On the 4th April 2004 Mr Fitzgerald took delivery of a newly constructed gyroplane which he purchased for approximately $54,000.00 direct from the manufacturer. He took delivery at the place of manufacture at Roadvale and intended to fly the aircraft to his base at Caboolture. He took off shortly before 1.30pm and at about 2.00pm, when he was part-way through the journey and close to the town of Esk, the aircraft was seen by a number of witnesses to break up in the air and crash to the ground. Mr Fitzgerald died at the scene as a result of multiple injuries suffered in the crash.

Medical issues

Mr Fitzgerald was 63 years old and at autopsy was found to have moderately severe coronary artherosclerosis which Dr G Lampe, the investigating pathologist, described as only slightly worse than average for a man of his age. The pathologist found no evidence that the heart condition had contributed to his death. While a heart attack could have occurred and left no evidence, the pathologist was of the opinion that due to facial and other bruising the evidence suggested Mr Fitzgerald's heart was still beating when he suffered major trauma to his head, either during break up of the aircraft in the air, or upon impact with the ground. He was therefore satisfied Mr Fitzgerald did not suffer a heart attack which precipitated the crash.

There was a further medical issue in that Mr Fitzgerald had some history of atrial fibrillation, or irregular palpitations of the heart. In October 2001 there was such an episode which Dr W Stafford, a cardiologist, described as being "not associated with dyspnoea, dizziness or chest discomfort". Normal rhythm returned after medication was given. In April 2003 there were two further episodes three days apart. On both occasions normal rhythm spontaneously returned. On the first such occasion he simply lay down for a brief period and on the second he presented himself to Royal Brisbane Hospital. He was reviewed by Dr Stafford in June 2003 who prescribed Sotalol, an anti-arrhythmic drug. Given this infrequent history of atrial fibrillation, and subsequent medication to control such episodes, Dr Lampe was of the opinion that it was unlikely this occurred on the 4th April 2004. Further, while such an event could not positively be excluded, Dr Lampe observed that in previous episodes Mr Fitzgerald had not been grossly affected and therefore it was unlikely that even if fibrillation did occur that it would have significantly interfered with Mr Fitzgerald's capacity to control the aircraft.

The pilot

Mr Fitzgerald commenced flying at the age of 18 in 1958 and was licensed to fly general aviation aircraft; ultralights; gliders and gyroplanes. While this presents as a very experienced pilot, further investigation reveals otherwise, particularly with gyroplanes. Records reveal that in 46 years of flying he had flown general aviation aircraft for 152 hours; ultalights for 192 hours; gliders for 23 hours and gyroplanes for 16.8 hours, a total of 383 hours for an average of 8.23 hours per year.

The 16.8 hours in gyroplanes was accumulated in 17 flight sessions over 23 months from May 2002 until April 2004 and was spread fairly evenly over that period rather than being concentrated closer to 2004. The 16.8 hours was comprised of 13.4 hours of dual instruction flying ending in May 2003, followed by solo flights in July 2003 (0.6 hours), August 2003 (1.0 hours), September 2003 (0.8 hours) and 27 March 2004 (1.0 hours). Therefore, prior to the accident he had flown a gyroplane only once in the previous 7 months, and that was for a period of 1 hour. He had flown solo for a total of 3.4 hours spread over 8 months.

Mr Clive Phillips investigated this case and provided both a written report and verbal evidence. Mr Phillips is a qualified Aircraft Maintenance Engineer and has worked for various national and international airlines. He is the former manager of the Melbourne office of the Bureau of Air Safety Investigation and has extensive experience in the investigation of domestic, overseas and military aircraft accidents. He is a licensed general aviation and glider pilot and is the current president of the Antique Aeroplane Association of Australia. He has not flown gyroplanes.

