PIA - SAFETY ADVISORY

To: ***Skydivers – Riggers - Main Packers***

Date: ***6 December 2024***

Subject: ***Catastrophic - Consequential Line Failures***

Equipment: ***High Performance Canopy Piloting (CP) Parachutes***

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Introduction

Several competitive disciplines within our sport encourage the use of small, high performance canopies. CP events *(speed, distance, accuracy)* fundamentally require the jumper to perform a "speed-inducing maneuver" just prior to entering their final approach on the competition course. The speeds attained by top competitors have surpassed 105 mph (169 km/h). Even the skilled non-competitive jumper can reach 80+ mph (129 km/h) on final approach.

"Drag reduction" is now a prime objective for equipment designs that deliver increased performance and speed. Generally speaking, whenever there is an increase in performance, there is almost certainly a loss of durability and longevity. This is the subject of this *PIA-issued Safety Advisory*.

Background

Recent incidents indicate "line failure," which ordinarily occurs during canopy deployment, can now happen during the roll-out (plane-out / recovery arc) phase following a speed-inducing maneuver. This is the segment of canopy flight where the highest wing-loading can take place. One such incident claimed the life of a jumper when several consequential A/B lines failed. The definition of *"consequential line failure"* is the structural failure of specific suspension lines that significantly alter the aerodynamic shape of the wing, which may not allow for an injury-free or survivable landing. The center A/B lines fall into this category.

Following each line failure event and the subsequent inspection of the canopy and lines, it was determined by local riggers and the manufacturer that the suspension lines were "unairworthy" prior to the jump. The lines on these types of CP canopies are very light and small in diameter, often times rated at a nominal strength of 400 lbs (181 kg) or less. These lines presumably reduce drag, with the goal of increasing airspeed. The underlying problem is their lack of longevity. This is generally common knowledge amongst top level competitors who change out lines frequently, often with less than 100-150 jumps. However, non-competitive jumpers are also ordering canopies with light weight lines, possibly unaware of the unforgiving lack of durability or how much safety margin is actually being sacrificed for so little added performance.

Manufacturers have informed us that more line wear occurs during canopy flight than during the deployment. (Read that sentence again). During normal use, the lines attract minute debris which becomes trapped within the weave of the line. During flight, the lines vibrate and flex rapidly, allowing trapped debris to cause internal friction damage to the individual filaments and carriers. A sandy environment is especially detrimental due to the sharp crystalline nature of sand
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particles. Additionally, salt air mist that engulfs DZs near the ocean is another environmental factor that accelerates material degradation. The slider also causes major friction damage every jump, no matter how quickly it's stowed post-deployment. This damage is often severe, especially at the center A-lines... a very critical location.

At the moment of highest wing-loading following a speed-inducing maneuver, the forces on the center A-lines are tremendous. This is where visibly worn lines may fail, regardless of the line type or initial strength rating when the lineset was new. Additionally, some high performance canopies with ultra-light lines cannot be deployed at terminal velocity per manufacturer directives, which indicates just how little "reserve strength" exists with sub-400 lb lines, whether they be HMA, Vectran, or some other material.

Most competition jumpers are acutely aware of accelerated line wear issues and they replace their lines regularly. Many also have a backup canopy available when the other is down for maintenance. In contrast, the average sport jumper owns but one parachute system, increasing the need for an aggressive inspection/maintenance schedule, which they may not even understand is necessary. For these jumpers especially, the concept of *"just one more weekend of jumping and then I'll have a new lineset installed,"* can lead to grievous injuries or worse.

This *Safety Advisory* is chiefly directed at the sport jumper using light weight lines, but who is unaware of the safety issues noted above, and at packers who encounter these parachutes. Continued airworthiness must be verified before each repack.

Advisory

Main parachute lines of all types and weights must be carefully inspected PRIOR TO EACH JUMP for visible wear. Any signs of broken filaments and carriers is an indication of strength loss. The line surface will feel fuzzy rather than smooth to the touch. When exposed carriers feel burnt, brittle and rough, this may indicate the line's strength could be weakened by 50% or more.

Contact the manufacturer of your canopy for specific inspection criteria. Their website may provide excellent guidance and photos of various levels of line wear so the packer in the field can make an informed decision on continued airworthiness. When in doubt, contact your local rigger for a second opinion or return the canopy to the manufacturer for their professional assessment. The following links also provide valuable information on this subject.

https://parachutist.com/Article/Know-Your-Lines
https://www.skydivemag.com/new/gear-wisdom-line-sets/

Please direct any questions regarding this advisory to the PIA Technical Committee.

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