

AIRCRAFT ACCIDENT REPORT
CAA OCCURRENCE NUMBER 09/923
NORTH WING T2 TANDEM HANG GLIDER
INFLIGHT STRUCTURAL FAILURE
QUEENSTOWN
10 MARCH 2009

FOREWORD

Aviation safety investigations are conducted in New Zealand pursuant to New Zealand's international obligations under the Convention on International Civil Aviation 1944, commonly known as the Chicago Convention. Pursuant to Articles 26 and 37 of the Convention, the International Civil Aviation Organisation (ICAO) has issued Annex 13 to the Convention setting out International Standards and Recommended Practices for the investigation of aircraft accidents and incidents. Paragraph 3.1 of Annex 13 describes the sole objective of the investigation of accidents and incidents:

*3.1 The sole objective of the investigation of an accident or incident shall be the **prevention** of accidents and incidents. It is **not** the purpose of this activity to **apportion blame or liability**.*

This philosophy of prevention for the future promotion of aviation safety is reflected in New Zealand domestic law through the provisions of the Civil Aviation Act and Part 12 of Civil Aviation Rules.

Civil Aviation Authority accident investigations are conducted in accordance with ICAO guidelines. The objective of investigations is the prevention of accidents by determining the contributing factors or causes and implementing appropriate preventive measures – in other words, restoring safety margins to provide an acceptable level of risk.

The focus of CAA safety investigations is to establish the causes of the accident on the balance of probability. Accident investigations do not always identify one dominant or 'proximate' cause. Often, an aviation accident is the last event in a chain of events or factors, each of which may contribute, to a greater or lesser degree, to the final outcome.

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Glossary of abbreviations used in this report:

amsl	above mean sea level
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule(s)
CEO	Chief Executive Officer
E	east
Hrs	hours
kg	Kilogram(s)
m	Metre(s)
mph	miles per hour
NZDT	New Zealand Daylight Time
NZHGPA	New Zealand Hang Gliding and Paragliding Association
S	south
UTC	Coordinated Universal Time
VHF	Very high frequency
WGS 84	World Geodetic System 1984

AIRCRAFT ACCIDENT REPORT

CAA OCCURRENCE NUMBER 09/923

Aircraft type, serial number and registration:	North Wing T2 Tandem Hang Glider, 71251 No requirement to be registered
Number and type of engines:	Nil
Year of manufacture:	16 January 2008
Date and time:	10 March 2009, 1015 hours ¹
Location:	Queenstown Latitude ² : S45° 02.111' Longitude: E168° 45.183' Elevation: 1100 feet amsl
Type of flight:	Commercial Hang Gliding
Persons on board:	Crew: 1 Passengers: 1
Injuries:	Crew: 1 fatal Passengers: 1 fatal
Nature of damage:	Hang Glider destroyed
Pilot's licence:	NZHGPA Hang Glider Tandem Professional Pilot Certificate
Pilot's age:	28 years
Pilot's total flying experience:	950 hours (approximately)
Information sources:	CAA field investigation
Investigator in Charge:	Mr C P Grounsell

¹ All times are NZDT (UTC + 13 hours)

² WGS 84 co-ordinates.

Synopsis

The Civil Aviation Authority was notified of the accident at 1100 hours on Tuesday 10 March 2009. The Transport Accident Investigation Commission was notified shortly thereafter but declined to investigate. A CAA site investigation was commenced the next day with the assistance of the NZHGPA Safety Officer for the region.

The hang glider pilot was conducting a commercial tandem hang glider flight from a site on the Remarkables mountain range. The hang glider was observed carrying out a series of manoeuvres before entering a steep left hand turn, when the wings of the hang glider suddenly folded rearward. The hang glider then descended rapidly towards the ground. An emergency parachute (hereafter referred to as a reserve parachute) was seen to initially deploy, then separate from the hang glider. The accident was witnessed by a number of people who went to assist the pilot and passenger, however the accident was not survivable.

