ACCIDENT

Aircraft Type and Registration:	Rotorsport UK MT-03, G-MEPU	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2006 (Serial no: RSUK/MT-03/007)	
Date & Time (UTC):	28 July 2016 at 1015 hrs	
Location:	Turweston Aerodrome, Buckinghamshire	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Pilot under training (see text)	
Commander's Age:	79 years	
Commander's Flying Experience:	1,650 hours (of which 41 were on type) Last 90 days - 35 hours Last 28 days - 8 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The gyroplane was seen to depart from controlled flight as it performed a go-around manoeuvre at Turweston Aerodrome. The accident occurred in benign conditions and no evidence of pre-existing failures or defects was found. A post-mortem examination showed that the pilot had been suffering from a serious and undiagnosed cardiac condition which could have incapacitated him and led to the accident.

History of the flight

The pilot was an experienced fixed-wing private pilot who was nearing the end of a course of instruction to qualify him for issue of a gyroplane pilot's licence. He had completed 41 hours of gyroplane flight instruction and was due to take his General Flight Test (GFT) the following week. On the day of the accident, he intended to fly approximately 90 minutes of solo flight in final preparation for the GFT; this was to be spread over at least two flights under the supervision of his instructor. After that, he was to join his instructor for a discussion about the test itself.

The pilot's instructor arrived at the aerodrome at about 0800 hrs on the day of the accident and met with the pilot, who was already carrying out the daily checks on G-MEPU. They completed the checks together, before discussing the pilot's preparations for the flight. This discussion included relevant safety notices and the weather forecast, which showed favourable conditions for the morning with some rain showers in the afternoon.

The pilot flew G-MEPU on a local flight, taking off at 0910 hrs and landing at 0950 hrs. The flight consisted of general handling in the local area and one approach and landing. Afterwards, the pilot spoke to his instructor and others. During this time he appeared to be his normal self and said nothing that would indicate that the aircraft was not fully serviceable or that he was in any way unwell or had any concerns about his next flight. He did speak to his instructor about refining his landing technique, and it was agreed that he might usefully fly some low approaches and go-arounds[1] on his next flight. Otherwise, the instructor's briefing for the second flight was unchanged from the first.

The pilot took off in G-MEPU again at 1003 hrs and flew to the north of the airfield for a short while before returning to join the circuit. Runway 27 was in use, a tarmac runway 1,256 m long with a declared length of 1,000 m between thresholds. The weather was fine, with a surface wind from 220° at 12 kt. The temperature at that time was 18°C. The pilot's return was sooner than his instructor expected but he was not surprised, given the pilot's expressed desire to practise landings.

The pilot made normal radio calls to the Turweston Flight Information Service Officer during the flight. On re-joining the circuit, he called his intention to perform a low approach and go-around. He was seen to fly what appeared to be a normal powered approach and, just above the runway, initiated the go-around and transmitted "GOING AROUND". The gyroplane was seen to accelerate at a low height until it reached a climbing speed and started to climb away. This manoeuvre was watched by the instructor, who said that it appeared normal.

At a height estimated in the region of 100 ft and without warning, the gyroplane was seen to roll quickly to one side and to dive to the ground, striking the Asphalt runway surface about 580 m from the Runway 27 threshold. There was no emergency radio call from the pilot and nothing was seen to detach from the aircraft in flight. The pilot did not survive the accident.

Eyewitness accounts

Eyewitnesses were consistent in their accounts that the gyroplane was in essentially normal flight and that it suddenly and quickly rolled to one side before descending steeply in a nose down attitude. The direction of initial roll was not uniformly reported, but the witness closest to the scene and to one side of it thought that it had been to the left. There were some descriptions of the aircraft continuing to rotate in some manner until it struck the runway, although the time period concerned had been very short.

One witness to the early stage of the go-around (but not the accident itself) who was also positioned to one side of the aircraft's flight path, described a noticeable pitching or 'porpoising' motion as the aircraft crossed his field of view in the early stages of the go-around. A similarly reported pitching motion was reported by a witness who saw the gyroplane during one of its earlier take-offs. The instructor, who witnessed the same

Footnote

[1] A manoeuvre in which the pilot flies a normal approach to the runway but discontinues the landing and climbs away again. The pilot was practised in this manoeuvre, which was commonly used during training.

stages of flight from a different viewpoint, did not recall any significant pitch variations and thought any such variations would have been temporary and could have occurred as the gyroplane transitioned through phases of flight during which the pilot was trimming the gyroplane in pitch.

Post-accident response

All or part of the accident sequence was witnessed by aerodrome personnel in the control cabin. The 'crash alarm' was sounded, which alerted emergency response personnel nearby. The aerodrome's dedicated response vehicle was dispatched immediately to the accident site, which was about 400 m away.

On arrival at the accident site, it was evident that the pilot had not survived. There was no fire, but a considerable amount of fuel was leaking from the tanks, so a layer of firefighting foam was put down. The civil emergency services were called as part of the initial emergency response plan and they duly attended.

The pilot had been wearing a flying helmet, but this had detached during the accident sequence and was lying nearby. Examination showed that the helmet had detached due to failure of its restraining strap, and its proximity to the wreckage suggested that the failure had occurred relatively late in the accident sequence.

