QUEENSLAND COURTS

CORONERS COURT OF QUEENSLAND

FINDINGS OF INVESTIGATION

CITATION:	**Non-inquest findings into the death of Ross Millard**
TITLE OF COURT:	Coroners Court
JURISDICTION:	Cairns
DATE:	23 July 2018
FILE NO(s):	2015/4707
FINDINGS OF:	Kevin Priestly, Coroner
CATCHWORDS:	CORONERS: Recreational aircraft; first flight on return to service; experienced pilot/engineer; partial engine failure on take-off; aerodynamic stall; collision with ground.

Introduction

At about 6.20am on 29 November 2015, Ross Millard was the pilot and sole occupant of a Howard Hughes Lightwing GA-912 that took off from Runway 33 at Starke Airfield at Woodstock near Townsville for the purpose of a single circuit, maintenance test flight.

The aircraft climbed to a height of about 100 feet above ground on the runway heading. At that point, there was a reduction in engine sound consistent with substantial power loss followed by controlled manoeuvring to the right of the runway centreline at reducing airspeed and increasing rate of descent. The aircraft then started a slight roll to the left followed by an accelerated roll, yaw and downward pitching movement in that direction – coming to a vertical attitude before impacting with the terrain. The point of impact was adjacent a point about ¾ of the way down the runway and slightly to the eastern side of the airstrip. A fire followed, consuming and destroying the aircraft. Mr Millard was fatally injured.

A coroner is required to investigate and make findings about who died, when the person died, where the person died, how the person died and what caused the person to die. A coroner must not include in the findings any statement that a person is or may be guilty of an offence or civilly liable.

In the course of better understanding 'how' the death happened, a coroner can consider if there are lessons that might be learnt to prevent deaths in similar circumstances.

I was assisted in the course of considering my findings by the reports resulting from investigations by the Forensic Crash Unit within Queensland Police as well as investigators from Recreational Aviation Australia (RAA). The RAA team comprised Mr Darren Barnfield, National Technical Manager, and Mr Neil Schaeffer, Assistant Operations Manager.

The movement of the aircraft was established from interviews with witnesses to the incident and review of a video from a mobile device that captured the incident. The focus of the investigations was more directed towards an understanding of what happened and why.

Before continuing with my findings, it is important that I disclose my current membership of RAA which started when I began recreational flight training. I now hold a recreational pilot certificate with various endorsements. My activities as a member are limited to satisfying requirements necessary to retain that certificate. I also hold a Private Pilot Licence issued by Civil Aviation Safety Authority. Having regard to the limited nature of my involvement with RAA and the matters addressed in my findings, I do not consider there exists any actual or perceived conflict of interest.

I also acknowledge the mere fact that I hold qualifications as a pilot does not give me any expertise in aircraft accident investigation. I discharged my role as Coroner by critically reviewing the evidence provided to me including the reports of people with the requisite expertise.

Background

Mr Millard was a pilot with about 1687 hours of aeronautical experience, with 1547 hours in RAA aircraft. His initial RAA pilot certificate was issued in April 1997 and he held endorsements for low performance, high performance, human factors, nose wheel, tail wheel, cross country, flight radio, passenger carrying and two stroke. He held ratings for unlimited maintenance, all types, engines and airframes.

The Light Wing GA-912 was manufactured by Howard Hughes Engineering in January 1991 and was registered with RAA as 24-0431. From the RAA aircraft file and logbooks, the RAA

investigation team reported:

- The Light Wing GA-912 is a three axis aircraft with a normally aspirated four stroke 912 UL 80 horsepower Rotax engine.
- The Light Wing GA-912 is capable of a cruising speed of 160 km/h (99 mph/ 86 knots) using 16-20 litres per hour. The aircraft has a stall speed (with full flaps) of 40 knots and an approach speed of 55 knots.
- This aircraft had approximately 1057.2 hours in service in October 2015. The Rotax engine had a documented 140.2 hours in service.
- Mr Lowry purchased the aircraft in February 2015 and it underwent extensive maintenance and repairs, completed by Mr Millard or Mr Lowry under the supervision of Mr Millard.

