

ACCIDENT

Aircraft Type and Registration:	Airborne Edge XT912-B/Streak III-B, G-CEHH	
No & Type of Engines:	1 Rotax 912 piston engine	
Year of Manufacture:	2005	
Date & Time (UTC):	28 March 2007 at 1220 hrs	
Location:	Blunts Lane, Potters Crouch, St Albans	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - 1 (Fatal) 1 (Serious)	Passengers - N/A
Nature of Damage:	Substantial	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	54 years	
Commander's Flying Experience:	4,960 hours (of which 50 were on type) Last 90 days - 59 hours Last 28 days - 35 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The flying instructor was demonstrating an 'engine-off' approach to his pupil, when the aircraft (a flex-wing microlight) struck a tree close to the final approach. Post-mortem toxicology indicated that the instructor's blood alcohol level was 137 mg/100 ml. The UK prescribed limit for pilots is 20 mg/100 ml; that for driving is 80 mg/100 ml.

History of flight

The aircraft departed on an instructional flight with the instructor, who held a CAA Microlight Instructor rating, in the front seat and the student in the rear; the intention was for the instructor to demonstrate an engine-off (or 'dead stick') landing to the student, who

was to undertake a General Skills Test two days later.

Other microlight pilots at the airfield observed the aircraft take off normally from Runway 30, before climbing out with a right-hand turn towards the airfield overhead. From a height of approximately 2,000 ft, the aircraft entered a glide descent in a left-hand circuit pattern for a landing on Runway 33.

The approach appeared normal at first, with the witnesses describing the aircraft being slightly high (as they expected in an engine-off condition) before the speed increased and a series of S-turns was commenced. The aircraft flew to the east of the extended runway centreline

and onto a right base leg. At this stage the witnesses assessed that the aircraft was rather low.

The aircraft's left wing then impacted the top-most branches of a tree, some 50 to 70 ft agl and 200 m from the runway threshold. The aircraft's flight was significantly disrupted by the impact with these branches, and it fell to the ground some 80 m from the tree. Members of the public who were nearby ran to give assistance, and were then joined by pilots from the airfield.

The pilot of G-CEHH sustained fatal injuries in the ground impact. The student was severely injured and could later recall very little of the day of the accident.

Post-mortem examination and toxicology

A post-mortem examination was carried out on the pilot by a specialist aviation pathologist and a toxicological investigation was conducted.

The pathologist's report stated:

'Toxicological examination of the pilot's blood revealed a blood alcohol level 137 mg/100ml. The prescribed limit for a blood alcohol level for an individual acting as the pilot of an aircraft during flight, as laid down in the Railways and Transport Safety Act 2003, is 20 mg/100ml. This contrasts with the legal limit for driving which in the UK is 80 mg/100ml. Toxicology revealed alcohol levels of 183 mg/100ml in the vitreous and 235 mg/100ml in the urine.'

The report also contained calculations related to alcohol consumption and the rate at which alcohol is metabolised in the human body, taking into account a number of variables:

'These calculations suggest either that [the pilot] had consumed a quantity of alcohol the previous evening which would be sufficient to induce stupor or coma in most individuals, or that he had continued to consume alcohol at some stage in the 12 hours prior to his death.'

Commenting on the pilot's liver, the pathologist noted that it was 'fatty' and that this 'most likely represents the effect of chronic alcohol use'. With regard to the fatal injury sustained by the pilot, the pathologist reported that:

'It is unlikely, given the nature of this type of aircraft, that any additional or alternative safety equipment would have prevented this injury.'

Accident site

The impact site was in a field of young crop and was approximately 166 metres from, and on the extended centreline of, Runway 33 at Plaistows Farm Airfield. To the east and west of the site the ground rises to approximately 85 feet above the height of the accident site. The area to the east was grazing land and to the west a mixture of woodland and agricultural land, with a line of power cables, mounted on tall pylons, running in a north-west to south-east direction. Approximately 80 metres to the east of the impact site there was a lone deciduous tree, the upper branches of which were 50 to 70 feet above ground level. The area to the south-east of the accident site consisted of agricultural fields interspersed with farm buildings.

Impact parameters

Examination of the accident site showed that the left outer wing of the aircraft initially impacted a substantial branch at the top of the lone deciduous tree.

