remake, giving it, amongst other things, diagonals, taped ribs in fine bands. Still very small and easy to carry everywhere, but with a better glide ratio than the Prion 3 from the same manufacturer. Having already done more than 200 km, the new Ibex 4 is therefore extremely versatile, suitable for school leavers, first XC flights and hike&fly.



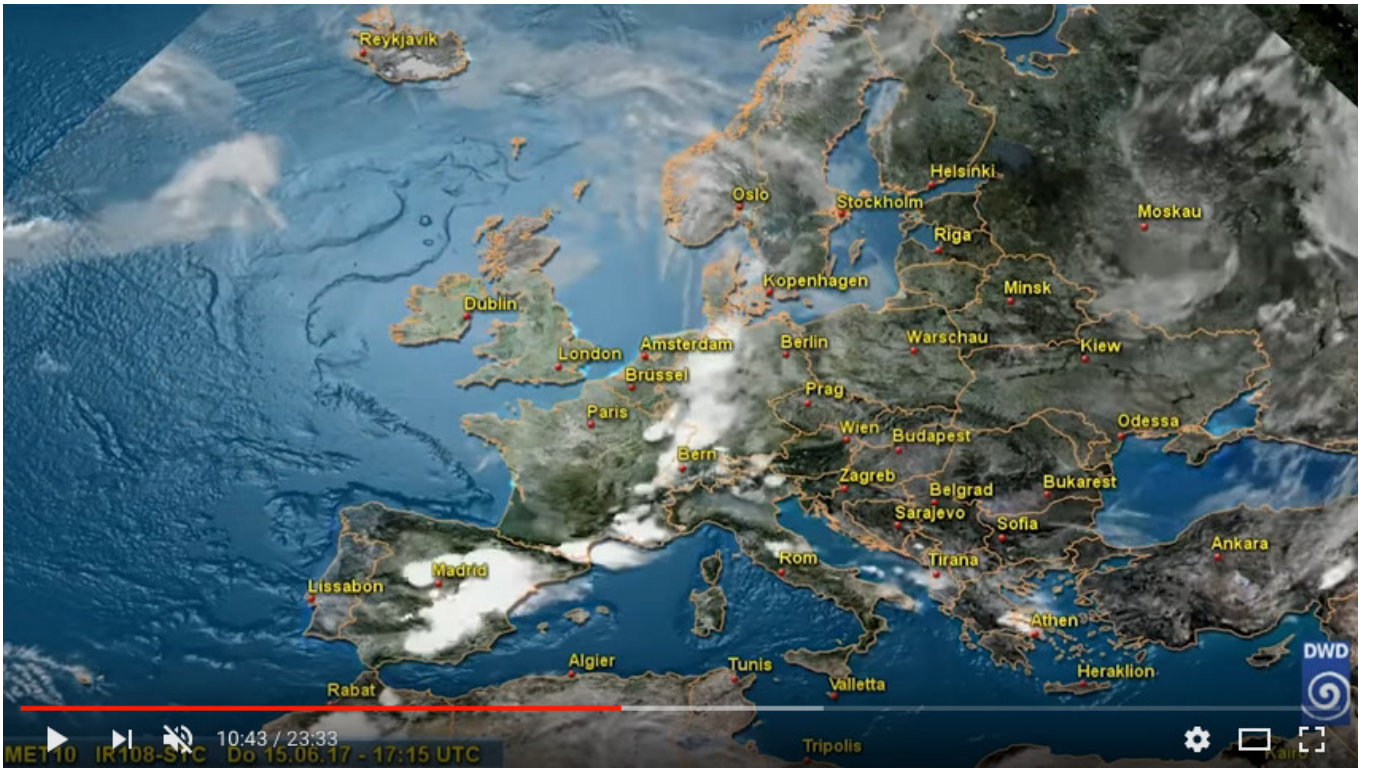
RELAXED – für Kurbler und Genussflieger | for recreational pilots | pour les pilotes de loisirs
STANDARD – Hausberg, Thermik- und Streckenfliegen, Schulung | recreational, thermal and XC flying, instruction | vol récréatif, vol de distance et vol thermique, enseignement
DYNAMIC – ideal für jene, die Geschwindigkeit bei guter Gleitleistung schätzen | perfect for those who value speed as well as good glide ratio | parfait pour ceux qui apprécient la vitesse et finesse

IBEX 4 TECHNICAL DATA				
MANUFACTURER	NOVA Web: https://www.nova.eu/en/gliders/ibex-4/			
DATE	2018	2018	2018	2018
SIZE	XXS	XS	S	M
CELLS	36	36	36	36
FLAT SURFACE AREA [M²]	22.97	25.38	27.8	30.22
FLAT WINGSPAN [M²]	10.31	10.84	11.34	11.82
FLAT ASPECT RATIO	4.63	4.63	4.63	4.63
ALL UP WEIGHT [KG]	55-90	70-100	75-110	(90-120)
WEIGHT OF THE WING [KG]	3	3.25	3.5	3.75
CERTIFICATION	A	A	A	(A)

VIDEO NOVA IBEX 4

The pretty nice Nova publicity clip: a little wing that Mum can sneak in for a flight during a Sunday walk.

FILM OF THE WEATHER IN 2017



A 23-minute-long video showing the weather in 2017: this film has been put on line by the DWD (German Meteorological Office) and shows the movement of the clouds over Europe from the 1st of January 2017 to the 31st of December 2017, day and night, at a rate of about four seconds per day. The sequence is based on infra-red images taken by the METEOSAT10 satellite. Obviously, you can choose a particular period by rewinding or advancing the video.

Our colleague Lucian Haas noted that this film shows, amongst other things, that in 2017 the weather in Europe was dominated by the rapid passage of temporary anticyclones and small depressions. Long periods of stable, anticyclonic weather, were rare. It was therefore more difficult to accurately plan flying trips in advance.

This didn't prevent France in 2017 from being marked by very mild weather and hot summers with very little precipitation. The average annual temperature was higher than normal by 0.8 °C.

Météo France summarised this in their climatic report for 2017.
Moreover, on their YouTube channel, the DWD offer these weather videos for each month of the current year.

The DWD has already published the video for January 2018.

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VIDEO: WEST RIDE STORY

Laurent Roudneff plays near the ground during a journey linking Normandy with Morocco.
https://www.youtube.com/embed/fNG-Jnmwi9o

A JOURNEY NEAR THE GROUND.
Laurent Roudneff rides the coastal paths in Normandy along with the Moroccan beaches. A film which shows his talent, even if Laurent clearly didn't have the same means to hand as the precursor to this type of film, featuring Jean Baptiste Chandelier.

FIRST IMPRESSIONS

PHI SYMPHONIA

We are currently testing a Symphonia. Whilst waiting for our final verdict, here are our first impressions...

For an EN A, the profile stability and the coherence of this wing are impressive. Apparently, Hannes Papesh has succeeded in playing with parameters such as:

- the number of cells (50!)
- the ballooning
- the surface finish
- the spread of the loads on the anchor points
- the reinforcements
- the trim

and thus created a wing which is visibly very coherent. It's a racing machine but with an aspect ratio of only 5.14! The amazing glide was evident right from our first flight. The large number of cells isn't a penalty at take-off: it remains an EN A, which comes up very easily, even if you don't lay it out properly and leave it almost in a ball. In this case, there is just an ear which can cravat, thanks to the low number of lines which contributes to the good performance. The wing flies very straight, as if on rails, whilst offering good handling.

We are impatient to finish the tests in the spring thermals so that we can bring you our conclusions as soon as possible!

The Symphonia, the top of the range EN A: thanks to a lot of attention to detail, this EN A has achieved an impressive level in terms of form and performance.

Photo : Véronique Burkhardt

The Tenor (EN B) at Phi in its prototype stage: looks promising. Worth noting, the loops which allow the attachment points for the As to be varied on this prototype.

The Sonata, an EN A below the Symphonia, ready for certification in the hands of Mad Mike Küng.

PHI SONATA

Phi have finalized the Sonata, 5 sizes went through certification. It's an EN A below the Symphonia. There will be three EN A models!

PHI TENOR

At the same time, the team are working on prototypes of a wing at the beginning, or in the middle, of the EN B class, the Tenor. The leading edge with its zigzag 3D-Shaping, miniribs and Hannes Papesh style SharkNose: all that promises a high performance wing. It will be made in a heavier Dominico fabric than the Symphonia.

https://phi-air.com/project/symphonia/

NEWS

The new Golden 5 by Gradient

NEWS GRADIENT
Gradient, which now belongs to Supair, have just announced the new Golden 5. It is certified EN/LTF B in sizes 26 and 28 initially. Size 24 is currently being certified, it will be followed by sizes 22 and 30. The weight range of the Golden 5 should cover 65-130 kg.

www.gradient.cx

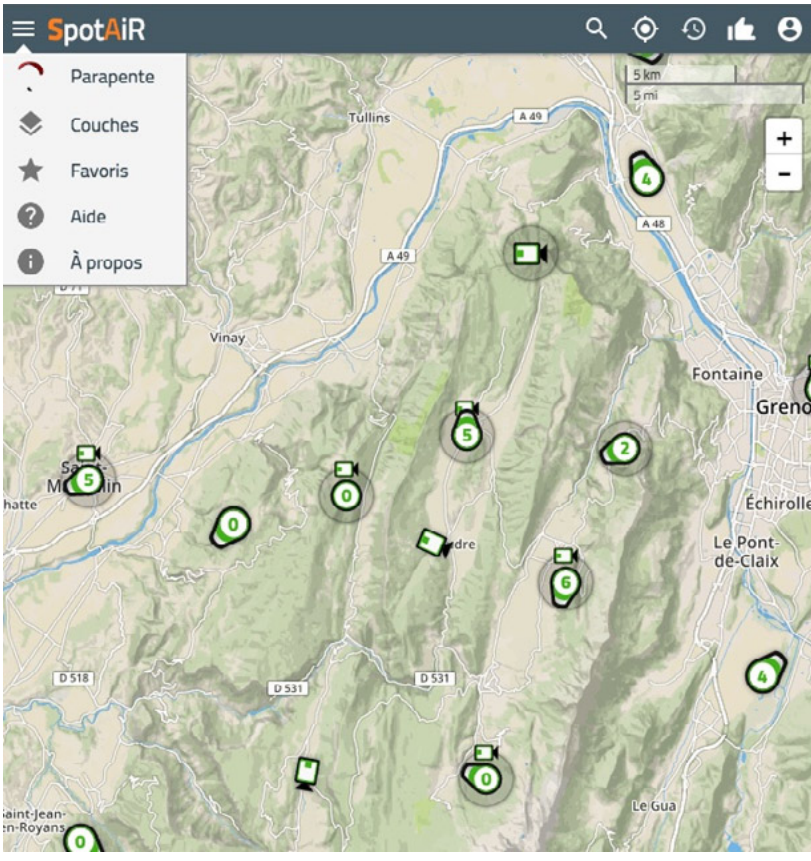
Horacio Llorens at Supair

NEWS SUPAIR
Following the global remake of the team, Supair proudly announced that Horacio Llorens is now officially a Supair pilot. Already equipped with one of the manufacturer's harnesses, Horacio will now also fly with Supair wings and equipment. A real acro legend, five times world champion in the discipline, Horacio is also part of the "Search Projects" and several expedition projects.
http://www.supair.com/

