free.zero
WORLDWIDE PARAGLIDING AND PARAM AZINE. FOR FREE.

HARNESS

HARNESSES: NEWS AND REVIEWS OF THE THIRD CONTROL


EXTRAORDINARILY
STEADY & ULTRALIGHT
OCTAGON
Rescue parachute · EN / LTF
niviuk.com
The rescue parachute with a revolutionary design made out of ultralight materials, to increase more safety and performance. Oscillation rate: 0-5º • Descent rate: 4.9 m/s

Cover photo: Michel Farrugiua on a Trekking Trek, sitting comfortably in a Kortel Kuik II harness, with optional Krashbox back protection.

CONTENTS

Translation by Ruth Jessop

Rapido

As speed flying and speed riding wings have evolved, so has pilot skill, experience, and methodology. The Rapido is a new design for pilots who are pushing the limits of steep carving flights, low barrel rolls, and long swoops. With a slightly higher aspect ratio and a more dynamic and agile character than the Fazer series, the Rapido is designed specifically for experienced speed flying pilots. A wider glide range, higher trim speed, and wider acceleration window set this wing apart from the other speed wings in our range.

Cade Palmer, Mount Maunganui, New Zealand - Photo: **Rebecca Bredehoft**

PORTFOLIO

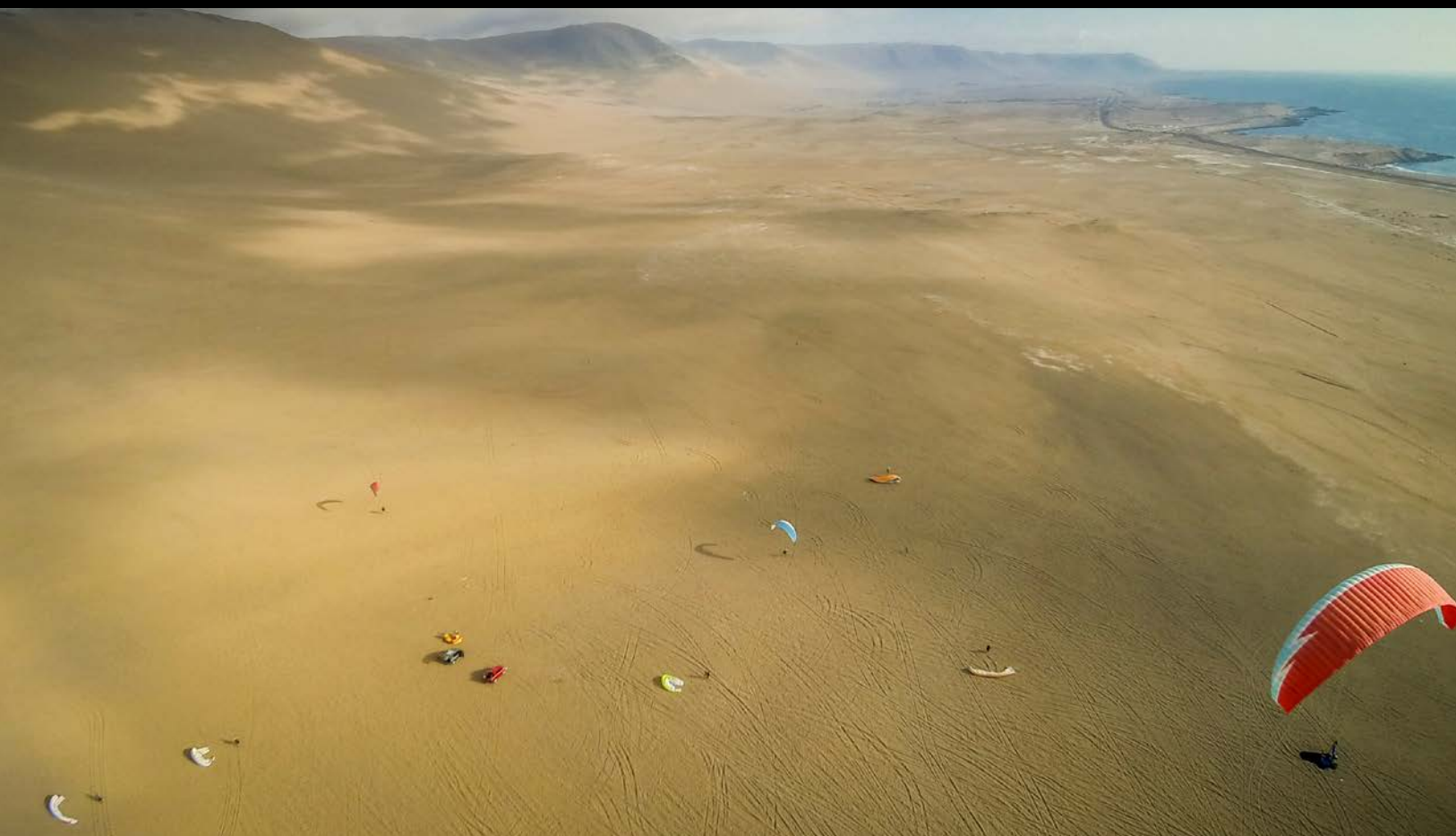
The Iquique Desert

Start thinking now about prolonging the ‘sandpit’ season. In a few months time, when it’s all grey at Dune de Pyla, you’ll find the most beautiful playground in Chile.
Welcome to ‘Pyla force 10’...

The mythical dunes at Palo Buque are accessible only by flying.
What an amazing place, perched far above the plain, when you want to be on your own with your wing.

Fairly ambitious XCs are possible by flying along the ridge. Watch out for the airspace around the airport about thirty kilometres north of Iquique.

At Palo Buque, you inflate low down on the flats, take off and are sucked up 1000m. The understated charm of the dune!



When the thermals rip too much, you can always find a nicely positioned hillock by the sea where you can play in the wind.

Iquique is a modern town, but 20 kilometres further away, amid arid terrain, the Chilean Far West begins.

So what's the main problem flying at the Iquique dunes? Well, you'll never want to go to Dune du Pyla for fear of being disappointed!

Despite the strong thermals, the conditions are rarely bad, as long as you don't fly into the lee of a ridge.

Accidents are best avoided at all costs given the local emergency service vehicles!

A bit of over confidence won't do any harm when playing in the laminar breeze near the sea.

Don't come to Chile for great performance; come for fun. As a general rule great achievements are done elsewhere.

This dune, tucked into the mountainside, has a height difference of 800 metres. What more could you ask for?

Leave your family at home. Apart from flying, there isn't much else to do. Perfect, that's what we have come here for! At Iquique, you can fly every day, all year round. The best time is from October to December. From January onwards, cloud base is often below the main ridge.

The bonus on the ground after flying: an extraordinary setting in an immense desert.

When the conditions become too strong at around 2 o'clock, everyone (well almost) lands on the beach at Iquique and goes for a little siesta.

Crossing the town of Iquique with no obvious landing options isn't trivial. Make sure that you have a big margin, given the strong sea breeze.

KLAUS MARTIN

CAMELEONV3

BE BETTER PREPARED FOR FUTURE FLIGHTS.

Photos: AEF

Following the problems that some pilots have had operating the OFF control under stress, a third version of the Cameleon has been created. Gerard Lesieux, the designer showed us what's new.

- The flying controls can be held completely in the hands with the front risers held between the thumb and index finger during take off, as when free flying, which will help pilots coming from a paragliding background.

- The accelerator is operated by the middle finger, which can be released immediately to give ten fingers free if necessary. The cruise control can take care of the motor, if engaged.

- The V2 version can be upgraded into a V3 thanks to an adapter kit.

- The range of Cameleon throttles will thus include the V2, the V3 and a V2/V3 kit.

The V3 and the V2/V3 kit will be on sale from the end of September.
For more information:
www.mycameleon.fr

NOVA

FACTORY IN HUNGARY
A SPARKLE IN THE SEAMSTRESS'S EYES

Nova introduced the employees in their factory in Hungary to paragliding by making it possible for them to fly from a winch with the local pilots. More than a hundred took part and discovered the magic of paragliding.

No doubt an excellent initiative to motivate and also to increase the awareness of their employees whose meticulous handiwork is responsible for assembling our wings all year round.

NOVA
200 KM IN THE UK

The British junior team pilot Theo Warden completed a 200 km open distance flight in England. He flew exactly 206,2 kilometres with an average speed of 36,8 km/h launching on his NOVA Mentor 4 from Milk Hill (about halfway between London and Bristol). By UK standards, this is already an amazing flight. What makes it even more special is the fact that Theo is only 16 years old!

Photo: Carlo Borsattino / flybubble.com

PAP GET INTO CLOTHING

PAP are now selling a new range of T-shirts and sweat-shirts for pilots. The Papman T-shirt, for example, is available in size S, M, L, XL and XXL. It is 100% cotton and costs 18 euros. The PAP Racing Team sweat-shirt is available in size S, M, L, XL and XXL and costs 42 euros.

http://www.papteam.com/index_ing.php
http://www.papteam.com/ropa_ing.php

FRESH BREEZE : APAX

The Apax wing, from the paramotoring manufacturer Fresh Breeze, has also gained EN A certification for free flight use. According to Fresh Breeze, it's a very flexible wing for free flight, winch and motor.
www.fresh-breeze.de/en/home.html

KANGOOK REUNION IN CANADA

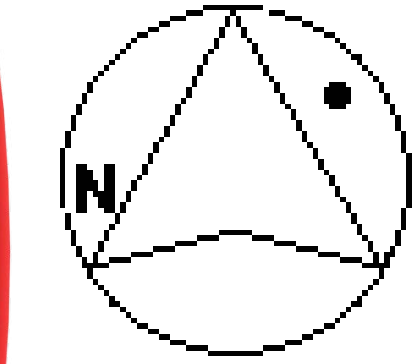
At the end of September there will be another Kangook Week in Quebec: a reunion of Kangook pilots (and others), with lots of flying together on the agenda and the possibility of camping in front of the manufacturer's workshop. The endless forests are just waiting to be flown over.
The video of the last event:
https://vimeo.com/77355645
For more information
www.kangook.fr

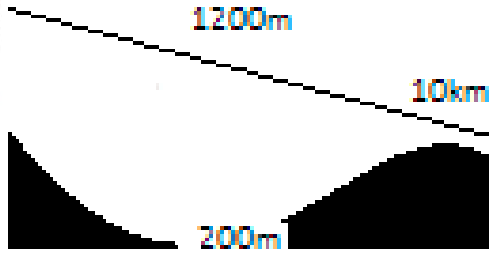
NAV V3: SYRIDE SUPPLY THE WORLD WITH SD

A new version of the Syride Sys'Nav is available: The Sys'Nav V3. Its memory can now be extended with an SD card. This integrates, as soon as it's installed, worldwide topography and airspace. The storage of information has become almost unlimited. In addition, its battery life has increased from 25 to 45 hours.

Also new, in the latest version of firmware, is the 'thermal core' display to help you find the core of the thermal more easily by displaying a point which precisely indicates the zone of greatest lift encountered.

The 'transition assistant' is a very useful function which displays a cross-section of the relief in the direction you are travelling.
www.syride.com





SOL: TANDEM KANGAROO 4

SOL have launched their new tandem, the Kangaroo 4. In the Kangaroo lineage which has set numerous records, the Kangaroo Four (4) is designed for experienced pilots who are looking for a high performance tandem for XC flying.

High aspect ratio: 6.25
small surface, 65 cells.
Price to the public: 3 950 €
Certification: EN C
All up weight: 140-204 kg
Free personalised colour scheme

For more information:
www.altimo.fr

PPGPS ON YOUR WRIST

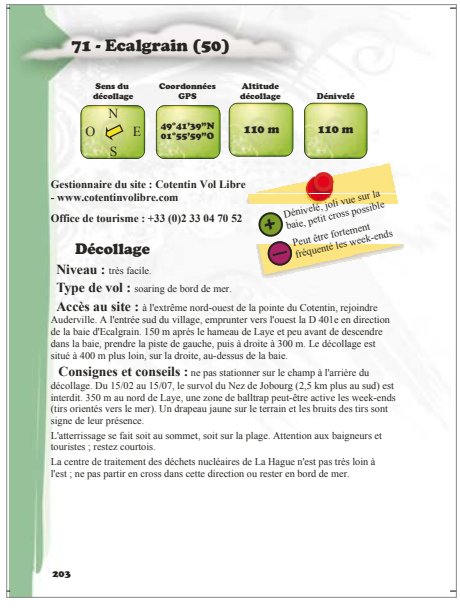
One of the best performing Android apps which can be used when flying paragliders or paramotors is now also available for Android Wear, the operating system for intelligent watches. There are lots of models which are cheaper than the Apple Watch in the Android universe; you can find them for less than 100 euros.

PPGPS Wear on your wrist gathers information sent by the app PPGPS on a smartphone and shows on a very visible display an altimeter, vario, speed over ground, direction, distance covered, time flown and information about the waypoint.

Price 2.40 €
http://www.ppgps.info

SITE GUIDES FOR FREE FLYING: 4TH EDITION

Free.aero has already written about several sites described in the topo guide to French flying sites. Sylvain Grandferry has now brought out the 4th edition. After the launch of the north-east of France (the Northern Alps to the Vosges), the south-east (the Southern Alps to the Côte d'Azur), and the south-west (the Pyrenees to the Massif Central), the north-west edition is now available. Maps show the take-offs and landings and give descriptions of the level, the type of flying, the access, the orientation, the height difference and the GPS coordinates. For each department it also gives all the aerological information, the restrictions and the XC and hike and fly routes. And to help you choose the best site for the day there is a table summarising the orientation of the take offs and the good and bad wind directions.
www.toposite.fr



71 - Ecalgrain (50)

Sens du décollage	Coordonnées GPS	Altitude décollage	Dénivelé
N O E S	49°41'39"N 01°55'59"O	110 m	110 m

Gestionnaire du site : Cotentin Vol Libre - www.cotentinvolibre.com

Office de tourisme : +33 (0)2 33 04 70 52

Décollage

Niveau : très facile.

Type de vol : soaring de bord de mer.

Accès au site : à l'extrême nord-ouest de la pointe du Cotentin, rejoindre Auderville. A l'entrée sud du village, emprunter vers l'ouest la D 401e en direction de la baie d'Ecalgrain. 150 m après le hameau de Laye et peu avant de descendre dans la baie, prendre la piste de gauche, puis à droite à 300 m. Le décollage est situé à 400 m plus loin, sur la droite, au-dessus de la baie.

Consignes et conseils : ne pas stationner sur le champ à l'arrière du décollage. Du 15/02 au 15/07, le survol du Nez de Jobourg (2,5 km plus au sud) est interdit. 350 m au nord de Laye, une zone de ball trap peut-être active les week-ends (tirs orientés vers le mer). Un drapeau jaune sur le terrain et les bruits des tirs sont signe de leur présence.

L'atterrissage se fait soit au sommet, soit sur la plage. Attention aux baigneurs et touristes ; restez courtois.

La centre de traitement des déchets nucléaires de La Hague n'est pas très loin à l'est ; ne pas partir en cross dans cette direction ou rester en bord de mer.

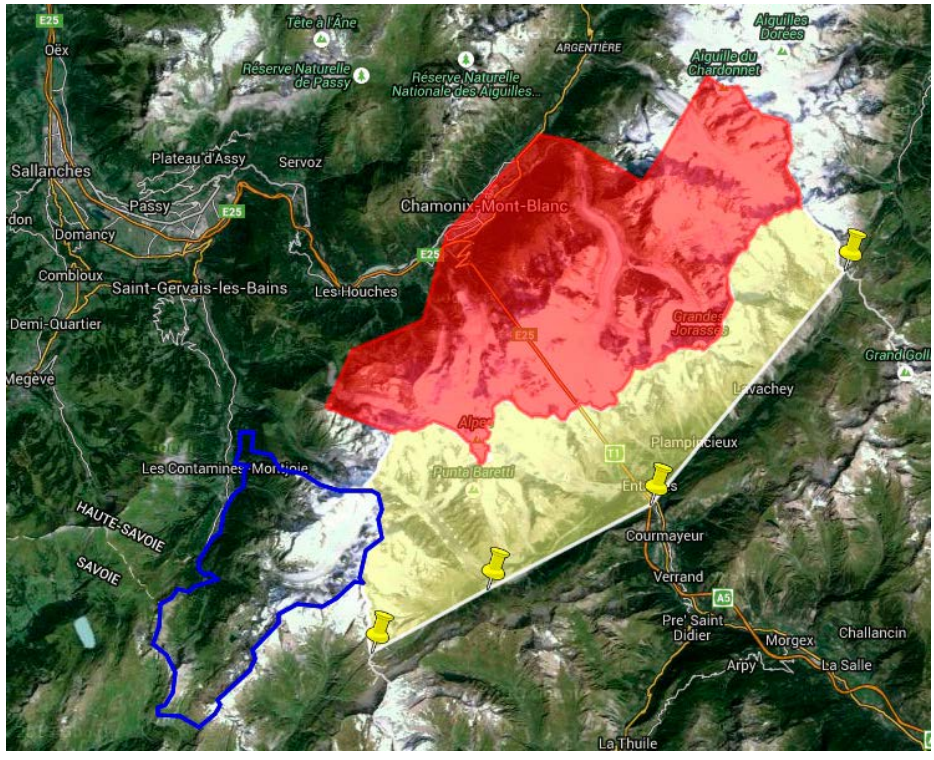
Dénivelé, joli vue sur la baie, petit cross possible

Peut être fortement fréquenté les week-ends

203

MONT BLANC : THE END OF THE GOOD TIMES

It is no longer possible to land on the summit of Mont Blanc. We've been used to having a forbidden zone in summer on the French side for a long time. Now it is also forbidden to fly on the Italian side of Mont Blanc, making it impossible to legally conquer the mythical summit by air. The Italian ban is valid until the 12th of October.