This impact substantially damaged the structure of the left outer wing. At the time of the impact with the tree it is estimated that the aircraft was on a heading of about 270°, flying at a speed in the region of 65 mph, in level flight and possibly banked to the left. At some point, after this impact with the tree, the aircraft's left outer wing collapsed upwards, which would have caused the aircraft to become unstable and, probably, uncontrollable. The damaged aircraft continued, on an approximate heading of 260°, until it struck the ground some 80 metres from the tree. The aircraft's nacelle impacted the ground with virtually no forward speed, banked to the left by almost 90° and in an almost level pitch attitude. The force of the ground impact severely disrupted the structure of the nacelle. All the parts of the aircraft were present at the accident site.

Engineering examination

There was good evidence to indicate that the propeller was not rotating at the time of the ground impact. The engine ignition switches were found in the ON position. There was a smell of fuel around the wreckage and a quantity of fuel was found in the fuel tank. The fuel cock was found to be selected to the ON position. There was no post-impact fire.

A detailed examination of the aircraft's structure and engine systems found no evidence of disconnections or restrictions prior to the impact with the tree. The engine was taken to the manufacturer's UK agent's facility for examination and testing; external and internal examination showed no evidence of a failure, disconnection or seizure. Both carburettor bowls contained fuel and both they and the fuel filter were free of contamination. The engine was installed onto an airframe mounting, a replacement propeller fitted and a successful engine test run was carried out.

It is, therefore, likely that the engine would have started correctly if this had been initiated before the collision with the tree.

Possible visual illusion and perspective

The tree, which the aircraft struck, had a clearly defined top, with some additional growth above it; it was this additional growth with which the aircraft collided. The possibility was considered that, as the aircraft approached the tree, these uppermost branches might have appeared to blend in with other trees, further away. To test the theory, the tree was viewed from the direction of the aircraft's flight, using a helicopter, and photographs were taken. Whilst there was no doubt that the line of sight took in both the top branches of the tree, and other trees behind, the illusion was not clearly apparent, and the test was inconclusive.

Engine-off landings

Pilots of single-engined aircraft are trained to carry out forced landings, to enable them to deal successfully with an unexpected engine failure in flight. In microlight flying, the exercise is carried out either with the engine running at idle power or with the engine switched off. If the engine is left running, it is possible for the pilot to advance the throttle at any time and gain thrust. However, the residual thrust from an idling engine means that the aircraft handles somewhat differently from an aircraft whose engine has stopped, and also means that the aircraft's rate of descent is somewhat less than that following engine failure. If the engine is switched off, the propeller stops rotating, there is no residual thrust, and the rate of descent is as it would be in the event of a genuine engine failure. It is usual for the engine to be stopped by switching the ignition system OFF, and once the engine and propeller have stopped, to select the ignition ON again, so that activation of the electric start (where fitted) will cause the engine to run again. G-CEHH was fitted with a serviceable electric starter.

Factors involved in engine-off landings were discussed with the British Microlight Aircraft Association (BMAA) executive. They stated that engine-off landings were not prohibited, but that in their opinion, such landings are best carried out at airfields where substantial areas suitable for landing are available, so that a misjudged approach will not hazard the aircraft and its occupants. The discussion highlighted the fact that engine-off landings require precise judgement; if the aircraft descends below the approach path, the desired touchdown area may not be reached without re-starting the engine. They offered the opinion that Plaistow's Farm was quite a small airfield and was not ideally suited to engine-off landings during pilot training.

Analysis

The aircraft struck a tree close to the final approach to the runway; the tree would not have presented a hazard in the course of a normal approach but the S-turns resulted in the aircraft being flown to one side of the final approach, at very low height, and towards the tree. The investigation examined the possibility of some visual illusion causing the tree to merge with other trees, in the distance (as perceived) but this was inconclusive.

It was apparent that, as the aircraft flew towards the final approach, the pilots were probably focussing their attention on the runway threshold, to their right. The tree, on the left, would not have been a point of focus. It is logical that the student pilot would have been relying on the commander's expertise, and would have been unlikely to have intervened.

The accident occurred in the course of an engine-off approach. The discussion with the BMAA indicated that, whilst there were no specific rules about engine-off landings, best practice would be to carry out such exercises only where significant areas, suitable for landing, exist. Then, a misjudged approach would not result in the aircraft and occupants being put at risk.

The level of alcohol in the instructor's body at the time of the accident was such that his judgement was likely to have been seriously impaired.

Safety Action

The BMAA has undertaken to publicise to its members the hazards inherent in flying under the influence of alcohol or drugs.