SHARING NEWS
SITE CONDITIONS

A French paraglider pilot has started a site which lets you consult the weather and wind conditions 'live' to choose a take-off spot. There are also webcams and information about take-off/landing sites, the snow line... It also offers a social dimension, by letting users send out a 'Shaka' when they arrive at take-off, a thumbs-up to pilots who use the internet that this site is working well on that day.

https://www.spotair.mobi
https://www.facebook.com/spotairmobi/



SHARING NEWS
REGISTER OF STOLEN WINGS

Good news for victims of theft. Thanks to an initiative by their secretary, Guido Reusch, the paragliding manufacturers association, the PMA, are going to put on line an international register of wings, reserves and harnesses lost or stolen. Registration and publication are free. All that is required is to send via mail all the relevant information such as the make, size, serial number and a photo etc.

guido.reusch@p-m-a.info

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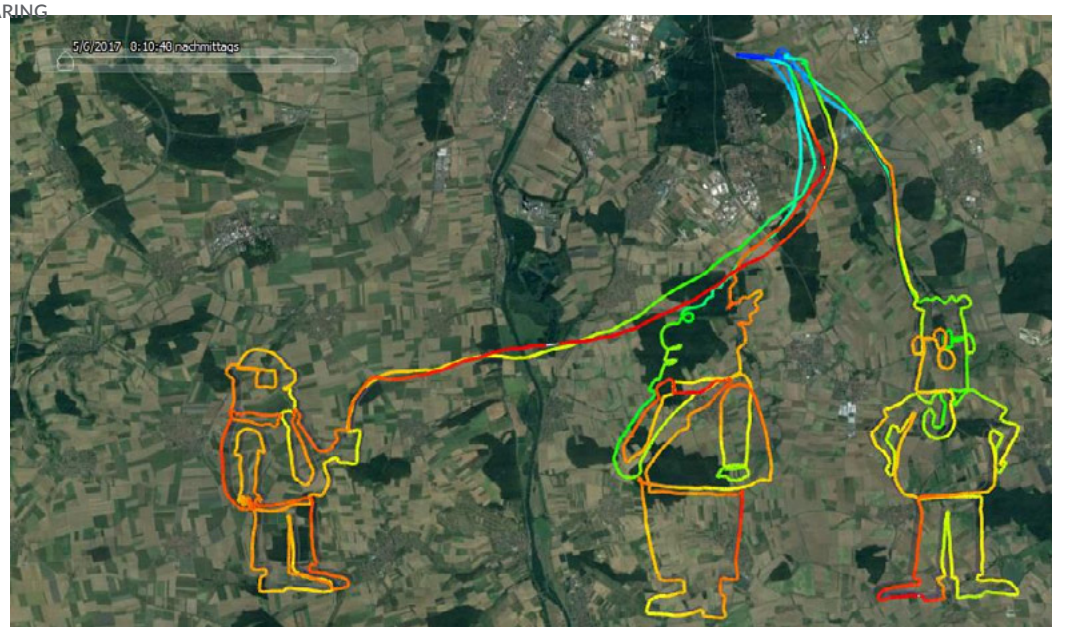


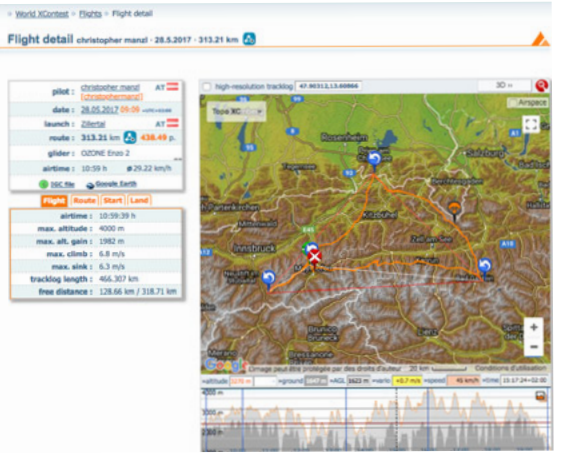
The pilot, Michael Merz, loves sharing his paramotor flights: they are real works of art. Here is one of his latest creations. There is more about his technique in this article.

SHARING FLIGHTS

Sharing your flights on the internet, after the event or even live...

The XContest server hosts both paraglider and paramotor flights in their own scoring framework (free), as well as numerous other national XC leagues.

In just one day, the **28th of May 2017**, 2,626 flights were declared on this server, including the triangle on the right.



Sharing flight tracklogs has been done for a long time. Not just during competitions, but also, quite simply, for sharing adventures, a bit like on Facebook. Publishing the tracklog of a flight, even small, can be very useful for other pilots. It can encourage them to fly the same place in similar weather conditions, and even try the same route, making it easy to analyse and relive.

Sometimes it can even be just a ploof from an unknown take-off.

Moreover, there is at least one server just for hike&fly: www.xc-hikeandfly.com, where pilots can download not just the tracklog of their flight, but also the tracklog of their walk up.

INTERCONNECTION

Out of all the servers, www.xcontest.org is the best known in Europe. In addition, some other servers copy these flights onto their own platforms, such as the XC league server or the DHV site, www.dhv-xc.de. A good idea in principle, because it lets pilots find the maximum number of flights on a single website.

GPS TRACKLOGS: G-RECORD VALIDATION

All XC league servers check whether or not a GPS tracklog is valid according to certain 'anti cheating' rules laid down by the FAI, protecting the file from any fraudulent modification.

Unlike GPSs used for walking, such as Garmin, most flying instruments generate a signature called a 'G-Record'.

It's a checksum, calculated using all the points on the tracklog according to a secret formula created by the manufacturer.

If a pilot tries to cheat by moving some of the points on his tracklog, or removing ones, the G-Record integrated in the tracklog file won't correspond anymore and the flight will be rejected.

Even those running the servers don't know the formula to recalculate the checksum for the flight.

To check whether the G-Record is correct, the vario manufacturer gives the FAI a small program which lets them analyse the validity of the tracklog.

This program, which the FAI integrate into their server http://vali.fai-civl.org/validation.html gives a verdict of 'valid' or 'invalid' after having analysed a tracklog and its G-Record, but it doesn't show you how to change the checksum to make valid a tracklog that has been tampered with.

When a pilot submits a flight to XContest for example, this checks the validity of the tracklog by submitting it automatically to the FAI server, which gives it the green light:

'The original file from instrument XYZ, hasn't been modified after it was written.' But this doesn't say anything about the value of the flight itself, nor about any possible anomalies with the rules.

But a year ago, Jakub Havel, founder of XContest, closed the link allowing automatic exchanges, because flights published on XContest, then withdrawn by the pilots who had flown them for various reasons, weren't automatically erased from the DHV server. This is, however, an important element because, on public GPS tracklogs which are accurate to the metre, possible bending of the rules, for example, are also visible for everyone to see…

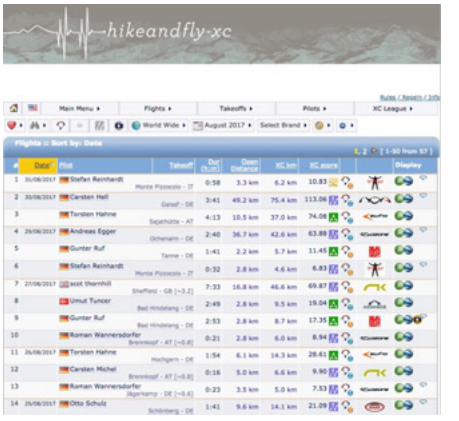
As a general rule, if there is a little discrepancy nobody will be bothered. There is no automatic disqualification of a flight whose tracklog touches a TMA for a few tens of metres. The tracklogs are analysed by officials from the national federations who have their national leagues hosted by XContest. With administrator access, the federation can disqualify a flight where the tracklog shows violations of the rules.

OTHER SERVERS

Manufacturers such as Syride or Flymaster have their own servers, and use a 'flight log' type style. They allow the owners of their instruments to quickly and easily download some, or all, of the flights recorded with their instruments. On the Syride server, for example, almost 140,000 flights were downloaded in 2017. That's more than 380 per day, including also, of course, the slightest 'ploof', registered and transmitted by Syride instruments plugged into a PC/Mac by their owner. 90% of these flights are left in 'public' mode by their pilot owners. The Syride server has thus become a very comprehensive database of possible flights.

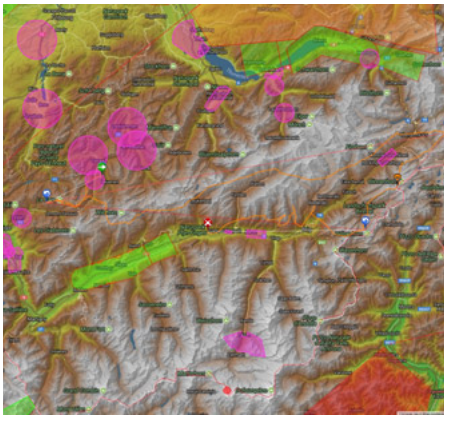
LIVE TRACKING

More and more pilots are not only publishing their flights after the event but are keen to give their live positions on a Live Tracking website. This doesn't just have a fun aspect as in the 'X-Alps', allowing their adventures to be followed live by their friends and family at home, but it also provides an element of safety, letting them know where the pilot is at all times. If there is an accident, their track doesn't move any more, which allows a rescue to be organised and the emergency services to be guided to the location.



Some flying outings shown on xc-hikeandfly.com

The DHV-XC site is one of the biggest in Europe but is becoming more limited to German speaking pilots.

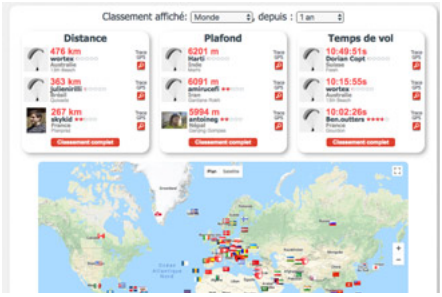


Airspace on the map showing one of Chrigel Maurer's flights.

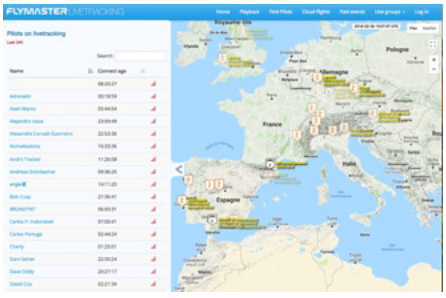
GSM TRACKING.
The simplest way is to use an iOS or Android smartphone. Since our most recent article on the subject (http://en.free.aero/contentsHTML/instruments-e/?page=23) sharing by Google maps, in particular, has become a lot simpler and more intuitive. The principle is the same. The smartphone transmits its position at regular intervals and can be picked up by authorised friends and family. On the other hand, the pilot can't specify the transmission interval, neither with Google Maps nor with iOS.

On the other hand, this is possible with dedicated apps such as the one that works with the Livetrack24 server. The full list can be found here:
http://www.livetrack24.com/apps/index

But all the apps which make heavy use of the GPS on smartphones, also run their batteries down very quickly. More and more pilots are therefore using an instrument which can be equipped with a SIM card (Flymaster Live, Flymaster GPS 3G, Compass C-Pilot, XC-Pilot and Easy-Pilot). Flymaster offer, in addition, a dedicated instrument, the 'Tracker', tested in 2017. An integrated SIM card is included in the purchase and works in most countries, with unlimited use, for 3.99 € per month. A comparable SIM card can be bought for other Flymaster instruments. The advantage: the pilot doesn't need to worry about roaming charges when he is flying abroad or near borders. Another advantage of this type of live tracking on the Flymaster tracker: if the pilot wants to, once he has landed, the server can transmit the flight directly onto another server, such as XContest for example. The live tracking therefore also serves as a flight declaration.