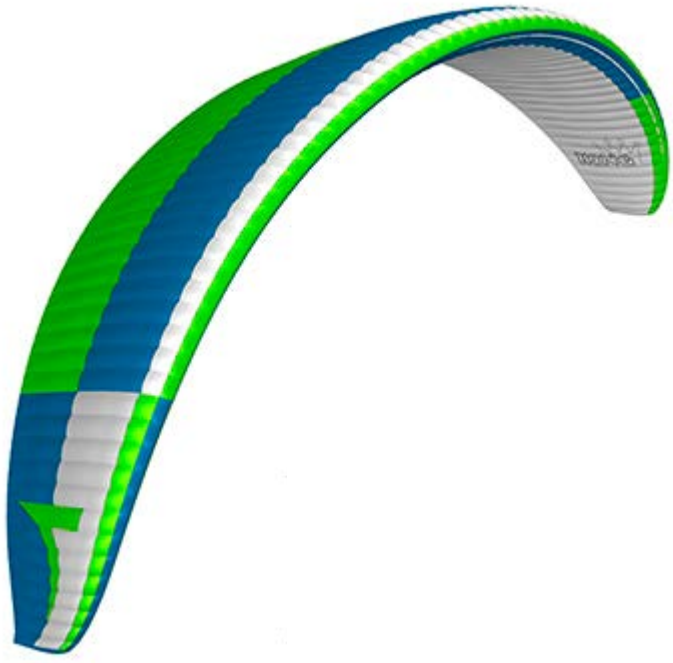
777 LET THE KING OUT TO PLAY

Triple Seven Gliders have advanced their King. The three line EN D 'King' is available in three sizes (flat: 22.2 m2, 24.6 m2 and 26.4 m2, covering a weight range from 75-125 kg).

The projected aspect ratio is 5.3 points and flat 6.98.

The designers promise a very high performance, even in turbulent conditions.

http://777gliders.com/tripleseven/king



SKYWATCH

We have already reviewed Skywatch's little anemometer, the Windoo, which plugs into an iPhone or Android telephone and transforms it into an anemometer recorder which, in addition, can supply a collective weather site with local data.

The most advanced model shows and records wind, temperature, humidity and pressure. Now the latest version of this little miracle is compatible with the iPhone 6 as well.

http://windoo.ch/compatibilities
www.facebook.com/skywatch.windoo

A nice design for this new Niviuk cap.

NIVIUK TAKES CARE OF THE PACKING

At Niviuk, there are three new stuff sacks for their paragliders: The Kolki Bag (right) is a spacious stuff sack with compression straps which comes with the Kougar 2, the Dobermann and the Link. Its main use is for transport by car or when walking short distances.

The Kargo 140 l (below right) is a new smaller version of the Kargo 175 l. This sack is designed for carrying small surface wings. For bigger models, there is the Kargo 175 l or the Kargo 220 l. When ordering a new wing, it is possible to choose between the three sizes of the Kargo and the Koli Bag.

The Nkare quick folding bag (opposite) has been improved; the strap attachment points have been modified and it has a new internal pocket to store the risers.

www.niviuk.com

STABILIZER VIDEO

Slick is a new motorized GoPro stabilizer. The project was launched by a paramotor pilot who had just graduated as an engineer. He developed this electronic stabilizer for the photographs he'd taken from a drone and decided to commercialize a fully integrated version to put on a helmet, a bicycle, a plane, a car, or any other support.

He launched the fund raising campaign on the crowdfunding website Indiegogo, which was very successful. Here are the five main selling points of Slick, according to its inventor:

1. Waterproof: Slick is perfectly suited for use in all conditions (surf, kayak, kite surf etc).
2. Hard-wearing: Slick is shock resistant and works with the GoPro protective cover.
3. Compatible: Slick is compatible with all modern GoPros (3, 3+, 4, 4 session) as well as all the accessories (helmet, harness, boom etc). It works under a drone as well.
4. Affordable price: 229€.
5. Easy to use: All you need to do is attach the GoPro to the Slick, then attack the Slick to a GoPro accessory and it's ready for action!

www.indiegogo.com/projects/slick-stabilizer-a-motorized-gopro-steadicam

SKYMAN MAKES FRIENDS

The Austrian specialist in lightweight mountain wings, Skyman, introduces his very first, 'first paraglider': The Amicus (above), is an EN/LTF A specially designed for beginners.

Nevertheless it is very sophisticated: 47 cells, three main lines and aspect ratio of 5.2 all promise a certain performance. Yet it only weighs 4.2 – 4.95 kg depending on the size: 23, 25, 27 and 29.

The Cross Country (opposite) is an intermediate EN B, very light (starting at 3.6 kg) made from D10 fabric and equipped with little anchor points for taking off in the snow.

Sizes:
XS : 23 m²
S : 25 m²
M : 27 m²
L : 29 m².

www.skyman.aero

"... just before boarding
I finally found time to
download Colombian airspaces."

For those who want to fly beyond

The Flytec Connect 1 is the first ever smartvario. Just like a smartphone it comes with a touch screen, a multitude of sensors and, most importantly, wireless connectivity. Download waypoints and airspaces and upload tracks on the go. The Connect 1 will ultimately help you explore new limits with a graphic thermal assistant, graphic airspace display, and maps. Learn more about the development stages of the Connect 1 on **connect.flytec.ch**

Flytec

Photo: Sascha Burkhardt

HARNESS EVOLUTION

Thanks particularly to Hike and Fly and the race for 'light', modern harnesses have evolved a lot. Here are some examples...

WEIGHTSHIFT

THE THIRD CONTROL

Before examining each harness in detail, it's worth remembering their second role. Harnesses aren't just a more or less comfortable seat, but also a 'third' control for starting a turn.

Photo: Véronique Burkhardt

With no restrictions at the waist, we're off to the playground. And no, this head without a helmet isn't somebody breaking the rules at Dune de Pyla, the sandpit in the photo is in South America.

Photo: www.profly.org

PILOTING WITH WEIGHTSHIFT

Initiating a turn, or steepening it through weightshift, is an important part of flying a paraglider. It's obvious: by leaning to the left of the harness, the paraglider turns left as you would expect. How efficient this is depends largely on the type of wing and the wing loading, as well as the harness. The pilot of an acro wing can initiate a spiral just by using the harness.

Some beginner wings change direction after movement through the harness but don't engage in a real turn. It's the same for weightshift with different wing loadings: a mini-wing goes into a turn very quickly while a tandem used as a solo wing doesn't budge. The height of the hang points and the geometry of the harness also play an important role. Remember the cross-bracing on the harnesses in the 90s. They totally stopped piloting by weightshift. Today 'full bracing' has been replaced by ABS (Anti Balance System).

Straps limit the inclination of the seat, but don't prevent steering by weightshifting too much. Be careful: the waist attached reserve container can have a brace effect and prevent movement. This restriction can even become dangerous for the same reason that cross bracing was abolished. A pilot who finds that he can't react to a collapse by weightshifting in the opposite direction, is tempted to over react by the only means available, by using the brakes. This can result in an asymmetric stall and it going negative.

WHY?

As with turning using the controls, different analyses of steering by weightshift aren't unanimously agreed upon. Is it rather the displacement of the centre of gravity in the direction of the desired turn which causes a roll movement or, are there other determining factors?

Certain theories have been put forward about the step which forms in the upper surface when the pilot leans to one side. It's true that at this point, the lift moves towards the inside of the turn. Logically, this force produces a bit of roll in the right direction. But is this a determining factor? On some wings where there is a central cell with the central lines attached to its left and right side, it's easy for the crease to form. On other wings, the inner lines join together on the central rib and it's more difficult for the step to form. The aerodynamic engineers defend the 'theory of the step' by claiming that if you carved a paraglider out of a block of wood, this 'wing' would only turn very slightly due to weightshift by the pilot. The lines on the outside would unload. Only replacing the lines with rigid lines (similar to the trapeze on a hang glider) would make weightshift work again. We tested several wings with a central cell, by comparing them to others where the lines joined together on a central rib. In fact, wings with a central cell, with a configuration which favours the formation of a crease, are often easier to turn by weightshift. But there are exceptions to the rule: The Paramania GTR, which is very manoeuvrable, is connected to the pilot by a central line.

In this picture of Charlie at the Dune, you can see the step in the middle of the upper surface; at this point the lift is tilted to the left and can help it go into a turn. The importance of this effect isn't unanimously agreed on by the experts.

Photo: Sascha Burkhardt Pilote : Charlie Piccolo

THE PLAN FORM
The plan form of the wing also plays a certain role in facilitating the turn by displacing the centre of gravity. Under a rectangular wing, the transfer isn't very effective, whereas under an elliptical wing it is a lot more.

Here's the explanation from the Italian designer Michael Nesler: by displacing the weight towards the tip of an elliptical wing, the centre of gravity is then under a profile with a reduced cord. The result would be increased wing loading with, as a consequence, a loss of lift on the inner side of the wing, which will favour going into a roll.

IN PRACTICE
In the end it doesn't really matter what the explication is, as long as it turns well. In paragliding, to make the most of the 'third control', better known as weightshift, be careful not to restrict your movement with a waist mounted container which is too tight and don't tighten the waist strap too much either.

Adjust it to 42 cm (46 for pilots weighing 80 kg), mark it with an indelible pen and experiment during a non thermic flight with different adjustments either side of this average value. Too loose and it won't just feel unstable in turbulence, but could also increase the pilot's inertia. .

Too tight and the weightshift will be restricted. Then try piloting using just weightshift; even try doing a whole flight without using the controls. Do a few wingovers - it's a very interesting exercise which allows you to measure the efficiency of weightshift and to feel the forces.

Photo: Véronique Burkhardt

With a motor, depending on the hang points, working with the harness can be as efficient as when free flying. Whether free flying or with a motor, it is rarely necessary to do pronounced movements with your legs. As a general rule, throughout the flight, follow the movement of the wing using your thighs. Be gentle, a bit like riding a horse with your chest always straight. To pilot, work with your hips, always doing everything smoothly.

LEG LOOPS ARE BACK.

The very first paragliding harnesses were mountain harnesses, in other words harnesses with the thighs separated, supporting the pilot by the thighs rather than the bottom. For the sake of comfort, a board was added to create a real seat, thus making our seats in the sky heavier.

An additional effect: piloting using weightshift became more efficient, because the pilot's leverage is greater.

But we've noticed that the new harnesses with thigh straps are often very reactive to weightshift piloting. One explanation: the leverage is perhaps less, but the pilot gains so much freedom of movement that he can quickly react to either half of the wing.

Comfort has finally evolved, except for in ultra light harnesses. Padded appropriately and made using the latest new technology, some harnesses with thigh straps like the Kortel Kruyère are surprisingly comfortable. Over the following pages, we'll look at some of the harnesses with thigh straps that we tested.

The Neo Body is a harness specifically for speedriding. Soon it will be available in three sizes (compared to just one at the moment). Price: 480€.
Equipped with Koroyd back protection which is thin, light and breathable (430 x 270 mm, 13 mm thick, 235g), it's a modern harness with thighs separated. It isn't the only one. Leg loops are making a come back in harnesses in general.

http://www.flyneo.com/en/

The String from Neo (left) weighs 300 g. The Everest 2 from Supair (right) weighs 450 g.
Photo: voler.info

Our goal was to create the best flight instrument ever. We are certain to have succeeded.

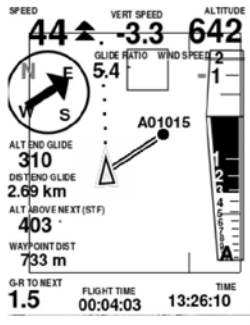
- Touch screen display
- Display absolute customization
- Sound absolute customization (CSS)
- C-Pilot EVO operative system
- Glide Over Terrain
- Auto-switch and auto-zoom in thermal mode
- Start - thermal - goal - glide automatic display
- airspaces automatic display
- multiple profiles modes
- FAI triangles (coming June 2015)
- Live tracking (optional)
- GOTO by touching a waypoint in the screen
- Bluetooth
- SD card
- Direct PC connection
- Easy interface
- C-Probe connection
- Hiper sensible variometer
- Airspace full management
- customizable polar
- Thermal assistant (Wind drift factor exclusion)

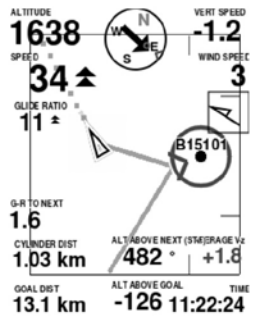
WWW.COMPASS-ITALY.COM

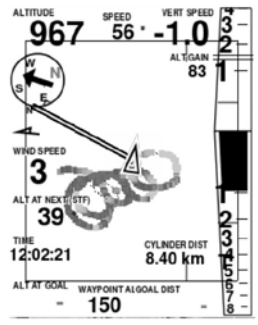
Triangle assistant &voice assistant are coming!

Imagine the instrument.that you always wanted to have: Easy is exactly that instrument since anything can be customized as you want.

FREE TERRAIN MAPS AND AIRSPACES







PRICE: € 599,00 EU tax included

DIRECT SALES TO PILOTS: sales@compass-italy.com

Compass devices are designed, made and assembled in Italy with respect of environment and protection of labor rights

KORTEL KRUYER II AND SAK II

Photos: Sascha Burkhardt

The Kruyer 2 from Kortel only weighs between 285 and 375 g according to the size. Together with the reversible bag/airbag, the Sak II, it's a full harness which is surprisingly comfortable and conforms to the LTF requirements for harnesses.

We were amazed how comfortable a lightweight harness of this type could be. The positioning of the foam seems very well understood by this French manufacturer, just like the geometry in general. Control through the harness is easy with good stability at the same time.

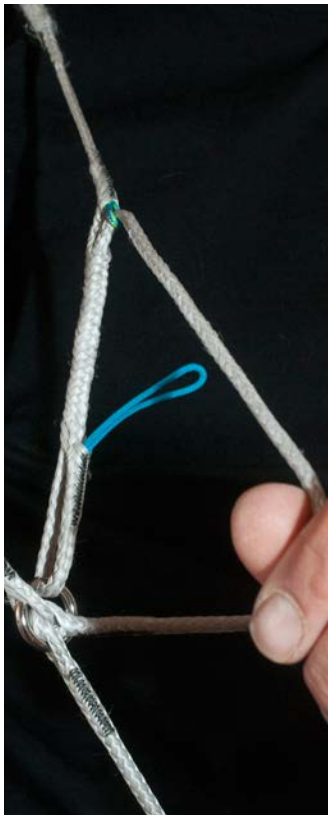
Kruyer II :
Sizes: Pilot height/harness weight

S -170 cm/285 g
M. 168/180 cm/320 g
L 180/195 cm/340 g
XL + 190 cm/375 g

Prix : 261 €
Sac II : 236 €

www.korteldesign.com/spip/index.php

Kortel's Kruyère harness is very comfortable and super reactive despite (or thanks to) the thigh straps. A distinctive feature is that some of the fastenings do up without buckles, just with a system based on splices.



KORTEL KOLIBRI

We briefly tried the Kortel Kolibri. It's a harness with thigh straps and a cocoon all in one. Unlike certain cocoon harnesses, it is possible to fly comfortably in a sitting position as well when necessary.
At take-off, it fits on like a mountain harness. The level of comfort is what you would expect from Kortel. Despite its light weight (2kg), thanks to a judicious choice of materials and their positioning, it's a real harness that can be used for long flights.

For the X-Alps 2015, a 'Pro' version was developed. We'll be reviewing it in the next article in our 'Lightweight' series.

