Karabiner problems:

Inspection reports of the karabiner manufacturers

Several karabiner manufacturers try to prove the safety of their karabiners with questionable fatigue strength analyses.

It is sufficiently well known that aviation sport karabiners do not usually break. The point is to prove that karabiners are sufficiently dimensioned **at all events with the necessary safety**. Breakages with AustriAlpin Parafly karabiners first became known about after more than 100.000 specimens were already in use. One of the broken specimens however was in use for only 2 years and showed no special signs of wear. This clearly shows that the risk of sudden karabiner breakage exists with a **small but intolerable probability** if the fatigue strength of the karabiner is not proven according to state of the art specified procedures.
Since inspections by the Sincotec Prüftechnik GmbH on behalf of the DHV ascertained, that karabiners from other manufacturers had similar short-fallings in fatigue strength as the Parafly karabiners, the DHV demanded ultimately from the manufacturers on February 3rd 2005 that they should bring documented evidence of the fatigue strength of their karabiners up to the point of actuation by gravity, as **otherwise the connecting element would be deemed unsuitable**. The DHV stipulated the following conditions for the documented evidence:

- The documented evidence must be carried out by an accredited inspections office
- The test must be carried out with an open catch
- The scope of testing must be made with at least, three samples of each karabiner
- The karabiner shall be burdened using 20 mm webbing loops attached at the least advantageous point of application (with the greatest possible torsion arm)

In accordance with the demands of the DHV, all of the karabiners used in Charly harnesses, Pin Lock, AustriAlpin Powerfly Inox, AustriAlpin Delta 3200, Camp, as well as Sup Air Twistlock steel and Sup Air Twistlock aluminium were tested by the inspection institute Sincotec Prüftechnik GmbH, recommended by the DHV and according to the methods stipulated by the DHV.

Result: By the majority of karabiners the established fatigue strength is lower than the operational demands ascertained by the DHV. Breakages as a result of metal fatigue cannot be ruled out with these karabiners, in as far as actuation by gravity does not occur before the fatigue strength has been exceeded.
We report on the results of the inspections hearing arranged by the DHV with the inspection institute and the karabiner manufacturers (see http://www.finsterwalder-charly.de/downloads/karabinertest_april05_eng.pdf).
The inspection report from SincoTec can be read under:
http://www.finsterwalder-charly.de/downloads/karabiner_pruefbericht_sincotec.pdf

AustriAlpin and the German Sup Air importer Hans Bausenwein doubted the documented evidence prescribed by the DHV from the outset, and let an inspection institute in Innsbruck carry out fatigue strength examinations in accordance with their own basic conditions. Seen in this light it is hardly suprising that the inspection reports come to different conclusions:

http://www.supair.fr/de/content/karabiner3.htm

http://www.austrialpin.at/03-austrialpin/bilder/pdf/Powerfly_Dauerschwingungspruefung.pdf

http://www.austrialpin.at/03-austrialpin/bilder/pdf/ALU_Flugkarabiner.pdf

The apparently differing results of the inspection reports can be thus explained, in that all statements from the inspection institute in Innsbruck do not relate in general to the loading of paraglider karabiners as the DHV intended, but rather to the loading along the guidelines of the manufacturers:

1. Operational loading not at the least advantageous point of application but rather in the middle of the harness support
2. Prescribed cycle only 22 to 75 kg
3. Tests with closed catch

To point # 3 above, whether the tests are carried out with an open or closed catch is not of relevance, in as far as measurements are made with maximum possible catch play +20%. It is however questionable whether the measured catch play was the maximum possible.

To point #1 above, Also by broad harness bands, an eccentric loading of the karabiner is frequently the case. The load application in the middle of the harness support rather than at the edge, can make a loading difference of approximately 30% in the least advantageous case. The test results would thus only have been of any use, had accordingly higher loads been initiated.

To point # 2 above, the upper limit of loading is estimated far too low at 75 kg. With a pilot weighing 100 kg, the static loading amounts to 50 kg. Depending on turbulence and flight style, the DHV measured up to 3g, amounting to 150 kg at each karabiner.

The mean value of the karabiner fatigue strength as demanded by the DHV was not found. For a fatigue strength proof, the mean value of the fatigue strength must take into account the dispersion of the tests and be statistically safeguarded and reduced accordingly.
For a correct proof, the variation in cross section measurements at the critical cross section must be taken into account as well as the positive or negative reset tensions arising from the process of bending, or from the adjustment of the karabiner catch play. For example by reducing the permissible catch play.

In conclusion it can be said that by the tests made in Innsbruck, neither the fatigue strength of the karabiners was proven, nor was a serious statement possible regarding the strength durability over time.