Flight log: the Syride server



Live tracking: the Flymaster server

TRACKING BY SATELLITE

Tracking by smartphone, or an instrument connected to a GSM network, won't work in regions or remote valleys without GSM coverage. The ideal system is satellite tracking. With systems such as SPOT or Garmin/Delorme, the pilot transmits his position, as a general rule every 10-15 minutes, and can also send out an SOS call. The conclusions in our in depth comparison 'Tracking by satellite', (see link on the right) are still valid. The Iridium (Delorme/Garmin) system is more suitable than the Globalstar (SPOT), because it can communicate properly in both directions. However, a small update needs to be made to this article. Since the buy out of Delorme by GARMIN, it is now no longer possible to subscribe directly in the USA. The cost is now 15 € per month minimum, and a contract giving unlimited tracking costs 29.99 € per month (instead of about 23 € previously).

TRACKING BY SIGFOX

Other trackers such as HidnSeek or Capturs work on specific terrestrial frequencies, we'll review them in more detail. Our first tests were fairly conclusive as far as their battery life was concerned (several days) and their operating cost (a few dozen euros per year), but the coverage in France still has big holes in it.

Coming soon:
The A*Live. It will allow communication via GSM and Iridium Satellites, in both directions, by using a smartphone screen and it will set off an alarm via satellite if it receives a substantial shock.


TRACKED LIKE A PRO...
FLYMASTER TRACKER

Most of the big international competitions use Flymaster tracking systems: The World Cup and the X-Alps for example. The instruments are, as a general rule, identical to those available for all pilots like this 'Tracker'...


SATELLITE TRACKING

Whether for a little flight in the Vercors or for a big cross country in the Himalayas, for pilots flying on their own, satellite tracking systems remain unbeatable.

They are financially very accessible, and new services make them even easier to use.

Tracking by satellite: our full article, which is still valid.

NIVIUK

AMAZING ADVENTURES

NIVIUK.COM > TANDEM

EN / LTF B

TAKOO 4

Tandem like never before

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instagram.com/Niviukparagliders

TEST

AIR DESIGN HERO

Photo: Nicolas Cochet

Photo: Nicolas Cochet

This Hero, in size SM, designed for an all up weight of 80 to 95 kg, is made entirely in Porscher Skytex 27 g (hard finish on the cell walls and diagonals). The lines are in three levels, totally unsheathed and support the arc every three cells. The internal structure, without an integrated transversal band, is reinforced with diagonals which are as light as possible.

Text: Philippe Lami

Known for the flying qualities of the Pure 2, as well as their single surface UFOs, the Austrian firm Air Design, based in Innsbruck, offered to let us try their ultra-light EN D Hero which they started to test in 2017. Getting ready to take off at Chalvet, Saint André les Alpes. I attach a harness to the wing which is roughly spread out, before my students take off, at 8 o'clock in the morning. Not a breath of wind. I take off confidently, without the risers in my hands, inflating the wing impulsively! Miracle! The wing scoops up, fills perfectly and stops nicely above my head. A few airborne strides and I'm off with the impression of having inflated a school wing.

However, a quick look at the arc clearly reveals a little racing machine with an aspect ratio of almost 7, with 50 cells designed around a short SharkNose, with a surface of 21.92 m2. The wing flies fast and, above all, glides remarkably well, on a very tight trajectory.

Photo: Thomas Lamplmaier

The lines are minimalist with a spread A1, A'1, B3, C2.


Photo: Thomas Lamplmaier

The risers on this SM are of woven dyneema and equipped with low friction rings. Therefore, it's the lightest EN D I've tried so far. At barely 3 kilos on the scales (3100 g) it's quite simply extraordinary for something so sophisticated.


Photo: Thomas Lamplmaier

There are very simple piloting handles attached to the C-risers in a vertical sense. B and C are linked at the top of the riser for rear riser pitch control. The accelerator separates the centre and wing tip, working on 18.5 cm of travel. The links to the risers are by a fabric softlink (apart from the big ear riser).

The wing tip turns upwards, forming a little breathing 'winglet', completely different to Advance's well-known appendix. Breathing? Yes, because the little regular holes cause a reduction in the vortex, also improving the shape of the wing tip at high speed...


Photo: Thomas Lamplmaier

I have precise reference points on this known flight path, and my arrival height was excellent. Coming back down to earth, after this little morning ploof in freezing cold air, allowed me to check more closely the structure of the wing.

I have just tested the latest Supair Wild (EN D X-Alps), excellent but a bit heavier. The Hero's weight was therefore a record, and it's exceptionally compact, thanks in particular to the famous short Concertina Bag, developed specially by Air Design. This multipurpose wing felt good, a little bag for in the hold or even in the cabin...

Back to take-off. In windier thermic conditions the inflation is remarkably compact, and it comes up as a single block. The wing turns out to be really easy, without any violent behaviour or tendency to overfly. It obeys docilely, for a cobra inflation or ball depending on your preference. When it's windy, its low weight makes it necessary to get ready 'balled up' on the ground, to insure the right shape and to avoid an unintentional inflation.

SPEED AND STEERING.
The trajectory is very stable, and the accelerated wing holds its course even better as though it were on rails pulley to pulley, pushing maximum on the second bar of the accelerator. Loaded to 93 kilos at 1500m, I top out at a speed of 55km/h, still on an excellent trajectory.

The brake travel is fairly short, about 50 cm before stalling. I continue with fine piloting with little brake. Little effort is required, compared in particular to the Supair Wild, and the response in the turn is frank and immediate. The flap created by braking is clean and the wing shows excellent qualities as far as bite and precision in thermals is concerned.

Its communication is direct, in a block, and collapses are extremely rare. When they happen, it reopens rapidly, almost immediately when it is moderately countered. Note that during certification, the wing got a single D, when heavily loaded, doing a fontal (pitch forward between 60 and 90°). The use of a folding line also forced it to be certified D.

After flying on pure glide, I am now going to accelerate! This really is the Hero's speciality. The wing, small, solid, mono-block, flown with the Cs, flies by cutting the air without blinking, in a very effective manner in turbulence. Using the accelerator and Cs, its behaviour allows long, well controlled transitions, warmly snuggled into a lightweight cocoon! It gobbles up the kilometres, that's for sure. It's well built for adventure type flights like the X-Alps and a variety of hike&fly outings, but also for daily use from a site with the objective of going XC, of course. The best glide angle, around 11, is achieved between hands up and 30 % accelerator. The deterioration caused by the accelerator remains moderate, even at full speed. So therefore, it can be used without restrain, to gain time on lovely days. At low speed, the Hero slows down, with my weight, to about 27 km/h, with a notable increase in the weight of the controls. The parachutal range is usable, but with dexterity, keeping a close eye on the stall point and falling back of the wing tip. Practice with some height, before exploring the low speeds when landing on the summit.


Photo: Philippe Lami


Photo: Nicolas Cochet

Photos: Thomas Lamplmaier

Checking the leading edge, the 3D Shaping reveals a constrained short rod which gives the SharkNose its shape. A double row of As, very close together supports the SharkNose.

COMING DOWN.
Descending with the Hero, is also easy: Big ears application via a dedicated riser. Here it's pointless to pull a lot. A little pull on the line to the ear will provoke a nice collapse, which will flap more or less depending on the load. Reopening can be helped with a little brake. Spirals also work very well and the wing, full of energy coming out, pitches back a lot. A good tug during the dissipation and the job is done! Return to level flight.

At the end of the test, I found it really difficult to distinguish between the results for the following group of wings: the Omega 2 X-Alps, Supair Wild, Skywalk X-Alps 3 and Niviuk Klimber. They generally have the same shape and same solutions so there is very little in it: 3 lines, aspect ratio around 7 and in 27 gramme fabric. The main thing with this family remains the comfort and the trade-off in stability and accelerated glide. But in the end, the pilot makes the difference. And not the wing really. The important thing, for you, is how you feel about it. At this level of flying, in any case, you need to know what's what, that's obvious.

After several pleasant hours of flying the Hero, I must admit that firstly, I felt really happy. And then I particularly appreciated its simplicity during take off, even in strong wind. It has a compact, single block side to it which makes it feel solid and was moreover, confirmed to be the case at all speeds. And when, on top of that, I go for a lightweight hike with this little red bag, knowing that I have a high-performance wing inside it, that surprises a lot of pilots. Frankly, a very nice toy, a great success. Oh, one thing I forgot: there is no carry bag delivered with this type of wing. They are, once again, targeting lightweight.

Photo: Philippe Lami


Photo: TNicolasCochet

The wing tips are clearly orientated towards the horizontal.

POSITIVE POINTS

- Weight
- Performance

NEGATIVE POINTS

- Be careful, it has short brake travel.
- It has thin fabric which needs to be treated with care.

The inner bag allows very compact folding.

Photo: Thomas Lamplmaier

HERO TECHNICAL DATA			
MANUFACTURER	AIR DESIGN Web https://ad-gliders.com/en/products/gliders/hero		
DATE	2017	2017	2017
SIZE	S	SM	M
CELLS	59	59	59
FLAT SURFACE AREA [M²]	20.29	21.91	23.42
FLAT WINGSPAN [M²]	11.85	12.32	12.74
FLAT ASPECT RATIO	6.95	6.95	6.95
ALL UP WEIGHT [KG]	70-85	80-95	90-105
WEIGHT OF THE WING [KG]	2.93	3.16	3.38
CERTIFICATION	D	D	D
FREE FLIGHT CERTIFICATION	EAPR 3/17	EAPR 3/17	EAPR 5/17
FF CERTIFICATION LAB	-	-	-
PRICE [€]	4200	4200	4200
MATERIALS	Upper surface: Porcher Skytex 27 classic II Lower surface: Porcher Skytex 27 classic II Ribs: Porcher Skytex 27 hard Top lines: Edelrid 8000/U-050,070,090,130 Middle lines: Edelrid 8000/U-130 / 190 Main lines: Edelrid 8000/U-190,280,360		

Photo: Félix Woelk

TEST

ADVANCE IOTA 2 : THE VERDICT

In December we gave our first impressions of the Advance Iota 2. Here's the final verdict after having tested it thoroughly in the Alpes-de-Haute-Provence in the South of France and in Andalusia…

By Philippe Lami

First of all we did a few flights in the South of France in weak thermic conditions: this confirmed the quality of flights we anticipated from our pre-tests in Interlaken. The inflation is very homogenous, easy and without traps. In this sense, it is clearly in the lineage of the Epsilon 8. The wing shows that in very weak conditions it has a good capacity to slow down and, above all, it has excellent communication, without any excesses. The brake travel, of sixty centimetres before stalling, gives a fast and frank response, and the main piloting happens in the first twenty centimetres with little effort and lots of precision. The coordination of roll-yaw-sink is clearly very well managed, and the wing shows behaviour here through the controls appropriate to wings with a higher aspect ratio. Above all, it isn't any more difficult; quite the opposite, with a precision which increases the pleasure of flying it.

Photo: Félix Woelk

The main piloting happens in the first twenty centimetres with very little effort and lots of precision.

