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**SAFETY RECOMMENDATION**

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Subject: accident occurred on Lasa (Bolzano, Italy) airfield to the helicopter AS350 B2, registration marks I-AIRY, on May 16th, 2011.

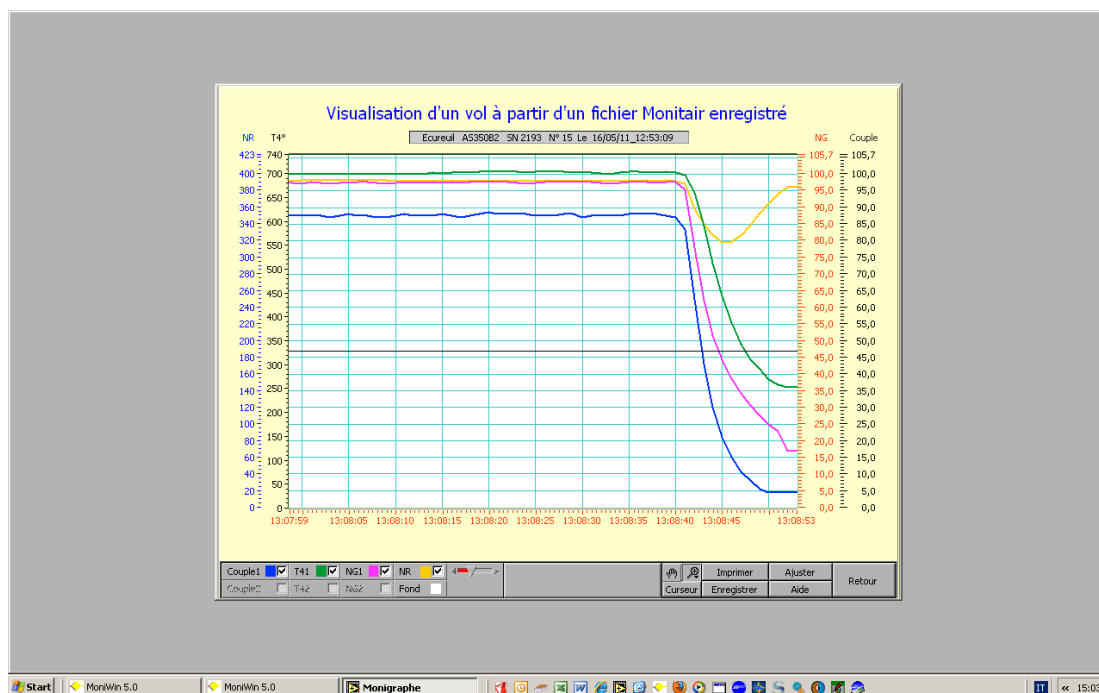
1. Synopsis.

On May 16th, 2011, the Eurocopter AS350 B2 (picture 1) registration marks I-AIRY was flying from Merano (BZ, Italy) to Curon Venosta (BZ, Italy). During flight at an altitude of about 4.300 ft, the pilot noticed that the "low oil pressure" light came on, accompanied by a yaw jerk to the right, a loud noise and a NR drop with its audio warning. The pilot immediately lowered the collective

pitch and landed the aircraft in autorotation on Lasa airfield that was directly in front of him. An observer on the ground reported the presence of white smoke from the exhaust pipe. On the ground, the preliminary inspection did not reveal any finding likely to explain the event. Minor damages to the helicopter due to the hit of one of the main rotor blades against the tail boom happened during touch-down. No injuries were reported by the three persons onboard (pilot included).



Picture 1: Eurocopter AS350B2 registration marks I-AIRY.



Picture 2: Data showed by “Monitair”.

The “Monitair” system evidenced an in flight shut down of the engine (picture 2).

2. Technical Investigation.

First examinations of engine and wreckage performed by Operator and all parties involved in the investigation have shown no discrepancy which could explain the event and no objection to perform a ground run. The ground run evidenced a good operation of the engine up to 83.1% NG on the helicopter.

It was performed an engine boroscope inspection and an engine test on the test bench to the engine manufacturer facilities and no discrepancy was found which could explain the event. In addition was performed an FCU test on the test bench too with same result.