The incident

On Sunday 29 November, Mr Lowry, Mr Savill and Ms Parsons were present at the airstrip when Mr Millard arrived about 6am and had a coffee. Mr Lowry conducted fuel drain checks while the aircraft was in the undercover area. Mr Millard joined Mr Lowry and the aircraft was moved into the open. Mr Millard conducted a pre-flight inspection of the aircraft including an inspection of a replaced oil temperature gauge/sender. Mr Lowry offered to join Mr Millard on the test flight but Mr Millard declined, preferring to complete a single circuit then return to get Mr Lowry for a flight together. Mr Millard climbed into the aircraft, secured the harness and discussed matters with Mr Lowry including the position of the fuel selectors which was different from the Lightwing that Mr Millard owned and flew. They also discussed the position of the seat and need to clean the windscreen, which Mr Lowry did with a tissue. The aircraft started normally, ran at idle, controls were checked and the door was secured. The aircraft taxied to the end of Runway 33 for a take-off into a light breeze from the north-west. First stage of flap was selected. Run-ups were conducted and the aircraft lined up for take-off.

The detail of the flight was best considered in light of the video of the incident.

Review and analysis of video

Ms Parsons took a video of the flight from start up to very near impact (actual impact was concealed by the tree line). She stood at the normal entry point for aircraft onto the runway. The RAA team reviewed the video and noted significant events and observations by reference to the time stamped on each image. I summarise the events and RAA Investigation Team observations as follows:

00.17-1.01	The aircraft appears to run normally and further internal checks conducted before the door is secured.
1.15	First stage of flaps is deployed, consistent with pre take-off check procedures.
2.46	The aircraft taxis normally for Runway 33. The elevator, aileron and rudder controls are operated normally.
3.15	The aircraft stops during taxi for no apparent reason.
3.46	The aircraft resumes taxiing.
5.05	Bystander comments consistent with engine power checks underway.
5.51	The aircraft lines up for take-off. The aircraft has run at various low power settings for 5 minute 34 seconds at this point.
5.54	Take-off roll starts as reflected in dust movement and engine sound consistent with production of full power.
6.01	The aircraft accelerates and becomes airborne, starting an initial climb and flight path consistent with normal take off.
6.04-6.09	A finger is inadvertently placed over the external audio reducing the sound level but tone and visual strobing of the propeller remained consistent with normal

operation.

6.10 There is a sudden changed in audio and visual strobing of the propeller consistent with a reduction of engine power.

6.11- 6.17 The aircraft turns in a controlled manner to the right of the runway with a nose attitude consistent with level flight but not the recommended 'best glide' attitude required in engine emergency procedures. In the event of engine failure, it is imperative to maintain sufficient forward speed and airflow over the wing to avoid aerodynamic stall by quickly lowering the nose to best glide speed.

6.18 A controlled left turn is initiated with increasing vertical sink rate, consistent with a 'pre- aerodynamic stall' condition.

6.22 The aircraft pitches downward with yaw to the left and roll to the left consistent with an incipient spin, which is an aerodynamic stall condition where the left wing stalled first creating left wing drop then aircraft rotation to impact which cannot be observed due to being hidden by the trees in the foreground.

The RAA investigators added the following comments on the video:

- The aircraft was in stable flight before 6.10 and all operations appeared normal.
- The manoeuvring after time 6.10 was not consistent with the RAAus syllabus of flight training in relation to engine failure after take-off (EFATO) procedures.
- The flight path from 6.22 was consistent with uncontrolled departure from normal flight where the aircraft loses significant lift due to excessive angle of airflow to the wing resulting in rapid height loss and rotation in all 3 axis of the aircraft.
- The emergency scenario presented to the pilot was survivable but the resultant loss of control and impact were not survivable.