IOTA 2 TECHNICAL DATA					
MANUFACTURER	ADVANCE WEB: HTTPS://WWW.ADVANCE.CH/EN/PRODUCTS/PARAGLIDERS/IOTA-2/				
DATE	2018	2018	2018	2018	2018
SIZE	21	23	25	27	29
CELLS	59	59	59	59	59
FLAT SURFACE AREA [M2]	21.8	23.7	25.7	27.7	29.7
FLAT WINGSPAN [M2]	NC	NC	NC	NC	NC
FLAT ASPECT RATIO	5.6	5.6	5.6	5.6	5.6
ALL UP WEIGHT [KG]	65-75	75-85	85-97	97-110	110-125
WEIGHT OF THE WING [KG]	4.40	4.65	4.85	5.15	5.40
FREE FLIGHT CERTIFICATION	(B)	B	B	B	B
FF CERTIFICATION LAB	AIR TURQUOISE				
MATERIALS:	LEADING EDGE SKYTEX 38, 9017 E25 UPPER SURFACE SKYTEX 32 UNIVERSAL 70032 E3W LOWER SURFACE SKYTEX 32 UNIVERSAL 70032 E3W LINES EDELRID / LIROS MAIN LINES A-8000U-230 / 190 / 130 / 090: UNSHEATHED				

Then in Andalusia, in the Sierra Nevada and at the site of Otivarque, I discovered the Iota 2 in real, pure, good thermals! 4 to 5 m/s on average, and big kicks in the harness (more than 7.5 m/s) approaching the clouds, in an aerology which alternated between gentle and strong with the north wind on the summit that hit our heads as soon as we approached the wispys. Interesting, and a very realistic test! The Iota 2 flies happily all by itself, without too much intervention through the brakes, even when the air mass becomes more turbulent.

In pure thermals, the Iota 2 can be positioned to the millimetre, with greater precision than numerous other wings in this classification. It is easy to corkscrew up a thermal flawlessly, right to base! And when I embarked on a transition, I savoured following Kari's advice (climb fast, then push). Maximum accelerator, straight line it to the next climb, with hands on the C riser handles to steer. The wing was stable and comfortable following the route. The Iota 2 doesn't care about the few patches of turbulence and continues attacking unperturbed. Pure performance? A glide superior to 10 (I measured more). Speed with maximum accelerator: 50 km/h. Speed hands up, on the M loaded to 94 kg, from 39-40 km/h.

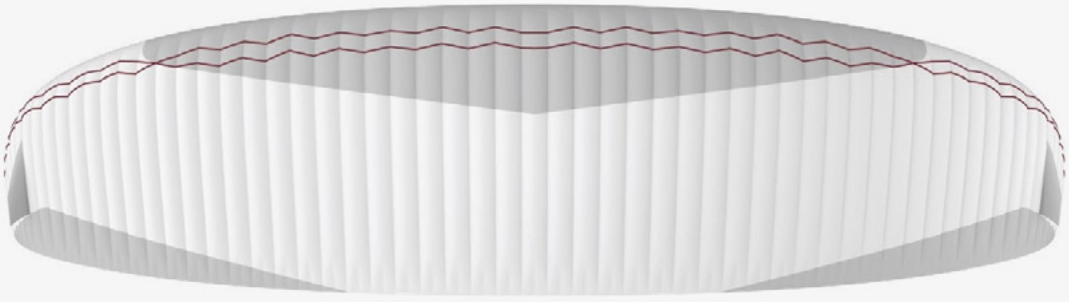

Photo: Philippe Lami

Here I am in a thermal. I take my foot off, lean. It felt as if the wing guided me into the thermal, thanks to its capacity to pull forwards towards the core of the rising air. What a pleasure!

Next came a succession of thermals, clouds, transitions, return to take-off and top-landing on the summit! On this little Iota 2, a simple wing, positioned half way between the Epsilon 8 and the Sigma 10 in terms of flying skill required, XC is a delight. Compared to the first version, it is much more efficient, and accessible, and offers pilots who fly EN Cs without pushing them, an easy way forward, offering as much pleasure, and certainly without reducing the performance. When I talk about performance, I'm not talking about glide ratio here, or speed, but of this inextricable link between ease and pleasure, letting you fly by daring to go to the limit of your wing confidently.

www.advance.ch/en/products/paragliders/iota-2/

In December, we published our first impressions as a preview.
http://www.free.aero/en/contentsHTML/Advance-Iota2-E/#issue/Advance-Iota2-3/portrait/1



The famous zigzag 3D-Shaping, a real trend. One could imagine how effective this would be against deformation in all the axes.

In brief, this Iota 2, is a super 4x4 for XC flying all over the World. Of course, others do exist, made by other manufacturers, but what in the end makes you choose one wing over another? Certainly, and above all, the pure pleasure of flying efficiently, a wing which you can forget about and which flies without any difficulty and gives the maximum without eating into the safety margins. The Iota 2 gives that. The only hitch: it's a shame that it isn't even lighter. That's all.

Photo: Félix Woelk

Photos : Supair

THE TANDEM SUPAIR SORA

Launched in 2014, the Sora tandem from Supair was the first paragliding wing designed by the harness and reserve specialist. Without a doubt the team are working on a follow up, but this wing remains recommended, it's a very universal tandem which has a good level of performance. It's steering is precise, the force through the controls is average to low depending on the brake travel.

SORA
TECHNICAL DATA

MANUFACTURER: **SUPAIR**
Web : http://www.supair.com/en/produit/biplace-sora/

DATE	2014
SIZE	41
CELLS	54
FLAT SURFACE AREA [M2]	41.2
FLAT WINGSPAN [M2]	14.9
FLAT ASPECT RATIO	5.35
ALL UP WEIGHT [KG]	120-220
WEIGHT OF THE WING [KG]	7.5
FREE FLIGHT CERTIFICATION	EN-B
FF CERTIFICATION LAB	-

Material
Upper surface: Porcher Sport Skytex Universal 38 g/m²
lower surface: Porcher Sport Skytex Universal 32 g/m²
Supported ribs cloth: Porcher Sport Skytex Hard 40 g/m²
Other ribs cloth: Porcher Sport Skytex Hard 32 g/m²

Photo : Tristan Shu

4 FOR 2
A fourth version of the Join'T will be launched. Amongst other things, it has very modern architecture with 3D-Shaping in the trailing edge. The wing's weight has been reduced and it has simpler lines, thus promising better performance, handling and comfort.
www.skywalk.info

JOIN'T4 TECHNICAL DATA		
MANUFACTURER	**SKYWALK** **Web:** https://skywalk.info/	
DATE	2018	
SIZE	S	M
CELLS	49	
FLAT SURFACE AREA [M²]	38.5	41.20
FLAT WINGSPAN [M²]	14.40	14.90
FLAT ASPECT RATIO	5.37	5.37
ALL UP WEIGHT [KG]	100-200	130-230
WEIGHT OF THE WING [KG]	6.9	7.2
FREE FLIGHT CERTIFICATION	EN B	
PRICE [€]	4190	4190

Photo : Profly

SWING BI TWIN RS

The Swing Twin RS is the first tandem to incorporate Swing's RAST technology. According to the manufacturer, this allowed them to choose a bigger surface (45 m2), without being subject to the disadvantages. The maximum speed reached was 50 km/h, even with the wing only loaded to 190 kg (max: 225 kg). According to Swing, the RAST system and the positive consequences on the other design parameters will make taking off easier and give damped behaviour in turbulence.

TWIN RS TECHNICAL DATA	
MANUFACTURER: **SWING** Web: www.swing.de/twin-rs-en.html	
DATE	2016
SIZE	Large
CELLS	49
FLAT SURFACE AREA [M²]	45
FLAT WINGSPAN [M²]	16
FLAT ASPECT RATIO	5.69
ALL UP WEIGHT [KG]	140 - 225
WEIGHT OF THE WING [KG]	8.6
FREE FLIGHT CERTIFICATION	EN-B

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Photo : Lucien Michi Mirjam

ADVANCE BI PI AND BI BETA 6

The Pi Bi from Advance which came out in 2017, with its surface of only 37 m², only weighs 4.8 kg. It's therefore a wing which is perfectly useable as a "hike&fly" tandem. It flies almost like a solo wing, with precise reactions and a high level of comfort.

From the same manufacturer, the BiBeta 6 weighs 6.7 kg in size 38. It is also very universal. A possible disadvantage for professional use on rocky sites in the south of France is that both models have unsheathed lines, even if the "Edelrid Magix Pro" fibres have a reputation for being very strong.

PI BI TECHNICAL DATA	
MANUFACTURER	ADVANCE Web: www.advance.ch/en/pibi/
DATE	2017
SIZE	37
CELLS	53
FLAT SURFACE AREA [M²]	37.2
FLAT WINGSPAN [M²]	14.2
FLAT ASPECT RATIO	5.4
ALL UP WEIGHT [KG]	100-180
WEIGHT OF THE WING [KG]	4.8
FREE FLIGHT CERTIFICATION	B

Photo : Mario Eder

NOVA BION 2

The tandem Nova Bion 2 came out in 2017. It is a three liner to reduce drag and simplify sorting out the lines. The lower surface of the Bion 2 is in Dominico 20D, 35 g/m² (upper surface: Dominico 30D, 41 g/m²). Compared to the Bion 1, that's a saving of 700 grammes.
www.nova.eu/en/gliders/bion-2/

free.aero MAGAZINE
www.free.aero

TREKKING B-BUS

The French manufacturer Trekking also has a tandem. It came out in 2013 and is manufactured in Croatia with 100 % Porcher Sport Skytex. It's main characteristic, amongst other things, is its progressive climb, it doesn't yank, even in strong wind. Its price makes it very accessible: 2850 €.
higlider.com/en/b-bus/20-b-bus.html

GIN BIPLACES

At the Korean manufacturer, apart from the more classic Fuse which came out in 2014, there is also the Osprey which came out in 2017, it is a small 34 m² tandem, all up weight 100-210 kg, based on the Bolero 6.

The lightweight tandem is still the Yeti Tandem made from Porcher Skytex 27/32, 37 m², 120-180 kg, 5.6 kg.

Photo : Gin

The Osprey is based on the EN A Bolero 6

The Yeti Tandem

Photo : Gin

Photo : Véronique Burkhardt

Launched in 2012, the Magnum 2 by Ozone, the brand's 'work horse' will be superseded by the Magnum 3 this year.

OZONE ARE DOUBLING UP THIS YEAR... Ozone have two tandems in the pipeline this year: the Magnum 3 will finally replace the Magnum 2 which is Ozone's all round tandem. Its glide and handling will be better as will be take-off and landing. And above all, its longevity should be further improved, no doubt in response to the needs of professional tandem pilots. For mountain tandems, Ozone don't want to be in the same space as the single skins, but are bringing out an ultralight tandem this year, which will have a double surface of 38m2, so that they can offer maximum flexibility whilst being ultra-light.

The Ozone SwiftMax which came out in 2016 (size 41) and in 2017 (size 38), is still current and is one of the highest performance tandems on the market. It's an EN C 57 cell wing, with an aspect ratio of 5.55 (still reasonable). Obviously, it isn't intended for all-day, everyday tandem use; its nil wind inflation, for example, is a bit slow (but its load take up is good) and, for landing, it doesn't flare as well. Honorin Hamard did **407 km on this tandem** two years ago.