Mr Phillips gave evidence that it is generally accepted that a pilot flying at a rate of less than 30 hours per year, per aircraft type, is not able to maintain a satisfactory level of competency. Records indicated Mr Fitzgerald had flown many different types of fixed wing aircraft over a very long period and led Mr Phillips to conclude that he had rarely done enough flying in any one type of aircraft to be competent and current. Further, such flying experience in fixed wing aircraft was largely irrelevant to the flying of a gyroplane which derives lift from a rotor, and consequently has significantly different flying characteristics to a fixed wing aircraft.

The flight

Mr Fitzgerald completed a flight plan which indicated he intended to fly at a speed of 70 knots. A GPS device fitted to the aircraft recorded ground speed, however there is no record of airspeed, which is the speed the aircraft is moving through the air, as opposed to ground speed which is a combination of airspeed and wind factors. The distance from the departure site to the crash site is 47 nautical miles, which would take 41 minutes at 70 knots. The actual flight time is not recorded, but it seems it was a little more than 30 minutes as discussed earlier.

The weather forecast for the flight indicated isolated moderate turbulence below 5000 feet and winds from the east- southeast at 20 knots, which on the planned flight would create a tail wind. While markings on the flight plan showed the pilot was aware of the forecast, it appears the wind was not factored into the journey, with true airspeed being used to calculate time intervals.

GPS data showed that during the flight the aircraft initially “buzzed” the airfield at about 50 feet and then climbed to an altitude of 2900 feet to commence the flight as per the flight plan. During the next 15 minutes the altitude varied between 2600 and

3050 feet and then it descended to 2250 feet before climbing to 3400 feet and then immediately dropping to 2700 feet. It then climbed to 3300 feet and stayed between 3000 and 3300 until the accident. The data also showed marked variations in groundspeed, especially during the first 15 minutes.

Mr Phillips commented that the data showed the aircraft "was flown without precision and the ground speed and altitude varied considerably. This may be an indication the pilot was having problems controlling the aircraft. This would not be surprising given his low total time and lack of currency", and "adding to the pilot's problems is that the flight was made into forecast moderate turbulence that may well have been the initiator for an upset".

Further, the manufacturer's specifications for the aircraft stated the maximum manoeuvring speed was 65 knots. While the actual air speed is unknown, times and distances are consistent with a planned speed of 70 knots. Mr Phillips advised:- "If the pilot was flying at 70 knots rather than at or below the 65 knot maximum manoeuvring speed limit, and if he encountered moderate turbulence, any flight control movement he imparted into the machine could lead to structural failure, or a more rapid response than he expected".

Mr Phillips also viewed a video of Mr Fitzgerald taking off and landing the aircraft a number of times, and noted that a crosswind was causing what he described as "significant drift", or sideways movement of the aircraft during takeoff. In his opinion this was either the result of the aircraft being poorly designed to cope with a crosswind, or a lack of skill of the pilot. He further noted that videos of various training flights showed the aircraft was not fitted with doors during training, whereas on the day of the crash doors were fitted. In his opinion this change was likely to cause a "very noticeable" difference of the handling characteristics of the aircraft, since it changed the aerodynamics of the pod, or fuselage, of the aircraft.

The aircraft

The gyroplane was designed and newly built by Mr Owen Dull, who sold it to Mr Fitzgerald through his company Newo Gyro Pty Ltd of Roadvale Qld. Mr Dull gave evidence that he has a grade 9 level of education and has no formal trade or professional qualifications in any kind of mechanical or engineering occupation.

While the design, manufacture, flying and maintenance of most aircraft in Australia is controlled by the Civil Aviation Safety Authority (CASA), in the case of gyroplanes CASA has vested such control in the Australian Sport Rotorcraft Association (ASRA) pursuant to Civil Aviation Order Part 95, made under Subregulation 308(1) of the Civil Aviation Regulations 1988. This in effect entitles ASRA to set standards acceptable to ASRA.

