Fatalities in BASE and Wing-Suit flying

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The relatively small number of BASE jumpers worldwide and their streamline communication enabled the precise documentation of fatality data.

Since 1985, BASE jump fatalities are documented and updated regularly as an open source containing reports on the attributable factors leading to the incident described for the benefit of future participants.
Why?

Hitting the wall when jumping in proximity to surrounding objects or when canopy is opened facing the object jumped from

No airflow to stabilize body position
Less aerodynamic control
Aerobatics

lack of control / vertigo / too slow= hitting ground prior to deployment
lose of body position/orientation- chute is not deployed in box position
Calculation of the approximate overall BASE jumping annual fatality risk during the year 2002 was of one fatality per 60 participants per year.

The fatality rate associated with skydiving from 1994 to 2009 has gradually increased, from 0.008 to 0.01 per 4,000 solo jumpers per year.

As so, the overall annual fatality risk in BASE jumping is approximately 40–65 times higher than in skydiving.
We are in 6/2016 and the current number is 284 (June 5th), it was 230 at the 2014 version of this talk...

25 years - 106

10 years - 178
Since 1981 to date, there were 284 BASE jumping documented fatalities attributed to a population of presumably less than 2500 jumpers, indicating an estimated 10% overall fatality rate since its evolution.

Fatality rates for BASE jumping seem to be consistent, with a moderate increase corresponding with the growth of the sport:

2009 - 15
2010 - 16
2011 - 20
2012 - 19
2013 - 24
2014 - 25
2015 - 27
72% of the jumpers had witnessed death or serious injury of other participants in the sport

43% jumpers had suffered significant injury

76 % had at least one “near miss” incident
Turn around time...
Can a human being fly?
2002 to 2007:
61 BASE jumping deaths, 10 (16%) - wing suit related

2008 to 2011:
59 fatal events, 29 (49%) - wing suit related

2013, 21 of 24 (87%) fatalities were wing suit related

Same trend is seen through 2016
Fatalities in Wingsuit BASE Jumping

Table 2. Incident mechanisms contributing to fatality

<table>
<thead>
<tr>
<th>Fatal incident mechanism</th>
<th>No. of fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wingsuit glide path miscalculation</td>
<td>17</td>
</tr>
<tr>
<td>Wingsuit equipment failure</td>
<td>1</td>
</tr>
<tr>
<td>Pilot chute complication</td>
<td>5</td>
</tr>
<tr>
<td>Exit complication</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
</tr>
</tbody>
</table>
2013: 19/24 (80%) fatalities occurred between April and October.
Fatalities by country of incident, categorized as with or without a wingsuits.

The countries from which most wingsuit BASE jumping fatalities were reported: Switzerland (13), Norway (7), and France (8) → Europe 82%
Object Type: Earth
Location: Yellow Ocean, Lauterbrunnen, Switzerland
COD: Impact Ground due to low pull
Clothes / Suit: Wingsuit Venom

Description:

Report that has come to light is that Jumper had shown up in Lauterbrunnen with his experience in base jumping at 10 slider down base jumps prior to this base trip...

Jumper was a very experienced skydiver with AFF rating and tandem master and a few thousand skydives...

Which is why the base community can't understand why he felt the need to rush into base jumping and jump a wingsuit on his 10th base jump. Witnesses stated he made 12 jumps in the valley in the days, leading up to the incident.

The jumper exited from yellow ocean, an object that has a 350+ meter rock drop and only 425 meters to the landing area. His Flying in his wingsuit (venom) was very high head and slow and therefore likely flying in a stall.

The canopy gets to line stretch but at the same time he hit the ground the canopy and bridle draped over the power lines (lower voltage).

There was 2 joined possible causes for death... Impacting ground at extreme force was the primary cause of death (possible low pull or pc caught in burble).

1.) This jumper had only 10 low altitude BASE jumps and ignored all advice from his fellow travelers and jumpers in the valley at the time.

2.) This jumper didn't register for the Landing card making it hard for Police to identify him and contact his family. He had no information from the SBA nor informed himself on the various exits and their profiles.

3.) This jumper assumed yellow ocean was a suitable exit for beginners, not considering that this exit doesn't have sufficient height to practice Wing-suit flights!

4.) Excellence in skydiving experience can help awareness and reactions in BASE, but it doesn't substitute proper training and preparation in this very different environment!

This fahility could of easily been prevented if the jumper had of slowed down and re-evaluated his jumping...
Date: August 13th, 2013 Nationality: French
Object Type: Earth
Location: Devolouy, France
COD: Impact
Clothes / Suit: Wingsuit X-bird

Description:

... was the first to go from a 3 way wingsuit from the house of cards... After exit he was flying to cross over the ridge or what is called the First house of card and impacted with nothing out trying to out fly the first ledge... This has rocked the smaller french community from the bourne area and has made everyone think to take a step back....

Date: August 16th, 2013 Nationality: Polish
Object Type: Earth
Location: Samoëns / Sixt-Fer-à-Cheval, France
COD: Impact (proxy flying)
Clothes / Suit: Wingsuit

Description:

Whilst flying a line he impacted a ledge in flight and was killed instantly...

Date: August 17th, 2013 Nationality: French
Object Type: Earth
Location: Dent de l'Arclusaz, France
COD: Impact
Clothes / Suit: Wingsuit

Description:

He had flown the normal line flown by experienced jumpers from this exit, BUT wrong appreciation of the height on the way of the grassy dome then too low. Slide and Impact in the grass.

Date: August 23, 2013 Nationality: Spanish
Object Type: Earth
Location: Dumpster, Lauterbrunnen, Switzerland
COD: Impact
Clothes / Suit: Wingsuit X2

Description:

“We were in Switzerland, we made this jump many time before, no complications compared with some that we have these days back. It was a Three way was second and me after Him. We were flying near the wall, but in a “safety way”, and you see that at some point it has come too close, seemed about to hit a part of the wall that was more prominent, he has turned to avoid that, but has made the turn too sharp and minced, as when rotating a plane and goes some head down... He could not regain that ground has played with the slope and impacted ...
<table>
<thead>
<tr>
<th>Sex</th>
<th>No. of total fatalities</th>
<th>No. of wingsuit fatalities</th>
<th>No. of nonwingsuit fatalities</th>
<th>% Wingsuit/nonwingsuit fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>165</td>
<td>38</td>
<td>127</td>
<td>30</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>1</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>39</td>
<td>141</td>
<td></td>
</tr>
</tbody>
</table>
Wingsuit-related BASE jump fatalities appear to be increasing as this version of base jumping becomes more popular.

Most fatalities are attributed to cliff or ground impact, and most are the result of flight path miscalculation.

As with many other extreme sports, limited experience also seems to be a contributing factor to wingsuit fatalities.
The rapid development in wingsuit design, combined with the jumper’s motivation to push the boundaries, may in essence have led some jumpers to act as test pilots of new wingsuit concepts.
So what do we do about it?
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- Proximity flying - the “problem” of better glide ratio and experience
- Mis calculation
- Pilot chute caught in air burbles
- Take-off aspects (slipping / stability / “feeling of void/no speed”)
- Experience (2 of the fatalities - first wingsuit BASE jump...)

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