LIGHT FOR SHARING

The appearance of lightweight tandems has made flying tandems for pleasure a lot easier, even for the professionals…

Tandems are becoming lighter and lighter: Classic tandems like the Pi Bi have come down to under 5 kg, and the single surfaces are smashing the records: first 3.3 kg for the Niviuk Skin tandem, then 2.62 kg for the Skyman Sir Edmund tandem.
SKIN and 2 STRING: 3.5 kg
If you were to make your tandem set up from a single skin wing, two string harnesses (2 x 0.25 kg) and Dyneema softlink spreaders (0.1 kg), your pocket aeroplane for two people would weigh less than 3.5 kg and will fit into a large hand bag…

The lightest tandem at the moment: 2.62 kg for the Sir Edmund Tandem (EN B), tested in "Light 2017".

By adding a reserve, which is highly recommended (3 kg for the lightest tandem ones), you would stay below 7 kg. Divided into two small back packs, this aircraft can accompany you everywhere: a walk which finally ends in a tandem flight if the conditions allow, a days skiing with a descent by air at lunch time… When the equipment is this light, you don't mind taking it with you 'just in case'. We can confirm this from experience: this way it is certainly a lot easier and more common to share paragliding with friends or family. Because, in addition to the reduced weight and volume on your back, the single skin brings, thanks to their quick setup and incredible ease of launch, an increase in the likelihood of flying. It is also for this reason that even certain professionals sometimes use them for tandem flights: with a single skin, you can take off more easily and safely. The incredibly easy inflation largely compensates for the slightly later load take up.

The Niviuk Bi Skin, tested in Light 2016"

Only the more rapid aging of the lightweight material puts a real brake on daily usage, particularly if you are doing ploofs, one after another on an 'industrial' tandem in a ski station, for example… For tandems in thermals, even if the single skins don't have the same penetration and the same bite, the Niviuk Skin, for example, surprised us with its effectiveness, especially in weak thermals. And thanks to their manoeuvrability and the lack of effort required through the controls, these wings let you pass the controls to the passenger even more easily to share the piloting…

SHARING WITH CHILDREN

Taking off with a child on a tandem. The child is briefed about the best way to get into the harness, he will do it a few seconds later. Icaro spreaders and harness: Loxia harness with thigh straps and airbag, passenger harness Batis (Airbag).

Photo : Véronique Burkhardt Pilote: Sascha Burkhardt

Sharing your passion with children: obviously it is ideal to have tandem training and to fly with them following the 'rules of the art' on a tandem adapted to their weight. But with a passenger weighing 20-30 kg, you can easily find yourself too low in the weight range, which is often a minimum of 130 kg.

In numerous countries, including France, there is no legal obligation when taking a passenger, nor an obligation to have a wing which is specially certified. Theoretically, you can fly tandem with a solo wing, if the all up weight including the pilot and passenger doesn't exceed the authorised weight range of the wing.

The ideal is obviously to use a tandem with a reduced all up weight, of which there are increasing numbers: the Osprey by Gin starts at 100 kg. Others with reduced all up weights: BiBeta 6 38 (100 kg), Pi Bi (100 kg), Nova Bion 2 (90 kg!), Ozone Mag2Lite 38 (110 kg), Skywalk Join'T 3 S (100 kg), to give but a few examples.

Flying at the bottom end of the weight range often has the following disadvantages:

- Slightly more difficult inflation (risk of being picked up in strong wind, lack of counterweight by the passenger).
- The passenger, being fully airborne before the pilot, remains nonetheless a weight to manage.
- Low into wind penetration.
- Poor manoeuvrability.
- Risk of over piloting (asymmetric stall) when trying to turn the wing.
- Wing tips more fragile in turbulence.
- Reduced flare due to the lack of capacity to accelerate.

On the other hand, in weak conditions, the reduced sink rate helps you climb, and the reduced speed can also be an advantage when landing, despite the reduced flare.

If you are happy to fly in calm, weak conditions, all of these inconveniences only have a small effect and allow a safe flight, even right at the bottom of the weight range, or slightly under it.

A tri-place is great for a family. Obviously, this isn't authorised in every country. If you want to quibble, you could point out that the passenger in the middle loads the stitching on the spreader in the wrong direction, which should normally be avoided, but here, it isn't a real problem given the loads in question. On the other hand, the separation bar must never be used as a hang point (which isn't the case here). Photo: Olivier Fritz

In each case, you need to take into account that the spreader system lifts the child up, because they are lighter. Therefore, the pilot often doesn't have as good forward visibility. To avoid this, obviously the pilot needs to be attached highest and the lightweight passenger as low as possible on spreaders with multiple attachment points.

Icaro spreaders, about 235 g including the spreader bar. There are three different levels for the passenger (right).

SPECIAL ESCAPE SPREADERS (image 1)
The brand Escape was one of the first to offer spreaders specially designed for children. They have longer attachments so that the lightweight passenger remains lower than the pilot. Often pilots who fly with children use just straps and not spreaders. With such a lightweight solution, the passenger and pilot are 'stuck' together. This is less of a problem with a lightweight passenger than with a heavy passenger.
With Neo for example, there are two ready-made solutions:

NEO KIDS TANDEM SPREADER BARS (image 2)
On the long strap, there are different possible attachment points depending on the weight of the passenger. Breaking strain: 2600 kg.
Fabric: Dyneema PE sling, Cordura Polyamid. Very light: only 26 g each.

ULTRA-LIGHT NEO TANDEM SPREADERS (image 3)
Above all, they can be used with heavier passengers. Spliced Dyneema chord spreaders, with the possibility of attaching them to the risers with a flat knot or with karabiners.
Weight: 29 g each.
Strength: 3000 daN
http://www.flyneo.com/en/

Explain to a child, just as you would to a heavier passenger, that no matter how they move about, they can't fall out of the harness. This will reassure them enormously if it is bumpy in the air. And then that will perhaps awaken the pilot's Wagga yearnings...

Just as important as with an adult passenger: explain to a child how to lift themselves up in the harness if they are not sitting comfortably. (Lift your knees, push down on the seat at the level of the straps with your hands). Ideally simulate this by attaching the harness to a swing, otherwise by lifting the child up at take-off.

The **Supair Kinder**, for 8-13 years or from 115 to 160 cm.
2100 g.
Bumpair 15 cm back protection.
A proper little harness.
Certified EN 1651.
Price: 295 € approx

HARNESSES FOR CHILDREN

Several manufacturers offer harnesses specifically for children. They provide safety and comfort. Admittedly, a child cannot fall out of a harness which is a little bit too big, if it is tightened up correctly, but there are limits with very little ones.

It is always more comfortable in a dedicated harness: a child who feels properly encased, rather than floating in a harness which is too big, will feel more reassured...

It is reassuring for the pilot to know that as far as the thigh straps are concerned, these harnesses are, as a general rule, equipped with classic flat buckles, and so the child can't easily open them 'secretly'.

Here are some examples...

The **Supair Loustic** is designed for children up to a maximum of 115 cm.
Special "Bumpair Loustic" protection. According to Supair, it is for children from 3-7 years, but following our tests, for a 7-year-old, often the Kinder seemed more suitable.
Certified EN 1651.

Weight: 1380 g. Price: 250 € approx

The **Junior by Independence**: the first children's harness certified LTF and EN. Foam protection.
Size S for children < 120 cm, size M for above.
Maximum weight 100 kg. Harness weight 1.7-1.8 kg. Price approximately: 280 €

Scorpio was one of the first to make children's harnesses, shown here a model from 2004 without back protection.

The new **Kid by Kortel**: from 0.8 m to 1.5 m.
Fully adjustable harness:
Width and depth of seat
Height of anchor points
Length of back
Incline of the back ventral protection
foam bag.
Certification: EN/CE
Weight: 2 kg. Price approx: 400 €.

FLY SOLO

WHEN CAN YOU FLY SOLO?

In France, as in other countries where there is no obligation to have an aeronautical licence, theoretically, a child can fly on their own at any age. In FFVL affiliated schools, the minimum age is 12 years old if the school has satisfied some extra regulations, otherwise 14 years old for a normal course. Later, an address worth noting for teenagers keen to learn in France: the Pôle Espoir at the Lycée Pierre de Coubertin at Font Romeu (http://www.lycee-fontromeu.com/) in the Pyrenees The school is structured to allow young sportsmen and women to juggle the demands of high level sport with a 'normal' school life. Champions like Charles Cazaux, Jérémy Lager, Laurie Genovese, Maxime Pinot and Simon Issenhuth as well as Ozone designer, Fred Piéri, all attended school there. Méryl Delferrière, runner up in the 2017 Paragliding World Cup Super Final in 2018, currently leading the lady's world ranking and first in the Paragliding World Cup in Australia in February 2018, also went to the Pôle Espoir at Font Romeu in the Pyrenees.

Facebook page: https://www.facebook.com/Pôle-Espoir-Vol-Libre-591120247763567.

In the meantime, get your children to play with kites or mini wings. With a bit of wind, they can do static take offs. However, obviously, never attach them to a chord, but hold them just by the arms. Because a lock-out, as on a winch, causing an accelerated return to the ground like a kite gone berserk, will always be a danger in strong wind... And with little wind, even the smallest can often make rapid progress all by themselves...

AN IDEAL PLACE TO PLAY: A DUNE...

The Dune de Pyla, an excellent place to train...

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CHILDREN: GOING TANDEM ON A PARAMOTOR

The advantage of a paramotor is that for children who aren't very confident, this aircraft, whether foot or wheel launched, lets you fly in air free of turbulence, for as long as your little passenger wants to. The minimum all up weight for small tandems is easily reached with a child and the motor. The problem of getting the right size, faced in free flying, is therefore much less.

Here, the thrust necessary is obviously less: in the right conditions (with a little laminar wind for the take-off), engines designed for solo flying work very nicely; often even a little 80 cc will do. Contrary to free flying a paraglider, in France, a licence to fly an ultralight (paramotor) with an endorsement to carry a passenger, is a legal obligation. The wing must be DGAC tandem certified and have an identification card.

Another advantage of paramotoring: in countries where there is no minimum altitude, such as Spain, flying near the ground is often more reassuring and more interesting for young passengers.

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VIDEO: A FAMILY EXPEDITION

Film maker Tim Green, who, amongst other things, helps BGD, regularly takes his 5-year-old daughter paragliding and paramotoring. For him, flying is also a way to learn about life just like other 'outdoor' activities. Following his latest expedition with his family to the far north, they are making a film. Even the trailer shows some great footage...

FOOT LAUNCHED TANDEM PARAMOTOR

In good conditions, foot launched paramotors let you easily take passengers of all sizes.

By Sylvain Dupuis

The new roll bar from Kangook attaches directly onto the swan necks. It is thus very easy to convert a solo paramotor into a tandem...

Photo : Véronique Burkhardt

A foot launched paramotor with a roll bar that Tim Green flew over Mont Blanc for his record breaking flight...

POWER NECESSARY

The force necessary to maintain an aircraft in level flight is equal to the weight (P) of the aircraft, divided by its glide ratio (f). Example: a tandem with an all up weight of 160 kg and a wing with a glide ratio of 7. It's simple: 160/7 = 23 You will need 23 kg of thrust to maintain level flight with a wing with a glide angle of 7, and about 18 kg with a modern tandem with a glide angle of 9.

Changing the surface area of your wing, on the other hand, won't change the power required contrary to what you would think! On the other hand, the speed necessary at take-off will be greater on a smaller wing, and its climb rate less.