The Kolibri Harness
Hybrid protection comprising a foam bag/airbag.
Total weight:
M 1.9kg
L 2.0kg
XL 2.1kg

www.korteldesign.com

Photos: Burkhardt

NEO
STRING

The String harness, already tested in our special 'Light 2014' article, is really minimalist. It takes up no space at all and easily fits into a small bag. The M weighs just a little over 310 g on our scales (therefore within the 290+/-10% tolerance published by the manufacturer).

Add 75 g for a pair of ultra light Grivel karabiners which have the advantage of enabling the pilot to clip in and do up the waist strap very comfortably, without having to step in and out of the harness. The width of the waist strap is fixed and is about the standard 42-44 cm.

Initially it wasn't a harness designed for doing 8 hours of XC flying, but it is sufficiently comfortable that you can happily stay in the air and thermal efficiently.

Sizes:
XS < 170 cm/55 kg
M = 165 cm to 185 cm/55 to 85 kg
XL > 185 cm/85 kg
Price: 290€, 320€ with Grivel karabiners

www.flyneo.com

TEST

THE OZONE F*LITE

THE 100 GRAMME HARNESS

*The lightest harness in the world: The F*Lite was designed to the nearest gramme.*

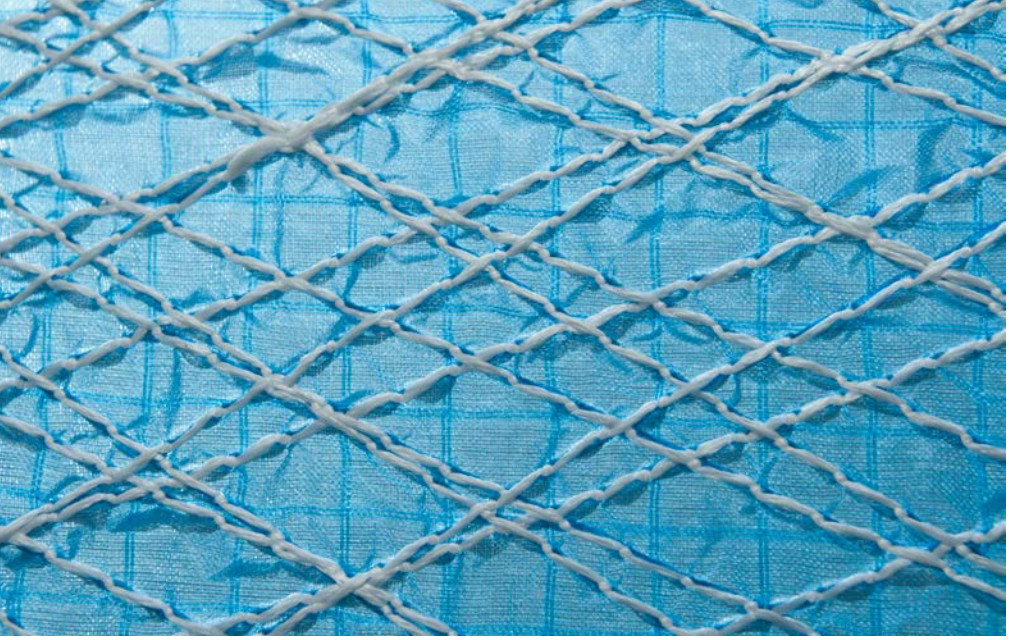
By Sascha Burkhardt

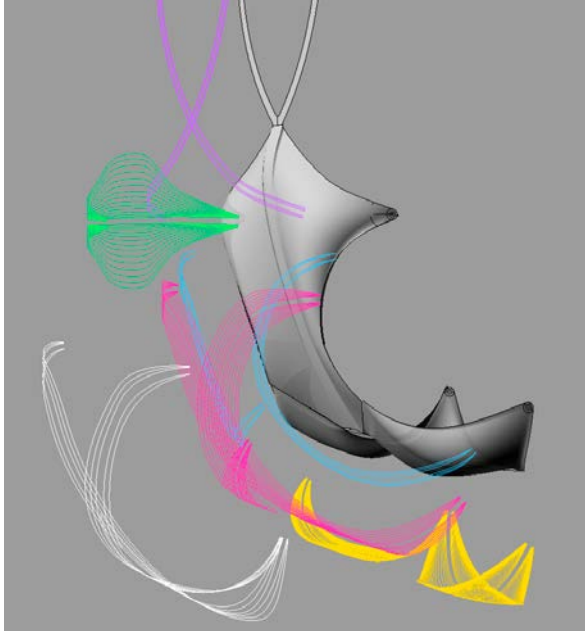
The F*Lite (short for F****** Lite) should have been the harness that weighs less than a 100 grammes, but in the end it went over by 3 grammes and weighs 102 grammes in size medium (on the editor's scales). It's still an incredible technical achievement. The person behind this achievement is the young aerodynamics engineer Fred Pieri, who is part of the Ozone development team. Amongst other things, the little "Anti-G" parachute for spirals, was designed by him.

For the F*Lite, the team at Ozone rethought how they design. The designers precisely calculated the force vectors in the harness, whether under tension or compression, and placed Dyneema fibre (for the tension) and carbon rods (for the compression), only at these points and along the length of these lines to the exact millimetre. The Porcher Skytex 27 fabric serves only to 'keep the fibres and other materials in the correct place.'

The compression forces are more difficult to compensate for than the tension forces. For compression, heavier material such as rods is required, whilst the tension forces can be handled by very thin fibres such as Dyneema. The result is thus a tiny bit of cloth with fibres indicating the dynamic lines which really give a visualization of the forces at play. Despite its light weight and 'ridiculous' volume, the F*Lite successfully passed a load test of 15 G, in other words, a tonne and a half for the M with its maximum pilot weight of 100 kg. No fibres broke according to Ozone. It's incredible compared to how fragile it feels when you hold the F*Lite in your hand.

100 g of harness in one hand.





Calculations and Hi-tech materials: All the forces calculated have been calculated as a network. The Dyneema fibres (tension) and the carbon rods (compression) are placed as a function of the force vectors.

ON THE GROUND

To do up this harness, on each side there are two loops clearly marked in red, which need to be connected to the riser from the wing. Ozone advise using Dyneema softlink style buckles. Contrary to other manufacturers, Ozone do three loops round, which is a bit more tedious. It's better to leave the harness connected to the wing and clip in by threading your feet through.

The waist strap is made up of a simple Dyneema cord which doesn't open and can't be adjusted. There is another little strap in Dyneema at chest height, the buckle to fasten it is a simple knot which jams in a loop. There is no way of adjusting it.

During ground handling, thanks to its light weight, it's easy to forget that you are wearing this harness. Even when playing in strong wind, it doesn't rub anywhere.

The carbon rods under the thighs work primarily in compression.

The F*Lite during the load test which allowed the concept to be validated. It survived 15 G which is equivalent to 1500 kg(!), and not a single fibre broke according to Ozone!

The young aerodynamics engineer Fred Pieri, who is part of the Ozone development team.

IN FLIGHT

After take off, the pilot easily gets into a sitting position. This isn't necessarily a benefit specific to the F*Lite. As a general rule, none of the Granddad style mountain harnesses with legs apart, present a problem during take off. The pilot ends up sitting straight and upright, which is very good for typical mountain flying.

Steering through the harness is fairly efficient. Comfort-wise it isn't as spartan as you would imagine at first sight. You can certainly feel the carbon rods but you can still sit relatively comfortably for more than an hour in the air. You even forget that you are just sitting in a piece of cloth and Dyneema threads, weighing only 100 grammes. As the back and thighs are well supported, the pilot doesn't feel as if he is sitting on the seat of a swing exposed to the air, as you would imagine.

On the other hand, on the model tested - a prototype example, a rod pierced the strap which was supposed to be strong enough to take this amount of force and felt quite uncomfortable towards the end of the last flight. This problem should be solved in the final mass production models.

The "Big Link Lite" connectors from Ozone are an option; they replace the karabiners.
Ozone advise using three loops with these Dyneema connectors.

The Dyneema fibres follow the force vectors.

A nice harness when ground handling.

A buckle made up of a knot jammed in a loop which holds the shoulder straps in position.

LANDING

Also when landing there are no surprises, this harness does what it is meant to do; be practical, sufficiently comfortable and prove that the lightest harness in the world is 100% operational in every possible situation when mountain flying. For pilots who want the very best in ultra light (and obviously without any back protection), it does all it claims to do. It is now available in size M (recommended pilot height 170 – 185 cm). Size S will follow very shortly and size L a bit later.

A small fault on the prototype we tried: a rod pierced the end of the strap covering it.

TEST

APCO SPLIT LEG HARNESS: SIMPLE, LIGHT, EFFICIENT.

The paraglider and paramotor harness and wing manufacturer, Apco, has had an idea which is both simple and brilliant; replace paramotor harnesses with ones with the thighs separated.

The idea is so simple that you wonder why it wasn't thought of earlier. Attach a mountain style harness, with thighs separated, onto a paramotor. By doing this, the whole thing will straightaway be lighter because some of the weight in the harness comes from the board under the seat. Saving a few kilos is the current trend. Not just for comfort when transporting and carrying it, but also for safety. We know that the less weight there is to move, the easier the aircraft will be to handle and control. It isn't just from a weight point of view that it makes a big difference.

There is also an effect which is less visible at first glance, but clearly confirmed during our tests. Thanks to its simplicity, the harness with the Apco thigh straps brings man and machine closer and the weight is grouped more closely together.

Close up, the geometry brings the two weights together.

As a consequence there is better comfort and handling, both on the ground and in the air. When running to take off, having your thighs separated allows you to run much more freely and comfortably.

Another effect that we can confirm is that it has never been so easy to sit down after taking off. It's amazing, but logical, because the pilot is lifted up by their thighs.

Finally, in the air, the freedom given by having two legs free allows you to actively put more weight onto one side of the wing. It is particularly obvious during a wingover, when the pilot needs to load the opposite side when passing through the lowest point of the pendulum.

Are there any disadvantages? You would think that this type of harness would be uncomfortable but it's not the case. Of course, during a three hour flight you are a bit better sitting in a classic harness. But Apco's Split Legs harness has been carefully padded and turns out to be pretty comfortable. There is even an aeration system in the back which is more efficient than in some classic harnesses.

Despite its 1.5 kg, this harness isn't spartan. Admittedly the zip side pocket to put your things in is an option you have to pay extra for, as is the side reserve container. But if you're happy to carry a chest reserve, the harness as it is sold, will be amply sufficient.

Two versions are available: for low attachment systems (left) and high (right).

Light, simple, comfortable and not at all spartan. The Split Legs benefits from all the Apco harness know-how.

It is made with high hang points and low hang points. We tested the version with low hang points by replacing the original harness on a Kangook Trekk. The result was the same for us as for the German Kangook dealer and the pilot photographer Bénédikt Bös, who did the same tests at almost the same time but independently from us. The Split Legs won the comparison with the original harness with flying colours.

You don't just gain two kilos, but also at almost every level. Excellent and recommended for most pilots, perhaps with the exception of those who regularly fly for more than an hour and a half at a time. Incidentally, Kangook are now offering it as an option on their machines if pilots want.

For all those who are equipping their current machines, ask your Apco importer for more information about compatibility. Available in a multi size model (adaptable thanks to a zip), for pilots between 1.60 and 1.85m.

Price 360€.
www.apcoaviation.fr/sellettesplitlegs.html

Photo: Tristan Shu / SKYWALK

FLYING SUPINE:
THE COCOONS EVOLVE

Cocoon harnesses have several advantages. Firstly there is a real gain in performance, as long as the harness is correctly adjusted. The penetration in the air is better, as is the glide angle and the sink rate. What a lot of pilots don't realise is that the fairing at the back, which lots of harnesses have, plays an important extra role in increasing the glide angle. Without it, the turbulence at the back would literally suck at the pilot and slow him down.

If the airflow is ideal at the front as well as at the back of the harness, the gain in performance is significant. Another advantage of supine harnesses with a cocoon is to keep the pilot warm and more comfortable at high altitude. This directly influences the pilot's performance. In addition, the pilot is in a better position to accelerate. Disadvantages: The risk of a twist is greater and they can be a bit twitchier to fly. The control of the wing through the harness is perhaps not as good. It isn't by chance that acro pilots fly sitting up, the outside of their legs pushed against the straps.

Cocoon harnesses are evolving, especially with respect to weight.

The Chogori light only weighs 3.2kg in size S. It is available in four sizes.
Price: 1190€
www.basisrausch.ch

The Ozium is a very light harness despite its full fairing, only 2.6 kg. The concept of this harness was put to the test during the 2013 Red Bull X-Alps. It doesn't have a board to sit on, not just to reduce the weight, but also to make it less sensitive to turbulence. Available in four sizes.
Price 890€
http://flyozone.com/paragliders/en/products/harnesses/ozium/info/

On the other hand, try getting into this position in a supine harness, and it won't happen. In some models it is very uncomfortable or even impossible to fly like that.

A further disadvantage of most supine harnesses is the carbon plate that constitutes the base of the bag (where your feet press), which can strike your calves unpleasantly while running down the launch.

Most manufacturers offer one of their cocoon harnesses in an ultra-light version. We'll talk more about that in the next issue of our 'Lightweight' series. Here's an example, The Genie X-Alps harness by Gin only weighs 2.4 kg in size M.

Will there soon be a new version? At Niviuk, an updated version of their range of harnesses is in the pipeline. Here, the classic Drifter cocoon competition harness will soon have been in their catalogue for more than four years.

Ozone's Exoceat: the perfect fairing at the back contributes massively to the increase in performance. On the other hand, it's a very competition oriented harness and is relatively heavy, weighing nearly 10 kg. Price: 1660€
http://flyozone.com/paragliders/en/products/harnesses/exoceat/info/

THE CATERPILLAR
AND THE BUTTERFLY

TEST

SKYWALK
RANGEAIR

The Skywalk Rangeair can't be compared to any other harness on the market. Before take off it resembles a 'small pile of wet rags'. Then it metamorphoses itself into an armchair in the sky with a perfect profile and protection.

The Rangeair was developed for the X-Alps in 2013 and became a production model. During the X-Alps in 2015, an even lighter version was used by Paul Guschlbaur. The production model is already incredibly light: less than 2kg. We checked it and it weighed just over 1.9kg on the editors scales. This harness has neither a board nor leg loops. All the back and seat have been calculated by a computer to form, once weighed down by the pilot, a comfortable and aerodynamic cocoon.

You can see straightaway that it works. The pilot can get into the harness very easily after take off. If he wants, he can also pilot from a sitting position; that works very well too.

The primary goal of this harness is obviously to fly supine. The correct adjustments were done quickly during our tests but, given the number of buckles you can adjust, it is probable that other builds of pilots would take longer to adjust it correctly.

Photo: Burkhardt

Photo: Skywalk

The Rangeair folds into a record volume for a cocoon harness. But compared to another harness of this type, like for example this Supair Delight 2, it seems rather limp when it isn't in the air!

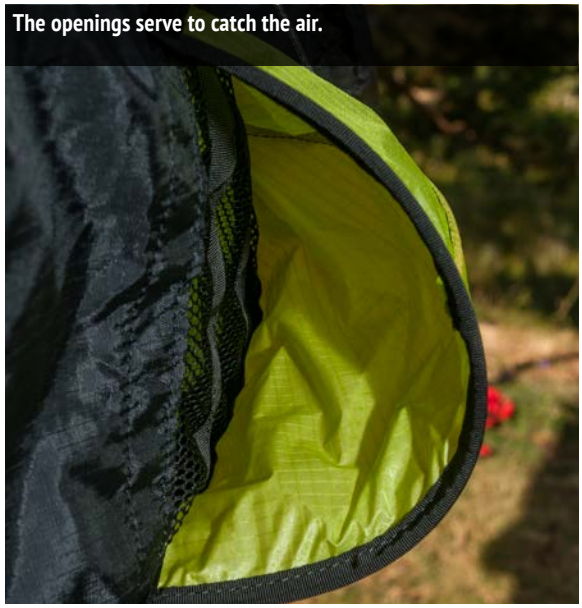
Photo: Burkhardt

At take-off its light weight and flexibility are a real advantage. You almost forget that it's there, except for the plank at the end for your feet, (the only rigid part of the harness) and which, as with all harnesses of this type, hits your calves.