While anyone may manufacture a gyroplane, in order for it to be registered with ASRA it must be inspected and certified by an ASRA accredited Technical Advisor. The ASRA Operations Manual sets out brief inspection guidelines which it describes

as “generalised for use with various construction details”. The Technical Advisor is required to complete a form F006 Gyroplane Registration Form and to sign a certification stating:-
“I declare that I have inspected the above gyroplane and checked that all the control movements are normal as specified in the ASRA Inc Operations Manual. The gyroplane complies with all the airworthiness requirements and the Airworthy Directives issued by ASRA. I take no responsibility for modifications carried out after this date unless approved by me. I do not take any responsibility for the accuracy of the owner or manufacturer’s statements, or the manner in which the Pilot operates the Gyro. This is an application for Registration or Renewal and is not indicative of the flight readiness or performance of the aircraft”.

In the present case, the Technical Adviser who inspected the aircraft and signed the form F006 was Mr Dull, the same person who manufactured it. No other technical inspection by any other person was conducted prior to the aircraft being registered by ASRA on the 29th March 2004, 6 days before the accident. There appears to be no prohibition by ASRA to such an obvious conflict of interest occurring in the inspection process.

As a comparison, Mr Phillips advised that for a glider to be certified the inspection must be carried out by an independent technical advisor employed by the Glider Federation of Australia. A glider manufacturer cannot certify his own aircraft. With general aviation aircraft CASA has similar requirements, and even though large scale commercial aircraft manufacturers employ technical advisors to certify their aircraft, these advisors are independent in that they are answerable to, and controlled by, CASA rather than the manufacturer.

Mr Dull gave evidence that in order to qualify as an ASRA Technical Advisor the only requirement was that he attend a 2 day training course, which he did at Broken Hill in 2001.

Since 2001 he had built 8 gyroplanes, 6 of which were similar to the aircraft in question, although the power of the engines varied from 75hp to 115hp, with the subject aircraft having a 100hp engine which was 10kg heavier than a 75hp engine. He made no changes in design of the aircraft or location of the engines when fitting the various engines to the similar aircraft, which presumably must result in some variation of the centre of mass of each aircraft.

Mr Dull did not make any list of specifications for the aircraft or prepare any scale plans or blueprints. The only plans he had were some fairly crude, not to-scale, drawings of a very limited number of components for the aircraft. He also used a number of templates to manufacture various components. Some of the components were purchased from commercial manufacturers, namely the rotor blades and head assembly; the engine and propeller; wheels; instruments; seatbelts; and various electrical parts. Everything else was designed and constructed onsite by Mr Dull.

He gave evidence that his method of design was based on “speaking to other members” (of ASRA), “keeping an eye” on other gyros, and using trial and error to make adjustments as he felt necessary. Remarkably, he said that the moulds he constructed for the manufacture of the fibreglass pod or fuselage of the aircraft, were the only moulds he made, and therefore the shape of the pod was not adjusted in any way from his original design, which itself was not based on any scientific or mathematical calculations, or copied from some previously successful design. It was simply what he thought would be a good design, based on “life experiences”.

Mr Phillips observed that while practical testing and adjustment serves its purpose, best practice requires there also be theoretical analysis of all design characteristics, which necessitates comprehensive plans which would be sufficient to enable a person to construct an identical machine. Clearly such drawings would also allow a technically qualified person such as an Aeronautical Engineer, to assess the airworthiness of the aircraft. In addition to such mathematical analysis, accurate measurements of stability, balance and resistance to turbulence could be more accurately assessed in a wind tunnel than by simple trial and error. As Mr Phillips pointed out, in the present case the aircraft was destroyed in the crash and therefore without comprehensive plans it is impossible to now independently review its design and construction, or its stability.

Mr Dull believed that he could build an identical aircraft without full plans, but even if this is true, an independent person wanting to review the design of an aircraft destroyed in a crash cannot do so without comprehensive plans. He could at best request the manufacturer to construct a replica, but would have no way of confirming the replica was accurate.

