

Communication Summary

Date: September 22, 2013

Communication From: Chief Inspector Itzhak Razchik



Summary & Factual Information:

Chief Inspector Razchik was the Israeli Accredited Representative and he indicated that the AIAI office (Aviation Incidents and Accidents Investigation Office) reviewed the NTSB report and video associated with the accident.

The AIAI comments and recommendations included:

Wing modifications

From the video, pictures and reports, it is clear that a major modification was done to the length of the lines, decreasing the angle of attack of the wing.

The knot on the front lines was performed on the line ends, where the line thickness is doubled. In this location, the knot shortens the line by 15-20 mm (A knot on a single line shortens the line by 10 mm). It is important to note that a knot reduces the strength of the line by up to 40%.

The two additional links on the back riser added approximately 130 mm to the length of the lines. This is a significant change from the original length of the line.

Simple calculation shows that with the above changes to line length (150 mm total), the angle of attack is reduced by approximately 3 degrees in the center of the wing and 6.5 degrees towards the wing tip.

A normal angle of attack is around 16-17 degrees.

With the line extension, the reduction in angle of attack is 30-40%, and even higher towards the edges of the wings where sensitivity to down wind is high.

Apart from fixing the difficult inflation of the wing, we can offer another significant explanation for the wing modification – increased flight speed.

With the reduction of the angle of attack, the speed of the wing increases by about 10-15 km/h, allowing the pilot to fly in stronger winds, or to fly faster from point A to point B.

This change is an increase of up to 20% of the original wing speed and performance.

Effects of modifications

Collapse resistance – the collapse resistance and pitch stability of the wing is hindered significantly. In this type of soft wing, the angle of attack plays a major role in the stability of the wing and its ability to handle down winds.

This is a bit different in more modern wings that use Reflex Wing Technology. Further suggested reading http://en.wikipedia.org/wiki/Paramotor_Reflex_Wing_Profile

Air intake – reduced angle of attack reduces the air intake capability of the wing. The air flows at a lower angle and faces smaller openings on the leading edge.

Rotational stability of a collapsed wing – from the video, it seems that the behavior of the wing after the collapse is more violent than normal. A rotation is expected in such a collapse, but not as fast as seen here. With correct pilot correction and ample altitude, it is possible to recover from such a situation.

Effect on Recovery – the reduction of the angle of attack, lower air intake and lower pressure on the under foil of the wing, all reduce the ability of the wing to recover itself from a collapse.

Most soft wings are built in a way that even without pilot intervention the wing inflates itself back from a collapse and returns to normal flight.

Pilot correction – both legs -- Immediately following the collapse, the pilot pushed both legs almost all the way forward. This is done for two reasons:

On the right, in order to maintain a straight flight and to prevent a spiral dive. In this case, the leg pressure correction was not sufficient.

On the left, to assist in re-inflating the wing by building more internal pressure in the cells. In this case, the leg pressure in the early stages of the collapse did not allow the wing to maintain a straight flight, thus contributing to the rotation and spiral dive.

The video clearly shows that both legs were pushed all the way to the front, from the beginning of the event until impact with the ground. No 'pumping' movement is seen.

Weather conditions - The meteorological reports show 5 mph winds. However, in the beginning of the video flags are clearly visible and show strong flapping that indicate 20-30 kph winds.

Other evidence to the higher wind speed is the delta speed between the downwind flight, compared to the last section of the flight, which was with headwind and directed towards the camera.

Terrain – the location of the collapse is between two hills. The cameraman is standing on the hill more into the wind.

Rotors from hill – at the point of the collapse, the plane altitude is almost level with the hill top, putting it in an area prone to turbulence from wind coming over the hill and down into the valley behind it.

Pilot correction – as noted above, the pilot did perform some correction. In such situations, instead of pushing both legs, only the right leg should be pushed and even deeper. After stopping or slowing the wing rotation, preventing it from spiraling, the left leg should be pumped deeply to assist in wing re-inflation. In most cases, by the time the direction of the wing is stabilized, the collapsed side inflates by itself without need for pilot intervention.

The continuous pressure by the left leg in this case, did not allow the application of right leg pressure to correct the wing rotation.

Recommendations

In the event of a collapse, do not allow the wing to rotate and dive. Keep the leg counter to the rotation direction as far as needed to stop or slow the rotation. Only then, if still required perform deep pumps with the leg on the collapsed wing side.

Warn the pilot community in regards to making modifications on stock wings.

Do not add links to one riser

Do not extend or shorten wing lines

Do not make fixes without consulting an expert

Specifically for Chiron wing owners, verify that the practice of adding links to ease inflation and takeoff is not used. There are better means of fixing this problematic situation by modifications of the wing attachment to the plane's body.

Advise authorities to verify that the Chiron wings that are still flying have a proper distributor that can perform the yearly inspection and repairs.

I can attest that the above summary and factual information was submitted on the above stated day, and is correct to the best of my knowledge:

Edward F. Malinowski
National Transportation Safety Board
Air Safety Investigator