During the release to service actions performed by the Operator on the helicopter, a deep reduction of the fuel flow has been experienced after the “oil to fuel heater” installation point.

The helicopter is equipped with the “oil to fuel heater” P/N 10544D (P&WC P/N3032708), s/n 1993, that is part of the optional Service Bulletin Nr. 28.00.09.

After that has been planned a fuel filter test and an “oil to fuel heater” test to the helicopter manufacturer facilities.

The test on the fuel filter revealed no discrepancy while the test on the “oil to fuel heater” showed a deep reduction between the fuel in to out pressure:

- test with fuel flow 80l/h: Inlet pressure 30 kPa; Outlet pressure 8 kPa (delta P=22 kPa);
- test with fuel flow 180 l/h: Inlet pressure 122 kPa Outlet pressure 1kPa (delta P=121 kPa).

They are values not acceptable for the normal operation of the engine, so a boroscope inspection has been performed on the first part of the inlet section of the component revealing the presence of pollution and debris (picture 4). Following these new evidences, it has been decided to proceed with a test of the “oil to fuel heater” on an engine test bench equipped with fuel filter and FCU, to the engine manufacturer facilities.



Picture 3: “oil to fuel heater”.



Picture 4: pollution and debris found within the “oil to fuel heater” inlet duct.

The test planned included following actions:

- pre start with booster pumps ON during 30 seconds;
- start: N1 increases until flight idle (fuel flow # 80 l/h);
- take off during 15 seconds: N1 increases until PMD (fuel flow # 220 l/h);
- cruise during 3 minutes: N1 decreases to PMC (fuel flow # 170 l/h).

During these tests the pressure has been monitored upstream and downstream the fuel filter, the FCU and the “oil to fuel heater”. The fuel flow and the fuel temperature has been monitored too. The following results have been experienced:

- fuel flow reaches 212 l/h then goes down and the test is stopped;
- FCU inlet pressure is 22 kPa abs (minimum allowable: 120kPa);
- delta P fuel heater 120 kPa at 212 l/h.

Therefore the FCU begins to cavitate at PMC, and at PMD HP pump self suction is not possible any more (fuel flow drops). The FCU inlet pressure is out of limit beyond flight idle.

After that the maintenance tasks required by the maintenance program for the “oil to fuel heater” component have been investigated. They are related only to a general visual inspection or to the hi/low temperature switch test (*AMM 28-93-00, 6-1 – interval 600FH/24M; AMM 28-93-00, 5-1 – interval 1200FH/48M*). Therefore, if the inspections required are “ok”, is not requested any additional check on the fuel flow or any cleaning procedure. For example the component tested has been installed on the helicopter for about 11593 fh, since 1989 (22 years) and its fuel flow capacity has never been tested during this time.

3. Conclusion.

The abnormal pressure drop inside the fuel heater induced cavitation phenomena on the FCU and explains the engine in flight shut down.

The lack of maintenance task on the fuel flow test or on a scheduled cleaning related to the “oil to fuel heater” appears to be linked to the conditions of the component.

4. Recommendation.

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Addressee: FAA, 800 Independence Avenue, SW Washington, DC 20591.

Text

The investigation and the analysis performed demonstrate that the “oil to fuel heater” clogging was the cause of the engine in flight shut down. The lack of specific maintenance task on it has contributed to make not possible to discover the problem before the event.

ANSV - considering the consequences of an “in flight shut down” on a single engine helicopter, considering the main use of this helicopter type for aerial work purposes and within mountain environment that get worse the risk management related to “in flight shut down” events, considering that the installation of the “oil to fuel heater” is an “optional service bulletin” for the helicopter type in subject - recommends EASA and FAA that:

- an additional inspection should be asked as soon as possible to the Operators/Owners of the helicopter type in subject now in operation (equipped with the optional Service Bulletin Nr. 28.00.09), in order to check the “oil to fuel heater” component for pollution presence and for correct fuel flow values (ANSV-16/726-11/1/A/11);
- a scheduled check should be implemented within the maintenance program of the helicopter type in subject (equipped with the optional Service Bulletin Nr. 28.00.09) in order to check the fuel flow of the “oil to fuel heater” component during its operative life and in order to perform its cleaning (ANSV-17/726-11/2/A/11).

President of ANSV
(Prof. Bruno Franchi)