The accident was also investigated by Mr Alan Wardill on behalf of ASRA. He holds the positions with ASRA of Operations Manager; Incident Registrar; and Senior Instructor. He is employed by QANTAS as a Boeing 747-400 pilot and is an experienced gyroplane pilot who owns two gyroplanes. He has had previous experience in aircraft accident investigation while employed by a commercial airline in Papua New Guniea.

Mr Wardill advised that Mr Dull has an “impeccable” reputation as a designer and builder of gyroplanes. He said it is very common for people to build their own gyroplane, although most would purchase a complete kit from a manufacturer, which simply required assembly. There are about 500 ASRA registered gyroplane pilots in Australia, and about 40 Technical Advisers, 6 of whom reside in southern Queensland. There are only 3 commercial manufacturers who sell gyroplanes in Australia, 1 of whom is in Queensland. Mr Dull has ceased manufacturing. Mr Wardill has confirmed that none of the 3 current manufacturers uses comprehensive plans in construction.

Mr Wardill did not agree with Mr Phillips as to the need for comprehensive plans, theoretical analysis of design, or wind tunnel testing. He was of the view that practical

testing and adjustment as performed by Mr Dull and other Australian manufacturers was quite adequate to achieve a safe aircraft. In effect he said that if an aircraft is flown and found to be stable, then the design is good.

Gyroplanes in general

Mr Phillips advised that gyroplanes are inherently susceptible to pilot induced oscillation (PIO) which leads to porpoising. He explained:-
"Porpoising is a well known phenomenon that has been identified as being the initiator of many gyroplane mid air breakups. When the gyroplane is disturbed from steady flight by the likes of turbulence the pilot reacts by moving the control in the relevant direction to combat the up or down movement of the gyroplane. If the pilot moves the control too quickly the body of the gyroplane moves quickly, causing the pilot to reverse the control input. A characteristic of PIO is that the severity of the oscillations rapidly increases with each control movement and rapidly becomes uncontrollable".

A gyroplane achieves forward movement by the thrust of an engine driven propeller, which is quite independent of the unpowered rotor which provides lift. As the aircraft in effect hangs from the rotor, Mr Phillips advised that "the relationship between the thrust line of the engine (TL) and the centre of mass (CM) is critical to the pitch stability of a gyroplane, and to its likelihood of surviving an in-flight upset". Basically, the further apart the TL and CM are, the more unstable the aircraft will be.

On the official ASRA internet site, under the heading "Stability" is an article by Jean Foucade who is employed by the French Space Agency and is involved in the calculation of satellite trajectories. He refers to a "complete mathematical study" of PIO in gyroplanes conducted by the University of Glascow with funding from the UK Civil Aviation Authority. He noted that the study concluded that "the longitudinal stability of the gyroplane is largely insensitive to a wide range in design characteristics. However, an exception was found to be the vertical location of the propeller thrust line in relation to the centre of mass. Stable or unstable configurations could be found depending on the height of the propeller thrust line".

He went on in the article to demonstrate that the relationship between the CM and the thrust line of the rotor is also important to stability and concluded that the best result is achieved when the centre of mass is in front of the rotor thrust line and close to, but above, the propeller thrust line. It is not necessary for me to discuss the physics and mathematics in these calculations, since it is sufficient for the purposes of this inquest to recognise that the relationship between CM, propeller thrust line, and rotor thrust line is important to the stability of a gyroplane.

Mr Phillips noted that ASRA had looked into this very issue in 2002 and had recognised the importance of the CM/TL relationship, but had taken no steps to regulate this in the construction of gyroplanes. He said that the measurement would be quite easy to achieve if accurate plans were fed into an appropriate computer program. Interestingly, Mr Phillips was of the opinion that the propeller thrust line should be through the centre of mass, rather than slightly below it as suggested by M. Foucade.

