

ACCIDENT

Aircraft Type and Registration:	Grob G103C Twin III Acro, G-CFWC	
No & Type of Engines:	N/A	
Year of Manufacture:	1990 (Serial no: 34154)	
Date & Time (UTC):	13 June 2021 at 1200 hrs	
Location:	Usk Airfield, Monmouthshire	
Type of Flight:	Private	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - 2 (Serious)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	BGA Assistant Instructor Rating	
Commander's Age:	60 years	
Commander's Flying Experience:	906 hours (of which 400 were on type) Last 90 days - 40 hours Last 28 days - 22 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The accident occurred during a simulated failed winch launch. The glider was initially flown away from the airfield at a low height and, whilst turning back to land, stalled and collided with trees on the edge of the airfield. Both occupants were seriously injured. With assistance from the BGA, the gliding club has taken safety action to improvement elements of the club's operation.

History of the flight

On the morning of the accident the resident gliding club held its usual morning brief at 1000 hrs. This was attended by a club pilot who had intended to fly his own glider that day but, on learning the weather was not favourable for his planned flight, decided to re-validate his use of winch launches from the airfield instead. This was agreed with one of the club's instructors at the end of the brief, to be done using G-CFWC, a club glider.

The first four flights of the day from the airfield involved the instructor flying with an ab initio student, conducting two practice circuits followed by two practice failed winch launches. The flights were all flown in G-CFWC and went without incident. The simulated winch failures were from launches from Runway 28 at a height of about 400 ft agl. After each simulated failure the glider was initially turned to the right before turning left and landing back on the airfield in the opposite direction to which it had departed.

After the final flight with the ab initio student, the glider was re-positioned ready for launch with the club pilot, for his re-validation flight with the instructor. The instructor met the pilot at the aircraft and advised him that they would do two simulated failed winch launches. The instructor also briefed the winch operator of this intention. No other brief of the exercise was conducted, although the pilot ran through, as part of his pre-takeoff checks, what he would do in the eventuality of a failure on launch.

At 1137 hrs the glider commenced its winch launch from Runway 28 with the pilot, who was occupying the front seat, in control. The instructor reported that at a height of about 150 feet he jettisoned the winch cable to simulate a launch failure. The pilot stated that he reacted by rapidly lowering the nose, with the aircraft quickly achieving safe flying speed. The instructor could not recall to what extent the aircraft had been pitched down as he was concentrating on how much landing distance on Runway 28 still remained ahead. Witnesses on the ground reported seeing the glider pitch down when the cable released, but that it had appeared to adopt a gliding, rather than a more nose-down recovery attitude.

The pilot did not believe he had sufficient distance to land safely straight ahead, but that he did have sufficient distance to land the glider in an area of the airfield extending to the left (south) of the end of Runway 28 (Figure 1). He turned the glider to the right, flying away from the airfield to position it for a landing across the airfield at the end of Runway 28.

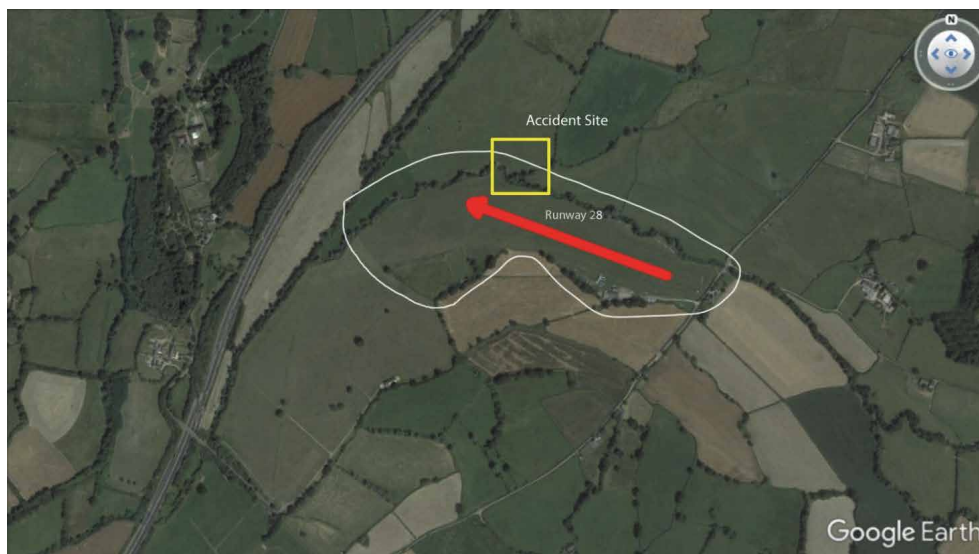


Figure 1

Usk Airfield outlined in white - Runway 28 marked in red - accident site in yellow

