STANDARDS IN SPORT: WINGSUIT FLYING

A subcategory of skydiving and BASE-jumping, the fledging sport of wingsuit flying is admittedly a niche within a niche. In this spectacular sport, the pilot's body, arms and legs—spread to open the fabric ram-air wings—becomes the aerofoil that enables flight.



Icarus's dream come true

In this highly specialised and extreme sport, a handful of manufacturers headed by actual wingsuit pilots, explores the many ways to make Icarus's dream come true: to fly longer or closer to the ground, with the least restraint, and the least danger.

One of the ruling bodies of the discipline is the Lausanne, Switzerland-based FAI, the International Air Sports Federation, which covers an array of aerial sports including parachuting, aerobatics, ballooning, hang gliding, paragliding, and so on, but doesn't mention wingsuit flying. Unsurprisingly, the organisation has not set down a formal framework for the sport, and the persons interviewed by *WSA* doubt that wingsuit standards will be implemented any time soon. Jari Kuosma, the manager of Birdman, notes that there are no civilian parachute regulations. The burgeoning activity is therefore left with a self-policing principle, phrased by the FAI on its website as "industry standards generally agreed upon as necessary for an adequate level of safety". The United States Parachute Association (USPA) is slightly more loquacious on the subject, stipulating that "any wingsuit, regardless of the model, should allow enough range of motion to pull the cutaway and reserve ripcord handles without having to disconnect the arm wings". This, as will be seen, refers to the conception of the parachute release, a vital element of the sport and its equipment.

Well aware that the sport will be banned if suspected of taking shortcuts in matters of security, wingsuit manufacturers take great care

Jarno Cordia, coach, pilot and worldwide representative for Phoenix-Fly, in action..

Wolfgang Lienbacher

COPYRIGHT

to develop suits that are safe, as well as easy to pilot. "It is true that there are no standards, but news travels fast," says Mr Kuosma. "And no one can afford equipment failure."

The first wingsuit pilots, also known as flying squirrels or birdmen, emerged in the late 1990s. Founded by husband and wife team Loic and Cathy Jean-Albert, a French company now called Fly Your Body, developed a wingsuit as early as 1996 with the help of Salomon Sports, a partner during the early years of the young brand's activities. Those were also the years when French extreme athlete Patrick de Gayardon, largely recognised as the father of the sport, was already flying in winged suits. He did not survive an attempt to try a new parachute-releasing system, in Hawaii, in 1998.

British skydiver Tony Uragallo and Croatian skydiver Robert Pecnik, the two other leading figures in this field, founded Birdman Inc. and began producing wingsuits in 1999. They subsequently parted ways and set up separate businesses, the former launched Tonysuits, in 2004, and the latter Phoenix-Fly, in 2006. Meanwhile, Finish skydiver Jari Kuosma is now the manager of Birdman.

The aerodynamics of flight

The role of the wingsuit is to add surface area to the human body and provide the most favourable ratio of lift to drag, following a principle that governs the shape of aircraft wings in general. The fabric wings are constructed like paragliding canopies, a ram-air system, which enables longer flights as air fills up the cells to provide the aerofoil effect.

Limited by the size and shape of the human body, jumpsuits fall into two categories. Tri-wing suits have three ram-air wings under the arms and between the legs, the original flying squirrel design. Mono-wing suits are bigger as the whole suit is one large wing. "A larger surface area makes flight more unpredictable," says Mr Kuosmi.

Used for aerial aerobatics and by beginners, smaller suits are said to be easier to manoeuvre, while bigger suits require more expertise but will go faster and be more agile, capable of making sharp turns for example. Proximity flyers tend to wear the bigger suits, also known as flying mattresses. The bigger the suit, the longer the flight, and the more physically demanding for the pilot.

How well a wingsuit flies is determined by what is called the 'glide ratio', represented by two numbers that indicate the distance flown forward (horizontal movement) for every metre of altitude lost (or vertical drop). A common ratio today, at 2.5:1, means the pilot advances 2.5 metres forward for every metre drop. Glide ratios have evolved from 1.5:1 in 1997, to 3.5:1 in 2012, according to sports writer and former professional parachutist Robin Heid.



The S-Fly Core wingsuit by Fly your Body has a built-in BASE-jump rig harness which is said to improve aerodynamics.

Soul Flyers / Fly your body

The critical moment in wingsuit flying is releasing the parachute. "Wingsuits produce a turbulence above and to the back of a skydiver, which may not provide the pilot chute enough air for a clean inflation and extraction of the deployment bag," notes the USPA. The pilot must be able to maintain a stable and symmetrical position when manoeuvring the toggle that releases the parachute. This is why great care is taken to design easy to use and reliable handle and sleeve systems. In many suits, a cable runs down the length of the arms to 'unfasten' them when the parachute opens. Attempts to rigidify the arms with a stiffer structure have been abandoned as any misconception or mistake in this critical moment is almost sure to lead to a dramatic event (remember Icarus). On the website of one brand, those looking for a more structured wing are invited to try out hang gliding.

