

# Wing separation during winch launch

## 18 February 2024

### ZK-GRR LAK-12 glider

### Lake Station Aerodrome



General photo of a LAK-12 under winch launch showing cable weak link - photo with permission of Mr Charlie Verrall

# About this investigation brief

The purpose of this report is to identify to the aviation community:

- data relating to the pilot, aircraft, and accident site.
- what happened
- the history of the pilot and aircraft, including any contributory factors
- the findings of the engineering inspection
- why it happened

## Administrative information

Date and time of accident		18 February 2024	14:25 NZDT
Nature of flight		Private	
Flight rules applying		Visual flight rules	
Occurrence number		24/1301	CAA WR: 24/SAI/239
Injuries	Crew	01 fatal	

## Pilot information

Age and gender		70	Male
Pilot certificates		Qualified Glider Pilot Certificate: 24/01/2013 Medical Certificate - valid from: 22/11/2022	
Pilot currency		Last BFR <sup>1</sup> issued	17/05/2023
Flying experience (hours)	Total hours	approx. 328 hours	
	In last 90 days	approx. 14 hours	
	In last 12 months	approx. 25 hours	
	Total LAK-12 hours	approx. 18 hours	

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<sup>1</sup> Biennial Flight Review (two-yearly flying competency check)

## Aircraft and accident site information

Aircraft manufacturer and model	Valstybine Kauno Aviacijos Gamykla LAK-12
Date of manufacture/serial no./country	05/1993      S/N 6219      Lithuania
Registration	ZK-GRR
Location	Lake Station Aerodrome [NZLE] 41°45'31.01"S      172°44'42.25"E
Aircraft damage	Destroyed

## Executive summary

The glider was being winch launched when the right wing separated from the fuselage at approximately 800 feet above ground level (AGL).

The pilot died in the subsequent uncontrolled impact with the grass runway.

Information gathered by investigators strongly indicates that the glider had experienced a heavy landing and ground loop incident while landing the evening before. Investigators are unable to be more certain about the causal link between these precursor events as a result of the reluctance of a knowledgeable eye-witness to participate in the investigation.

Had a 'heavy landing' and/or 'ground looping' incident occurred; Gliding New Zealand (GNZ) procedures require a pilot to:

- report the incident, and,
- have the glider inspected by an approved Class 2 Engineer before the next flight.

It could not be determined why these procedures were not followed.

## Safety lesson

All aircraft owners and pilots are reminded they must follow the published procedures produced by their club, training provider, organisation, and the aircraft manufacturer, after any significant aircraft incident, such as may have occurred in this case, a heavy landing or a ground loop.

Where applicable, all aircraft manufacturers provide instructions describing the engineering procedures that must be completed after such an event.

These procedures are designed with safety and continued airworthiness in mind.

# What happened

Glider ZK-GRR (GRR) was being winch launched from runway 29 when the right wing separated at the fuselage as the glider was climbing through approximately 800 feet AGL.

The glider then rapidly descended and struck the ground in a steep nose-down attitude. It was destroyed on impact and the pilot did not survive. The right wing landed separately in an adjoining farm paddock (see figure one).



Figure 1. Runway 29, with winch, launch start and accident site positions, and previous days ground loop area

## The pilot

The pilot's GNZ medical certificate and declaration was valid until December 2024, and he was current regarding recent flying requirements. His logbook was up to date, but some entries such as 'type of launch' and 'crew capacity' were not recorded in the last 20 entries, after October 2023.

## Pilot's recent flight history

The pilot's first flight in GRR was on 12 March 2023 after it was returned to service. That flight's landing resulted in a 'long arc' ground loop incident. Subsequently the pilot was advised of the GNZ procedure that required an engineering inspection be carried out by a

qualified engineer. The inspection was done and no defects noted. The glider was therefore issued with a new 'Certificate of Release-to-Service'<sup>2</sup> on 23 March 2023.