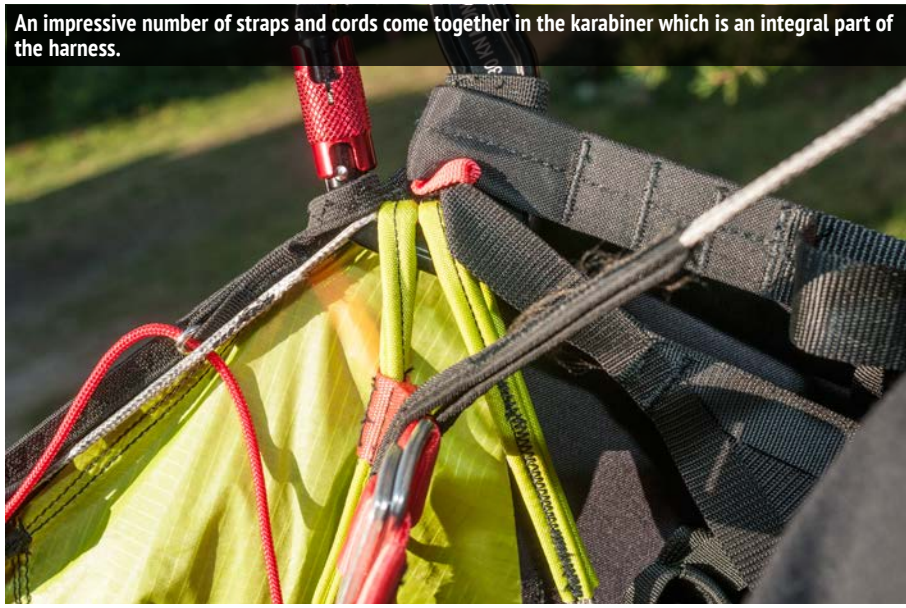
In the air, the airbag takes on an impressive volume, but as Skywalk quite rightly said, this isn't necessarily a disadvantage. The absolute volume and the surface hardly count, just its profile. The long raindrop-shaped trailing edge on the pilot's back contributes without a doubt, to the low drag coefficient despite appearing bulky.
As for the drag coefficient, Skywalk claim Cw=0.27, compared to 0.31 in another supine harness, the Range 2. The increase in glide angle will be in the order of 0.4 points for an intermediate wing.

The level of comfort is very good, only just below that of a more rigid padded harness. It can therefore be used for clocking up the miles. In fact, Armin Harich did 300 km on it. It is possible to pilot through the harness, despite the absence of both a board and leg loops.

The lightweight is also an element which contributes to security. As a general rule, the less moving weight there is, the better it is when there is a mishap.



The openings serve to catch the air.



An impressive number of straps and cords come together in the karabiner which is an integral part of the harness.

The only criticism: the little buckles are not very practical to open and close.

In the base of the cocoon, fine lines are used, amongst other things, for the accelerator.

Photos: Burkhardt

Lots of stitching judiciously placed, together with the straps, creates a complex system which guarantees that this 'bag of washing' takes on the correct shape. The seat of the Rangeair allows it to be flown in a sitting up position as well, if the pilot wants: an important advantage in certain situations requiring good downwards visibility, for example when landing out.

Lots of stitching judiciously placed, together with the straps, creates a complex system which guarantees that this 'bag of washing' takes on the correct shape. The seat of the Rangeair allows it to be flown in a sitting up position as well, if the pilot wants: an important advantage in certain situations requiring good downwards visibility, for example when landing out. At the same time, we know that the very thin layers of extra foam found in some harnesses are virtually useless. There is no miracle back protection material. Volume is what's needed, whether made of very thick foam or a cushion of air.

The reserve container is fixed to the waist strap on the Rangeair with a hang point on the main karabiners. It's a very good option from a security point of view, as long as you don't forget to attach it when getting ready or, alternatively, leave it connected and just slide into the harness.

In summary, this harness doesn't look up to much when you take it out of its little bag which is light and easy to carry but, once metamorphosed, it really has everything that you would expect of a 'proper' harnes.

Available in three sizes.
S : pilot < 170 cm, weight 1,9 kg,
M : pilot 170 cm - 183 cm, weight 2,1 kg,
L : pilot > 182 cm, weight 2,3 kg,
Price: 990€.
Video in German:
https://vimeo.com/128198495
For more information:
skywalk.info/en/products/range-air/

Photos: Burkhardt

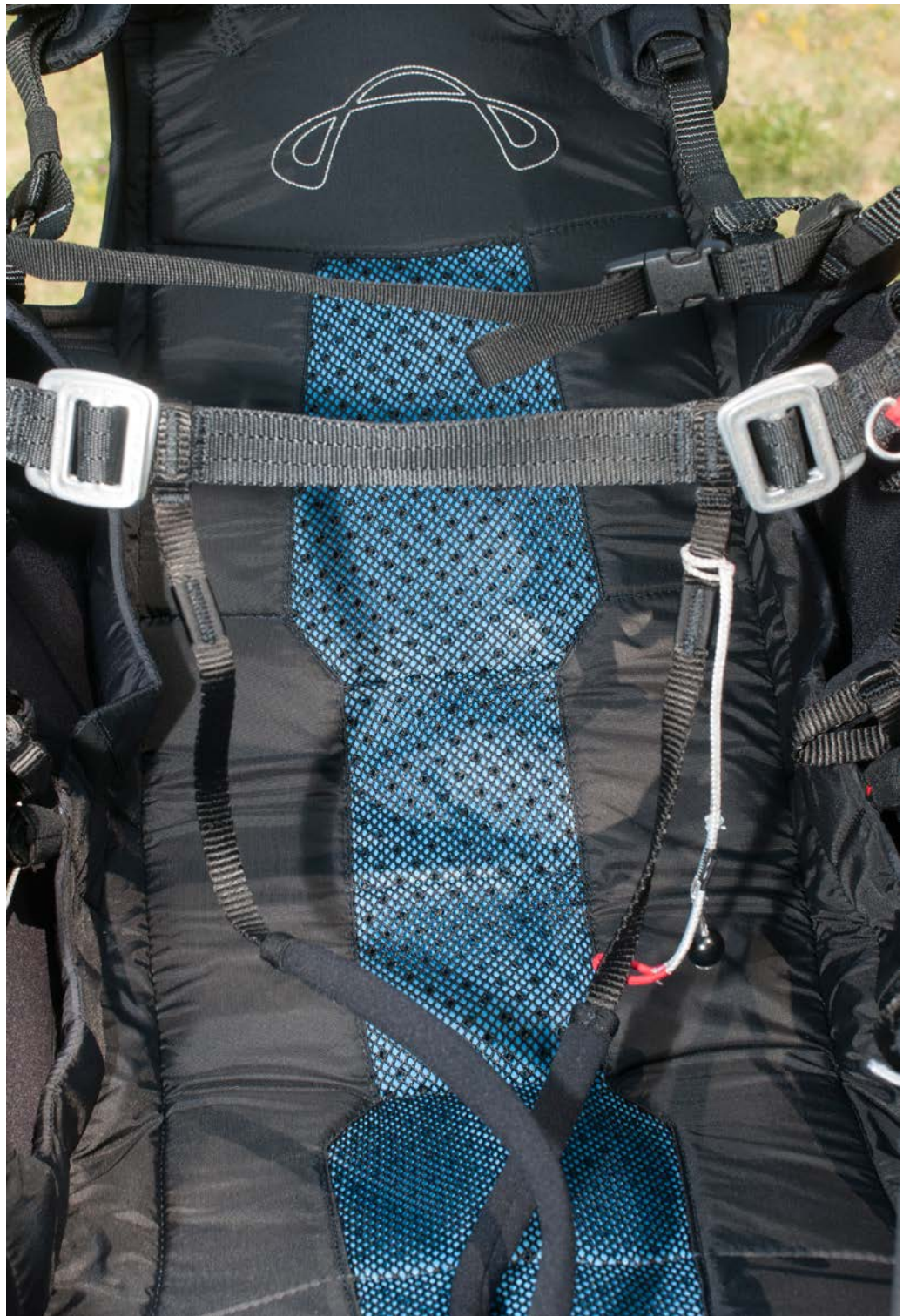
Above, integrated rods help give it the correct shape.
Below, the result in the air, perfectly inflated, a very aerodynamic cocoon harness with protection. Here in the harness, one of the cofounders of Skywalk, Arne Wehrlin.

Photo: Skywalk

TEST

THE ADVANCE LIGHTNESS 2

The Lightness 2 is Advance's very light weight, top of the range, cocoon harness, weighing only 3 kg.



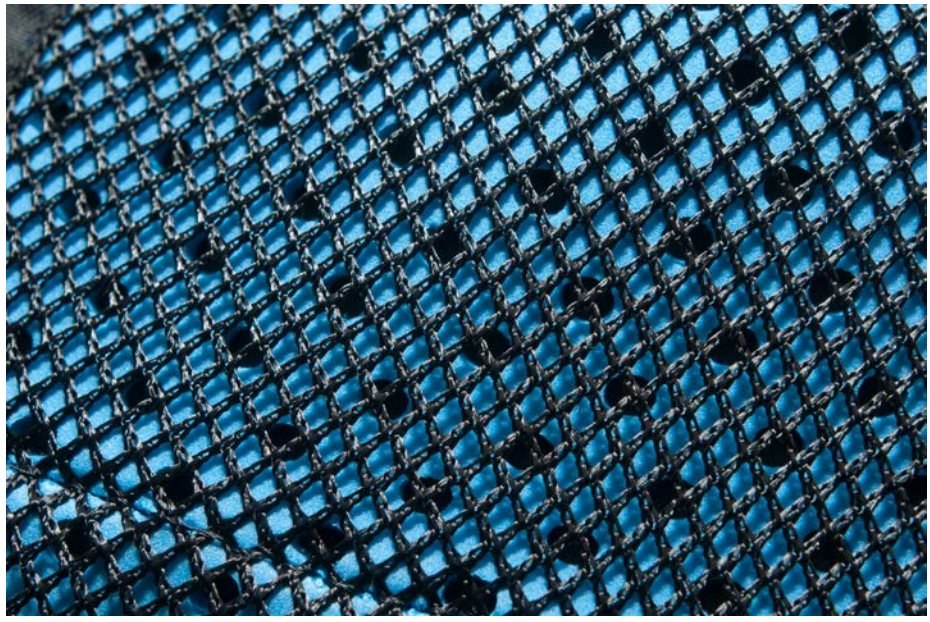
A complete and very ergonomic sit in pod. It is amazing how sophisticated the construction of this harness is, whilst respecting the label 'light' in the specifications, barely 3kg.

The compression bag is optimal for the combination of Lightness 2 with a mountain wing.
Middle: this fully functional harness weighs less than 3kg, despite its design being generous in size and detail, thanks to well chosen materials.
Below: the foam which makes the back comfortable isn't part of the protection measured during the certification test.

Photos: Burkhardt

The first Lightness model was one of the first harnesses to discard the board and introduce the hammock principal into Advance harnesses. The back protection in the first version wasn't certified.

The Lightness 2, launched a year ago at Saint Hilaire, aimed to follow the same principal but in a certified model. Despite its small size, the protection under the seat got, with 43 G, a value within the norms.



Advance have also put the reserve compartment in the back. It's a choice that some pilots don't like, preferring the ventral position.

The central part of this harness is the padded pod, a gem to touch and behold. Harmonious shapes, very nicely finished detail and, above all, very comfortable.

It is very efficient to fly, the pilot being surrounded by the pod which transmits good, direct feedback about the movement of the centre of gravity.

On the other hand, the harness must be correctly adjusted; otherwise it can be difficult for the pilot to get into the pod after take off.

Moreover Advance warn that this harness won't work if the pilot doesn't put his legs into the cocoon to push. Actually, flying sitting upright is very uncomfortable.

This is a small point against it. It is an advantage to be able to fly sitting normally, a possibility offered by some harnesses like the Skywalk Rangeair, especially when doing a technical landing in a demanding place.

Photos: Burkhardt

Above: the reserve is in the back. An increasingly common position but open to discussion.

Above right: the buckles to adjust it show the Swiss manufacturer's indisputable love of putting the finishing touch to every detail.

Middle: Perfect adjustment of the detachable pod is paramount. It is done with knots that the pilot moves just once along these lines. During our test, the latter got damaged during the handling necessary to adjust them. Since then, Advance have made some modifications.

Right: The first system to close the cocoon used a karabiner. It was replaced by this lighter, more efficient system.

Everything stays perfectly in shape, for example this storage space for bags under the harness. Just behind it is the foam protection which enabled it to be certified LTF 91/09.

Below, hidden behind the blade of grass caught in the GoPro, the harness, as you would expect, is very comfortable and the handling is efficient and direct..

The harness only needs to be correctly adjusted once thanks to the lines and the sliding knots like on a kite.

The cocoon is detachable, a system offered by more and more harnesses of this type. It's a good idea as this part gets dirty quickly, and even wears out.

The accelerator on the Lightness 2 is made up of fine lines. They can be accidentally pulled a few centimetres whilst getting into the cocoon, but it isn't a problem for a pilot that uses this type of harness.

In summary, the Lightness 2 is impressive due to its light weight of 3kg, compared to the generous amount of foam and thick material used to make the pod. The volume of storage space is enough and on a par with their direct competitor, the Delight 2, by Supair.

The Lightness is however surprisingly compact and packs away easily with a lightweight wing into the compression bag delivered with it.
As a consequence, the price is 1460€, which is top of the range too.

The Advance Lightness 2
Available in 3 sizes
Price: 1460€ with the compression sack.
www.advance.ch

Photos: Burkhardt

TEST

THE SUPAIR DELIGHT 2

The Delight 2 replaces the Delight in the Supair catalogue. Bertrand Chol (Bornes to Fly) summarizes the improvements.

Photo: Supair

Photo: Supair

Photos: Burkhardt

A buckle system with two buckles at the thighs and an anti-forget T for the waist. Worth noting, the radio pocket which has been included, a popular little detail.

The Delight and its bag are key products in their categories combining weight, comfort and durability. In 2015, the manufacturer from Annecy renewed interest in these two products by launching the Delight 2 and its bag, the Trek.

When you unpack the harness, there is no doubt that it's a Delight. The manufacturer's colours, green and black have been judiciously used. The Dyneema Ripstop and the aluminium 25 mm buckles are also there along with a 15 cm thick Bumpair to provide back protection. These choices have proved their worth and guarantee good durability.

Although the chassis has been slightly modified, the concept remains the same with a very deep seat allowing piloting in an almost sitting position. The reserve is in the back. The storage pocket in the back has lots of space and is complemented by a space under the board allowing room for 2-3 litres extra.

The instrument panel is removable and is attached by Velcro onto the ventral storage bag.

The 15 cm thick Bumpair protection ensures the EN/LTF certification of this multipurpose harness. The reserve is in the back and the container flaps are clearly marked. The Harken pulleys ensure the transfer of forces applied through the foot accelerator. The latter is less spartan than on other harnesses of this type. Comfort and ease of use take precedent over 'gramme pinching'.

A magnet closes the leg cover, making the cocoon totally airtight. It is possible to adjust the comfort and waist straps in flight. The cockpit sits horizontally leaving access to the storage space whilst flying. The visibility of the instruments is a lot better than on the previous version.

In thermals the harness doesn't transmit parasitic movement and stays very solid in roll and yaw. It is part of the group of harnesses which are pretty stable whilst still allowing the pilot to apply a lot of weightshift. The removable board will be liked by pilots who are used to this type of seat. Several hours of flight proves the overall comfort of this harness.

At 3.6 kg on the scales, the Delight 2 is a bit overweight. It's heavier than its predecessor, but has gained in flexibility. It compliments the XA13 perfectly, which is designed for the purists of raw hike and fly.

On the Delight 2, the level of comfort and protection is sufficient for doing ambitious XCs whilst leaving enough mobility to access a remote hill on foot. It is good for 90% of XC enthusiasts whether walkers or just lazy!

Photos: Burkhardt

The back pocket is nicely finished off too. This polyvalent harness includes everything and is correctly priced too: 1180 €. Below: in a classic sitting position.

Photo: Burkhardt

THE SUPAIR DELIGHT 2

'A lightweight XC hammock style harness for mountain flying.'
Weight: 3660 g
Sizes: S, M, L
Price: 1180 €
http://supair.com/en.html

Photo: Supair

Photo: Jérôme Maupoint / GIN

COCOON ADVICE

Photo: Sascha Burkhardt

Some tips for pilots moving onto a cocoon harness.

By Pascal Kreyder

GETTING IN

To get into a cocoon harness, as soon as the wing takes up the load, stay in the sitting position, almost vertical, so that you can take control if there is a collapse.

As soon as you are high enough, and more than 10 metres above the ground, lean forward and push your chest against the risers. With the point of your foot, catch hold of the lowest open part of your cocoon. By moving your leg and foot pull up your cocoon and put your second foot in.

.

Sometimes you can catch the accelerator at the same time as the tip of the cocoon. This isn't a big problem. Depending on how it is set, you'll accelerate a few centimetres for a fraction of a second.

Once the cocoon is in place, lift your bottom to get yourself correctly positioned without creases behind your back and check that everything is correctly adjusted. When stretching yourself out fully, the cocoon should hold you by the shoulders and your feet.

ADJUSTMENTS

In flight, the cocoon should be tilted parallel to your glide angle. As far as I am concerned, I try to lean at about a glide angle of 8 or 9. Make sure you can't feel anything hard under your thighs so that you'll have optimum comfort during transitions.