1. Factual information

1.1 History of the flight

- 1.1.1 On Tuesday 10 March 2009, two tandem hang glider pilots employed by Skytrek Tandem Hang Gliding Limited based in Queenstown, were tasked by the operator to carry out four tandem hang glider flights.
- 1.1.2 The launch site in use was known as 'The Knoll' which is located on the Remarkables Mountain Range at an elevation of approximately 3000 ft amsl. The landing area in use was known as 'Mee's Field' located at the base of the Remarkables at approximately 1100 ft amsl. See Figure 1.

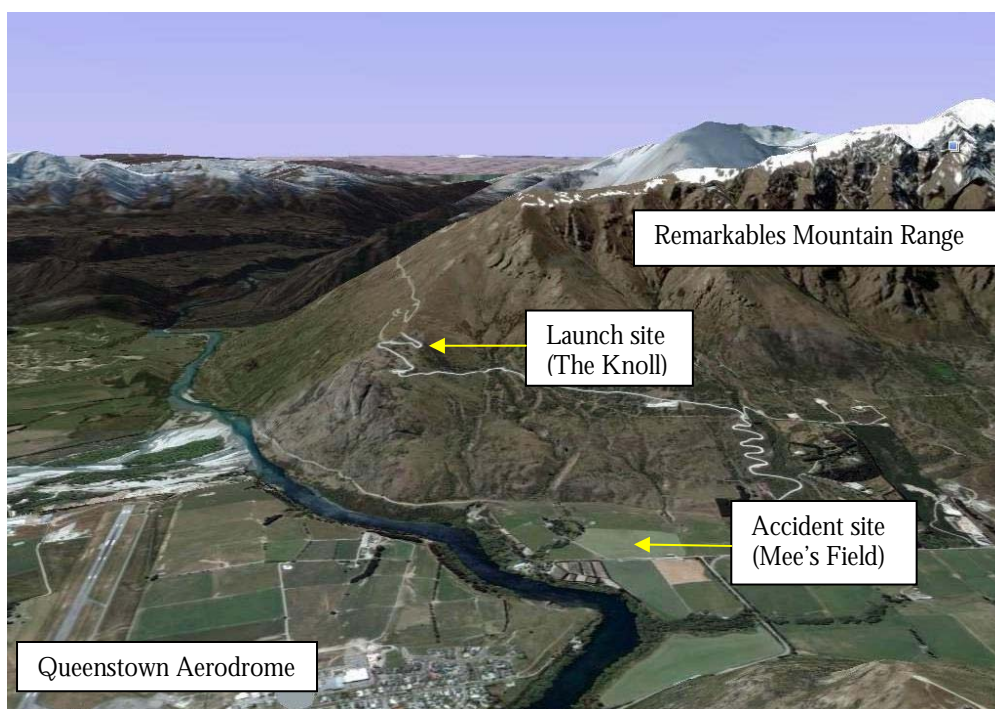


Figure 1: Launch and landing site overview

- 1.1.3 The first two flights were conducted at approximately 0900 hrs by the pilots. Just prior to launching, the wind conditions were obtained from Queenstown Aerodrome Control Tower by the accident pilot who was acting as the Duty Pilot on that day.
- 1.1.4 The two flights were flown without incident with a flight duration of approximately 10 minutes. The hang gliders were then de-rigged and transported back to the launch site and re-rigged by the pilots for the next two passengers.
- 1.1.5 After re-rigging the hang gliders, the passengers' weights were assessed and the second series of flights was commenced at approximately 1000 hrs. The accident pilot had waited briefly for the crosswind conditions to ease prior to launch.
- 1.1.6 The hang glider was fitted with an onboard video camera which captured approximately three minutes of video recording. The recording shows the flight from the launch until shortly after the structural failure of the hang glider.
- 1.1.7 The pilot carried out a series of flight manoeuvres involving pitch and roll. As the flight progressed, the manoeuvres became more aggressive with the hang glider accelerated to a high airspeed and the angle of bank increasing up to 90 degrees in turns.
- 1.1.8 Video evidence showed that at approximately 800 ft agl, the hang glider entered a high speed dive, then commenced a rapid climbing left hand turn, at an angle of bank of approximately 47 degrees with a nose pitch up in excess of 30 degrees. It was at this point that a structural failure occurred. The structural failure sequence of the hang glider can be seen in the series of photographs captured from the video recording in Figures 2 to 5.