The pilot conducted one more flight in GRR on 24 April 2023. He did not fly the glider again until 29 January 2024, after which he flew 10 more flights until the day of the accident.

On 17 February 2024, the evening before the fatal accident, GRR was observed by a bystander, not knowledgeable in glider operations, to have been involved in what has been interpreted by investigators as a heavy landing and ground loop incident. On this occasion the incident was not formally reported as required by the GNZ procedure, regarding hard landings, wheels up landings or ground loops.

The fatal accident occurred the following day on GRR's next flight during a winch launch.

## The glider

GRR was made in Lithuania in May 1993, and CAA records show it was first registered in New Zealand on 28 February 1994. It has had five owners including the deceased pilot. The fourth owner did not fly the glider during their eight months of ownership. It was registered

with the CAA by the deceased pilot on 6 June 2019.

The deceased pilot also owned another LAK-12 glider, ZK-GKL, which was registered with the CAA on 09 December 2013. This glider was in storage in the owner's workshop while he was preparing it for a return to an airworthiness condition. The pilot also held all the technical drawings from the manufacturer for both LAK-12 gliders. He was known to carry out minor maintenance tasks and have that work checked and signed off by a qualified engineer. This is an acceptable practice under the Civil Aviation Rules.

The glider design is unique as its total wingspan<sup>3</sup> is 20.4m, while most other gliders have wingspans of 15 or 18m. Another design feature is that the control column hand grip is offset to the left of the control column shaft (see figure 2).



Figure 2. Photo showing GRR left offset control column hand grip.

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<sup>2</sup> A record that a glider has been found serviceable after an engineering inspection.

<sup>3</sup> Wingspan is measured from wingtip to wingtip, including fuselage.



This means if the hand grip is held vertically, an unwary pilot will inadvertently be applying right turn aileron inputs.

This glider type is considered by some pilots to be challenging to fly during take-off and landings. The glider's flight manual (FM) describes the following instructions for approach and landing: "To adjust the approach profile a pilot should use a combination of slipping, changing flap setting position (between  $+18^{\circ}$  and  $+2^{\circ}$ ), and using airbrakes. The published FM touch down speed is 75km/h. Then, after landing a pilot needs to move the flap control to the -2 (up) position and use rudder to keep straight while using 'energetic' aileron and rudder control deflections to prevent the wings from touching the ground".

## The heavy landing and ground loop

The heavy landing and ground loop incident believed to have occurred the evening before is considered to be a contributory factor to this accident. The CAA investigators were advised by the police that this incident occurred on the previous evening (Saturday) and that a person, who was not knowledgeable in gliding operations, at the gliding club rooms had witnessed it.

The witness recalled seeing the glider land and bounce then do a rapid right turn, coming to rest in rough ground, facing the opposite direction. The witness added that the time from landing to stopping was approximately five seconds.

The witness showed the police the landing area and they marked and mapped the site as relevant evidence on the day of the accident (see figure 3).

The CAA investigators were also advised there was an 'expert' witness who may have also seen the hard landing and ground loop, however this person did not respond to requests to assist with the investigation.



*Figure 3. The ground loop markings from the grass runway on to adjoining rough area*

## The accident flight

On Sunday 18 February 2024, the pilot attended the club's daily briefing where that day's hazards and risks were discussed. Unsuitable weather delayed flying that morning, with gliding operations starting later that afternoon.

The pilot prepared his glider for flight and signed the glider's daily inspection and tech log to indicate the glider was airworthy. There were no entries in the logs major defects page, or mention of the heavy landing and ground loop the evening before.

The glider was positioned in the queue to be winch launched. The winch cable was retrieved from the previous launch and the pilot gave an indication to the ground handler, to acknowledge it was the correct colour coded weak link (blue), and it was connected to the glider.

When the pilot and the wing runner were ready, the pilot radioed the winch operator to advise he was ready for the slack in the winch cable to be reeled in. As the glider started moving forward the pilot radioed the winch operator with the instruction, 'all out, all out'.