RISKS

The main risk is forgetting to attach yourself, especially if you have a cockpit which hides the leg straps. Never forget to do your pre-flight checks. If you do get distracted by another pilot, start your pre-flight checks again from the beginning.

REFLEX IN CASE OF A COLLAPSE.

A cocoon has a lateral wind resistance which is greater than in a normal harness. Moreover, when there is a twist, the supine position will increase the inertia of your body. Therefore it is essential to have good reflexes in case there is an incident whilst flying.

Lift yourself immediately back into a sitting position, with your legs folded. This reflex will lessen the difficulties of flying from a supine position.

PERSONAL REGRETS

My biggest regret is that the new lightweight harnesses from the big manufacturers place the reserve in the back which limits the back protection at this point by several centimetres.

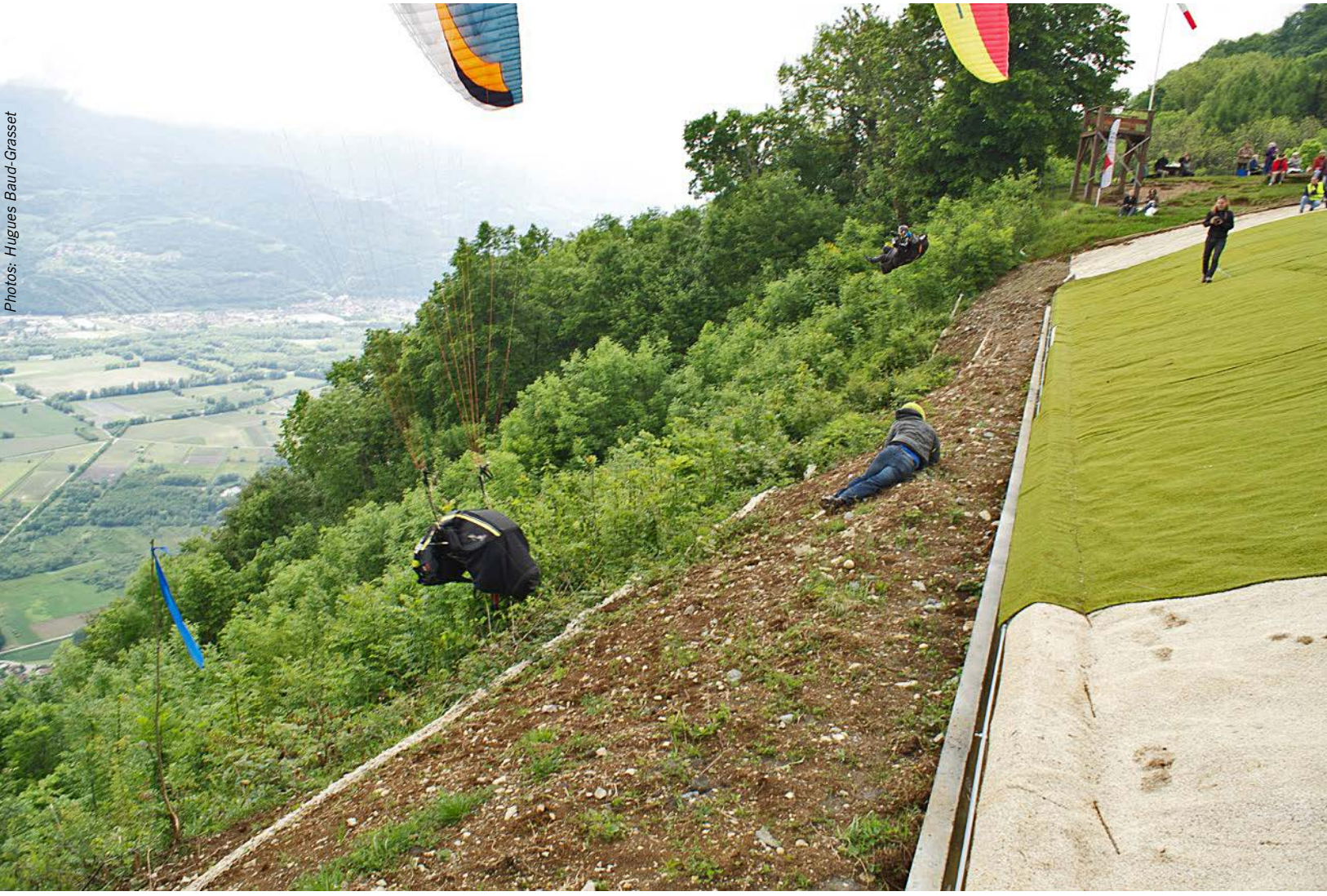
Given that 95% of accidents at landing are on the back or on the side of the back, I don't understand the choice of manufacturers and the certification houses, because their simulated falls are onto the bottom rather than the back.

LONG LIVE ANTI-FORGET SYSTEMS FOR COCOON HARNESSES

Here's a little reminder to show the importance of preflight checks and the presence of anti-forget systems in cocoon harnesses.

During a leg of the Paragliding World Cup in 2014 at the Saint Hilaire take-off, a competitor forgot to do one of his preflight checks correctly. The pilot closed his cocoon without doing up the thigh straps before taking off; he remained on the ground, whilst his wing took off on its own into the competition. It's a stark example which clearly reminds us that forgetting to clip in doesn't just happen to other people, it even happens to the best of us. Unfortunately there are cases where it didn't end so well. With cocoon harnesses, the risk is greater because once the cockpit part is closed the pilot feels 'properly held in', even if the leg straps are still undone.

A similar situation can happen with a conventional harness and a waist reserve/cockpit. On recent cocoon harnesses, safety systems which are supposed to avoid this problem are becoming more widespread, but they aren't a 100% guarantee.



Photos: Hugues Baud-Grasset

No anti-forget system: after a first aborted launch, the pilot didn't redo up his leg straps. Fortunately, it was during take off that the wing jettisoned the pilot...

...took off on its own...

...and continued thus for quite a few minutes!

TEST

NIVIUK KONVERS

Reversible harnesses are the current big story, despite certain criticisms along the lines of 'a harness which transforms into a backpack can only be a poor compromise'. The Konvers is a reversible harness which has been put to the test in both roles.

Photo: Niviuk

The same comfortable foam everywhere: in backpack configuration...

... and as a harness. Note the thickness of the seat.

Photos: Véronique Burkhardt

Photo: Niviuk

Photo: Véronique Burkhardt

The challenge for any reversible harness is to be both efficient as a back pack and as a harness.

The Konvers is supposed to, according to Niviuk, 'be a reversible harness suitable for all pilots and for all types of flying, convertible into a large rucksack, very light, comfortable and versatile.' From a versatility and comfort point of view there is no doubt that the specifications are fully realized.On the other hand, from a weight point of view, if you include the foot rest delivered with the series model, it weighs about 5kg on our scales. So it's not really in the very light category! But it's no doubt the manufacturer's choice to favour comfort and efficiency. The big board in the base of the seat (40cm wide by 47 cm deep) is also included in the weight of the harness.

The choice of materials also plays a role: Strong components and fabric are no doubt very resistant to the tests of time. The adjustments are easy and the harness adapts fairly easily to different morphologies. Once again, the versatility promised is there.

Photo: Niviuk

Photo: Véronique Burkhardt

For safety, the harness has a very bulky airbag, which also fits high up on the back.

This is a good idea because, even if the certification only tests the shock to the lower back in the sitting position, the reality on the ground is very different. Lots of falls are onto the back, right where the Konvers seems to offer good protection.

The buckles on the Konvers correspond to a 'Get-Up' type system: only two buckles, easy to do up and which allow lots of freedom for leg movement whilst running to take off. Moreover, when the pilot ground-handles in strong wind, the buckle system on the Konvers is less bothersome than on lots of other harnesses of this type.

Right: the foot rest delivered with the production version of the harness; a fairly unusual offer for this type of product. Below: the Konvers is equipped with 'Get-Up' buckles, so it does up with only two buckles at waist level.

Photo: Niviuk

It is very easy to slide into the harness at take-off; the foot rest isn't necessary for that. It is, on the other hand, very useful during long flights, another versatile aspect.

Piloting through the harness is classic and efficient. The comfort in flight compensates for the extra kilo to carry when using it for hike and fly, possible thanks to the undeniably comfortable rucksack once the harness has been transformed.

The bag includes numerous very useful pockets for storing your phone for example, which remain easily accessible as you walk up.

In summary, this harness really is very versatile and keeps all its promises, with a small compromise necessary as far as weight is concerned. It seems very strong and should last well too.

Photo: Véronique Burkhardt

The Niviuk Konvers

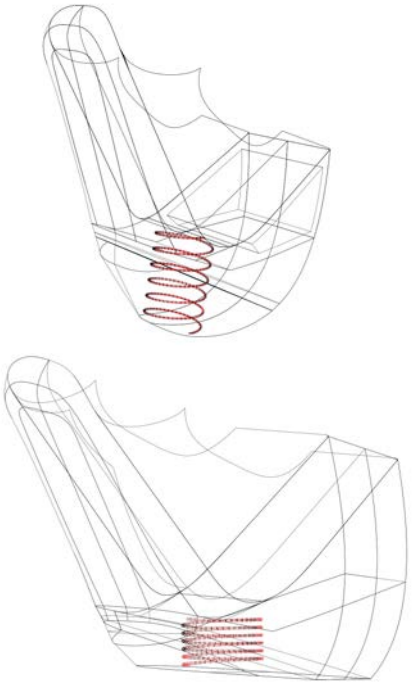
Available in three sizes (pilot height):
S (155-169cm)
M (165-180cm)
L (175-195cm)
Price: 789€
www.niviuk.com

Photo: Burkhardt

TEST

WOODY VALLEY WANI / WANI LIGHT

With the Wani, Woody Valley have already brought out a very light, reversible, versatile harness weighing 4.2 kg on our scales. Now its little sister the Wani light beats all the records for a fully reversible harness: 2.7 kg.



On their Haska harness (diagrams on the left), Woody Valley used for the first time a spring to preinflate the airbag at take-off. On the Wani they used the same device: it is clear in the photos above that the protector is already operational before take off. On the Wani light, there isn't a spring; it was sacrificed in preference to weight and volume. On the other hand, even on the Wani light, there is a Nitinol wire to make the bottom of the airbag rigid (photo below), thus giving it a minimum amount of preinflation. The results of the shock absorption, once the airbag is inflated, are identical according to Woody Valley.

The Wani about which we've already published an initial review in our article, 'Light 2014', is a reversible harness, a great example of the know how of Woody Valley, the company founded by Simone Caldana in 1985.

The quality of manufacture is obviously based on lots of experience over the last thirty years. The Wani also includes several interesting innovations.

For example, it's a reversible harness with an integrated bag. On a classic reversible harness, the flap which closes the back pocket is also the flap which closes the back pack when it is being carried on the back.

On the Wani, Woody Valley have integrated an entire panel of material which transforms into a backpack thus freeing the manufacturer from a certain number of design constraints which affected both the harness and the backpack.

The second important point concerns the spring under the seat on the Wani. This spring preinflates the airbag during take off so it is operational before flying. This is a very good initiative, because one of the big disadvantages of airbags is their lack of efficiency during take off, yet this is a time when there are a high number of accidents.

Photos: Burkhardt

The Wani and the Wani light are both equipped with an innovative system for a reversible harness: the backpack isn't made from the same material as the harness, but from a piece of extra material. This allows Woody Valley to avoid the constraints that come from having to compromise.

No sacrifices were made as far as the 'services' were concerned on the Wani light. For example, there is also a slot for a bladder tube.

In a comparison of reversible harnesses, the German Federation, which is normally fairly critical of reversible harnesses, didn't hesitate to underline the very good level of safety offered by the Wani.

Since then, the Wani has been a great success with pilots. It's a very practical harness, efficient and comfortable for hike and fly with lots of pockets, fastenings and useful details for this purpose and with a weight of only 4.2 kg.

The only criticism was of the 'Get-Up' buckle system on the model tested. In fact Woody Valley offer it with a choice of Get-Up or T-Lock buckles.

The difference: T-Lock are classic buckles at thigh level, combined with an anti forget buckle in a T shape on the chest strap. The Get-Up system, which is increasingly popular with all the manufacturers, comprises only two buckles at waist level, which leaves the legs free during take off and in the air.

On the other hand, as far as the fastenings are concerned, the buckles, although simpler, are light and efficient.

A disadvantage with all the Get-Up systems is that the straps pinch when ground handling.

The Wani has met well deserved success; it's a very flexible and efficient harness.

On the other hand, for male pilots who enjoy ground handling in strong wind, most of the Get-Up systems can be a bit uncomfortable. For ground handling enthusiasts, it would therefore be better to opt for a classic Wani buckle system.

THE WANI LIGHT

As the Get-Up system is lighter, it is the only one offered with the 'Light' version of the Wani. At 2.6 kg, it is obviously an ideal reversible harness for hike and fly. The Wani Light has taken lots of details and features from the classic Wani with a notable exception, the preinflation spring isn't there, for reasons of volume and weight. In its place, a Nitinol wire does a fairly efficient job of keeping the bottom of the airbag rigid. Once in the air, the internal pressure very quickly takes over.

Another difference: on the Wani Light the housing for the reserve is closed by a zip system and not by flaps of material. The zip opens at the slightest prompt. The same system is very often used for the sheaths on reserve risers. Apart from that, there is no difference as far as functionality and comfort are concerned. On the contrary, the Light, being a little bit more flexible at every level, appears to be at least as comfortable, indeed a bit more so, than the classic. It is equally efficient to fly which is logical; the basic geometry is the same.

The saving in weight has therefore essentially been made in the width of some of the straps and the choice of materials. Everything superfluous has been eliminated. The result is an even better harness which, apart from the absence of the preinflation spring, doesn't have any drawbacks but brings a weight gain of 1.5 kg in size L. As an aside, Woody Valley's size L often corresponds to M elsewhere.

Above: no cutting corners as far as comfort is concerned, nice foam in the back of the back pack.

Middle: the materials used are thinner but don't seem weaker.

Below: the Wani and the Wani light side by side.

Wani light

One last little drawback: the pilot has to put his reserve in the container which comes with the harness; it isn't possible to use a different one. But this is only a detail which affects pilots who change harnesses depending on the type of flying that day.

In summary, the excellent Wani still has its place, even if the light version tops the sales..

Wani light

WHY THE NAME WOODY VALLEY?
A little anecdote: The name Woody Valley comes from a flying site above a valley where Woody, one of the pilot's loyal dogs, was buried after many years by his master side.. Woody was known by all the pilots because, whilst his hang glider master was in the air, the dog would go down all by himself from the take-off to the landing field and wait loyally there for the pilot's return. In honour of the famous dog, the site, the hang gliding club and finally also Simone Caldana's company, took on the name.

The Woody Valley Wani
Three sizes: M, L, XL
With the T-Lock buckle system: 909€
With the Get-Up buckle system: 909€

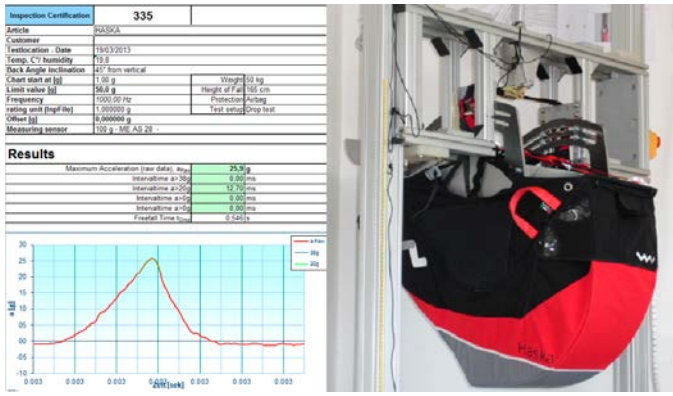
Woody Valley Wani light
Three sizes M, L, XL
With the Get-Up buckle system: 799€

www.woodyvalley.com

MORE ON

SAFETY

In a future article, we'll show how harness safety has evolved with hybrid protection foam bags, air bags and the use of rods and springs as well as new testing procedures. Some manufacturers, like Woody Valley for example, go well beyond the EN/LTF requirements and simulate falls onto the back (right, with the Haska harness).



AND YET MORE
SPECIALIST HARNESSES.

The Woody Valley Passenger

In a future article we'll also publish tests on several harnesses specially designed for tandems

The Woody Valley Passenger, for example, can be used for passengers of almost any size, and seemed to us to be particularly well designed for both leisure and professional use.

A small detail that we really appreciated: the handles to hold onto the passenger at take off, or later for them to tuck their hands in.

Equally appreciated: the easily adjustable straps to adapt it for different sizes of passenger, a cockpit on the passenger's back to stick instruments onto, thick protection on the harness against wear on the lower part and obviously an airbag adapted for a passenger.