The instructor was expecting the pilot to land straight ahead on the remaining runway due to the aircraft's low height and had been surprised by the turn. Witnesses on the ground also reported that they considered there was sufficient distance remaining for the glider to land straight ahead on the remaining runway.

The glider continued to fly away from the airfield for a few seconds before being turned left back towards it again. By this time, the aircraft was sufficiently low that it was in danger of

colliding with trees at the edge of the airfield. Accounts differed between the two occupants as to when the instructor took control, however the instructor stated that it was at this point that he had taken control of the aircraft, attempting to turn further left between a gap in the trees. He reported the turn had tightened whilst at the same time the nose dropped. The glider then hit a tree before striking the ground, seriously injuring both occupants.

Accident site

The glider had come to rest against a fence on the northern edge of the airfield, with the right wing overhanging the bank of an adjacent stream. Damage to the leading edge of the left wing at approximately two thirds span was consistent with it having struck a small elder tree on the bank of a stream at the edge of the airfield (Figure 2).

A flattened area of vegetation on the stream bank corresponded to the shape of the left wing and debris in the vicinity of the tree was matched to the left wing leading edge. Corresponding strike marks on the tree indicated that the glider was approximately at ground level when it struck the tree. The impact caused the glider to pivot sharply around the tree before coming to rest in its final position.

The left wing had separated from the fuselage such that it remained attached only by the aileron and airbrake control rods. The right wing was intact, with the exception of damage to the trailing edge where the wing had struck a fence post as it came to rest.