It is therefore possible to fly tandem with a Top80 but not safely and in all conditions. You will run for longer and have difficulty climbing to avoid obstacles and be subject to the weather conditions...

As on a solo wing, it is important to have a climb rate of a minimum of 2 m/s to give a safety margin. Engines of around 20 horse power, such as the Polini Thor 130, PAP PA 125 and others of this type of capacity, are sufficient for doing lightweight tandems, for examples, a 70 kg pilot with a passenger of 50 to 60 kg. More than that and these motors are at their limit. You can count on requiring a minimum of 0.16 HP/kg of all up weight, to be comfortable. Thus a pilot and passenger each weighing 80 kg would need 160 x 0.16 = 26 HP to be comfortable. The climb rate would be correct. Don't be afraid of taking more power! I use a Polini Thor200 with 30 HP myself, and I weigh 65 kg and my principal passenger weighs 55 kg. This is very comfortable for a tandem: good climb rate, use of trims etc.

TO ROLL BAR OR NOT TO ROLL BAR?

During a foot launch, you can take off with the passenger just attached with spreaders. But most failed launches that I have witnessed would have probably succeeded if there had been a roll bar. The primary role is the sideways alignment of the passenger. What happens if you want to turn right to recentre yourself? The passenger feels this movement and naturally follows suit. The secondary role is to separate the pilot and passenger during the launch run. The passenger is attached to the roll bar by their belt. Therefore, they are kept totally separate from the pilot. You can run without tripping each other up! Remember that as the pilot, you have a motor with a thrust of 70 kg on your back which is going to help you run fast!

No doubt a shared pleasure, as you can see from these photos taken on board a foot launching tandem paramotor by Sylvain Dupuis, who made this roll bar himself.

The roll bar serves above all at take-off: it aligns the passenger and separates him from the pilot and, above all, from the blade... Shown here, Kangook's old roll bar.

Without the roll bar, the passenger wouldn't feel this thrust, and it would be with your stomach that you make them accelerate right up to take off speed. Because the roll bar is attached to the chassis AND the passenger, it distributes the thrust from the motor by pulling the passenger by their belt. They feel the thrust of the motor and are able to run at the same speed as you. Once flying, the passenger can loosen the straps which attach them to the roll bar so that they can get closer to the pilot. This will limit the inertia of the machine and avoid big yaw movements. For landing, these straps remain loose and you don't need to run. As far as the roll bar is concerned, often the manufacturer of your chassis will recommend one from his catalogue. If this isn't the case, you can always make one fairly cheaply.

Kangook's new roll bar can also be adapted to some of the chassis made by other manufacturers.

BRIEFING

Foot launching a tandem, is, above all, about being a good manager: knowing how to manage your passenger (and their stress!) and that starts well before the flight! You need to get them to understand that THEY are the one who will make the take off a success. Without their help, you absolutely can't do it. The task is, however, very simple: you just need to run, and above all, not sit down (or throw yourself) into the harness when you feel yourself taking off. If the passenger respects this simple rule, there will be no reason to fail. Therefore, you need to start the briefing with this, and repeat it regularly, right up to the moment you take off.

Since 2017 Kangook have been marketing this new roll bar which fits very easily onto the swan neck. Very practical for taking a friend or relative flying with a solo engine at the end of the day in calm, laminar conditions like here at the seaside. Obviously, you need a tandem wing and the engine must be sufficiently powerful but, with a modern wing, a little bit of wind and open terrain, even a 130, indeed an 80 can be enough depending on the passenger's weight.

The other very easy way of taking a passenger up on a paramotor: a tandem trike such as this Funflyer 2 by **Adventure** with a Shuttle 2 tandem from the same manufacturer. We'll take a closer look at 'wheeled launching' in a future edition.

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TEST
INDEPENDENCE AIR-TAXI

Independence's specifications for this tandem: a manoeuvrable wing, 'close to a solo wing' and a profile with optimised air entries particularly for high speeds.

Photo : Véronique Burkhardt, Pilote Sascha Burkhardt

Text: Cédric Nieddu/Certika,
Photos Véronique Burkhardt

TAKE-OFF
When it comes out of the bag, you spread out a lightweight wing with a wide open leading edge. Untangling it goes smoothly, the risers and the brake handles fall into your hands: simple and efficient.

Nil wind: the wing scoops up very well and comes up pretty rapidly. As it comes up initially, the wing transmits a little less information, then the feeling becomes clearer.

The wing is relatively small at 39 m2. So, in nil wind, the load take up happens a little bit later. On the other hand, with the wind established, the wing inflates fast, but it doesn't lift you up, a very nice quality.

FAST AND MANŒUVRABLE.
Once in the air you feel straightaway that it flies fast, 2 or 3 km/h faster than other comparable wings. This is no doubt partially due to the smaller surface.

As a consequence, as soon as the mass of air becomes unstable and the wind picks up, it maintains excellent penetration and the bumps in the air mass are absorbed in the pitch. On the other hand, roll movements become a bit more perceptible.

When you look up, you really get the impression of flying a solo wing with advantageous and aesthetic proportions. And, when you go into the first turn, you realise straightaway its exceptional potential in terms of handling. Even if the wing has a tendency to dive a bit at the beginning of the turn when you apply too much brake, the turn is really nice and precise. This allows you to get into a better position in the thermal. In addition, on a site which is used by pilots who consider that the rules of the air don't concern them, you'll be able to weave in and around them no problem.

The leading edge doesn't have a SharkNose but is very efficient at high speed.

Reinforced along the As in the leading edge, which is optimised for flying fast.

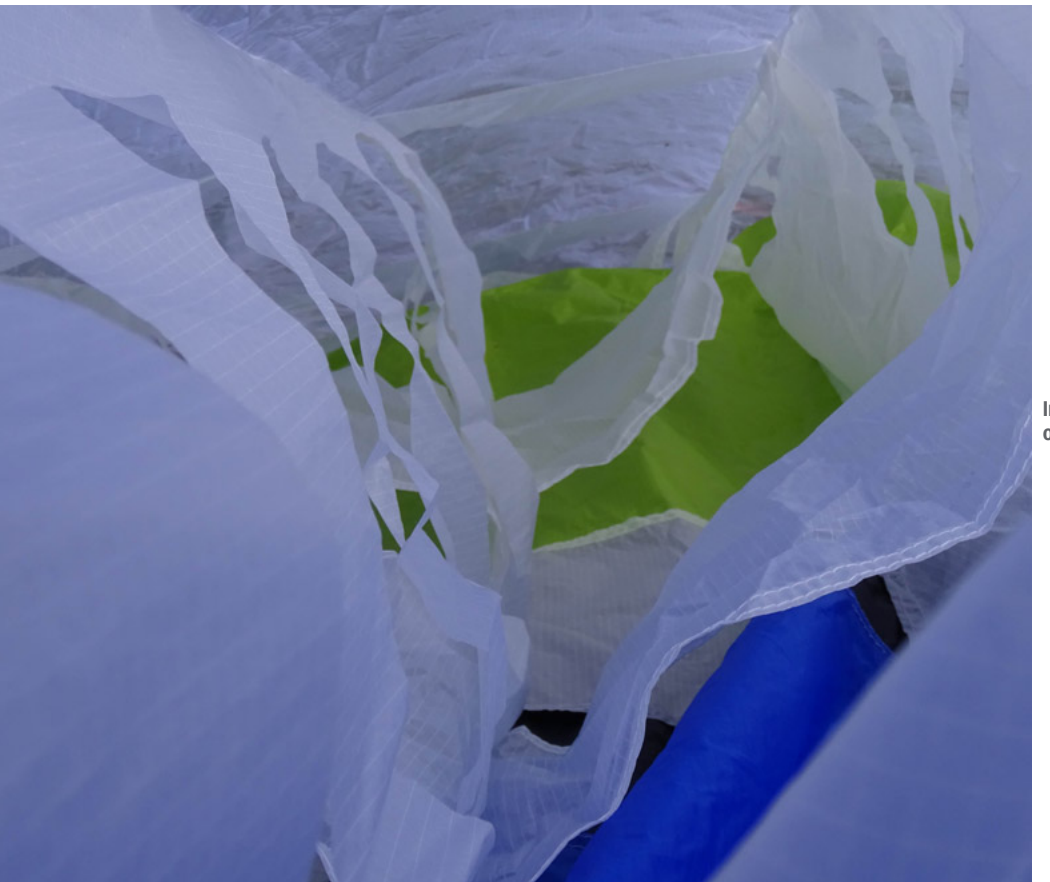
THE MERRY-GO-ROUND.
For passengers who would like to, tandem pilots often offer a spiral or wingovers.

Off we go with the Air Taxi for a figure of 8! You can position it however you want, it's easy and intuitive. It's reserve of energy allows the inversion to be delayed whilst keeping the classic dissipation. For pilots who like to exit in a wingover (a fashion I don't understand) it is easy to block the pitch forwards using the brake travel; no need to do wraps.

It is a really playful tandem which will be particularly appreciated by the younger instructors. Some of the older ones would perhaps prefer a less manoeuvrable wing, but more damped.

LANDING.
It's relatively high speed lets you release the energy giving an efficient flare, even with heavy passengers and no wind. On the other hand, as just before a gentle landing, the ground arrives fast, it is perhaps good to explain to heavy passengers that this sensation of speed will disappear before you land.

When there is a well-established breeze in the bottom of the valley, you can use the wing's speed: you don't get stuck in the lee of the terrain.



Inside, airy cells, moderately opened up.

Metal pulleys and anti-twist swivels.

CONCLUSION.

Independence have kept their promise of a tandem with 'perfect handling, similar to that of a solo wing.' This also allows it to use thermals very efficiently. The Air Taxi is also very efficient in turbulence which is absorbed in the pitch, with roll movements being more present.

This wing is really well suited to use by both professional and leisure tandem pilots.

A relatively classic tandem riser with trimmers.

Lower lines:
Edelrid Technora 7343:
420/340/280/230.
Higher up there is also
Edelrid Dyneema.

The upper surface: Dominico 30D soft finish.

The lower surface: Dominico 20D soft finish.

POSITIVE POINTS

- Manoeuvrability
- Playful
- Speed
- Absorption of the turbulence in the pitch
- Taking off with wind

NEGATIVE POINTS

- Load take up a bit late if the wind is light and the is passenger heavy.
- Roll movements inturbulence.

AIR TAXI TECHNICAL DATA	
MANUFACTURER	INDEPENDENCE Web : www.independence.aero/fr/produits/parapentes/parapente-air-taxi.html
DATE	
SIZE	M
CELLS	52
FLAT SURFACE AREA [M²]	39
FLAT WINGSPAN [M²]	14.39
FLAT ASPECT RATIO	5.29
ALL UP WEIGHT [KG]	130-220
CERTIFICATION	B
MATERIALS	Upper surface : Dominico 30D soft finish Lower surface : Dominico 20D soft finish **Lines**: Edelrid Technora 7343: 420/340/280/230 (lower lines) Edelrid Technora 7343: 280/230/190/140/090 (middle cascade) Edelrid Dyneema 7850: 130 (top cascade A/B) Edelrid Technora 7343: 140 (top cascade A/B/C/D) Edelrid Dyneema 7850: 100 (brake: top cascade) Edelrid Dyneema 7850: 130 (brake: middle cascade) Edelrid Dyneema 10/N300 (steering line)

Photo : Niviuk

TEST
NIVIUK TAKOO 4

The launch of the Takoo 4 tandem was eagerly anticipated, as the bar had been set very high with the version 3, which already largely satisfied the needs of lots of pilots and not just the professionals.