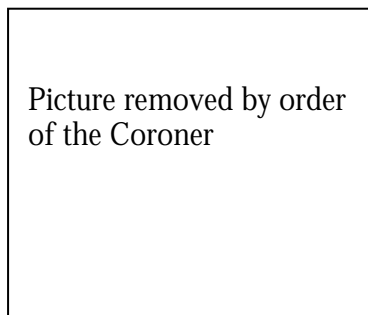


Fig 2: Climbing turn entry

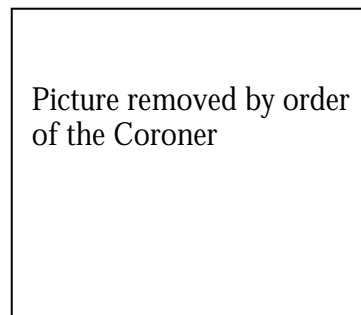


Fig 3: Noticeable bowing of down tube

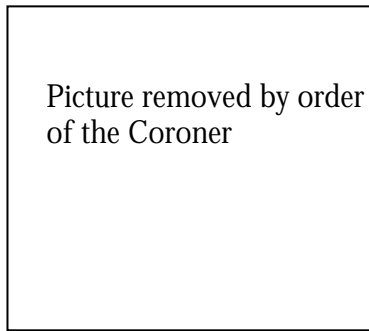


Fig 4: Failure of down tube

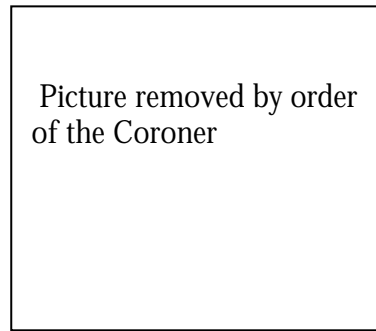


Fig 5: Complete structural failure

- 1.1.9 Witnesses on the ground reported seeing the hang glider in a tight turn and hearing a loud ‘cracking’ sound. This was followed by the hang glider wing folding rearward and the hang glider then descending at a high speed to the ground.
- 1.1.10 The Charly Duo 160 reserve parachute was deployed by the pilot, however the parachute separated from the hang glider and failed to arrest the rate of descent.
- 1.1.11 A video recording was obtained from a security camera at Queenstown Aerodrome which captured the final few seconds of the flight and showed the separation of the reserve parachute from the hang glider.
- 1.1.12 Personnel and rescue services were quickly on the scene, however the accident was not survivable.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	1	0
Serious	0	0	0
Minor/None	0	0	

Table 1: Injuries to Persons

1.3 Damage to aircraft

- 1.3.1 The hang glider was destroyed.

1.4 Other damage

- 1.4.1 Nil.

1.5 Personnel information

- 1.5.1 The pilot had been employed by the operator since October 2007. He had begun flying in 1997 and had accrued more than 800 hours solo flying, including extensive competition flying in both New Zealand and overseas. The pilot had flown tandem hang gliders for approximately four and a half years and was experienced on the North Wing T2 tandem hang glider.

- 1.5.2 The pilot held a valid Hang Glider Tandem Professional Certificate issued by the NZHGPA.
- 1.5.3 The pilot had flown approximately 195 tandem flights in the previous 90 days.

1.6 Aircraft information

- 1.6.1 The North Wing T2 tandem hang glider airframe is constructed with a combination of 7075, 6061 and 6063 T6 aluminium alloys and has a wing span of 10.6 m. The basic hang glider weight is 31 kg with a maximum load carrying or 'hook in' weight of 204.1 kg.
- 1.6.2 During the investigation, it was determined by calculation that the hook in weight of the hang glider at takeoff was 174.6 kg, being 29.5 kg below the maximum allowable. The calculated weight included 4 kg for the harnesses including reserve parachute, and 170.6 kg for the combined weights of the pilot and passenger.
- 1.6.3 The passenger's weight had been estimated at 90 kg by the pilot, as there were no scales available to accurately measure passenger weights.
- 1.6.4 The following operating flight limitations are stipulated in the North Wing T2 Owner's Manual and also displayed on a placard on the hang glider:

Va speed ³	37+/-2 mph
Maximum speed	41+/-2 mph
Vne speed ⁴	47 mph
Pitch angle	no greater than 30 degrees up or down
Bank angle	no greater than 60 degrees left or right

The North Wing T2 Owner's Manual also states that it is entirely possible to push the North Wing T2 tandem hang glider beyond its limitations and cause catastrophic damage.