It's very easy to fold flat and its weight is fairly light at 2.85 kg on our scales (less than the 3.1 kg advertised by the manufacturer!).

Price: 499€
www.woodyvalley.com

Photos: Burkhardt

Supair Loustic
Supair Kinder

The Loustic is designed for children of 3-7 years old, although we got the impression that it would be a bit tight for kids over 6 years old. It has a special Bumpair protector.

Price: 250€.
Weight: 1380 g.

The Kinder is a harness for 8 to 13 year olds (115-160 cm). It weighs 2100 g and is a really comfortable little harness with a 15 cm thick Bumpair foam bag.

Price: 295€
http://supair.com/en.html

Supair Kinder

Supair Loustic

THOR Polini.
A winning family.

1°

THOR 130
1 TIME WORLD CHAMPION
2014

1°

THOR 200 EVO
2 TIME WORLD CHAMPION
2014

1°

THOR 250
2 TIME WORLD CHAMPION
2 TIME EUROPEAN CHAMPION
2014

The Polini Thor 130,200, 250 range scores a series of successes, one after other. Designed for all flight requirements, they are powerful technological real jewels, reliable performance, ready to defy the skies of the world and to win all the hearts of the enthusiasts. Thor by Polini, a large family born to win with you.

www.polini.com

polini® motori
trasforma il meglio in massimo

HANGPOINTS:
THE HIGHS AND LOWS

The type of hang points changes everything, especially on a paramotor. Here's a little reminder about the existing systems and what's new.

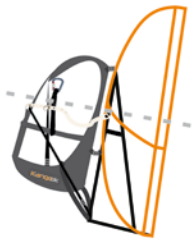
At the beginning, on paramotors, the hang points were uniformly high. The configuration was very stable, but piloting through the harness was barely possible. The manufacturer PAP was the first to offer low swing arms, which were more sensitive and which, being more mobile, gave handling close to free flying.

It was only then that acrobatics on a paramotor became possible with pioneers like the PAP pilot Mathieu Rouannet. Since then, nearly all the manufacturers now use them and often offer several systems to choose from, from the more stable for beginners to more sensitive for experienced pilots.

Here are some examples.

HANG POINTS AND AXES

In this table, David Rouault from Kangook summarises the different hang points offered by this manufacturer whose catalogue offers a wide choice. It shows nearly all the hang points on the market.
Another interesting detail in the table: the grey dotted line which represents the axis of force of the blade. This definitely plays a role when the revs change. For example, if the axis passes above the pilot's hang points, an increase in power would tend to throw the pilot forward.

Attachment systems	Fixed arms (J-bar)	Intermediate arms	Low swing arms	Mobile swan neck arms	High swing arms	High fixed arms
						
Stability	++	++	+	+++	+++	+++
Easy Mount	+++	++	+	++	+	++
Harness Entry	+++	++	++	+++	+	+++
Beginners	+++	++	+	+++	+++	+++
Experienced pilots	+	+	+++	++	++	+
Weight shift capabilities	+	++	+++	++	+	+
Mitigating torque effect	++	++	+	++	+++	+++
Use with trikes	+++	++	+	++	+++	+++
Compatible with Tandem-Rollbar	+	++	+	+++	+++	++
Weight of kit	0,6 kg	1,0 kg	1,2 kg	1,6 kg	1,5 kg	1,0 kg

Photos: Véronique Burkhardt

Some examples of hang points

1. PAP motors FTR (Germany) style Swing arms

2+3. the hybrid arms from Nirvana, these are high hang points with little swing arms.

4. high swing arms

Left picture: Kangook

The father of all modern hang points: PAP's low swing arms.

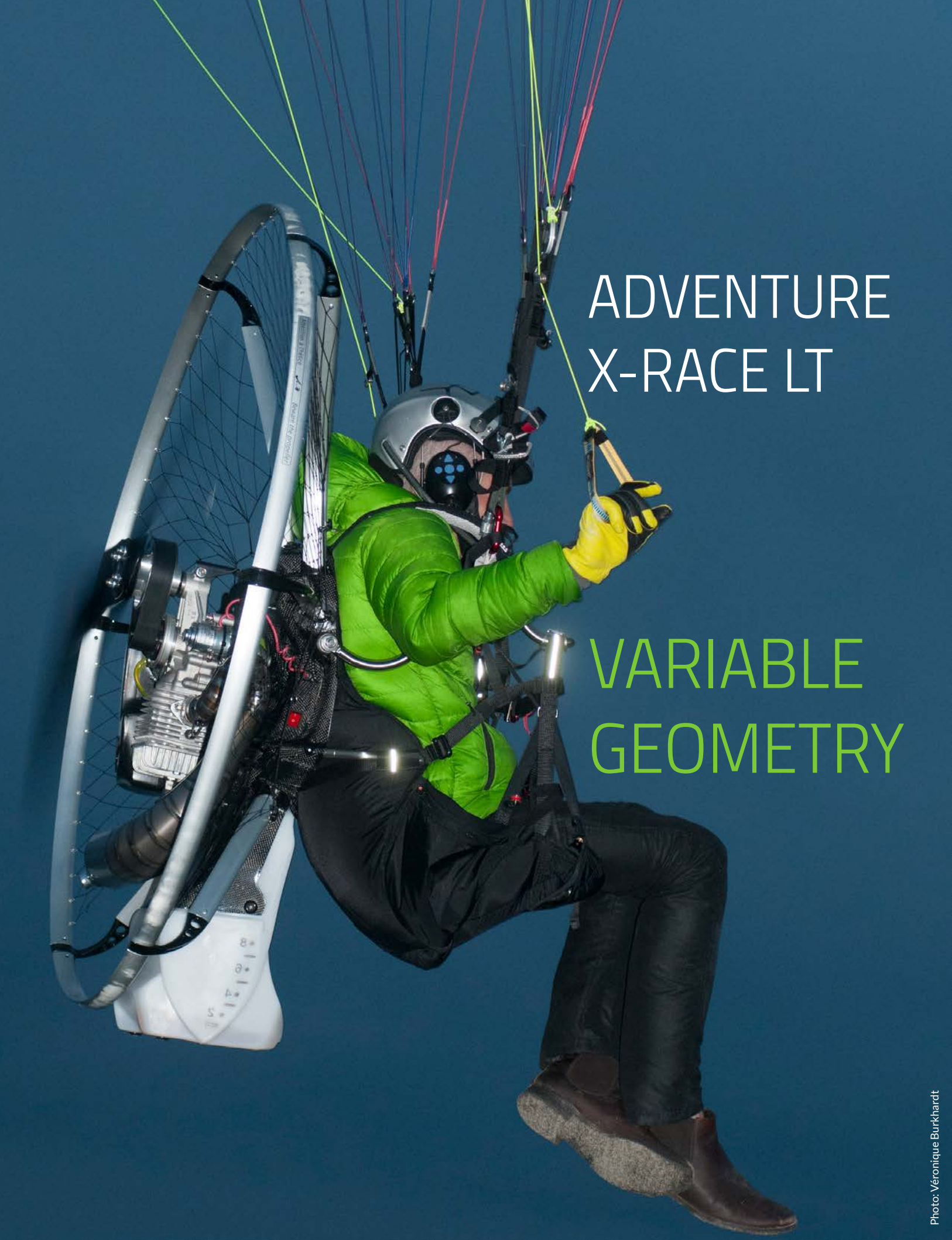
Often considered as a very good compromise, Swan necks are being offered by more and more manufacturers.

On these bars from FTR, you can clearly see the different holes allowing the hang point to be adapted to the pilot's weight. The heavier he is, the further forward the attachment of the risers will be on the bar.

The lateral offset serves to compensate for the torque of the motor.

On this Nirvana trike, it's the diagonal strap which serves to compensate for the torque of the motor.

There are two positions depending on the weight of the pilot on this Adventure machine.



ADVENTURE X-RACE LT

VARIABLE GEOMETRY

Photo: Véronique Burkhardt

Photos: Burkhardt

LT ADAPTS TO THE PILOT

With the X-Race LT launched at the 2014 Coupe Icare, Adventure had on offer several new ideas.

This is the first time that this manufacturer has really got into 'light' and it was a real success: only 23kg for a motorized Tiger 160. You'll be able to read the full test in our next 'Light' article which will appear at the end of the summer.

With this machine, another innovation made its debut: hang points adapted to the level of the pilot. The rods are always mobile both upwards and downwards. Given their geometry and their height, the result is very efficient piloting through the harness, whilst being sufficiently stable for low air time pilots.

Then, later on, when the pilot wants to increase the sensitivity, all he needs to do is turn a washer in the attachment system so that the rods become freer laterally, so that they can move both left and right, and move together and further apart.

The result: the machine is a lot more sensitive to weightshift. Obviously too much for a beginner, but enough to have fun with when precision flying. We really noticed the difference during a 'before' and 'after' test.

The modification was done in ten minutes, so it is totally possible to adapt the machine to the conditions on the day and to return to a blocked system when the conditions are going to be turbulent.
www.paramoteur.com/en

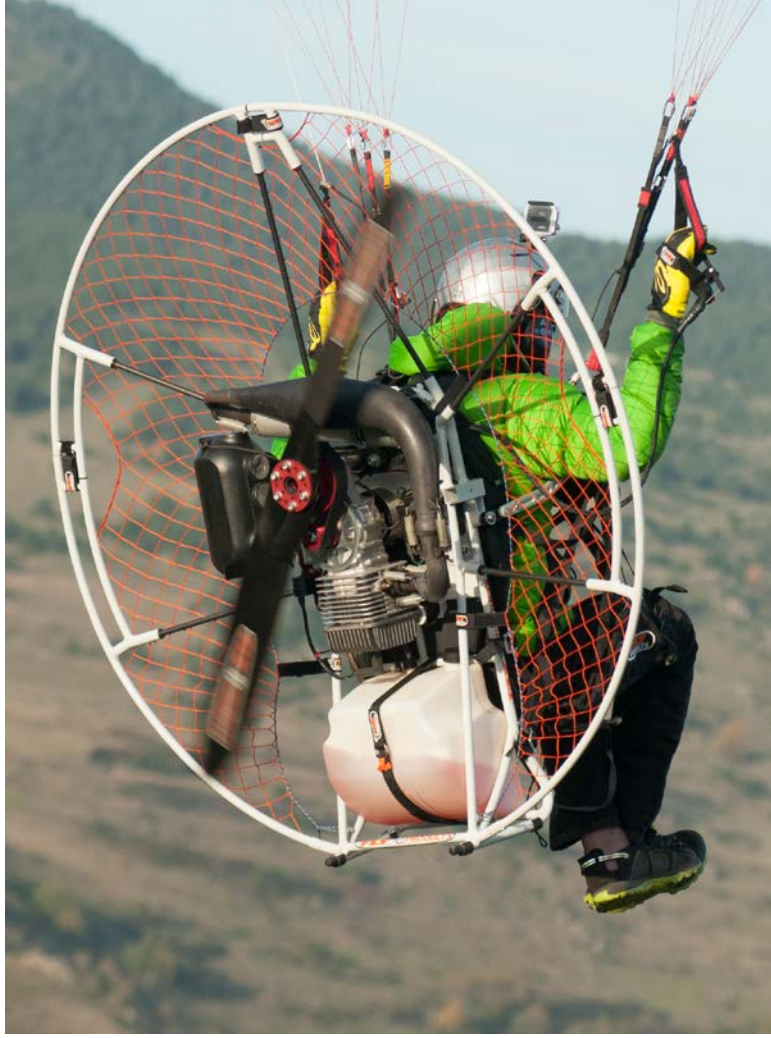
Photo: Véronique Burkhardt Pilote: Sascha Burkhardt

FLY PRODUCTS : A LARGE CHOICE OF ATTACHMENTS

The Italian manufacturer Fly Products offers his machines with several different attachments. In the picture on the left, we set up as a demonstration two of the systems available on the same harness: medium fixed rods, with hang points from the harness on the shoulder strap and low mobile swing arms with attachments onto the latter. You can really see the difference even just in terms of height.

Since last year Fly Products have had an improved version of the low swing arm system on offer.
Bottom left, the old system with two straps, forming a triangle with the karabiner.
Right, the ASC system: Thanks to a rigid component which pivots freely, the hang point becomes mobile forwards and backwards too.
This further improves the behaviour at take off and manoeuvrability in the air.

Photos: Véronique Burkhardt



Photos: Véronique Burkhardt

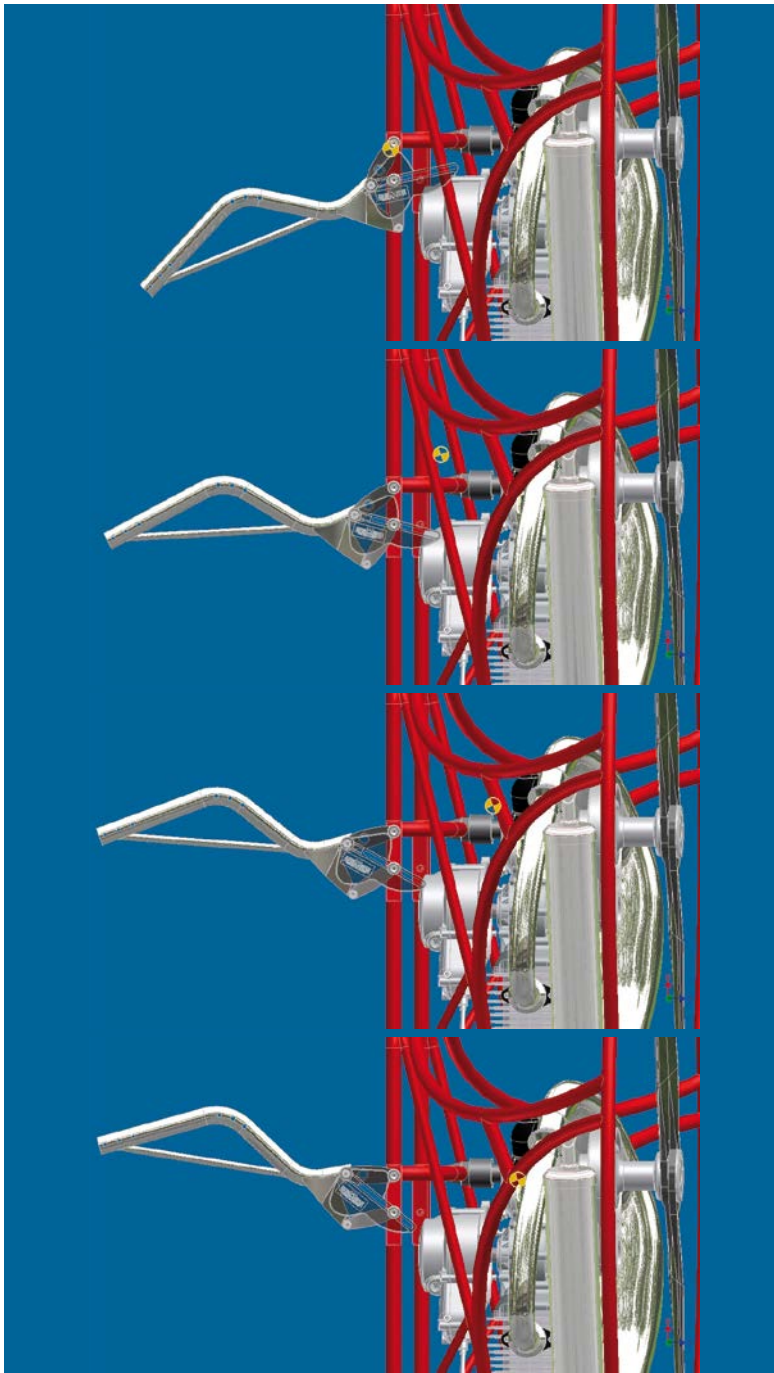
The Fly Products S4 Rider is on offer with a choice of low or high swing arms. For the cage, the pilot can also choose one with a single hoop (right) or a double hoop (left).

For an experienced pilot, the simple cage is preferable, as there is a difference of more than 1.1 kg (the machine in the picture on the left weighs 30.84 kg and the one on the right weighs 29.74 kg).

The Rider S4 therefore offers all the power and reliability of the Simonini Mini 2 in a fairly light but still surprisingly solid cage. But it isn't the only advantage of the simple cage. It also folds in a much more compact manner, and is very practical for travelling.

In both versions, the bars on the cage are carbon.
http://www.flyproducts.it/en.html

Photos: Véronique Burkhardt



FRESH BREEZE: SCHNAPPMATIK

Top left, the classic fixed rods that Fresh Breeze have offered for a long time as the only attachment.

As always, the manufacturer waited a long time before introducing a new system. It needed to be something that worked correctly.
The Schnappmatik system in the photo top right and in the diagrams on the right, shows an original and fairly complex movement.