By Philippe Lami

Photo : Niviuk

In fact, it's a total remake, with a complete review of the shapes and profile. Niviuk have clearly taken into account the feedback from the professional pilots, especially concerning the abrasion on the leading edge on stony surfaces.

On the Takoo 3, contact with the leading-edge rod could damage the fabric. On the Takoo 4, Niviuk opted against a SharkNose profile, choosing instead mylar rigidification integrating a Nitinol rod, set back at least a centimetre from the leading edge. The Catalan manufacturer has gone for a more satisfactory option! The shape of the wing is more angular, with a straighter leading edge and wider wing tip. The half-moon shaped openings are wide and scoop easily! An extra cell, and an arc which is a little different compared to the Takoo 3, for an aspect ratio which has increased by 0.1. The smoothness of the leading edge is also worth noting, due to nicely tailored 3D Shaping. The lines remain sheathed for the two lower levels and the centre, just a bit of very thin unsheathed Liros in the outer upper part. The risers only differ from the Takoo 3 in the way that the height of the brake keepers can be adjusted. The big ears system remains the same, very functional. The trimmers, which only allow acceleration, can be operated easily by one hand.

The Nitinol rods are a Niviuk speciality.

Photo: Philippe Lami

Photo : Niviuk

A completely new conception as far as the profile, plan form and internal structure is concerned. It has all the modern elements like 3D-Shaping and mini ribs.

Now available in three sizes (39, 42 and 44 m²), the Takoo 4 covers a weight range from 110 to 240 kg. The most popular size, the 42, has slimmed down its surface area a bit, by 0.5 m² compared to the Takoo 3, and has also lost 200 grammes.

In a nil wind take off, the wing inflates in a very homogenous fashion and it comes up without reluctance or tendency to overfly. The load take-up of the pilot and passenger is quicker than on the Takoo 3, a sign of better lift. In stronger wind, I found it even easier, a docile wing which came up very well in a cobra or in a ball. A very good feature on our windy take-offs in the Southern Alps.

In the air, the sensation was different to the Takoo 3. The wing flew faster, trimmers in neutral (flat), the controls were firmer, but it could be steered with less brake travel. It had a good sink rate and a new bite for those used to the Takoo 3. Some nice Spanish thermals (in Andalusia) showed me the efficiency of the Takoo 4 and especially its comfort. In lighter conditions, a little bit of brake was enough to come out on top...

The openings on the leading edge with their U shape.

Photo: Philippe Lami

Photo : Niviuk

No classic SharkNose for this tandem, a deliberate choice... and a successful one.

Essential for a tandem: at take-off, whatever the situation, you need to be able to rely on your wing. In addition, the Takoo 4 takes up the load more quickly than the previous version.

And in more turbulent conditions, I found the Takoo 4 very good. It hardly needed to be controlled and it clearly had excellent damping in the pitch, without losing its penetration. Releasing the trimmers literally boosted the speed, whilst keeping lots of directional stability and remaining very solid.

What makes it different to the Takoo 3 is undoubtedly its tighter trajectory and less need to touch the brakes. Letting it do its own thing is better for the glide, as is the case for all the new generation wings. The roll has been improved, giving the passenger more damping and making the flight more comfortable for them.

The overall liveliness of the wing remains well controlled, without being excessive, but the Takoo 4 willingly goes into pirouettes and inversions, close to acro if you want it to. The wing tip is homogenous, in a solid block, and collapses are rare. Nitinol plays its role perfectly here. Spirals, ears, nothing changes. It's frank, easy and any well-trained pilot will find that the build-up of energy dissipates easily.

The big ears system is easy to operate, and the special line blocks via a well-placed knot. Effective and allows steering via the brakes.

Coming back down to earth seemed even easier to me than with the Takoo 3. The latter had lots of energy, with, as a consequence, a substantial pitch, which needed to be controlled at the right moment. The Takoo 4 is more tolerant of low speed approaches, always conserving a bit of extra energy to flare with not much speed. An approach at full speed will also reward you with a long flair and a landing without having to run, easier than on the Takoo 3.

CONCLUSION

After a few hours of flying the Takoo 4, despite the old Takoo 3 being excellent, the improvement is clear: more efficient, less brake, therefore less effort and a delightful glide. As for the rest, inflation and landing are both great. Bonus: Folding is simpler thanks to the Nitinol rods. In addition, these rods don't distort with time, unlike some nylon ones and will guarantee that the leading edge stays correctly tensioned.

OUR TEST PILOT
PHILIPPE LAMI

Philippe has worked with Aerogliss paragliding school for thirty years. He is also one of the most experienced test pilots and specialist paragliding journalists. Another string to his bow is his company Windsriders, who make down jackets optimised for our sport.

Clearly visible: the 3D Shaping in both the leading and trailing edge.

TAKOO 4 TECHNICAL DATA			
MANUFACTURER	niviuk Web : http://www.niviuk.com/		
DATE			
SIZE	39	42	44
CELLS	29	29	29
FLAT SURFACE AREA [M²]	38.5	41	44
FLAT WINGSPAN [M²]	14.55	15.02	15.55
FLAT ASPECT RATIO	5.5	5.5	5.5
ALL UP WEIGHT [KG]	110-190	120-220	140-240
WEIGHT OF THE WING [KG]	7.1	7.4	7.8
CERTIFICATION	B	B	B
FF CERTIFICATION LAB	AIR TURQ 12/2017	AIR TURQ 12/2017	AIR TURQ 12/2018
PRICE [€]	4 300	4 300	4 400
MATERIALS	Upper surface: Porcher Skytrex 38 g/m² lower surface: Porcher Skytrex 32 g/m²		

POSITIVE POINTS

- Improved performance
- Staggered Nitinol and Mylar to better manage wear.
- Improved all round comfort

NEGATIVE POINTS

- We would have liked a wing which was even lighter with, for example, a lower surface in 27 grammes. But Niviuk have announced that there will be a Takoo 4 Plume...

VIDEO

The manufacturer's promotional video: after our test we can confirm that the promises made about this fourth machine have been kept.

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TEST

APCO BI-GAME 42

Photo : Sascha Burkhardt

The Apco Game 42 (pronounced 'four two', almost identical to 'for two') is the current tandem from the Israeli manufacturer. A promising modern wing. Remarkably, the manufacturer APCO has accepted, in a concern about the quality of the test, to leave one of their tandem wings with our tester, Cédric Nieddu, for a relatively long time. Over the course of three months he was able to carry out about 50 flights in different conditions, with passengers of varying, shapes, sizes and weights. Here's his verdict…

TAKE OFF.
When I spread the wing out on the ground I noted two characteristics straightaway: it is lighter than APCO's usual wings, even if the Game 42 remains in the group of tandems which are fairly heavy and with relatively narrow cell openings.

Nil wind: even if it feels relatively heavy as you start to bring it up, it comes up consistently and without a reluctant phase. The wing fills uniformly across the whole wingspan. Once overhead, the load take-up is progressive. Whether flying with a heavy or light passenger, everything happens intuitively and with no surprises.

With wind onto the launch: given its great behaviour during a nil wind inflation, I was rather dreading that in stronger conditions the wing would then pull us off the ground. A concern which, in the end, turned out to be unfounded. Even with 25-30 km/h and on a fairly steep slope, I couldn't fault its behaviour. With or without wind, the wing comes up progressively, at no point does it pull; all of which guarantees maximum safety for my passengers. In any case, releasing the trimmers by 5 cm compared to the position of trimmed to maximum, is ideal.

Photo : Sascha Burkhardt

Photo : Sascha Burkhardt

SPEED, GLIDE AND DAMPING.
Trimmed the wing flies between 36 and 39 km/h depending on the load being carried. Detrimmed to maximum, the speed varies between 45 and 48 km/h. The minimum speed can vary between 22 and 24 km/h, which is very slow for a tandem, this is undoubtedly a strong point for daily use and avoids 'face-plants' when you land…

Compared to the Niviuk Takoo 3, Supair Sora and the BGD Dual, the glide is slightly better as is the conservation of penetration in a mass of turbulent air, only the maximum speed remains a bit behind.

On the other hand, where the Game clearly differs from its competitors is at the level of general damping when it's bumpy. This wing is incredibly well balanced on all the axes. It feels very calm and safe. As a result, you have to put in a lot of effort to make a passenger feel sick. It is one of the most comfortable tandems that I have ever tried.

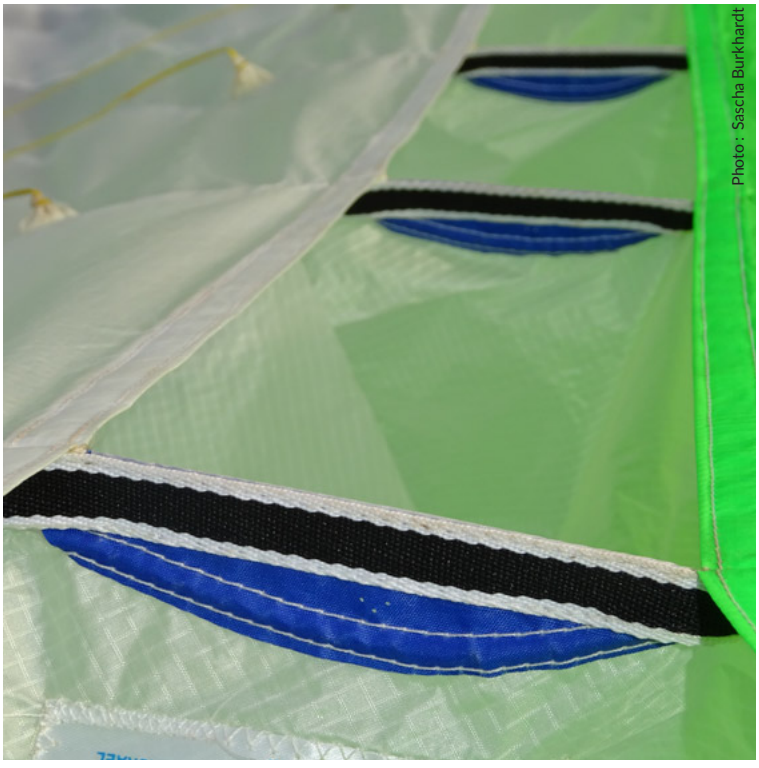


Photo : Sascha Burkhardt

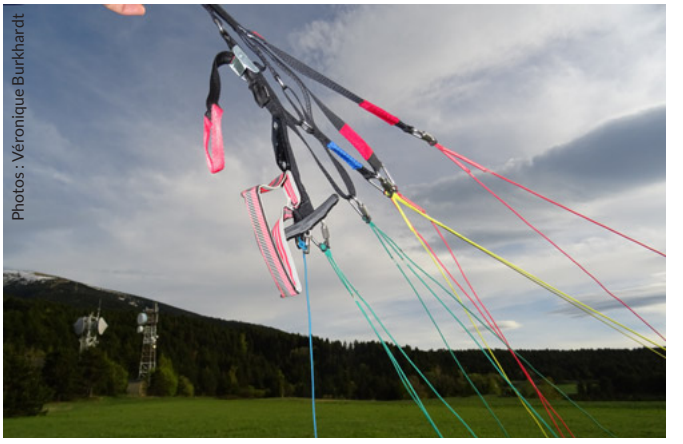
TURNS AND USING THERMALS.
The handling at the beginning of the brake travel isn't exceptional, it really starts to go into a turn from 25 cm of brake onwards. The wing starts to turn incredibly efficiently no matter what the conditions, but particularly when they are weak. Here once again, the Game was more efficient than the other tandems on the market, except for the Swift Max. If you want to do a tight turn, you need to take wraps, not always easy with rigid handles. The wing turns whilst keeping the glide and the energy throughout the turn.