- 1.6.5 North Wing T2 tandem hang glider S/N 71251 was manufactured in January 2008 and entered service with the operator in May 2008. At the time of the accident the hang glider had completed 428 flights and approximately 107 hours flight time. There was no record of the North Wing T2 tandem hang glider having received a Warrant of Fitness as required by CAR 106.17(b) when it entered service with the operator. The North Wing T2 tandem hang glider should also have had a further

³ Va (Design manoeuvring speed). This is the maximum speed for operation in turbulent air and also applies to rapid or aggressive control inputs to the glider as it may generate a force greater than the aircraft's structural limitations.

⁴ Vne (Never exceed speed). The maximum indicated airspeed specified by the manufacturer above which structural failure may occur.

Warrant of Fitness Inspection when it had completed 250 flights, in accordance with the NZHGPA Organisation and Procedures Manual.

- 1.6.6 The North Wing T2 tandem hang glider is required by the manufacturer to undergo a maintenance inspection at 100 hours flight time or 400 flights whichever occurs sooner. At the time of the accident, the hang glider had accumulated 107.5 hours and 430 flights and was therefore 7.5 hours and 30 flights overdue for the required maintenance inspection.
- 1.6.7 A Charly Duo 160 reserve parachute was carried in a pouch on the front of the pilot's harness. The reserve parachute is rated for a maximum load of 160 kg and it is designed as a fast opening parachute. The total all-up weight of the hang glider at the time of the accident was calculated to be 205.6 kg, which exceeds the reserve parachute's maximum loading by 45.6 kg.
- 1.6.8 The reserve parachute was last repacked six to seven weeks prior to the accident by the pilot. The reserve parachute is required to have an inspection and re-pack carried out and recorded annually. The last recorded annual inspection and re-pack was carried out in October 2007, therefore at the time of the accident the parachute was 5 months overdue for this inspection.
- 1.6.9 The date of manufacture of the reserve parachute could not be established. It appears to be an accepted practice in the hang gliding industry that the reserve parachutes and harnesses are retired after ten years in operation or sooner if their condition dictates.
- 1.6.10 During the investigation, no method for the pilot to determine altitude in the form of an altimeter could be found as is required by CAR 106.15(b). There was also no means available for the pilot to accurately gauge the airspeed of the tandem hang glider nor is there a rule requirement to do so.

1.7 Meteorological information

- 1.7.1 The wind at Queenstown Aerodrome was reported by Air Traffic Control as a 7 to 9 knot south-westerly. The sky was overcast and there were showers of rain in the vicinity. The wind at the landing site was reported as calm by witnesses. At the launch site, the pilots agreed that the air was somewhat turbulent but not beyond conditions that they would normally fly in.

1.8 Aids to navigation

- 1.8.1 Not applicable.

1.9 Communications

- 1.9.1 VHF communication was available between the pilot and the Control Tower at Queenstown airport via a portable radio carried by the pilot, however no transmissions were made during the accident flight.

1.10 Aerodrome information

- 1.10.1 Not applicable.

1.11 Flight recorders

1.11.1 Although not a dedicated flight recorder, a video camera was carried on the hang glider which provided very useful information for the accident investigation.

1.12 Wreckage and impact information

1.12.1 The hang glider struck the ground in a near vertical nose down attitude. This was determined by witness marks on the hang glider and ground. The nose of the hang glider was initially buried in the ground but was subsequently moved by those persons initially on scene to gain access to the pilot and passenger. The wreckage was in a localised area and all components of the hang glider were accounted for. Investigation on site revealed that the control frame down tubes, keel, and leading edges had failed from overload forces.

1.12.2 The reserve parachute was located 40 m away from the hang glider wreckage. It was noted on site that the parachute nylon attaching strap (Bridle) had failed at the loop where the parachute rigging lines attach. See Figure 6.



Figure 6: Failed Bridle loop

1.12.3 The hang glider and reserve parachute were removed from the accident site to undergo further investigation.

1.13 Medical and pathological information

1.13.1 The Post-Mortem reports concluded that the pilot and passenger died of injuries consistent with a high-energy impact.