Witnesses versions

Mr Lowry reported to the RAA team that the engine sound changed at about tree line height, '… it died down, you could hear it just going down, the plane levelled and just banked right'. There was no surge or other unusual sound. Although Mr Lowry suffers a degree of industrial deafness, he heard a distinct change in tone as the 'sound went down' but believes the engine continued to operate and saw the propeller continuing to turn.

Mr Savill reported the take-off roll commenced approximately 5 minutes after engine start and full power was heard and observed up to a point adjacent to the observers, approximately 200m from the starting threshold (with 600m remaining plus another 200m in a neighbouring property for an emergency landing). The aircraft was approximately 100 feet above ground on runway heading and climbing under full power. There was a change in the engine tone, likened to "spluttering" with a distinct reduction in power that remained suppressed. He thought it "sounded like a miss" and surmised it was "running out of fuel". The engine kept running and may have started to sound a little bit better but still not producing any real power. Mr Savill thought the aircraft was still in a climb attitude, slowing and wallowing 'right on the edge and I was waiting for him to stall'. He then said:

> "…it veered to the right and then straightened up but was still in a climb attitude and then we observed a deliberate roll to the right to turn it around and then I got the impression he rolled it left and then I thought he tried to kick it around (with the rudder)" .
>
> …
>
> "It was a deliberate turn back and soon as he did that it dropped a wing (left wing) and went nose down, started an incipient spin and I saw a quarter of a turn and then I was already running .... "

Issues and analysis

There are two significant events which led to the loss of control and impact; namely, partial loss of engine power and aerodynamic stall. Therefore, why did the engine suffer a loss of power? And why was the aerodynamic stall not avoided with immediate nose down attitude to achieve best glide speed per standard flight training?

The RAA Investigation Team concluded the aircraft was serviceable prior to the incident, Mr Millard was appropriately certificated and endorsed for the proposed flight and maintenance of the aircraft; environmental factors such as weather, visibility and turbulence were excluded as contributors; and the engine was operating with enough power to become airborne.

The mechanical investigation involved review of the maintenance and repair work undertaken, recent operation of the aircraft through to take off, and the mechanical findings on inspection of the scene of impact. The degree of destruction at impact and damage by fire limited the extent of mechanical inspection.

Although investigation were unable to definitively exclude fuel contamination, investigators reviewed the fuel remaining in the jerry cans used for refueling and found no evidence to indicate contamination such as water.

Further, due to substantial fire damage to the aircraft and engine, the team was unable to determine if a mechanical defect with the engine was contributing factor.

The RAA Investigation Team reported:

> Possible pilot decision making errors - reviewing the obtained footage of the incident and attending the scene raised the question of why the pilot elected not to continue to land ahead to ensure the aircraft was directed immediately back onto the ground if the pilot had recognised a possible issue.

Although reviewing the actions and decisions of Mr Millard might appear insensitive in the context of this tragedy, it is important for potential lessons to be learnt. The RAA Investigation Team reported the fact that Mr Millard did not configure the aircraft into best glide per emergency procedures, and instead appeared to continue in level or near level flight until it stalled. Why? He was a very experienced recreational aircraft pilot flying a type of aircraft with which he was very familiar. Although it is impossible to answer this question on the available evidence, there are possibilities that might be explored. In the initial report, the RAA Investigation Team did not report on these possibilities on the grounds that doing so was considered speculative and did not lead to any firm answers. I fully understand the reasoning of the RAA Investigation Team on this point. However, I requested the RAA Investigation Team to consider and report on the possibilities including aspects of Human Factors that might be implicated and I would assess whether or not the views expressed were speculative and what use I might make of them. In my view, even if those possible explanations remain only possibilities, there is potential for lessons to be learnt.

The RAA Investigation Team provided an addendum report: Analysis of Potential Contributing Factors. The information was provided as possible insight into the pilots thinking and actions in reacting or responding to the inflight emergency.