This is a command from a pilot to the winch operator to rapidly apply the pre-selected take-off power to start winding in the winch cable.

The glider became airborne and started to climb away normally. The winch operator commented that, from his perspective, all was proceeding as expected, until he saw the right wing suddenly separate from the glider. He immediately backed off the winch power as the glider fell to the ground.

The fuselage and left wing landed on the grass runway while the right wing landed flat 'under surface-up' in an adjoining farm paddock 300m away from the fuselage wreckage.

## Engineering inspection and analysis

### Control integrity

All flight controls and associated mechanisms and cables were examined on site and during a later engineering inspection by the CAA investigators. No pre-accident defects were found.

### Engineering examination and analysis

The area of the wing where the separation occurred was carefully examined at the accident site. It was noted that the wing locking mechanisms were still correctly in position (see figure 4), thus eliminating incorrect assembly of the glider as a contributing factor.

An independent engineering consultant was later engaged to examine the wing failure area. The inspection concluded that unseen internal damage and delamination probably initiated or contributed to the sudden catastrophic failure of the right wing. This information reinforced the probable link to the heavy landing and ground loop events the evening before, as described by the only available witness.

The glider manufacturer was also contacted, and they confirmed that this type of failure could happen after a heavy landing scenario (refer figures 4 and 5).

The glider had been kept in very good condition and there were no visible signs of wear and tear or aging.





*Figure 4. Right wing failure area and wing spar connections pins still in position (fuselage was in the middle section)*



*Figure 5. Right-wing failure area (right of four bolts) with spar and wing repositioned for this photo.*

Aircraft wings are designed to withstand high-bending loads (vertical flexing), but not much forward or rearward movement, such as often occurs in a ground loop.

Some aircraft have G load<sup>4</sup> limitations which are published in their operations manuals. Glider wings in particular are designed to withstand the very high 'G' loads that they might encounter during their service life. GRR had a tested wing loading value of +6 to -4 G.

A winch launch will increase the G load on a glider's wings rapidly. The G load will rise slowly at first but increase rapidly as the glider gains height and the angle of the tow line steepens (see figure 6). To safeguard against the towing operation from exceeding a glider's wing G load limit, all winch cables have a 'weak link' connected between the end of the winch cable and the glider. The weak link is designed to deliberately fail well before a glider's G limits are reached (refer to cover picture).

In this accident, the weak link did not break or even deform during the winch-tow sequence, thereby indicating the right wing failed at a much lower G loading value than that of the weak link.

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<sup>4</sup> G load, or g-force, is a measure of the force exerted on an object or person due to acceleration or deceleration. (Harvard University)

