

Deutscher Hängegleiterverband accident report 4.02.2011

Date	18.7.2010	Time	21:20
Land	Denmark	Site	Lökken/Lygnby, Danish West coast, soaring
Pilot	M, 42 years old, experienced Pilot, PG- Licence since 1995, PG-Instructor, Flying school manager		
Equipment PG <input type="checkbox"/> HG <input type="checkbox"/>	Skywalk Cayenne L, LTF 2 PG; Manufactured 8/2003, last checked 4/2007	Testing Centre	DHV
Weight range	105-130 kg	Start weight	approx. 130 kg
Harness	-	Reserve	-
Pilot injuries	fatal	Passenger injuries	-

Wind and Wetter

Sunny (Sunset: 22:00), strong winds up to and over 30 km/h, mainly laminar.

Accident

The accident occurred at a coastal site in north west Denmark. In a see breeze (W-WNW) the 20-80m high cliffs are sufficient for soaring flights.

The pilot had been flying for some time along the face of the cliffs. He was observed intermittently by an Austrian test- and acro pilot. The observer noted that the pilot had repeated problems when flying wing-overs. The crash itself was witnessed by a 14 year old Danish child, no other eye-witnesses were present. Statements to the accident are quoted as follow:

1. (Danish newspaper): The young girl reported to the Nordjütland police that the glider turned quickly, collapsed and crashed shortly after.
2. (Report from the Danish hang- and paragliding association): The pilot was about 25m above the beach and had lost some height. He turned away from the cliff and held this course for about 2 seconds. Following this, a radical 180° turn to the right was performed which ended in a crash on the cliff.

The 42 year old pilot was killed instantly on impact.

Accident Investigation

Equipment - paraglider

The paraglider was sent to the DHV for examination some weeks after the accident. A line check showed all lines to be 30 – 35mm too short.

A second line check was performed by Skywalk while the safety manager of the DHV was present. The results were nearly identical: symmetrical shortening of the total line lengths on average 30mm, largest asymmetric shortening 9-12mm, largest shortening of a gallery line: 28mm. The brakes were set 20 mm too short. Skywalk declared the glider to be airworthy with these trim settings, but noted that the brake lines should be set 20 mm longer and a correction of the 28mm difference in a gallery line should be performed. According to Skywalk, the flying characteristics of the accident glider should not be different to those of a production model. Flight tests (a full LTF test-flight program was not performed) conducted by the DHV did not indicate changed flying characteristics due to the trim differences.

Investigations by the Danish association had revealed the presence of a large quantity of sand in the right hand stabiliser of the glider. 2-3kg of sand is mentioned in their accident report. The DHV measured the weight difference of the accident glider with the archived test example of this glider – difference 2.6kg. The sand in the right hand stabiliser weighed 1.6kg, while that in the left hand stabiliser weighed only 200g.



Picture 1: Right hand stabiliser of the accident glider containing approx. 1,5 kg sand.



Picture 2: The sand could have been easily removed via the Velcro opening on the glider.

Danish accident investigators reported the following when asked whether the sand could have entered the glider after the crash:

There was found 2-3 kilograms of sand in the right wing-tip, that is assumed to have been in the wing during flight, as any sand picked up by the canopy during the rescue attempt will not have collected in the wing-tip but instead would have lain in the cells that it entered, and the model flown has 5 closed cells in each wing-tip, so it is not possible for the sand to have entered these cells directly.

DHV investigations confirmed the Danish reports. After the crash, sand in the middle of the glider would have had to work its way down through all the ribs to get into the stabiliser. This cannot be accounted for merely by the salvage of the glider at the accident site. It can be assumed that the glider contained between 1.6 and 2.3 kg (DHV and Danish measurements) of sand in its stabiliser at the time of the accident.

Flight tests were conducted on the glider at the request of the DHV safety department. Firstly, tests were conducted on the DHV Test wagon at speeds of approx. 10 m/s. (See video „Test wagon tests“).

Negative effects due to the sand in the stabiliser were hardly noticeable during inflation, directional stability and collapse tests.

Following this, test pilot Reiner Brunn conducted test-flights at lake Garda. During normal flight no negative effects were noticeable: flight tests starting, straight flight, turning, checking the brake travel distance and tendency to enter a spin were all normal. Recovery after collapsing on the sand-filled side was slightly delayed, with more tendency to cravat. Flight characteristics were markedly different when flying wing-overs – the manoeuvre performed at the time of the accident. Even at moderate roll angles the right-hand side of the glider collapsed easily when this was on the outer side of the turn. Following this, the sand-filled stabiliser became severely tangled within the outer lines. The glider then turned immediately and rapidly towards this cravat. Immediate response from the test pilot was required to prevent the glider entering a spiral dive.

This test was repeated several times with identical results. (See test flight videos 1 and 2).



Picture 3: Outer wing tip collapse during wing-over manoeuvre.