Aircraft examination

Examination of the wreckage revealed that the aircraft had struck the runway in a steep descent with considerable rotational energy in the main rotor blades, both of which had separated following in-plane bending during the initial impact. Limited damage had been inflicted to the propeller. Impact with the surface had destroyed the fuselage forward of the front occupant position, fragmenting most of the instruments and pneumatic system components mounted in the nose area. Distortion had resulted in jamming of the control system but all those components not destroyed by the impact remained connected and exhibited no evidence of pre-impact failure. Examination of the engine did not reveal any evidence of failure and both carburettor float chambers were found to be nearly full of fuel.

Since the propeller on the type is mounted aft in an un-exposed position, propeller blades did not come into contact with the ground until late in the accident sequence, after the aircraft had become almost inverted. Separation of the main rotor blades during initial impact precluded them from entering the arc of the propeller. Thus the limited damage to the propeller blades almost certainly happened late in the impact sequence and was not indicative of the amount of engine power being delivered at the time of the impact.

Pilot information

The 79 year old pilot had qualified for his fixed-wing Private Pilot's Licence in 1999. His training and all his subsequent flying had been conducted from Turweston. For about the last 10 years, he had owned and flown a PA-28-180 fixed wing aircraft. The pilot was a popular and well regarded club member who was described as meticulous in his

approach to flying and not an individual who would deliberately take risks or attempt to fly beyond his own limits or that of his aircraft.

The pilot had flown a total of 1,650 hours, which included 41 hours gyroplane training that commenced on 25 April 2016. This flying had been spread over a total of 45 flights in G-MEPU, 10 of which (9.5 hrs) had been solo. His last flight, a solo, had been made two days before the accident.

The pilot had made satisfactory progress through his course, and had demonstrated an attitude and approach to his training which reflected his considerable fixed-wing experience. Although the pilot himself had raised some concern about his landing technique prior to the accident flight, his instructor considered any issues he was having to be minor and consistent with his relative lack of experience in gyroplane flying. He was considered ready to undertake the GFT.

Medical and pathological information

The pilot's family and colleagues considered him to be very fit and active. He appeared to be in good overall health and was not suffering from any known condition or illness which may have affected his ability to safely pilot the gyroplane. There was nothing remarkable in the pilot's history in the days immediately before the accident. He had slept normally the night before and had breakfasted that morning.

On 2 February 2016, the pilot had been examined by an Aeromedical Examiner for a Class Two medical certificate. This was duly issued and was valid until 20 February 2017. The examination included an electrocardiogram (ECG).

A post-mortem examination concluded that the pilot had died from a combination of injuries sustained in the accident. However, the examination also revealed severe and extensive coronary artery atherosclerosis, to an extent of severity that it could have been given as a cause of sudden death in the absence of any accident. The pathologist performing the post-mortem reported that it was *'very likely that a sudden cardiac event, possibly causing unconsciousness, precipitated the accident'*.

Analysis

The accident occurred without prior indication that anything was amiss. The pilot appeared to be well, had reached a level of competence whereby he was ready to be tested for his licence, and had expressed no misgivings about the aircraft or the conditions of the day.

The accident occurred during a routine manoeuvre with which the pilot was familiar and which he had demonstrated his competence to carry out during his previous training. The pilot had already flown the most critical stage of the manoeuvre, being the transition from the approach phase to the climb-out phase, and this had appeared unremarkable to his instructor.

The aircraft was not being flown in a regime of flight which ordinarily would be regarded as close to the limit of its capabilities, nor in unsuitable or marginal weather conditions.

The progression of the flight was as expected and the pilot had made a routine radio call seconds before the accident. The option to land the aircraft was available to the pilot even after initiating the go-around (an emergency landing ahead on the relatively long, tarmac runway should have been within the pilot's capabilities, even taking into account the surprise factor of an unexpected event occurring at that stage). Consequently, the accident sequence either unfolded very rapidly or the precursors to it were not apparent as such beforehand.

The physical examination of the gyroplane structure, its systems and engine revealed no evidence of pre-impact failures or defects. There was ample fuel in the aircraft tanks and related engine components.

The aerodrome response to the accident was in accordance with the local crash procedures, which appear to have been properly executed. However, the forces involved in the accident were such that the pilot did not survive the initial impact and no changes to local procedures could have affected the fatal outcome.

Although the post-mortem examination concluded that the pilot died as a result of multiple injuries sustained in the accident, the discovery of severe and extensive coronary artery atherosclerosis is significant as it provides a credible case for a pilot incapacitation. Indeed, the pathologist performing the examination thought that the severity of the pilot's condition could itself have been given as a cause for sudden death, stating that it was *'very likely that a sudden cardiac event, possibly causing unconsciousness, precipitated the accident'*.

Conclusion

The investigation considered the post-mortem evidence and the opinion of the pathologist, along with the lack of any evidence of other causal factors. It was concluded that the accident was most probably the result of a sudden medical incapacitation of the pilot, in which his capacity to pilot the aircraft safely was either removed or severely degraded.