1.13.2 There was no indication of any pre-existing medical condition that would have affected the pilot's ability to operate the hang glider normally.

1.13.3 Toxicological tests conducted on the pilot disclosed a trace level of alcohol (less than 5 milligrams per 100 millilitres) which may have been due to means other than deliberate ingestion. There was no evidence of medicinal or recreational drugs.

1.14 Fire

1.14.1 Fire did not occur.

1.15 Survival aspects

- 1.15.1 Helmets were worn by the pilot and passenger, however the impact forces were not survivable.
- 1.15.2 The Charly Duo 160 reserve parachute had failed when it was deployed by the pilot. The combined weight of the hang glider, and occupants, exceeded the maximum load rating of the reserve parachute. Had a suitable reserve parachute been carried by the pilot, the accident may have been survivable.

1.16 Tests and research

- 1.16.1 Metallurgy tests conducted on the failed hang glider down tubes determined the aluminium tubing to be 6063 T6 for the outer tube and 6061 T6 for the inner sleeve. This conforms to the manufacturer's specifications for correct strength and type of material.
- 1.16.2 Examination of the pilot's harness, which had the reserve parachute bridle attached, showed that the bridle attachment loop where the parachute rigging lines attach was torn through at its apex. There were friction/burn marks evident on the bridle and the parachute rigging lines where the rigging lines had torn through the bridle loop. See Figure 6.
- 1.16.3 Further examination and testing of the bridle by an independent organisation experienced in nylon safety harnesses and equipment, indicates that the bridle showed signs of deterioration of the webbing due to damage and ageing. It was also noted that the design of the attachment area was poor and could be improved by the use of a connecting ring and sleeve. It was felt that the current design of the looped bridle end, could reduce the strength of the bridle by up to 30%.

1.17 Organisational and management information

- 1.17.1 Hang gliding activities in New Zealand are administered by the NZHGPA.
- 1.17.2 The Director of Civil Aviation delegates his authority to issue Pilot Certificates to a nominated senior person in a Part 149 Certificated Recreational Aviation Organisation. The NZHGPA, as a Part 149 Recreational Aviation Organisation, is certificated by the CAA to administer the issue of Pilot Certificates by the individual delegation holder. All tandem hang glider pilots are required to hold a Tandem Professional Pilot Certificate. Some NZHGPA operating procedures and requirements apply universally to tandem and recreational hang gliding pilots. It is incumbent upon the pilot to operate in accordance with those procedures.
- 1.17.3 CAR Part 106 *Hang Gliders – Operating Rules* sets out the operating rules for hang gliders, while CAR Part 91 – *General Operating and Flight Rules* sets out the General Operating and Flight Rules for all pilots. Pilots of hang gliders are required to comply with the operating standards and procedures set out in the NZHGPA Organisation and Procedures Manual.
- 1.17.4 Currently, there is no regulatory oversight of commercial tandem hang gliding operators. CAR Part 115 *Adventure Aviation Operations* Notice of Proposed Rule Making (NPRM) is due to go to the Ministry of Transport in July 2010. It is

hoped to have the NPRM out to aviation industry participants for consultation in the last quarter of 2010. Depending upon submissions received in response to the NPRM, it is anticipated that CAR Part 115 will be introduced in mid to late 2011. This Rule provides for the regulatory oversight, by CAA, of commercial operators and operations.

- 1.17.5 As there is no CAA regulatory oversight of commercial tandem hang gliding operators at present, principal regulation is covered by the Health and Safety in Employment (HSE) Act 1992. The HSE Act requires employers to take 'all practicable steps' to ensure the safety of employees in the workplace. Obligations are also placed on self-employed persons, principals, and on persons who control places of work, to other people entering their workplace, e.g. passengers.
- 1.17.6 The HSE Act applies to tandem hang gliding operators irrespective of the NZHGPA operating procedures and requirements. HSE coverage in aviation is a function of the CAA Health and Safety Unit. This means the CAA is required to ensure that health and safety practices are adhered to on aircraft as a place of work, by identifying where deficiencies exist and then encouraging and assisting with compliance.