The point of rotation of the rods isn't fixed, but moves as a function of the angle. At take-off, with the rods pointing downwards, this point (yellow in the diagrams) is near the pilot. The weight of the motor keeps the pilot in an upright position

In the air, when the pilot sits down, the rods point forwards and the point of rotation of the system moves towards the motor, superimposing on itself the point of gravity of the motor. The result is increased comfort for the pilot.

During our tests, we noticed that the system seemed to be fairly efficient. The stability is good and the handling by weightshift equally good, all whilst remaining suitable for less experienced pilots.

TEST:

KANGOOK TREKK

CANADIAN COMBINATIONS

From his stronghold in Quebec, the Canadian manufacturer Kangook is getting ready to conquer Europe as well. One of their strengths is that this innovative manufacturer provides numerous combinations of cages, motors and attachments.

By Sascha Burkhardt

Photo: Véronique Burkhardt

The Trekk chassis can easily be dismantled into two pieces, a lower part with the tank (which is also detachable) and an upper part with the motor. When putting it back together again, the pieces reassemble and are solidly fixed together thanks to a system of bolts with a tensor similar to the ones used to fasten a bicycle wheel.

The orange piece marked 'Trekk' is part of the collapsible cage, it isn't used with the classic cage.

Below: The Kangook Trekk can be ordered with this Supair harness which includes a large pocket under the seat in addition to the generous side pockets.

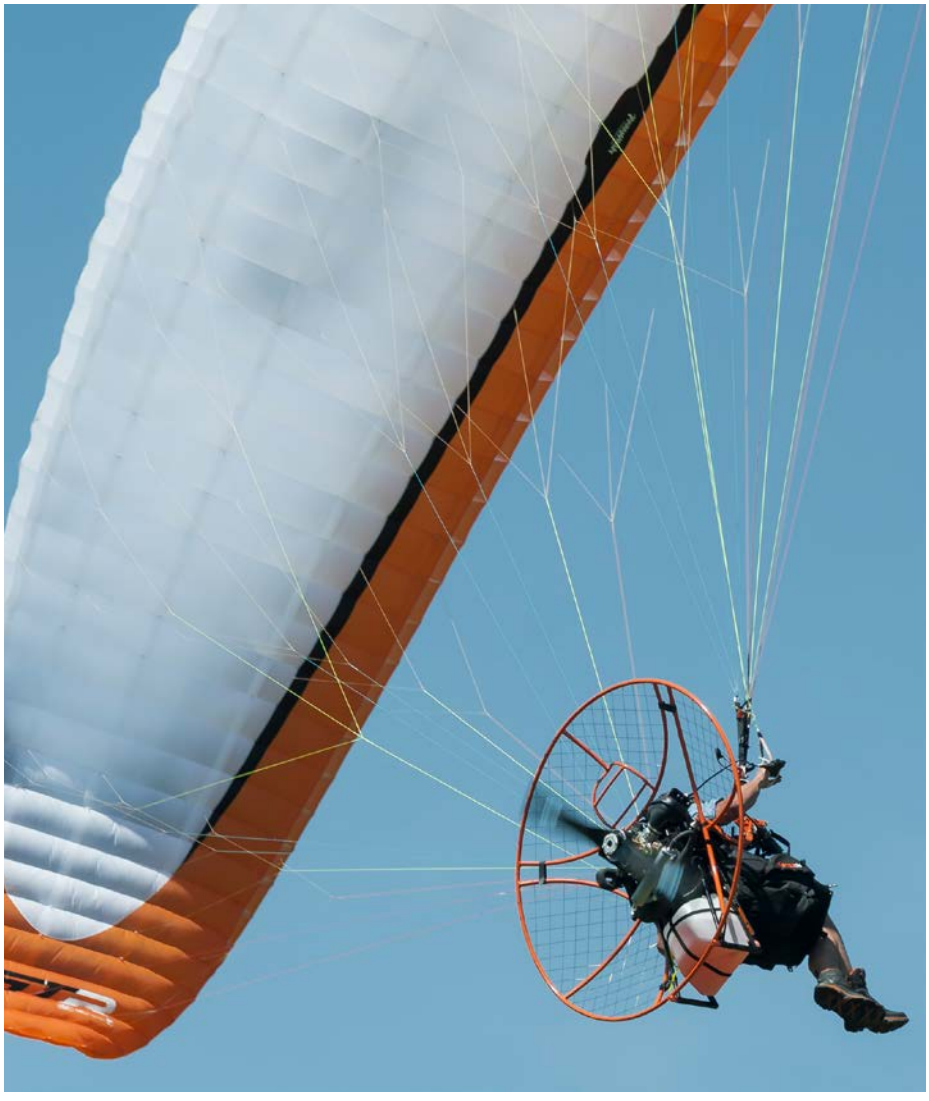
The company, Kangook-RSUltra, was founded by two Europeans, of which David Rouault from France will, from now on, be running the company on his own as it continues to progress. The head office is on the edge of the endless North Quebec forests. The Kangook make is sold all over the world, with a slight temporary weakness in the French market following the departure of its previous importer. But the German importer, an extremely competent motor mechanic called Christian Reuter, will now be looking after the increase in sales in the European market by the maple leaf mark.

Their machines have a reputation for being solid and competently manufactured, but that's not all: They offer almost all the engines on the market, at least six different attachment systems and several different cages. The Canadian manufacturer is also the grand maestro of combinations. The table of different attachments can be found on a previous page in this dossier. One of the best compromises is without a doubt swan necks. The behaviour when there is a shift in the centre of gravity is close to that of a PAP, inventor of low swing arms. On the other hand, the torque effect using the swan necks attachment is a little bit less compared to with the classic low swing arms – brilliant for an average or experienced pilot!

Kangook also offers the possibility of mounting almost any motor on their chassis; metal plates are available for every model. It is therefore possible to easily change it the day you want to replace one engine with another. All you have to do is order the adaptor for the chassis from Kangook.

For a long time, 'light' wasn't a priority for Kangook but, for this test, we were able to try the very first versions of the collapsible Trekk cage on a Trekk chassis.

The model tested, with movable swan neck attachments, turned out to be almost as responsive to piloting through the harness as a system with low swing arms.



A nice ensemble: A Paramania GTR and a Kangook Trekk.

The same Trekk chassis can also be used with a Vikking cage, more solid, but bulkier and heavier by 800 grammes. We tried both, the latter version is recommended, for example, for pilots who also want to go tandem.

The Trekk chassis is primarily designed for travelling; it can be dismantled in a few minutes. The top part of the chassis with the motor comes apart from the lower part with the tank. The tank is also removable and, amongst other changes following our comments, the tube will have a quick connector in future. Kangook had the great idea of dismantling the chassis into two parts. Taking it apart is very quick thanks to a bolt which is like the quick release bolt used in cycling. The whole thing is thus a lot less bulky and can even fit into the boot of any car.

The quality of manufacture of all the parts is very good and they are well finished. The chassis and cage combination, 'Trekk chassis plus Vikking cage', seems very solid. Only the Trekk collapsible cage seemed, not surprisingly, a bit more fragile. The net just needs to be tightened up properly to make the whole thing more rigid.

(continued on page 105)

A KANGOOK TREKK WITH A TREKK CAGE

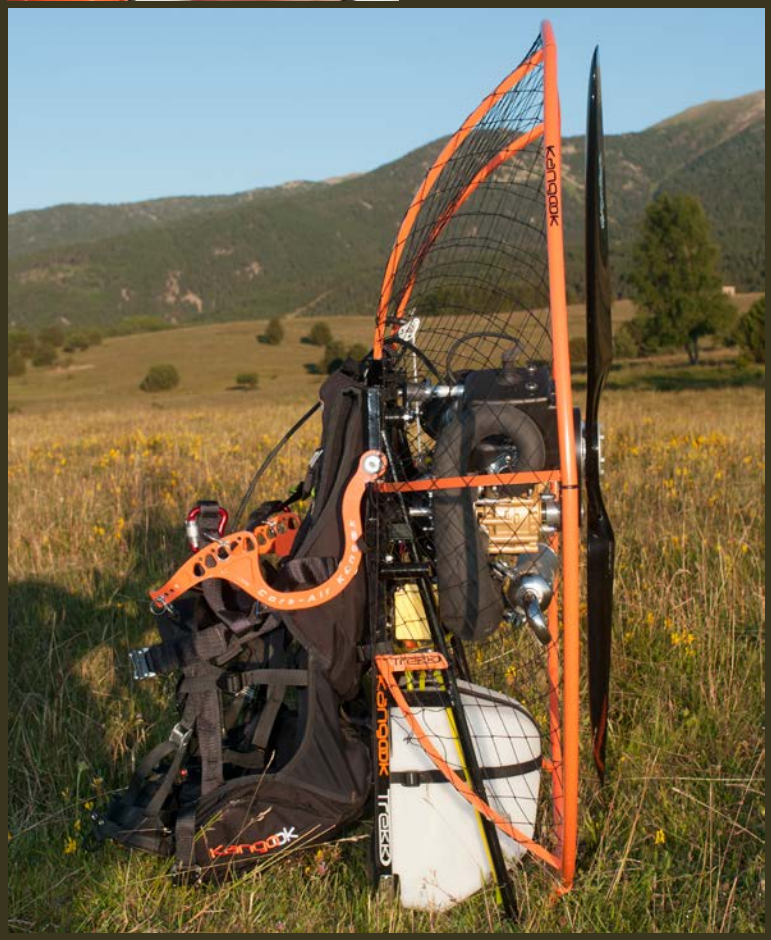
A KANGOOK TREKK WITH A VIKKING CAGE

Two versions of the Trekk, but with two cage systems. The collapsible Trekk cage is only 800 grammes lighter than the Vikking cage, but much easier to transport.

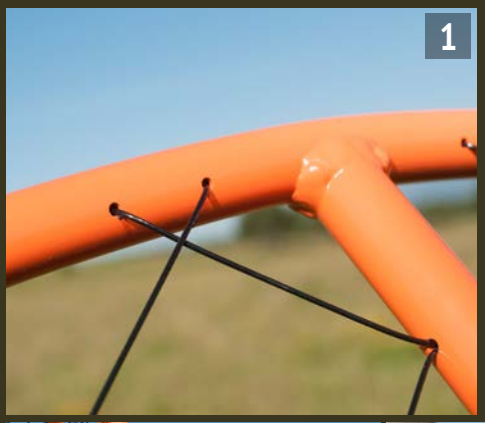
A KANGOOK TREKK WITH A TREKK CAGE

1, 2 and 3: Quickly put together with a collapsible cage.
3: Comparison: the cage from a Fly Products Rider S (white) and the collapsible Trekk cage. The latter takes up less space but, on the other hand, the Fly Products one seems a bit more solid.

The Trekk cage system: the connectors between the hoops are held in place by the bars.



A KANGOOK TREKK WITH A VIKKING CAGE



The Vikking cage in three pieces. Even quicker to put together and solid as a rock. Another advantage: the attachment for the reserve is above the pilot's head.

TWO KANGOOKS DISSECTED ON THE EDITOR'S SCALES

We took advantage of the modular format of the system to weigh each component of the two versions; this revealed some interesting details.

Kangook Trekk: weight of the component parts in grammes	Trekk chassis with Trekk cage	Trekk chassis with Vikking cage
Top part of the chassis	1 533	1 533
Lower part of the chassis	1 058	1 058
Back plate	345	345
Tank	1 210	1 210
Swan neck attachment	1 214	1 214
Cage net and hoops	**1 299**	**2 728**
Base of cage	**290**	**202**
Cage bars	**517**	**0**
Attachment plate for a Polini 190 light	718	718
Karabiners and straps	282	282
Various cables, petrol filter	48	48
RSUltra/Supair harness	3 335	3 335
Attachment for hand starter	86	86
Aluminium strut	113	113
Screws and bolts	68	68
Carbon propellor	1 100	1 100
Total weight without the motor	**13 216**	**14 040**
190 light motor, starter, air filter, cables.	16 850	16 850
Battery and screws	1 624	1 624
Miscellaneous, spark plug	198	198
Total weight with starter and motor	**31 888**	**32 712**

Full price of the model tested: 4950 €
Manufacturer: RSULtra
RS ULTRA INC. 95, St-Charles, Lac-Aux-Sables, QC G0X 1M0 Canada,
Tel : +1 418 289 389
info@rsultra.com, www.rsultra.com

Germany/Europe: Firma Reuter Fluggeräte
Alleestr.42, D-56410 Montabaur, Tel +49 (0)2602 9995477, Fax +49 (0)2602 9995480
info@reuter-fluggeraete.de, www.reuter-fluggeraete.de

POLINI 190 LIGHT

We tried the Polini 190 Light, with the electric starter option, on the Kangook Trekk chassis. The configuration is a bit unusual. Normally with the Trekk and collapsible cage, a 190 without an electric starter would be more logical.
The 190 light is very close to the 200 Evo, with similar power but with a belt reduction. It can be ordered with a clutch as well, but with that set-up, the electric starter isn't possible.

The Polini 190 light is clearly a bit more sensitive to fine-tuning compared to the make's other engines, but with the help of Kangook's European importer, Christian Reuter, we managed to optimize the engine, including replacing a small spring in the carburettor to modify the pressure pop-off.

Once correctly adjusted, it's a very good motor, fairly quiet, with a good power curve.

POLINI 190 LIGHT TECHNICAL DATA	
Model	Polini Thor 190 Light
Displacement	193 cm^3
Power @ rotations/min	27 HP @ 7400 RPM
Compression ratio	11,4:1
Thrust	n.c.
Cooling	Aircooled, fan
Electric	Electronic ignition, optional output power 80 W @ 5 500 RPM
Starter	Pull starter, optional electric starter
Transmission	Belt, optional clutch
Propeller	Counterclockwise 130 cm
Carburetor	Walbro
Fuel	Lead free 2% synthetic oil
Weight	Engine 13,6 kg Engine with clutch: 14,4 kg Engine with electric starter: 14,6 kg
Prices	Engine: 2180 € plus VAT Engine with clutch: 2450 € plus VAT Engine with electric starter: 2520 € plus VAT
Adress	www.polini.com

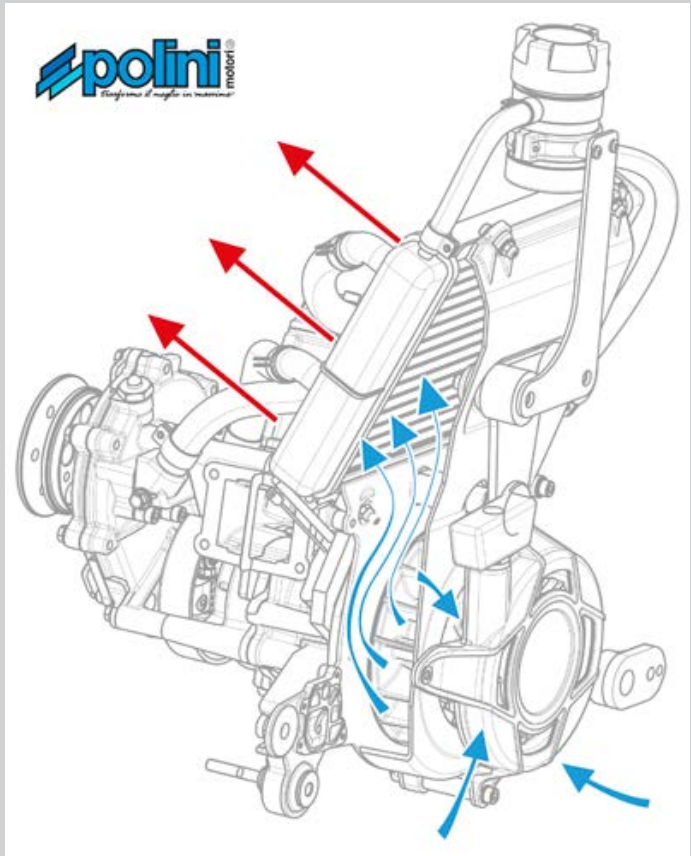
Thor 250
Weight without radiator:18-19 kg
36.5 HP

Thor 200 Evo
Weight: 17.5–18.5 kg
27 HP

Thor 190 light, from 13.6 kg upwards according to the manufacturer. We measured it at 16.8 kg with all the cables, handle and electric starter option.
27 HP

Thor 130
Weight: 13.8 kg
21.5 HP

Christian Reuter from Kangook Germany is the first importer to have tested the new Polini Thor 80. Advertised weight: 11.1 kg, advertised power: 17.2 HP.
With a lightweight harness from Apco and despite a 16 l tank, the total weight is very light at only 23 kg.
This little motor really seems very promising with respect to power. A distinctive feature: all the water cooling system, including the radiator, is directly attached and integrated into the motor.