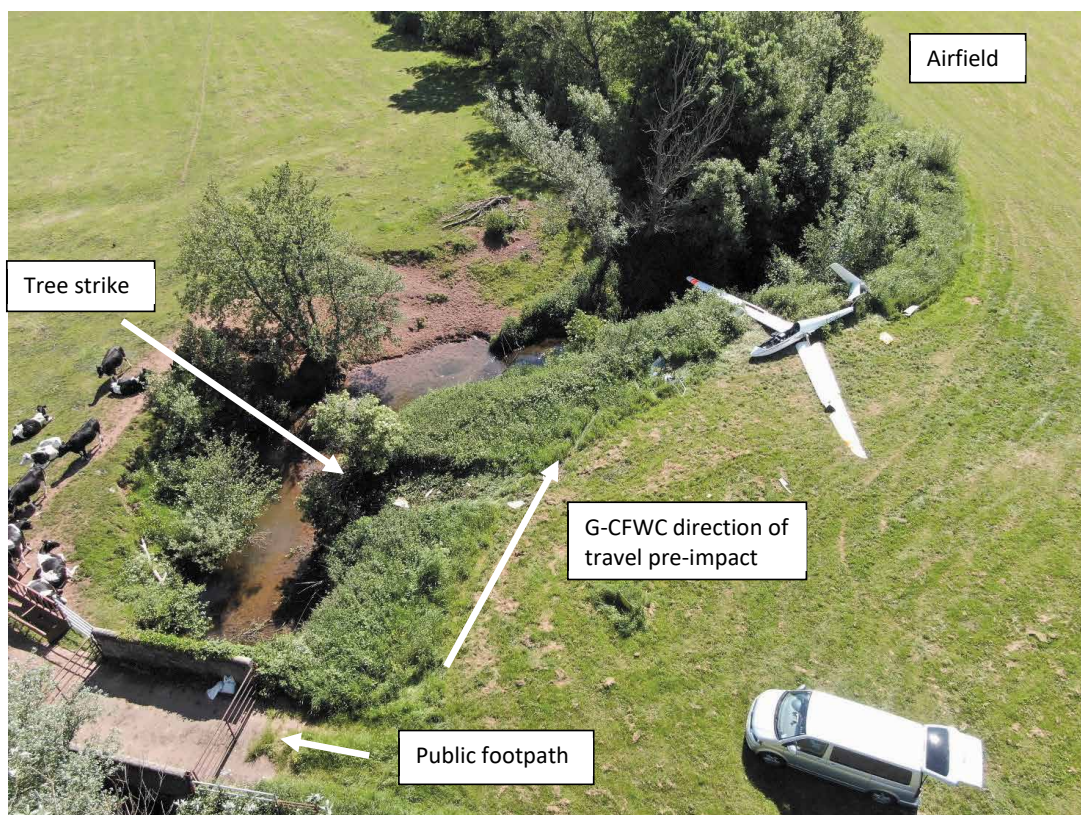


Figure 2
Accident site

The first ground mark in the direction of travel, had been made by the tailwheel and base of the fin and likely occurred just before, or coincident with the left wing striking the tree. The transparency from an inspection window at the base of the vertical fin was found in this ground mark.

The rear fuselage had failed just forward of the tail fin, with the tail assembly remaining attached only by the rudder and elevator control rods, electrical wires and pitot/static lines. The leading edge of the horizontal tailplane showed evidence of having struck the ground and the pitot and total energy probes on the leading edge of the vertical fin were bent. The rudder had detached.

Both front and rear cockpits had retained their basic shape and structural integrity. The rear canopy remained intact while the front canopy had broken into large pieces.

The presence of all major components of the glider and the compact distribution of wreckage indicated that the glider had been structurally intact prior to striking the tree and ground. Ground marks indicated that it had been in an approximately level pitch, slightly left-wing-low attitude at impact.

Recorded information

Sources of recorded information

The aircraft was fitted with a LX Nav manufactured FLARM¹ Powermouse unit that had recorded a GPS derived track log of the accident flight and the previous flights earlier the same day. A recording of the FLARM unit's transmissions² made during the accident flight was also obtained. The data sources provided a comprehensive record of the accident flight and closely correlated with the witness statements and the final position of the aircraft.

Summary of recorded data

The recorded data indicates that the aircraft had reached a height of about 160 ft agl (Point A - Figures 2 and 3) whilst initially maintaining the runway track, but after a few seconds the aircraft made a right turn onto a track of 350° (Point B - Figures 3 and 4) whilst also starting to descend.

When the aircraft was at a height of about 110 ft agl and 80 m beyond the airfield's northern boundary, a left turn, back towards the airfield, was initiated (Point C - Figures 3 and 4). At this point the glider flew approximately level for several seconds with the groundspeed starting to reduce. Shortly after entering the turn and from a height of 100 ft agl, the aircraft's descent rate suddenly increased to about 2,000 fpm (Point D - Figures 3 and 4).

Footnote

¹ FLARM is a flight alarm system that transmits the position and altitude of an aircraft over a low-powered, short-range radio as part of an electronic conspicuity system that can alert pilots to the proximity to other suitably equipped aircraft.

² Data recorded by the Open Glider Network (OGN) <http://wiki.glidernet.org/> [accessed July 2021].

The recorded data showed that shortly before striking the tree, the aircraft's rate of descent reduced to approximately 700 fpm.

The total flight time was just under 30 seconds.