Mr Wardill did not agree that the CM/TL relationship is vital to stability and in fact said he is aware of designs quite different to what either Mr Phillips or M Foucade suggest, which have still resulted in a stable gyroplane. Nevertheless, he did agree that the best result will be obtained if the CM/TL relationship is recognised and aircraft designed accordingly.

The ASRA Operations Manual, under the heading Gyroplane Inspections, does provide for some physical check of the relationship between CM and the rotor thrust line. It provides at 5.02.4.b. under the heading "Inspections on new or recently purchased gyroplanes":
"Hang test the gyroplane from the teeter bolt with the pilot (or someone the same weight) buckled in the seat with helmet on, with half a tank of fuel and the joystick either held or locked in the mid travel position. The gyroplane should balance between 9 and 12 degrees nose down measured on the keel or horizontal nose line."

Clearly if the aircraft tilts nose down during the "hang test", then the C/M is in front of the rotor thrust line since the machine is hanging from the centre of the rotor (the teeter bolt). This positioning is as recommended by Mr Foucade and Mr Phillips.

There is however no requirement by ASRA, or even a suggested method, to make any measurement of the relationship between CM and the propeller thrust line. Nor is there any requirement to produce any plans whatsoever prior to certification by a Technical Advisor, or registration by ASRA.

In the present case Mr Dull gave evidence that he did carry out the hang test in accordance with the Operations Manual, but took no steps to calculate or measure the position of the CM relative to the propeller thrust line other than observing the pilot was positioned relatively high in the aircraft, which would suggest the CM was also relatively high.

Regarding stability, Mr Phillips also mentioned that this is affected by the design and location of the tail section of the aircraft, which is made up of a rudder, or vertical tail, and a horizontal stabiliser. The size of these components and the distance they are located behind the centre of mass both affect the stability of a gyroplane.

Both Mr Phillips and Mr Wardill advised that once a gyroplane experiences PIO it can be difficult, if not impossible to regain control. This therefore means that a trainee pilot is never deliberately subjected to PIO in order to teach him avoidance or recovery techniques, simply because it is too dangerous to do so. Further, novice

gyroplane pilots who are also experienced fixed wing pilots, are prone, in the event of PIO, to revert to their learned recovery techniques for fixed wing aircraft, which turns out to be the opposite of what is needed in a gyroplane, and is therefore potentially disastrous.

The mid-air breakup

The evidence from both eye witnesses and examination of the wreckage seems clear that the aircraft broke up in the air. There is no direct evidence of porpoising or any other problem with control of the aircraft prior to the breakup, however there is circumstantial evidence of this.

Mr Wardill attended the crash site and prepared a written report after examining the wreckage and relevant documentary records, and discussing the matter with eye witnesses and various ASRA representatives, including Mr Dull.

In his report Mr Wardill said the aircraft was properly registered with ASRA and complied with their standards. There was no evidence the aircraft was not fully serviceable at the time and there was no evidence of any inflight mechanical failure causing the accident. He found “The gyroplane was subjected to a pilot or atmospheric upset that induced a negative vertical acceleration to the gyro that caused the damage which followed.” And that “Inspection of the wreckage indicated that precession stalling of the rotor blades caused them to teeter violently and excessively such that the left hand cheek plate was damaged to an extent that allowed the rotor head to rotate to the left through approximately 90 degrees. Thereafter the rotor blades struck and severed the top portion of the vertical tail. The forces generated by this event caused the pilot’s seat belt to fail allowing him to be ejected from the cabin….”

His conclusion was :
“It is apparent that the gyro was subjected to a strong negative vertical acceleration, which was probably pilot induced and may have been related to the onset of pilot incapacitation, but may have been made significantly more severe by an atmospheric upset, after which possible inappropriate pilot reaction resulted in the precession stalling of one or both rotor blades, a condition from which there is no known recovery.
Probable contributing factors:

1. Pilot inexperience with gyroplane operations.
2. Weather conditions not conducive to safe operations by an inexperienced gyroplane pilot.
3. Reversion to fixed wing techniques with which the pilot was more familiar.