In a very interesting video presentation, Kangook explain the numerous choices possible due to the many combinations of chassis/cage/attachments and possible motors in the Vikking range.
https://vimeo.com/118266302

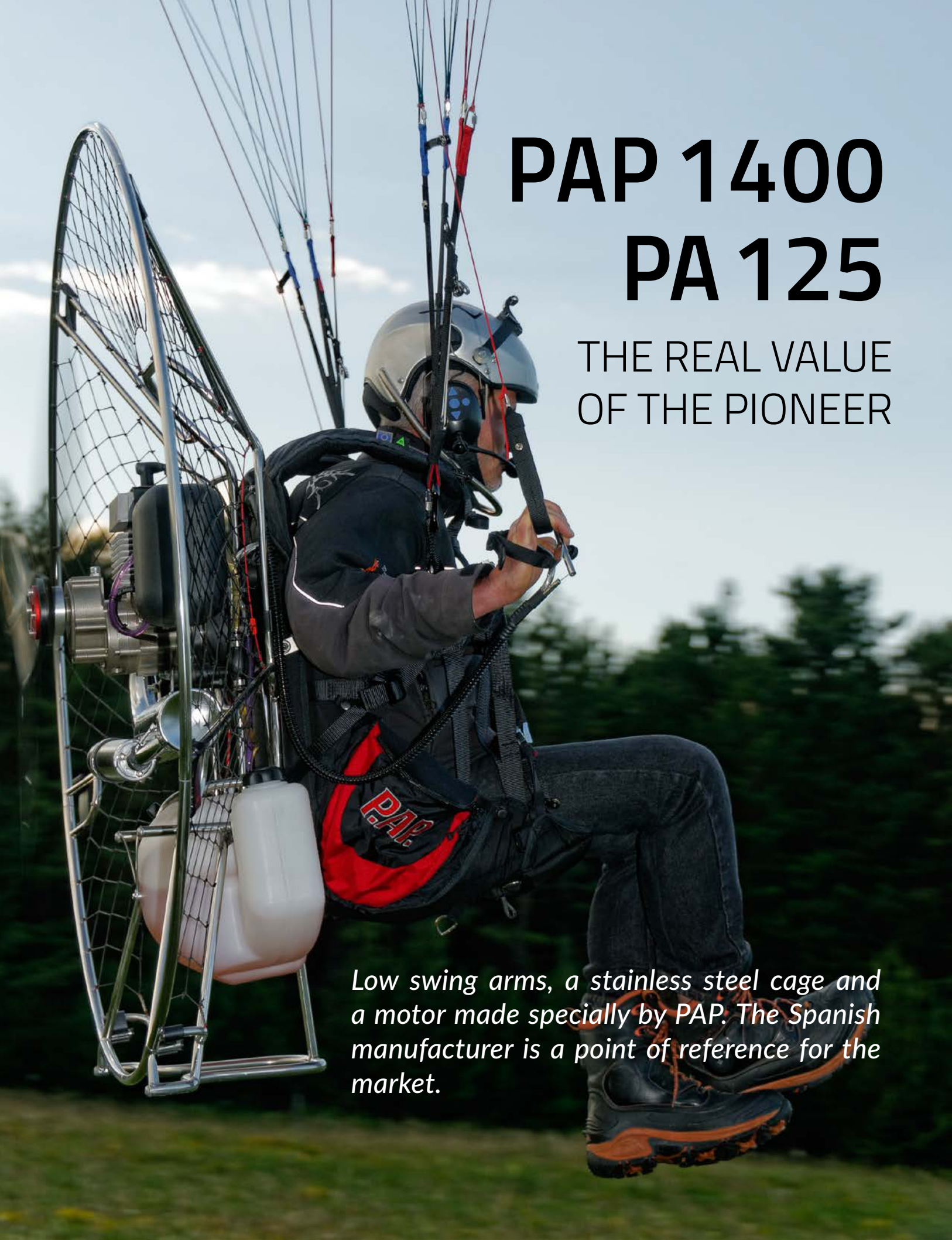
(continued from 99)

The Supair harness which comes with the motor weighs 3.34 kg. It is well padded, very solid and proved to be comfortable when the pilot is sitting down. In addition, the sizeable pockets are accessible in flight. On the other hand, the harness must be properly adjusted to give maximum comfort during and after take off. The Apco Split Legs harness, tried at the end of the test, was even more comfortable during this part of the flight; see article about it in this edition.

In the air, the choice of swan necks as attachments for this test proved wise. It is a very universal system which offers a good compromise between stability whilst flying, comfort, possible piloting through the harness and reduced torque.

SUMMARY

The machine tested is very easy to dismantle and transport, especially with a collapsible Trekk cage. In addition to the good quality of manufacture, the Canadian's good looks and nice colours appealed to us. The swan neck attachment system gives the maximum number of possibilities to the majority of pilots. Beginners should choose another type of attachment at the beginning and move onto swan necks later, but school use should be possible for promising students. The modularity of the system, in any case, leaves all the options open, including an eventual replacement of the motor by any other type of motor.



PAP 1400
PA 125

THE REAL VALUE OF THE PIONEER

Low swing arms, a stainless steel cage and a motor made specially by PAP. The Spanish manufacturer is a point of reference for the market.

A nice 'pure stainless steel' machine. And even with the board badly adjusted like here, the machine is comfortable.

PAP 1400 PA125
TECHNICAL DATA

Manufacturer	Propulsión Auxiliar Parapente Urb. Bel Air - The Water Gardens, Loc.1. 29680 Estepona, Málaga - Spain Phone : +34 (0)952 884 811 info@papteam.com, www.papteam.com
Model	PA125
Displacement	125 cm^3
Power @ rotations/min	22 HP @ 9580 RPM
Weight	63 kg (PAP 1400)/65 kg PAP 1450)
Cooling	Aircooled, fan
Starter	Pull starter (Hand/Foot)
Transmission	Centrifugal clutch, gear 1/3,65
Propeller	125 cm or 130 cm (PAP 1400 / PAP 1450)
Carburetor	Walbro 24 mm
Fuel	Mix 2,5 %
Fuel tank	13 l
Power output	No
Pilot	PAP 1400: Pilot 100–120 kg recommended PAP 1450: Pilot 105–125 kg recommended
Weight	27 kg / 27,5 kg (PAP 1400 / PAP 1450)
Price	5 200 €

The manufacturer who pioneered low hang points offers their chassis with a large choice of motors, amongst others, the whole Polini range, the RM 80 and PA 125. The PA 125 is a classic, made exclusively for PAP by H&E.

For two and a half years the assembly and final adjustments have been done at the PAP workshop so that Pierre could control the quality.

The details of this machine have improved a lot. Over the last few years, we have been able to test it several times, and can now confirm that it really is a fully fledged machine. It starts reliably, runs like clockwork and we were happy with it over the entire speed range between tickover and its maximum of more than 9500 RPM. With its 22 horsepower, PAP advise that it is suitable, for example, for a pilot of 80 kg, on a reflex wing, flying at sea level. The table of recommendations on the PAP website is very informative.

The 'cage in 4 pieces' version gives the best compromise between strength and ease of transport.

The 1400 chassis with the PA 125 is a very good compromise between power and weight given that, for PAP, 'light' wasn't a priority for a long time.
Nevertheless, the weight remains reasonable; we measured the tested machine at 28.6 kg. Not bad for a complete 22 HP paramotor with a stainless steel chassis, strong, with correctly dimensioned tubes to guarantee a high resistance to shocks.

It is also possible to order an almost similar machine (the PA 1450) with a cage 5cm bigger and equip it with a 130 cm propeller to gain 3 kg of thrust. Theoretically, the 130 cm blade will also fit the 1400 cage, but it doesn't leave much margin in the event of a large shock.

FOLD IT SEVERAL TIMES

An important innovation is that the chassis will now be available in 3, 4 or 5 parts. Obviously, the more parts there are, the smaller the volume it folds into. On the other hand, it is more difficult to assure rigidity of the cage. In the five part cage a transversal bar has thus become necessary.

French pilot Pierre Aubert, the Father of PAP who emigrated to Andalusia, advises that the 4 part cage is the ideal compromise. We can confirm that the volume when transporting it is reasonable and it is quick to put together. With PAP there are never any nasty surprises, the tubes fit together easily without requiring force and stay together almost without any play. Only the plastic clips need a bit more force to close, but they guarantee a connection that won't fail.

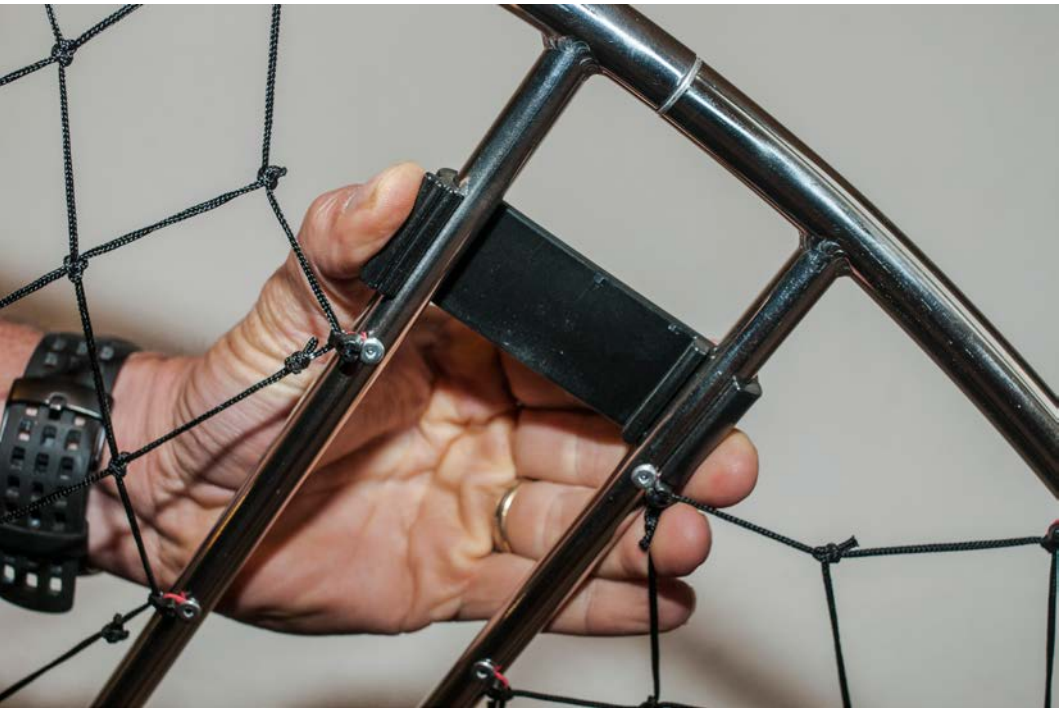
The welding is very good. There isn't a single detail that you can fault. It's a beautiful unvarnished, stainless steel machine, whose metalwork shines in the sun. And if there is a bump, there isn't any paint which can chip off.

The famous PAP low swing arms, which revolutionized paramotoring, making it more like paragliding. There's no doubt that, without them, there wouldn't be so many free fliers taking up paramotoring, as has been the case recently.

Time has endorsed the PAP starter system: simple, reliable and possible to start by foot if the pilot wishes. This is not only practical in the air, but is a non trivial factor from a safety on the ground point of view as well. You just need to support yourself against a fence, for example.

Remember that the clutch brings extra security when getting set up and eventually also when running to take off: as long as the pilot leaves it on tickover, the blade on his back doesn't turn.

A clever mix of plastic components and tubes in stainless steel gives lots of stability to the structure.



The clips are almost too big; attaching them is a bit physical, at least on a new machine.

The tension of the netting is good and the fine mesh is an important safety element.

It was definitely the 4 part cage that we tested, even though the number of connectors makes it look like a cage which dismantles even further.

A part which assures the solidity of the structure.

At take off, to warm the engine up, the blade can be blocked using this device. Obviously, remain on tickover so that the clutch doesn't engage, making the motor stall.

SITTING

After take off, it's very easy to slide into the harness. The latter is very deep: 35 cm plus 12 cm extra under the thighs. Very comfortable.

As far as handling is concerned, the PAP principle hasn't changed and remains a reference point on the subject. The whole unit reacts very quickly to pilot weightshift and the feeling is very close to that of free flying. Without being 'radical', the increased sensitivity of this attachment system begs the question of whether a beginner pilot could benefit from it.

According to PAP, lots of schools automatically teach using this type of attachment point. As Pierre Aubert pointed out, being able to clearly feel the movement of the wing at take off is already a big help even, and especially, for a complete beginner.

NEWS AND SUMMARY

Since our test, some important news has emerged: From now on the machines will be delivered with new harnesses with an integrated airbag.

In summary, for us, the PAP 1400 PA 125 in its version 'cage in 4 parts' is a total success in terms of the motor, its conception, it's attachment system as well as the ease with which it can be assembled and dismantled.

Obviously the price of the whole thing is, as a consequence, also 'top of the range'.

BLOIS

BALLENSTEDT

Unlike the Coupe Icare, at exhibitions like Blois and Ballenstedt, there is lots of time and space for free flying.

Three years after the last Basse-Ham event, summer 2015 saw two important paramotor gatherings: Blois and Ballenstedt (in Germany). Here are some pictures taken by the photographer Benedikt Bös. www.paramotor-germany.de

In both countries, Dudek is clearly established and is strengthening their position with the new XX range (Reflex and SharkNose for paramotor wings). www.dudek.eu/en/

Another make which is on the up is Kangook. One of the European importers, Christian Reuter (left), is well known for his amazing motor mechanic skills. We have already seen him give lessons on how to tune a motor to engine manufacturers, for whom he is a client.

The Italian manufacturer, Fly Products, is making inroads into the market, thanks to, amongst other things, their commitment to paramotor acro with the pilot Manu Malaguita. New for this year: a four stroke trike.

The Czech make Nirvana has finally found a French importer.
www.nirvana-paramoteur.fr

In Germany, here at Ballenstedt, the make is already well established.
http://www.nirvana.cz/index-en/

The German make Parazoom (shown here at Ballenstedt), imports Mustang trikes and makes the T4-Triostar 'flying bicycles' (in the background). www.parazoom.de

The French instrument manufacturer Syride doesn't sell products specifically for petrol powered thermaling, but their very small and light GPS varios which can be easily fitted onto the risers, are becoming increasingly popular in the paramotor world too.
www.syride.com

Wing mounts are simple devices, an efficient way of fixing a GoPro onto a wing.
http://paramotorgermany-products.com/blog

A trike which has been inspired by Fresh Breeze's XCitor, the Zenith, costs less than 20,000 euros.
http://www.zenith-paramotortrike.nl/Engels/home.htm

A pioneer of paramotoring gives up the controls of the company Adventure. Guy-Léon Dufour will have more time to fly, leaving the company and the work to his successors Andrea Testoni (left), Emmanuel Layan and Pascal Vallée.
http://www.paramoteur.com

legende

Visual effects guaranteed: Paramania now offer to print designs directly onto the fabric of the wings, allowing very detailed graphics, never seen before on paragliders.
wwww.paramania.com

PAP had on show, amongst other things, their new harness with integrated airbag. In the era of Slalomania and other Acrobatix, it was time to talk about back safety.

A new face in the Paramania team, pilot Kristianna May, here with a toy from Kangook.

Much anticipated, the motor by Bidalot goes against the current trend. The priority is neither light, nor power, but guaranteed reliability from this very experienced motor manufacturer from the world of two wheels.
www.bidalot.fr

The German make Simplify has had rapid success in Germany and Austria with its 'light and easy' concept. The foot launch machine with EOS 100 only weighs 17.5 kg. The trikes in titanium exist in several versions between 22 and 45 kg.
www.simplify-ppg.com

The X-One trike from Fresh Breeze is designed to be almost indestructible, no matter which pupil is at the controls.
http://www.fresh-breeze.de/en/home.html

A good initiative at Ballenstedt: reserve throwing. There was more than one which wouldn't open, like the one on the right due to a mounting error.

The re-pack organized by Knut Jäger was also very instructive (Photo: Jäger)

Manu Malaguita was everywhere: propelled by a Cors-Air motor on a Fly Products chassis. He was one of the leading lights who clearly showed that, yes, paramotors can be just as dynamic as paragliders.

There was a real aviation feeling, flying happily in random order, over the 27 at Ballenstedt.

PARAMANIA : THE NEW GTS

At last Paramania have brought out a new model of the GTS.

Our test pilot Sylvain Depuis was able to do some of the first tests. Here's what he had to say: "*The Paramania GTS is the manufacturer's new hot slalom machine. It has the advantages of the GTR (unrivalled speed) without any of the disadvantages, because it consumes less and tightens the turns a lot more whilst going slightly faster. It is particularly aimed at competitors because all the advantages of this wing will be felt when the bar is being used intensively. The limited movement of the trimmers and its small line cone don't make it great for cruising. On the other hand it is likely to really frighten the other competitiors in slalom comps. Available in 16, 19 and 22 m²*".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