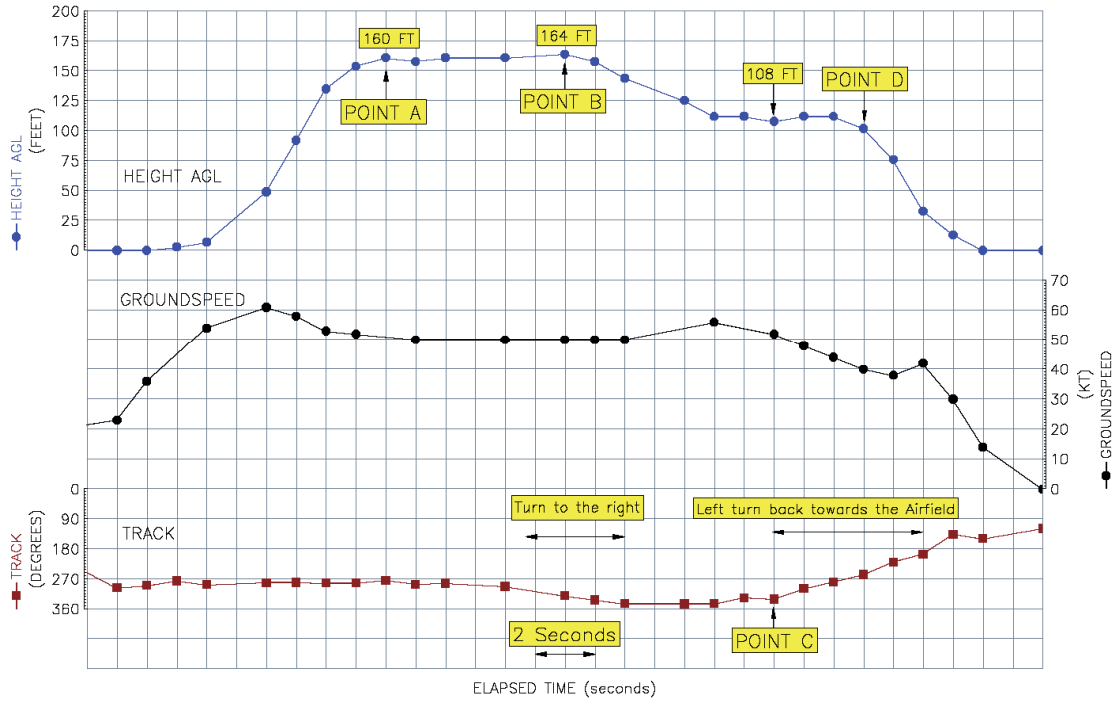


Figure 3
Recorded GPS data

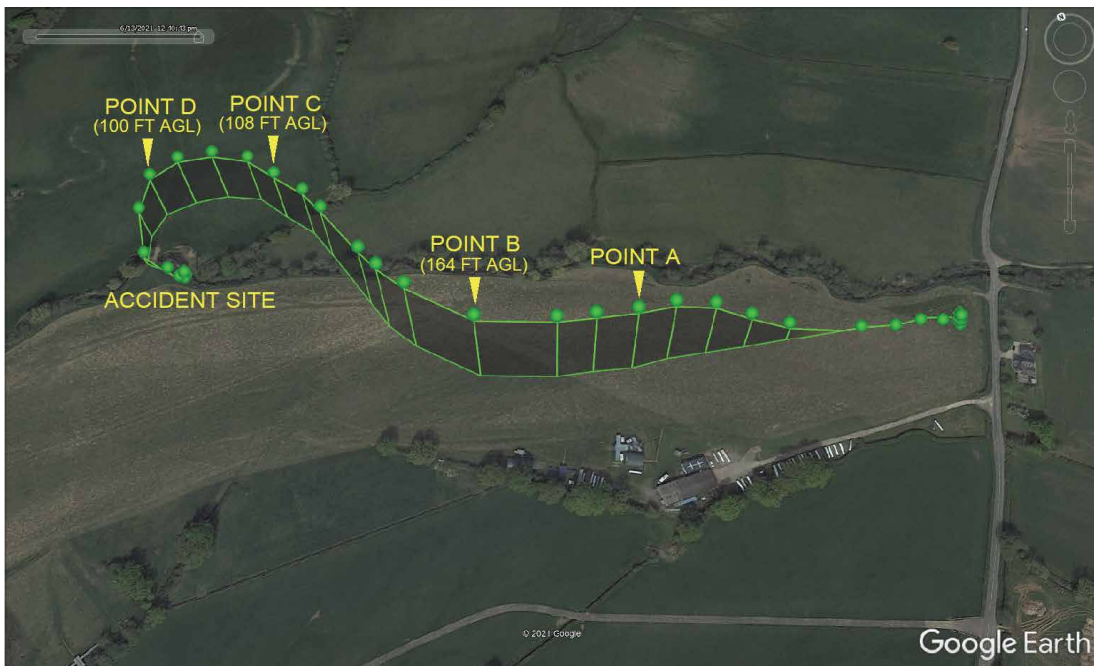


Figure 4
Recorded GPS flightpath of aircraft

Aircraft information

The Grob G103C Twin III Acro is a two-seat, mid-wing glider with a T-tail and is of predominantly glass fibre construction. The landing gear is comprised of three non-retractable wheels.