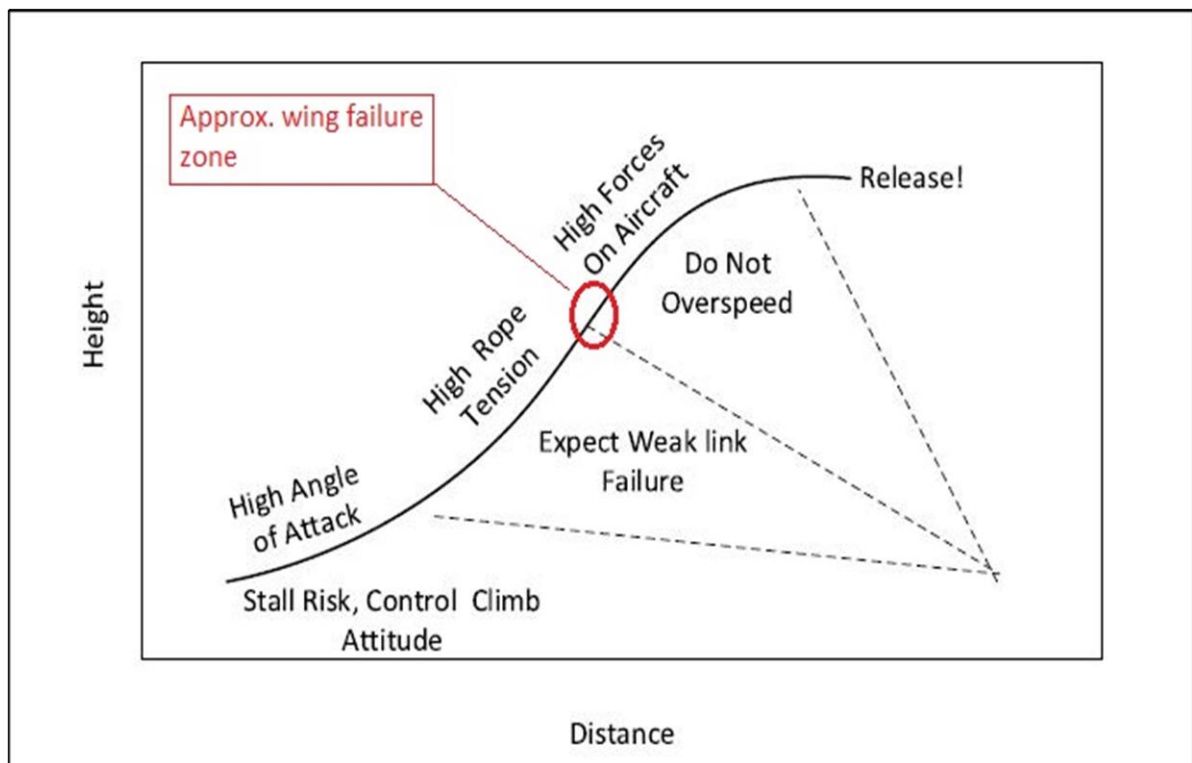


Figure 6. Winch launch loading graph with approximate indication where wing separated.

## Why it happened

There is no evidence of the heavy landing and ground loop incident, believed to have occurred the evening before the accident flight, being reported by the pilot as required in GNZ procedures. Had the occurrence been reported, it would have required the glider to be grounded and not flown again until a qualified class 2, or higher engineer had inspected the glider for damage before any further flight.

It was inconclusive as to why this procedure was not followed after the ground loop incident, as a key knowledgeable witness did not make themselves available for interview.

These checks are designed to identify any unseen defects or delamination and may require the wings to be removed and an internal inspection conducted with an 'endoscope' device.

GRR had a 'long arc' ground loop landing incident less than one year prior to the accident. At the time the pilot correctly followed the GNZ procedure. In that case no defects were found, and the glider was issued a new 'Certificate of Release to Service'.

Relevant sections from GNZ manuals and advisory circulars are included as below:

1. GNZ *Manual of Approved Procedures* (MOAP) Section 2-2 2, 'Operational Responsibilities of the Individual Pilot-in-Command' (2.4) states: "The pilot-in-

command shall ensure the aircraft is airworthy prior to flight and that any event that renders it unairworthy for further flight is reported to an appropriate person”.

2. GNZ Advisory Circular 2-08 states in section 2 Definitions (2.3) that; Typical gliding incidents that must be reported include: Take-off and landing incidents such as heavy or wheels-up landings and ground loops that require an inspection by an engineer to check for hidden damage before the glider can be considered fit for further flight.
3. The GNZ ‘Certificate of Release to Service’ document states on it in *Block 4*, “All heavy and wheels up landings, ground loops and abnormal flight occurrences, invalidate this Release to Service and are to be reported to a GNZ engineer for inspection in accordance with GNZ Tech 22, Section 6, **before further flight**”.

Civil Aviation Authority of New Zealand  
Level 15, Asteron Centre  
55 Featherston Street  
Wellington 6011

PO Box 3555, Wellington 6140, NEW ZEALAND

Tel: +64-4-560 9400

[www.aviation.govt.nz](http://www.aviation.govt.nz)