The Game 42 offers an extremely large brake travel: without wraps it is impossible to go parachutal.

FEELINGS
Spirals and asymmetric spirals: even though going into turns requires a lot of brake travel, you can, without any problem get into a spiral, and also make it asymmetric once the necessary energy has accumulated. The wing remains taut across the wingspan. Coming out is classic, the dissipation of energy can be done with a quarter turn as with any other paraglider.

Wingover: at the low end of the weight range, it isn't easy to get a big angle, but loaded with 150 kg, it starts to be dynamic, and above 180 kg, you can pass vertically above the wing. On the other hand, going between horizontal swings, and very pronounced wingovers, you have to find the right timing.

BIG EARS
Lots of tandem pilots frequently use ears to shorten a flight when the passenger 'can't stomach it' in turbulence, for example. With the Game, the ears flap and are fairly unpleasant to keep in. For some pilots, that could be a real problem.


Photos : Véronique Burkhardt

Classic: four rows of risers

The sheathed lines are easy to untangle.

Clever: the shape of the magnets puts the handles automatically parallel with the riser, no matter what angle they are put.

THE LANDING

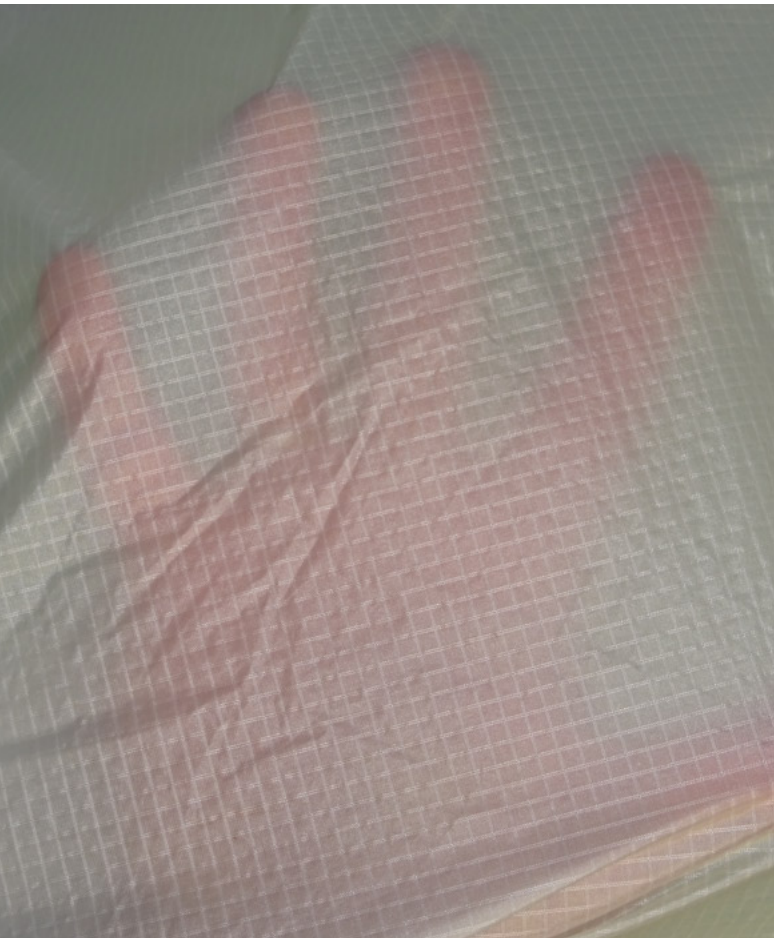
For a tandem pilot, a gentle landing is one of the biggest requirements. With the Game 42, the landing is a formality. Its general balance removes the parasitic pendular movements and its flare is excellent. Flying at low speeds is obvious and very efficient.

BI-GAME 42
TECHNICAL DATA

MANUFACTURER **APCO**
Web: www.apcoaviation.com/

DATE	2016
SIZE	42
CELLS	52
FLAT SURFACE AREA [M²]	42.5
FLAT WINGSPAN [M²]	15.1
FLAT ASPECT RATIO	5.4
ALL UP WEIGHT [KG]	140-230
WEIGHT OF THE WING [KG]	8.4
FREE FLIGHT CERTIFICATION	EN B
FF CERTIFICATION LAB	AirTurqu
PPG CERTIFICATION	DGAC
PRICE [€]	3850

Materials: 42 g/m² "Zero Porosity" Ripstop Nylon siliconé



TEST REMINDER

BGD
DUAL LITE

Photo : Véronique Burkhardt, Pilote:Sascha Burkhardt

The Dual Lite, the lightweight version of the Dual, is still current: a very successful tandem and, in addition, very light…

It came out well before the Single Skin tandems, which now beat all the records for light weight and make 'hike&fly' with a tandem just as pleasant as with a solo wing. The Dual Lite is one of the rare classic tandems which makes this activity envisageable: 6.35 kg instead of 7.5 kg for the standard version; this makes an appreciable difference when walking! In addition, both versions have amazing performance, making them good as both commercial and XC wings.

In the Lite version, it obviously has slightly more damped behaviour during big movements with the wing. During Cédric Nieddu's tests for free.aero, coming out of a stall was very gentle.

In addition, the Dual Lite is, logically, even easier to handle than the classic version. The effort required for the controls is pleasantly low: Bruce succeeded in achieving his goal of behaviour approaching that of a solo wing. The turn initially starts with a yaw, allowing efficient use of weak thermals, then the wing adds some roll, requiring a lot of brake, which is surprisingly not very physical at the start. In summary, very good handling for long, fun flights. At take-off, the Dual already comes up very well, but the Lite is even better (logical). Excellent!

Our measurements with an all up weight of 160 kg for the Dual Lite 40: 39 km/h trimmed, 47 km/h detrimmed to maximum, minimum speed 25 km/h. The stall is very physical, you really have to want to do it!

SUMMARY

The Dual Lite is very nice to fly, gentle in its reactions, good performance right from the smallest thermals upwards. More than three years after coming out, it's still a great favourite on the market. The only inconvenience with the lightweight version is the necessity to be a bit more careful if you want to keep it for a long time.

The Dual Lite during our first tests in 2015. This wing continues to be a good investment just like the classic Dual.

For two years, both the Dual and the Dual Lite have been certified DGAC for paramotor use. Photo: Green/BGD.

The classic Dual. Different materials are used in the internal structure: Dominico N30 DFM 36 g/m² for the classic Dual, whilst that of the Dual Lite is in Porcher Skytex Hard 32 g/m².

The Dual Lite with its leading edge with CCB 3D-Shaping, a BGD invention.

DUAL-DUAL LITE
TECHNICAL DATA

MANUFACTURER : **BGD**
Web :http://www.flybgd.com/

	DUAL	DUAL LITE
DATE	2013	2014
SIZE	40	40
CELLS	52	52
FLAT SURFACE AREA [M²]	40	40
FLAT WINGSPAN [M²]	15.56	15.56
FLAT ASPECT RATIO	5.3	5.3
ALL UP WEIGHT [KG]	120-220	120-220
ALL UP WEIGHT [KG] PPG	120-240	120-240
WEIGHT OF THE WING [KG]	7.5	6.35
FREE FLIGHT CERTIFICATION	EN B	EN B
FF CERTIFICATION LAB	AIR TURQ	AIR TURQ
PPG CERTIFICATION	DGAC	DGAC
PRICE [€]	4150	4540
Materials	**Top surface**: Porcher Skytex 38 g/m² **Bottom surface:** Dominico N20 DMF 38 g/m² **internal structure:**Dominico N30 DFM 36g/m²	**Top surface front:** Porcher Skytex 40 g/m² **Top surface rear:** Porcher Skytex 27g/m² **Bottom surface:** Porcher 7000 Universal 27 g/m² **Internal:** Porcher Skytex Hard 32 g/m²

VIDEO

free.aero MAGAZINE
www.free.aero

TEST REMINDER

AIRCROSS DOUBLE U

We've already noted that the Double U is a tandem which keeps its promises and offers a wide range of possible uses...

Text and photos : Sascha Burkhardt

free.aero MAGAZINE www.free.aero

The brand AirCross, initially known above all for their racing machines, have progressively opened up to models for the general public. For tandems, it's the same: after the U Share in 2003, a performance tandem for going cross country, AirCross brought out the Double U in 2015, designed for a wide range of uses, from amateur tandem to professional rotations

Typical of this type of machine, its objective was: easy to take off and great to fly, with maximum safety. Being very solid was also part of the specifications, an indispensable condition for professionals and clubs.

Paul Amiell, the designer at Air Cross, obviously put rods in this machine, and he took great care with the internal construction.

The fabric is a mix of 42 g/m² and of 38 g/m². This has lightened the wing, but at the end of the day, this tandem of 41 m2 isn't particularly light, weighing 8.7 kg. The materials chosen for the other components of the wing are fairly heavy duty: classic risers, wide and easy to handle during take-off, and padded brake handles, all of which leans more to comfort and durability than light weight.

The behaviour during take-off also corresponds to the specifications: an uncomplicated work tandem which scoops and comes up easily and doesn't have a tendency to over fly except in strong wind, of course, where it can require, like any other wing, a little bit of brake.

In the air, you find all the characteristics promised in the specifications: Renaud summed up his observations in the box below. It's worth noting that we also flew with children slightly under the lower all up weight limit: for this type of flying, the wing behaved really well too.

SUMMARY OF THE AIRCROSS DOUBLE U

Renaud Rrançois, instructor and tandem pilot with Volaime in the Cerdagne in the Eastern Pyrenees summed up his impressions of the AirCross Double U:

PREPARATION :

- Fast and smooth to lay out

- **TAKE OFF:**
  - Inflation: good capacity to scoop, comes up evenly and homogenous without reluctance.
  - Trimming: no marked tendency to overfly in the wind speeds experienced whilst it was being tested.
  - Load take up: fast and therefore very comfortable with good manoeuvrability through the controls.
- **FLYING:**
  - Stable and damped with, all the same, good feeling for the air mass.
  - Stable big ears which reopened fast.
- **GENERAL BEHAVIOUR:**
  - A well tensioned wing, compact and solid in turbulence, penetrates without porpoising.
  - Reactive controls with a certain amount of stiffness.
- **TURN:**
  - It goes into a turn with little inertia, first in the roll, then quickly in the yaw.
  - A good gliding sensation despite feeling like a flat turn.
- **BEHAVIOUR IN A THERMAL:**
  - It gives good feedback through the controls.
  - Precise and effective when climbing which makes it efficient.
- **LANDING:**
  - Good flare with the different wing loadings used.

A tandem designed by Paul Amiell, who has been a designer since the start of paragliding.

The official price for this tandem is 4100 € but if you buy it directly from the manufacturer, you can benefit from a discounted price of 2990 €.

The Edelrid Kevlar lines on the lower level.

Classic: opening for emptying the stabilo.

The brake system with a classic reduction of the trailing edge.

The relatively thick and very solid risers contribute to the final weight.

One way pockets in the leading edge.

Leading edge rods, but no SharkNose.

free.aero

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