Possible contributing factors:

1. Pilot fatigue and stress.
2. Pilot incapacitation from a pre-existing heart condition, exacerbated by the use or non-use of prescription drugs.”

At the inquest Mr Wardill added a fourth probable contributing factor, namely the aircraft being flown too fast, and was surprised he had not included this in his report.

While Mr Wardill did not think the gyroplane suffered PIO as such, he did think it was likely that turbulence had made the aircraft unstable and that Mr Fitzgerald was unable to recover from this.

He conceded at the inquest that there was no evidence to suggest Mr Fitzgerald was fatigued. Part of his initial suspicion was based on the understanding that Mr Fitzgerald had driven a car a considerable distance to get to Mr Dull's property, however he did not dispute advice from Mr Fitzgerald's wife that in fact she had driven the car and Mr Fitzgerald was a passenger

As already discussed I am satisfied that there is no evidence of pilot incapacitation and as Dr Lampe found, fibrillation was unlikely to have occurred, and even if it did, was unlikely to have significantly interfered with the pilot's capacity to control the aircraft.

Mr Phillips was also of the opinion that the break up occurred as a result of the rotor blades coming into contact with the tail of the aircraft. In a written report he said "There may be several reasons why this happened. These include flying the gyroplane outside its approved envelope, over controlling following a minor upset, or porpoising". He went on to explain that in the first point he meant flying too fast; in the second that "it was entirely possible the pilot encountered…turbulence", and in the third he explained PIO as earlier discussed.

At the inquest he nominated 5 potential contributing factors to this occurrence:

1. Turbulence.
2. Pilot error or inexperience.
3. Design characteristics of the aircraft regarding the relationship between the centre of mass and the propeller thrust line, and/or the rotor thrust line.
4. Design characteristics of the horizontal stabiliser being too small and/or too close to the centre of mass.
5. The aircraft being flown too fast.

It seems to me that Mr Wardill and Mr Phillips are largely in agreement, except that Mr Phillips adds the question of design characteristics to potential contributing factors.

Mr Wardill discounts design factors as a contributor on the basis that Mr Dull has built a number of similar aircraft which have all proved themselves as stable and reliable. He had flown another of Mr Dull's aircraft which he said was so identical it was a "sister ship" and that it was a stable aircraft. He had however never seen the aircraft flown by Mr Fitzgerald other than in the videos shown at the inquest and it must therefore be an assumption on his part that the two aircraft were identical. As

already discussed, now that the aircraft is destroyed and there are no plans, the exact specifications of the aircraft can never be verified.

Conclusions

It must be kept in mind that gyroplanes are largely used for recreational, sport or hobby purposes, although some commercial use is made in areas such as cattle mustering. It is a high risk activity as are many sports and recreational activities. Ours is not a perfect world and care must be taken not to over-regulate leisure activities to the point where it becomes too expensive or time consuming to participate. A balance between safety and practicality is needed.

On the other hand it seems to me that when a person pays a considerable sum of money to purchase an aircraft that is registered with, and formally certified as airworthy by, an organisation operating pursuant to Commonwealth legislation, that purchaser should be entitled to place reliance on that registration and certification as prima facie evidence that the aircraft is in fact airworthy.

As it presently stands, ASRA permit a person with no demonstrated expertise whatsoever to design and build a gyroplane for sale to the public. A Technical Adviser who has completed nothing more than a two day training course may then certify that aircraft, even if the designer/builder and the Technical Adviser are the same person.