1.18 Additional information

- 1.18.1 Pilots must ensure that hang gliders flown in New Zealand have a current Warrant of Fitness. In accordance with the NZHGPA Organisation and Procedures Manual, a Warrant of Fitness Inspection is required at least every 12 months or 250 flights, whichever comes sooner, for tandem hang gliders. The Warrant of Fitness is issued by a hang gliding organisation in accordance with the procedures authorised by the organisation's certificate. To be eligible for a Warrant of Fitness the hang glider must first meet a required airworthiness standard. This standard is determined by the following requirements as outlined in the NZHGPA Organisation and Operations Manual:

The Airworthiness standards of hang gliders flown under the jurisdiction of the Association shall be:

1. All tandem hang gliders flown in New Zealand shall be tested to a German DHV Gutesiegel certification standard and/or the British Hang Glider and Paraglider Association certification standard and/or the United States HGMA certification standard. This testing can be carried out within New Zealand provided the tests are submitted to the Operations Manager and audited by the Flight Rules Committee.

2. Information on materials shall be available, along with a recommended maintenance schedule for the hang glider's life.

The North Wing T2 tandem hang glider is not approved for tandem use by any of the above three overseas organisations.

- 1.18.2 The requirement to carry a reserve parachute during tandem flights is not stipulated by CAR, however, it is specified in the NZHGPA Organisation and

Procedures Manual under Equipment and Instrument Requirements. This requirement is also mirrored in the Skytrek Operations Manual.

- 1.18.3 The NZHGPA is responsible for conducting audits of the Association and member organisations, as specified in the NZHGPA Organisation and Procedures Manual. Member organisations are obligated to comply with the audit process to continue operation under the certificate holder. The NZHGPA carried out an audit on Skytrek Tandem Hang Gliding Ltd following a tandem hang gliding accident which occurred on 3 March 2006. During this audit, the reserve parachutes were not inspected. However, it was noted in the audit report that: *“With regard to the hang glider Warrant of Fitness, reserve parachutes are not at present listed, therefore they were not inspected and it is not known whether they would be rated for the maximum weight likely to be carried by a particular pilot.”*
- 1.18.4 The CAA conducted an accident investigation into the same accident (CAA occurrence 06/650). Two safety recommendations with relevance to this accident under investigation were:
- 1. The General Manager, General Aviation, has accepted the recommendation to liaise with the rules group in an effort to fast track the completion and implementation of Rule Part 115,*
 - 2. The Manager Health and Safety has accepted the recommendation that with the assistance of the Manager Sport and Recreation he draw up a code of practice relating to commercial hang gliding operators, and then monitor the operators under this code and the HSE Act until such a time as Rule Part 115 is promulgated.*
- 1.18.5 The pilot was present at a scheduled Skytrek staff meeting held on 26 February 2009. Minutes of this meeting indicate that discussion took place regarding the flight manoeuvres being carried out by Skytrek pilots and the need to keep high angle of bank manoeuvres in check. This discussion was a result of the CEO’s observations of pilots carrying out high angle of bank manoeuvres and his concern regarding that activity.

1.19 Useful or effective investigation techniques

- 1.19.1 Not applicable.

2. Analysis

- 2.1 From analysis of the video obtained from the accident flight, it was possible to determine the sequence of events which led to the structural failure. The pilot had entered a high speed climbing left turn which applied an excessive aerodynamic load to the hang glider’s structure.
- 2.2 During this manoeuvre, the left hand down tube of the control frame started to bow inwards due to excessive wing loading. Bending of the down tube continued until the tube failed approximately mid-way along its length. See Figures 3 and 4.
- 2.3 Once the left hand down tube failed, it was followed in quick succession by an inward failure of the right hand down tube, then a down-ward failure of the hang

glider keel. Once this had occurred the hang glider was no longer controllable and it entered a nose down vertical descent. Failure of the wing leading edges occurred in the high speed descent.