In summary, it was reported:

- Pilot management of a partial engine failure presents greater risks and requirements for critical decision making than full engine failure. A partial engine power loss presents a more complex scenario to the pilot than a complete engine power loss. Pilots have

been trained to deal with a complete power loss scenario with a set of basic checks and procedures before first solo flight. Furthermore, this training, which emphasises the limited time available to respond, is continually practiced and reviewed in an attempt to make it second nature. However, pilots are not generally trained to deal with a partially failed engine. Following a complete engine failure, a forced landing is inevitable, whereas in a partial power loss, pilots are faced with making a difficult decision whether to continue flight or to conduct an immediate forced landing. The course of action chosen following such a partial power loss after take-off can be strongly influenced by the fact that the engine is still providing some power, but this power may be unreliable or inconsistent. The pilot may also have a strong desire to return the aircraft to the runway to avoid aircraft damage associated with a forced landing on an unprepared surface.

- The two variants of the Lightwing are designated GA 912 and GR912. Mr Millard was the owner and very experienced operator of the GR912 whereas the aircraft flown on the day was a GA912. There were two relevant key differences: The GA912, the accident aircraft, has a shorter wingspan (by 0.9m) and different ailerons (control surfaces on the wings for turning). This results in a higher wing loading and different response in turning behaviour, to the GR912 owned by the pilot, particularly at low air speeds. GA912 exhibited markedly different behaviour at aerodynamic stall to that of the more benign handling GR912 variant.
- The GA912 variant with higher wing loading and shorter span could earlier depart from controlled flight by misuse of aileron at the point of stall. The aircraft was recoverable if the standard recovery technique was applied by the pilot and sufficient height was available. Further, any turn back at a height under 300° AGL was unlikely to be successful in the GA912 variant. This was due to the design differences and the increased sink rate that the GA912 variant exhibited at low airspeeds when close to the aerodynamic stall.
- Experienced pilots like Mr Millard can compensate for these varying design behaviours. However, in the face of high stress and situational overload, Mr Millard may not have so compensated, reverting to responses and actions expected to manage an emergency in his aircraft, a GR912.
- It was also possible Mr Millard's thinking and response was influenced by the prospect of damage to the aircraft if he attempted to land on the limited runway remaining and was manoeuvring for a turn back.
- Mr Millard was well aware of the instinctual response of pilots to turn back to the last known safe area in the event of engine failure and the dangers associated with that manoeuvre.

The RAA investigation team reported that the RAA syllabus of flight training specifically includes elements relevant partial engine failures after take-off.

The author concluded that the complexity and speed of the required decision making following partial engine failure cannot be underestimated. The powerful instinctive response of a pilot to return to the departure runway, a difference in expected handling characteristics at the point of aerodynamic stall, involvement in the maintenance of the aircraft and an interest in preserving the aircraft: may have combined to cause Mr Millard to manoeuvre for a turn back.

I might emphasise some or all of these factors might have contributed to the incident. It might also be the case that Mr Millard, with his maintenance background, was also attempting to check possible cause of the partial power loss, thereby increasing his mental workload.

Conclusion

I find Ross Millard died at about 6.20am on 29 November 2015 while piloting a Hughes Lightwing GA-912 aircraft that took off from Runway 33 at Starke Airfield, suffered a loss of

engine power, aerodynamically stalled and impacted the ground causing his death. The cause of the loss of power was unable to be determined. Prior to operation, the aircraft was thoroughly tested and inspected without any issue detected. Prior to loss of power, the aircraft appeared to operate normally and achieve full power during take-off. When there was a loss of power, the aircraft attitude was consistent with level flight and not the recommended 'best glide' attitude. Nor did the flight path suggest an immediate attempt to land on the remaining runway.

There were a number of possible factors that may have contributed to the absence of both actions, namely; the complex decision making associated with partial engine failure in comparison with complete engine failure, the different handling characteristics at the point of aerodynamic stall of this aircraft compared that of Mr Millard's, attempts to check for and resolve the cause of the loss of power, and the complex decision making associated with where to safely land while managing the strong instinctual response to turn back. All of these matters are processed in the context of extremely high stress and workload.

I close the investigations.

Kevin Priestly
Coroner

23 July 2018