Further, in the certification process the Technical Adviser states “The Gyroplane complies with all the airworthiness requirements and the Airworthy Directives issued by ASRA.” followed by the extraordinary statement “I do not take any responsibility for the accuracy of the owner or manufacturer’s statements.” I find these two statements inconsistent, since the inference seems to be that while the Technical Adviser may rely upon information from the owner or manufacturer about aspects of the aircraft’s design or construction to certify its airworthiness, he at the same time takes no responsibility for that reliance. One may ask – what then is the value of the certification? It presently seems to serve no purpose other than to offer some vague immunity for the Technical Advisor and/or ASRA

If a gyroplane is to be sold without any real assurance as to its airworthiness, despite being registered with the appropriate body, surely the purchaser should at least be made abundantly clear of the situation. Anything less is likely to lure a purchaser into a false sense of security.

An additional concern arises with respect to a licence to fly a gyrocopter. A flight instructor should not be able to certify the trainee as ready to fly. This should be done by an independent senior instructor, as I understand is required with a licence to fly fixed wing aircraft. This is even more necessary where the instructor is also selling a

gyrocopter to the trainee and therefore has a vested interest in the trainee gaining his licence. The conflict of interests is plain and should be avoided.

Findings

I make the following findings in relation to this death:

1. The deceased person is Anthony Michael Fitzgerald.
2. Mr Fitzgerald died after the gyroplane he was flying broke up in mid-air and crashed to the ground. The aircraft broke up as a result of the rotor blades coming into contact with the tail section of the aircraft and this caused catastrophic damage. The rotor blades contacted the tail section as a result of either porpoising or negative vertical acceleration which caused the blades to teeter and flex excessively. The exact cause of the porpoising or vertical acceleration is unknown however the probable cause is as a result of one or more of the following factors, namely: turbulence; pilot inexperience or lack of skill; inappropriate design characteristics of the aircraft; flying at excessive speed.
3. Mr Fitzgerald died on the 4th April 2004.
4. Mr Fitzgerald died a short distance outside the town of Esk.
5. The cause of death was 1(a) Multiple injuries, due to or as a result of
   1(b) Aircraft crash.

Comments

Pursuant to the Coroners Act I may comment on anything connected with an inquest that relates to public health or safety, or ways to prevent deaths from happening in similar circumstances in the future. In the present matter there are a number of issues upon which I wish to comment. My comments apply particularly to cases where a designer or builder of a gyroplane sells the machine to another person. It is perhaps

appropriate that if a person designs and builds a gyroplane which only they will fly, then the regulation of that gyroplane's certification ought to be more relaxed.

1. There is an obvious conflict of interest with a manufacturer of a gyroplane being the Technical Adviser who certifies the aircraft as airworthy. Clearly such certification needs to be carried out by an independent person.

2. The Technical Adviser should have suitable formal qualifications to ensure that he is able to reliably assess the airworthiness of an aircraft, without the need to rely upon anything he is told by the owner or manufacturer. A two day training course is grossly inadequate.

3. The Technical Adviser should not be permitted to state, as part of the certification process, that "I do not take any responsibility for the accuracy of the owner or manufacturer's statements". This is exactly what he should be independently verifying.

4. ASRA needs to formally recognise the importance of the relationship of the centre of mass to the rotor thrust line and the propeller thrust line. Specific design parameters need to be included in the matters to be certified by the Technical Adviser.

5. Accurate scale drawings or blueprints of a gyroplane, sufficient to enable an identical machine to be constructed, should be a pre-requisite to the certification by a Technical Adviser.

6. A flight instructor should be required to have a second, independent, instructor certify the trainee pilot as ready to fly. This is especially the case where the instructor is also the manufacturer of the aircraft.

7. The minimum number of hours required to train a pilot needs to be reviewed, and having regard to the inherent instability of gyroplanes, specific training in flying during turbulence should be mandatory, at least from a theoretical perspective. Special consideration needs to be given to trainees who are experienced fixed wing pilots, to reduce the chance of reverting to fixed wing techniques in the event of an emergency in a gyroplane.

I offer my condolences to the family of Mr Fitzgerald and declare this inquest closed.