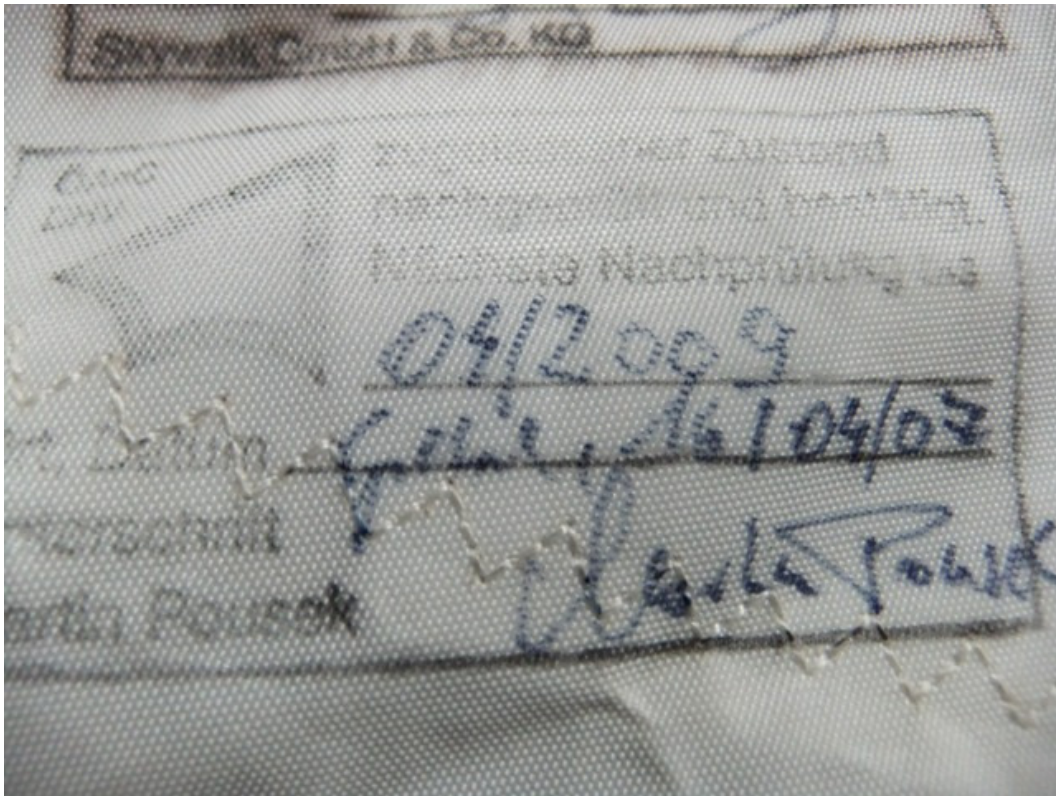


Picture 4: Cravat on the right hand stabiliser, the glider rapidly turns to the right.



Picture 5: Active recovery required from test pilot to release cravat and stop the dive.

Glider re-check validity period



Picture 6: Check label on accident glider

The glider had had its last check in April 2007, which was valid until April 2009. Further checks are not noted on the glider. It is not known if the pilot had checked the glider himself at a later date. Checks by the manufacturer did not indicate that the glider was not airworthy (aside from the sand in the stabiliser).

Harness

The harness was not available for the investigation.

Reserve

The reserve was not available for the investigation.

Accident investigation, Wind and Weather

According to the Danish accident report, wind strengths of 7-8m/s (25-29km/h) (free of turbulence) were present at the time of the accident. Other pilots who had been flying at the site at the same time estimated the wind strength to be more than this (at times much stronger than 30 km/h) but laminar and free of turbulence.

The accident occurred on the windward side of the cliff, so it is improbable that a collapse resulting from lee turbulence played a role in it.

Conclusions

The pilot had the required license for the glider used.

The glider had been type-tested, but did not have a currently valid re-check.

Conditions for flying this coastal site were normal – there were 8-10 other pilots in the air at the time of the accident.

Qualified observers noted that wing-overs were often not conducted correctly by the pilot.

The crash occurred from a height of approximately 25m directly into the cliff.

The cause of the accident cannot be named with complete confidence. Two options are possible – a steep turn towards the cliff, or a collapse/cravat after a failed wing-over with resulting steep turn towards the cliff. A collapse due to turbulence is less probable.

Flight tests conducted by the DHV indicated that the glider was particularly prone to collapsing and cravating on the right-hand side (where the stabiliser was filled with sand) after flying even moderate wing-overs

Other negative flying characteristics (e.g. increased tendency to spin on the right-hand sand-filled side) could not be observed.

Safety advisory for Paraglider pilots

Test flights conducted by the DHV with the accident glider indicate that large quantities of sand in a stabiliser significantly increase the danger of a cravat which is difficult to recover from. It is most probable that this is the case for other makes and models of gliders.

Pilots flying at coastal sites, sand dunes or other sandy areas should recognise this danger and take steps to prevent significant quantities of sand from collecting in the glider stabilisers. Gliders must be regularly emptied of sand.

It is also to be noted (as is far too often the case) that the accident occurred at 25m over ground, where the pilot had no reserve safety height. Sufficient height would have given the pilot a chance to recover from the cravat before hitting the cliff.

For flying schools and tour operators

Schools and tour operators offering dune/coastal flying must inform participants of the dangers associated with sand collection in a glider. Additionally, they must also check / help participants to empty their gliders of sand.

For paraglider manufacturers

Openings at the end of a paragliders stabilisers are most helpful to aid the emptying of sand from it. (See picture 2). Emptying the sand through the internal ribs is particularly difficult for glider which have closed cells at the wing-tips.

4. February 2011

Karl Slezak
DHV Safety & Technical department