- 2.4 Although the angle of bank at the time of failure did not appear to exceed the 60 degree maximum limit, the angle of nose up pitch was calculated to be in excess of the maximum pitch limit of 30 degrees. Given the high airspeed of the hang glider at the time of the manoeuvre, the pilot was able to exceed the structural limitations of the airframe.
- 2.5 A hang glider is manoeuvred in pitch and roll by weight shift of the occupants. In this case the lateral centre of gravity was moved to the left to enable the left turn. This would therefore increase the loading on the left hand side of the control frame and supporting structure through the effects of gravity and the flight loads on the left side of the wing. This occurred to a point where the structural strength of the left hand down tube was exceeded.
- 2.6 The manufacturer's stated maximum airspeed limit (V_a) for flying in turbulent air or for rapid and abrupt control inputs is 37+/-2 mph. It is considered that at the time of the structural failure the hang glider's airspeed would have been in excess of this maximum speed. As the pilot had no airspeed indication apart from the wind in his face, he would not have known how fast he was going at the time of entry into the manoeuvre. Without some form of accurate airspeed indication the pilot cannot know that he is flying the hang glider within its safety limitations.
- 2.7 This hang glider was being used for commercial tandem flights when it did not meet the manufacturer's requirement for a maintenance inspection after 100 hours flight time or 400 flights, whichever ever occurs first. There was also no record of the hang glider having a current Warrant of Fitness at the time of the accident. The airworthiness status of the hang glider is therefore unknown.
- 2.8 The serviceability of the reserve parachute could not be determined. The operator had not followed the annual servicing requirement as stipulated by the manufacturer or in the Operator's Operations Manual. Although the pilot had repacked the reserve parachute six to seven weeks prior to the accident, this did not fulfil the requirements of an annual inspection. The servicing records for two other reserve parachutes owned by the company showed that they were also overdue for an annual inspection.
- 2.9 The failure of the reserve parachute bridle was investigated further. It was determined that the following factors, or a combination thereof, most likely led to the failure:
 - a. Poor physical condition of the nylon webbing,
 - b. The high airspeed at the time of reserve parachute deployment,
 - c. The maximum weight limit for the reserve parachute being exceeded, and
 - d. No protection of the bridle loop in the form of a sheath or metal ring which would help to transfer the load from the parachute lines to the bridle.

2.10 In 2007 the NZHGPA had sought clarification from the CAA concerning the airworthiness status of the North Wing T2 tandem hang glider. The Manager of the CAA Sport and Recreation Unit responded that on advice received from North Wing regarding the certification specification, the North Wing T2 tandem hang glider was identical to the previously certified Pacific Airwave Double Vision 215 tandem hang glider. The Manager stated in a letter to the NZHGPA that it was reasonable to agree that the design met the certification standard as required by the NZHGPA Organisation and Procedures Manual. The NZHGPA then assessed that the North Wing T2 tandem hang glider was suitable for tandem use.

2.11 The fact that the North Wing T2 tandem hang glider had not been certified by any other overseas organisation was investigated further. Correspondence from the President of the Hang Glider Manufacturers' Association USA (HGMA) stated the following:

On 13 March 2006, North Wing requested that the HGMA grant a Certificate of Compliance to the North Wing T2 tandem hang glider based on a claim that it was identical to the previously certified Pacific Airwave Double Vision 215 tandem hang glider.

The HGMA Board of Directors then made the following determination:

The board declined to authorize the transfer of the certificate at this time for the following reasons:

a) The board believes that the design rights for the Double Vision are currently held by Airwave Gliders, as Pacific Airwave was purchased by Airwave gliders before it was shut down, and

b) The board notes that North Wing has claimed a different glider weight for the T2 (increase by 4 lbs) which indicates design changes, which would require some documentation of the details of those design changes and documentation of compliance following those changes, and

c) the board notes that North Wing has claimed a different weight range for the T2, which would require at a minimum the documentation of Vd max at the new, higher maximum weight.

2.12 For a Warrant of Fitness to be issued, the North Wing T2 tandem hang glider required certification from the NZHGPA that it was suitable for tandem use in accordance with one of the three accepted overseas standards. The NZHGPA instead opted to accept North Wings advice that the North Wing T2 tandem hang glider was a 'copy' of the certified Double Vision 215 tandem hang glider.

At the time that the North Wing T2 tandem hang glider was assessed, it is likely that neither the CAA or the NZHGPA were aware of the information provided by the President of the HGMA which was obtained during this investigation.