The flight controls are actuated using a combination of pushrods and bellcranks. The rudder uses control cables in addition to pushrods.

G-CFWC was owned and operated by the resident gliding club and was used primarily for instructional flights. It was manufactured in 1990 and at the time of the accident had accumulated 7,167 flying hours and 14,611 launches. The last annual inspection and Airworthiness Review Certificate (ARC) renewal had been carried out on 10 July 2020.

Aircraft examination

Examination of the flight control runs showed that continuity was maintained, with the exception of the aileron control connection between the fuselage and right wing, which was disconnected. Distortion to the bellcrank, its integral bearing and the control connection indicated that the connection failed as a result of impact loads, when the left wing struck the tree. The resulting distortion of the aileron control rod within the left wing, would have imparted substantial loads on the right aileron control rod and bellcrank.

No defects were found which could have affected the controllability of the glider.

Survivability

The pilot and instructor received serious neck and back injuries in the accident.

Both were wearing five-point harnesses. The fabric harness straps were undamaged and in good condition and the structural attachment points had remained intact and secure. The quick release fitting on each harness operated correctly.

Both seats remained intact. The BGA³ recommends the use of energy absorbing seat cushions as a means of reducing spinal injuries during a hard landing or accident. The gliding club's Operations Manual strongly recommended the use of energy-absorbing seat cushions in all gliders and provided such cushions for use in its club gliders. The seats in G-CFWC had been re-upholstered in 2012 and energy absorbing foam was incorporated at that time, therefore separate cushions were not required. Examination showed that the energy absorbing foam used in the re-upholstering had been fitted on top of an existing layer of standard compressible foam. The BGA guidance explained the detrimental effects of using foams that do not remain compressed in an impact and the need to replace them with energy-absorbing types. In particular, it stated:

Footnote

³ <https://members.gliding.co.uk/library/safety-briefings/safety-foam/> [accessed January 2023].

'Try to avoid installing an energy-absorbing cushion on top of existing material that is not viscoelastic or that does not remain fully compressed in flight. In a crash loading, the original material will not go rigid immediately and may produce an effect similar to a bounce. This is because you and your energy-absorbing cushion may initially move on without decelerating as you compress the material whilst the underlying glider structure starts to decelerate immediately in the crash – maybe bouncing back up.'

It was not determined to what extent, if any, the particular arrangement of foam on G-CFWC's seats may have reduced or contributed to the injuries sustained by the occupants.

Meteorology

There was a light easterly wind during the morning of the accident of 5 kt and below, with no significant cloud and good visibility.

Airfield information

Usk Airfield is a grass airfield from which the resident gliding club was the sole operator. The layout of the airfield accommodated a takeoff and landing strip orientated 100/280°. The airfield extended to the south at the end of the takeoff run from Runway 28, providing another area capable of being used as a landing area if necessary.

The airfield was bounded by hedgerows containing mature trees. Beyond these were fields, with those to the west providing more favourable forced landing options, due to their size, than those to the east. The gliding club used both winch launches and aerotows.

On the day of the accident, the tug aircraft being used for the aero tows was not as powerful as the normal club aircraft. As a result, they had opted to use Runway 28, despite the wind direction, in case of problems with launches as it offered more options for forced landing away from the airfield.

Pilot backgrounds

The instructor was 60 years old and had started gliding in 1993, since when he had gained 906 hours total flying time, including 338 hours instructional time. He held a BGA Silver C badge and qualified as an assistant gliding instructor in 2007. He had been flying from Usk Airfield for a number of years, being familiar with both aero tows and winch launches from the airfield.

The pilot was 84 years old and had starting gliding whilst in his early twenties. He had also flown light aircraft for three years whilst at university with an RAF University Air Squadron. He later stopped flying for 37 years, but starting gliding again at Usk Airfield in 2010. He had previously been an assistant gliding instructor for 13 years and, in total, had flown gliders for 22 years with a total flying time of 535 hours. At the time of the accident, he held a BGA Silver Badge.

