ACCIDENT

Aircraft Type and Registration:	Whitaker MW6 Merlin (Modified), G-MYZA
No & Type of Engines:	1 Rotax 582 piston engine
Year of Manufacture:	1995
Date & Time (UTC):	13 July 2005 at 1930 hrs
Location:	Airstrip near Newent, Gloucestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Minor) Passengers - N/A
Nature of Damage:	Extensive
Commander's Licence:	Private Pilot's Licence
Commander's Age:	73 years
Commander's Flying Experience:	550 hours (of which 250 were on type) Last 90 days - 4 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB enquiries

History of the flight

The pilot had taken off from his own airstrip on the evening of the accident and had flown to a club meeting at another airstrip approximately 20 minutes flying time away. After about an hour on the ground he flew back to a friend's landing strip, close to his own, and remained there for about half an hour.

The pilot then took off for the brief flight back to his own airstrip and reported that on reaching a height of about 200 ft agl the engine 'stopped dead'. There were fields containing crops ahead and the pilot chose to turn through about 90º to the right in order to try and make a forced landing on a grass area adjacent to the strip. This also brought him into wind, which he reported as being 5 kt. In attempting to land, the pilot cleared a hedge and passed upwind of a group of trees. He reports that when passing the trees at a height of about 30 ft the aircraft suddenly stalled, impacting the ground nose down at low speed. The aircraft was badly damaged but the pilot suffered only minor injuries and was able to vacate the wreckage unassisted.

In his report to the AAIB the pilot did not make clear whether he conducted a full power check prior to each takeoff. A meteorological aftercast indicated the likely temperature at the time of the first take off was about 27ºC and at the time of the accident it was about 24ºC.

Aircraft description

The aircraft type is a three axis microlight with a rigid wing mounted above a faired tricycle unit. G-MYZA was fitted with a two-cylinder, two-stroke liquid-cooled engine fitted driving a three bladed propeller through a gearbox. The aircraft had a main fuel tank in the wing centre section and fuel was gravity fed from the wing tank to a header tank located under the engine. The aircraft was issued with a Permit to Fly by the CAA based on the inspections and recommendations of the PFA.

Aircraft refuelling

The aircraft was operated on MOGAS[1] which the pilot purchased at a local petrol station. The aircraft had been stored in a hangar with the fuel tank only partially full the night prior to the accident and was refuelled in the morning using a different batch of fuel to that already in the tank. The pilot stated that he was not in the habit of testing his fuel for water and had not done so on this occasion. In justification, he pointed out that operating this way he had flown his aircraft for many hours without problem.

Analysis

The aircraft's engine was badly damaged by the impact and it has not been possible to determine beyond doubt whether it was a failure of the engine itself or a problem with the fuel system which caused it to stop.

The pilot reported that colleagues had informed him that the exhaust fumes smelled of paraffin and he believed the failure was caused by contaminated fuel purchased from the garage. He sent a sample of this fuel for analytical tests but at the time of writing his report, the results of these tests were inconclusive.

The pilot's statement that he did not test his fuel for water also raises the possibility that the failure was caused by the presence of water in the fuel system. The fact that the aircraft was left parked with the fuel tank partially filled may have allowed the formation of condensation in the tank overnight. However, the presence of any significant quantities of contaminant can probably be eliminated because the aircraft had operated without a problem using the same fuel for two flights prior to the accident.

Motor gasolines have a higher vapour pressure than aviation gasoline (AVGAS) and so engines operating on MOGAS are particularly susceptible to vapour lock. This condition is caused by the fuel vapourising when subjected to ambient low pressure or high temperature. If the vapour forms in a fuel line it effectively cuts off the fuel supply to the engine causing it to stop. For this reason the use of MOGAS is restricted to flights below an altitude of 6,000 ft and a maximum tank fuel temperature of 20ºC. Conditions on the warm summer evening of the accident flight (24º to 27ºC ambient air temperature) suggest that the temperature of the fuel in the tank probably exceeded 20ºC whilst the aircraft was on the ground. If the aircraft had been parked in direct sunlight, this could have raised the fuel temperature in the wing tank well above ambient air temperature. Moreover, residual heat from the engine could also have raised the temperature of the fuel in the header tank and its associated fuel transfer pipes to the engine.

In view of the special precautions required when operating aircraft using MOGAS, both the CAA and the PFA publish specific information highlighting the restrictions that apply. The CAA publish Airworthiness Notice Number 98B entitled "*Use Of Filling Station Forecourt Unleaded Motor Gasoline In Microlight Aeroplanes*" and Airworthiness Notice Number 98C entitled "*Use Of*

Footnote

[1] Motor Vehicle Gasoline

Filling Station Forecourt Unleaded Motor Gasoline In Certain Light Aircraft". The Authority also publishes Safety Sense Leaflet 4b "*Use of MOGAS*". Before permitting aircraft to operate on MOGAS, the PFA requires engine/aircraft combinations to be approved and any necessary engine adjustments to be made. The PFA also requires a placard to be fitted next to the filling point on the fuel tank detailing the standard of fuel that may be used and another in the cockpit detailing operational limitations that must be observed. As part of this process, the PFA issue a MOGAS operating pack to the aircraft owner which contains detailed information on the storage, testing and use of MOGAS, a copy of the relevant CAA Airworthiness Notice and the placards required to be fitted.

All these documents, including the cockpit placard, emphasise the importance of checking fuel for contaminants (primarily water), carrying out a full pre-takeoff power check and operating with a fuel tank temperature not exceeding 20ºC.

Having suffered the engine failure, the pilot chose to attempt a landing on an area close to the airstrip. He explained he was concerned that if he landed in the field straight ahead that the presence of the crops would bring the aircraft to a rapid halt, or turn it over, causing him potentially serious injury. He had decided, therefore, to try and land on the grass area next to the airstrip, but in doing so he was required to make a large turn at low level. He believes the trees had shielded the aircraft from the wind just prior to touchdown, causing him to lose airspeed and stall.

Conclusion

The most likely cause of the engine failure was a vapour lock in the fuel supply, which was probably caused by a combination of high ambient temperature, the aircraft engine heating the fuel between flights and possibly the heating effect of sunlight on the wing fuel tank whilst the aircraft was parked. In attempting the subsequent forced landing, the aircraft stalled at low level resulting in it impacting the ground.

Relevant information exists on the use of MOGAS and is readily available. Irrespective of whether or not a problem has previously been encountered, the advice offered should be followed.