2.13 In accordance with the NZHGPA Organisation and Operations Manual, it is the responsibility of individual pilot members to ensure that they comply with airworthiness standards defined in the manual. Apart from the HSE aspects, there

are no CAA rule requirements applicable to commercial hang gliding operators to ensure that equipment is maintained to an airworthy standard.

- 2.14 Following the audit carried out by the NZHGPA in March 2006, no other form of auditing or checking was carried out on Skytrek Tandem Hang Gliding Ltd by the NZHGPA. The NZHGPA Organisation and Procedures Manual has very limited information regarding the auditing of member organisations. There is no evidence of an audit schedule or surveillance of commercial tandem hang gliding operators. This indicates that the auditing of commercial operators is not carried out in a managed or co-ordinated manner.
- 2.15 At the conclusion of the CAA accident investigation into the March 2006 accident, a number of safety recommendations were raised. A recommendation was made that the CAA make an effort to fast-track the introduction of Rule Part 115. From consultation with the CAA Rules Development Group, it appears that Rule Part 115 could be implemented by late 2011.
- 2.16 A recommendation was also made that the CAA Health and Safety Unit produce a code of practice for commercial hang gliding operators. This code of practice was to be monitored by the CAA Health and Safety Unit until the implementation of Rule Part 115. This recommendation has not been actioned by the CAA due to the view that the implementation of Rule Part 115 was considered to be imminent.

3. Findings

- 3.1 The pilot carried out a flight manoeuvre which exceeded the manufacturer's flight limitations which then led to a structural failure of the hang glider.
- 3.2 The pilot ignored the CEO's caution about exceeding the hang glider flight limitations.
- 3.3 The pilot was not in compliance with the following:
 - a. Civil Aviation Act 1990 Section 13(a) Being responsible for the safe operation of the aircraft and safety of its occupants,
 - b. CARs:
 - i. 91.201(2) Safe operation of the aircraft and safety of occupants,
 - ii. 106.15(b) Requirement for an Altimeter to be carried, and
 - iii. 106.17(b) Requirement for a current Warrant of Fitness.
- 3.4 The Charly Duo 160 reserve parachute carried by the pilot at the time was not fit for purpose.
- 3.5 The Charly Duo 160 reserve parachute was five months overdue for its annual inspection.
- 3.6 The use of a more suitable reserve parachute may have rendered the accident survivable.
- 3.7 The hang glider did not have the required Warrant of Fitness.

- 3.8 The North Wing T2 tandem hang glider had been ratified as suitable for tandem use by the NZHGPA, although it had not been established that it met the standard of one of the approved overseas organisations.
- 3.9 The pilot had no means of accurately determining the hang gliders airspeed and there is currently no rule requiring that hang gliders be equipped with an airspeed indicator.
- 3.10 There is currently no effective surveillance of commercial tandem hang gliding operations in New Zealand.
- 3.11 The CAA has not completed the safety recommendations as agreed in the CAA 06/650 accident investigation report.
- 3.12 The pilot was appropriately rated and fit to carry out the flight.
- 3.13 Assistance was immediately on hand for the pilot and passenger at the accident site, however the accident was not survivable.

4. Safety actions

- 4.1 Safety Action No. 10A1559 has been raised for the Manager Sport and Recreation Unit to liaise with the Rules Project Team to consider inclusion of the following items in the NPRM for CAR Part 115:
 - a. Fitment of a means of accurately measuring airspeed to commercial tandem hang gliders,
 - b. A requirement for commercial operators to have a means of accurately weighing passengers, to ensure maximum hook in weights are not exceeded,
 - c. Carriage of reserve parachutes on all tandem flights,
 - d. Define the minimum requirements for reserve parachutes,
 - e. Training of pilots in the use of emergency equipment,
 - f. Annual competency checks on commercial tandem hang glider pilots, and
 - g. Annual auditing of commercial operators.
- 4.2 Safety Action No. 10A1560 has been raised for the Manager Sport and Recreation Unit to liaise with the NZHGPA for immediate incorporation of items from Safety Action No. 10A1559 into the NZHGPA Organisation and Procedures Manual. This will ensure that, where possible, the items in Safety Action No.10A1559 will be incorporated before CAR Part 115 is implemented.

Report written by:

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