The pilot owned his own Cirrus glider and would normally use aerotows to launch the glider. He had last undertaken a winch launch some months before the accident. Due to the COVID-19 pandemic, his flying activities at the club had been severely curtailed and he had not flown between 27 September 2020 and 26 April 2021. On 26 April he had, as with all other club members, been required to undertake a check flight as part of the club's return to normal flying. This had been undertaken with the Chief Flying Instructor (CFI) in G-CFWC using an aerotow, with the pilot being cleared to resume solo flying. However, the CFI required the pilot to carry out a winch check flight with an instructor, due to the length of time since his last winch launch, before using winch launches again.

Since his check flight, the pilot had completed two further flights, on 2 May and 30 May, both using aerotows and without incident.

Pilot age and recency requirements

The gliding club operations manual contained information on recency requirements which related to both qualification and age. Age-related requirements fell into four categories: under 18 years, 18-75 years, 75-79 years, and 80 years and above. It was reported by the club that whilst subjective in nature, the requirements were intended to take into account the possible effects on pilot performance due to age. Both the pilot and instructor met with these requirements.

An AAIB investigation into another glider accident⁴ on 26 August 2020 included consideration of pilot age as a possible factor. The report stated:

'Older pilots are not necessarily less-safe pilots and poor decision making can affect pilots of all age and experience levels. Nonetheless, age-related deterioration in eyesight, hearing, mobility, memory, cognition and decision making are recognised as having an impact on piloting ability.'

Winch launch failures

Gliders at Usk would normally release from a launch at between 700-900 ft agl, depending on the conditions. Instructors at the airfield described winch launches falling into three categories, depending on the height at which they happen. Those occurring below 250 ft agl were considered low failures with the glider normally having sufficient distance remaining on the airfield to land straight ahead. Those occurring above 300 ft agl were considered high failures with the glider having sufficient height to be able to carry out a low circuit to land. Where the glider was between the two ie 250-300 ft, this presented a more difficult scenario requiring quick assessment of whether to land straight ahead or position the glider in the height remaining to land elsewhere.

When carrying out winch launch validation flights a pilot would not normally know at which height the instructor would choose to carry out the simulated failure.

Footnote

⁴ AAIB Reference Number 26884, G-CFST, 26 August 2020

The BGA Instructor Manual contained information on the handling of launch failures. It gave the following requirements for a safe outcome:

- recover to the appropriate recovery attitude while checking airspeed
- wait to regain the approach speed
- assess the situation
- plan a safe approach and landing
- release the wire
- check the airspeed again
- continue to monitor it
- fly the approach and landing or a circuit variation to it

The manual stated:

'As the glider adopts a steep climbing attitude during a winch launch, should the launch fail, a positive move forwards of the control stick is required without delay to place the glider in a nose down attitude sufficient to regain airspeed. This attitude is steeper than the attitude experienced during a normal approach and is termed the 'recovery attitude'. If the attitude is not achieved quickly there is a danger of the glider stalling.'

The manual further stated that the first question the pilot should consider is whether they can land ahead. It added that if the nose isn't lowered sufficiently, it can change the perspective of the airfield, making it appear that there is insufficient room to land ahead. It continued that even in cases which at first seem marginal there is usually enough room to land safely. It conceded however that at small or restricted sites the decision to land ahead remains difficult. The manual also considered the opportunity to turn if choosing to not land straight ahead and emphasised the need to maintain appropriate airspeed if doing so.

Club information

The gliding club was affiliated to the BGA and had carried out periodic safety reviews as part of the BGA safety oversight programme. It had suffered three other accidents investigated by the AAIB since 2016⁵ and, as a result of the accident to G-CFWC, the club consulted with the BGA to seek assistance in identifying and addressing any existing operational and technical safety issues. As a result, a further review was conducted by the BGA after the accident. A number of actions were taken which included:

- Review of the club safety management, including consultation with club members to improve the overall safety culture.
- Review of the club Operations Manual.

Footnote

⁵ G-BLCV – 5 April 2016, G-KHEH – 10 June 2018, G-DDGX – 27 July 2019

- Engagement with the BGA Training Manager.
- Practice days undertaken by instructors in cable break procedures.
- Winch launches towards the west stopped due to the limited number of options for recovery from failed winch launches in that direction.

The BGA advised that it would continue its collaboration with the club, providing any necessary guidance and support to ensure successful implementation of these actions.