Skydivers and BASE-jumpers currently wear the same type of suits. The acronym-based term was coined in the 1980s—BASE stands for Building, Antenna tower, Span (as in bridge span) and Earth. However, they do not have the same parachutes: skydivers are equipped with a reserve parachute that BASE jumpers don't actually have time to use.

BASE-jumping is an entirely different sport, says Jarno Cordia, Phoenix-Fly coach, pilot and worldwide representative for Phoenix-Fly: "A sky diver has 20 seconds to react, a margin that BASE-jumpers don't have." He says the average duration of a skydive is 45 to 50 seconds, while

COPYRIGHT

a BASE-jump usually lasts 0.5 to 1.5 minutes.

A typical skydive launches at 4,000 metres (13,000+ ft), the main parachute is opened at 1,000 m, the freefall drop is therefore three km. By one calculation, for the same type of jump a wingsuit diver can cover a distance of 7.5 km at an average speed of 160 km/h. The average rate of vertical drop is 200 km/h, and wingsuits are said to be able to bring that speed down to 65 km/h.

Fabric specifications

Derived from parachute and canopy design, wingsuits are made in traditional parachute fabrics, such as a 620-denier ripstop polyamide, to which a heavy waterproof coating is applied to achieve zero air porosity. It will come as no surprise that double stitching is standard. Canopy-manufacturer Atair Aerodynamics, based in Slovenia, manufactures wingsuits for Phoenix-Fly.

The first suits developed by Fly Your Body were made in a stretch Gore-Tex laminate. "Fabrics must resist speeds of 180 to 200 km/h," says Cathy Jean-Albert. Airtight zippers, powerful magnets (to reduce flapping) and an abrasion-resistant material, placed under the feet, are the key components of the company's suits. Prices range from €645 to €1750 at Fly Your Body. The company's most expensive suit, which costs €2850, includes a built-in harness and parachute (designed to reduce turbulence above the flyer's body).

At Birdman, which licenses out manufacturing, the suits are sewn up in Japan. They combine a breathable fabric for the body with an airtight (zero air porosity) fabric for the ram-air wings. The brand has chosen military-grade fabrics, made in Japan, and places special attention on finishing, including the linings, for both comfort and aesthetics, says Jari Kuosma. Sold in a range of €1600 to €2500, Birdman positions itself as the "Mercedes Benz" of wingsuits.

Rules for safe flying

Though there are no standards for the suits themselves, the FAI and national air sports federations have laid down a certain number of recommendations for beginner wingsuit pilots. In some countries, 150 to 200 skydives are required before engaging in any 'flying squirrel' activity, while other countries set the bar at 500 free fall jumps. The companies interviewed for this article find this level of experience too lax.

For Jarno Cordia, at Phoenix-Fly, 200 free fall jumps is a bare minimum. "If one calculates that a typical skydive lasts a minute, then 200 jumps is slightly over three hours of experience," he says, adding that if skydiving is akin to car driving, then wingsuit flying is the equivalent of airplane piloting.



Extreme athlete Tim Emmett, ready for take off. He is a member of the Mountain Hardwear team of athletes and a television presenter.

Tim Emmett/ Mountain Hardwear

The leading brands all provide coaching and training lessons for wannabe birdmen, deemed essential for the development of the sport. Phoenix-Fly, for instance, has two departments, one dedicated to manufacturing and the other to coaching. The company is thinking of separating the two activities, and would like to see its own designs become the official standard. "The whole sport will suffer if we don't provide the tools for safe wingsuit flying," says Mr Cordia.

A growing community

Over the past decade, the discipline has gained in visibility, drawing new and dauntless daredevils. "When I started wingsuit flying in 2003, I was often the only one, now I regularly see 15 to 20 wingsuit pilots at a dropzone," says Jarno Cordia.

As skydivers and mountain climbers fill the wingsuit-flying ranks, the sport is evolving in two directions: those emerging from a plane and those jumping off a cliff. Extreme athlete Tim Emmett is a member of the latter group. With 150 wingsuit flights to his name he says "flying is the greatest way to come down" a mountain. He flies a Phantom suit made by Phoenix-Fly, which he says "starts flying early" and was walking the exhibition halls of ispo with the wingsuit in his backpack.

Events and championships are also helping draw media attention to the sport. The World Wingsuit League organised a BASE wingsuit World Series in China last October in which the top sixteen pilots competed. The competition inspired *Time Magazine* to cite wingsuit racing as "one of the best inventions of the year 2012."

COPYRIGHT