Analysis

The investigation found no technical issues which may have contributed to the accident. Examination of the glider did not identify any pre-existing defects which would have affected its controllability. The damage to the glider and flight controls was consistent with having been sustained during the impact sequence. Ground marks, together with the distribution and condition of the wreckage also showed that the glider was structurally intact prior to the collision with the tree and ground.

The occupants had suffered serious injuries. BGA guidance discusses the potential issues of using energy absorbing seat foam on top of more compressible foams which may already be present. It was not determined if the presence of compressible foam on G-CFWC's seats may have limited the effectiveness of the energy absorbing foam in reducing the severity of the injuries sustained by the occupants.

The pilot being checked was confident that he had carried out the appropriate recovery manoeuvre when the instructor simulated the winch failure. He was equally confident that he had positioned the glider appropriately to carry out a landing in the 'dogleg' area of the airfield.

By contrast, the witnesses watching from the airfield considered that the glider had not adopted a sufficiently nose-down recovery attitude. They had also expected the glider to land in the area remaining immediately ahead which, to them, seemed more than adequate.

The glider's initial recovery attitude had not been obvious to the instructor, who had been concentrating instead on the landing area still remaining at the time he initiated the simulated winch failure. He had been taken by surprise when the pilot turned away from the airfield, having expected him to land straight ahead.

Based on the position of the glider at the time of the cable release, determined both from eyewitnesses and recorded data, there would have been sufficient distance available to land the glider straight ahead, as the instructor had anticipated. It is possible the pilot's assessment that there was insufficient distance had been made because he had not lowered the nose sufficiently, creating a more restricted view of the area ahead.

The instructor was candid in his own recollection of meetings he had attended where the importance of early intervention by instructors had been stressed. He reported he had not done so in this case due to the experience of the pilot and he had only intervened when he

considered they were unlikely to make the airfield. Whilst there are differing recollections of who was flying the glider when it turned back towards the airfield, it is clear that the glider had by then descended too low to make it to the airfield safely. The reduction in descent rate seen on the data may have been an attempt to maintain altitude but this resulted in a loss of airspeed. This reduction in airspeed at such a low height put the glider in a precarious position, being too low and too slow to conduct an effective recovery. The instructor had instinctively pulled back on the controls just prior to impact in an attempt to cushion the landing. Despite this, the impact forces experienced by the aircraft were still sufficient to cause significant injuries.

The pilot had passed a check flight with the club's CFI not long before the accident without any apparent issues. It was not possible to make an objective assessment of whether his age or lack of recent flying experience contributed to his ability to assess the glider's attitude and position when recovering from the simulated winch failure.

Although the flight was intended as a re-validation check, there was no briefing other than that undertaken at the aircraft itself just prior to the flight. This largely relied on the pilot's pre-takeoff brief to the instructor of what he would do in the event of a winch failure. A more comprehensive brief in a suitable location would have allowed for a more thorough assessment by the instructor of the pilot's knowledge of the exercise they were about to undertake. This would have been even more important because the exercise itself represented a more hazardous type of operation than normal.

Following the accident, the gliding club worked with the BGA to review the safety of its operation and they put in place a number of safety actions. These actions were intended to address the areas in need of immediate improvement with a more long-term engagement aimed at achieving a continued improvement in safety.

Conclusion

The practice of winch launch failures is a common training exercise with suitable guidance existing for those undertaking it. At the initiation of the failure there was sufficient distance available for the glider to have been landed straight ahead, although the pilot manoeuvred the glider to land on a different part of the airfield. There were differing accounts of subsequent events, but the glider then became too slow to maintain controlled flight and too low to return safely to the airfield.

It was not determined to what extent, if any, the particular arrangement of foam on G-CFWC's seats may have reduced or contributed to the injuries sustained by the occupants.

Safety Actions

The gliding club took the decision to seek assistance from the BGA in assessing the safety of its operation. The BGA, in turn, was proactive in its response in facilitating improvement of elements of the club's operation. The resulting safety actions included:

- Club operations manual re-written for clarity
- Improved engagement with club member on safety matters
- Review and changes to some airfield and flight operations
- Instructor refresher training from the BGA
- Review of resourcing current and future training needs within the club

Published: 19 January 2023.