AIRCRAFT ACCIDENT SHORT REPORT

CA18/3/2/1211 ZS-KPC, emergency landing on a field following engine power loss due undetermined reasons.

Date and time	:	20 June 2018, 0928Z
Occurrence type	:	Accident
Aircraft registration	:	ZS-KPC
Aircraft manufacturer and model	:	Air Tractor, AT-301
Last Point of departure	:	Boland Agricultural High School, Paarl, Western Cape Province
Next point of intended landing	:	Boland Agricultural High School, Paarl, Western Cape Province
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	:	S25°51'34" E028°26'57"
Meteorological Information	:	Cape Town International Aerodrome (FACT): wind: 020°/10 kts, temperature: 15°C, dew point: 11°C, QNH1025, FEW020. Pilot's report: no wind, temperature: 16°C, CAVOK
Type of operation	:	Agricultural operation (Part 137)
Persons on board	:	1 + 0
Injuries	:	None
Damage to aircraft	:	Damage to the undercarriage and propeller

All times given in this report is Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability.***

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved

SYNOPSIS

1.1 On the 20 June 2018, at 0915Z, the pilot, being the sole occupant on-board the aircraft, departed the Boland Agricultural High School airfield for a crop spraying operation.

1.2 On completion of the crop spraying operation, during the return leg to the airfield, the pilot reported that the fuel flow indicator started fluctuating. This was followed by a loss of engine power. At approximately 650 ft. above ground level (AGL) the engine failed and shut down. The pilot reported the situation to his colleague on the ground and then committed to an emergency landing approximately 2 nm from the intended place of landing.

1.3 Upon touch-down, the aircraft nosed over and the propeller impacted the ground. Damage to the aircraft was limited to the undercarriage, the nose cowling and the propeller. The pilot sustained no injuries during the landing sequence.

1.4 The investigation revealed that the cause of the accident was as a result of unsuccessful forced landing due to engine failure. The cause of the engine failure could not be determined. The engine run was performed post the accident and no anomaly was found during engine run.

2 FACTUAL INFORMATION

2.1 On the 20 June 2018, the pilot, being the sole occupant on-board an Air Tractor AT-301, departed the Boland Agricultural High School airfield, near Paarl in the Western Cape Province, for a crop spraying operation. The estimated time of take-off was approximately 0915Z.

2.2 On completion of the crop spraying operation, the pilot was routing back towards the departure airfield when the fuel flow indicator started fluctuating. Following the fuel flow indicator fluctuation the engine started losing power. The pilot contacted the ground operations personnel to notify them of the problem. At a height of approximately 650 ft. AGL with an indicated air speed (IAS) of 135 miles per hour (mph), the engine failed and stopped. The pilot executed an emergency landing in an open field.

2.3 On touch-down, the main landing gears dug into the soft ground and caused the nose to tip over. The propeller then impacted the ground. The aircraft came to rest in a nose-down attitude. Damage to the aircraft included the main landing gear, the propeller, support structure and a portion of the nose cowling. The pilot stated that there was 220Lt of fuel remaining on board after the accident. The pilot sustained no injuries during the forced landing sequence.

2.4 The location of the emergency landing was approximately 2 nm from the airfield. The incident occurred during daylight hours in visual meteorological conditions (VMC).

2.5 The aircraft was recovered and moved to an aircraft maintenance organisation (AMO) in Bethlehem, Free State Province, for inspection and troubleshooting.

2.6 Following the accident the operator conducted an engine test run. The engine ran normally at full power and fuel flow checks were conducted and no anomalies were found.

3. FINDINGS

3.1 The pilot-in-command held a valid commercial pilot's licence (CPL) which was initially issued on 14 December 2017 and is due to expire on 31 December 2018. The pilot held the required rating to operate the aircraft.

3.2 The pilot's aviation medical certificate was valid at the time of the incident. It had been issued on 1 November 2017 and is due to expire on 31 November 2018.

3.3 The pilot had flown 8.1 hours on type and 7.1 hours in the last 90 days.

3.4 The pilot held a valid Certificate of Registration with the Department of Agriculture, Forestry and Fisheries to act as a pest control operator for aerial applications.

3.5 The aircraft held a valid Certificate of Airworthiness (Issued: 28 April 2004, Expires: 31 May 2019) and a valid Certificate of Release to Service (Issued: 21 May 2018, Expires: 30 May 2019 or 8548,9 airframe hours).

3.6 The aircraft was fitted with a Walter M601 D turbine power plant.

3.7 The last mandatory periodic inspection (MPI) was carried out on 31 May 2018, at 8 448.9 airframe hours.

3.8 The aircraft had operated 9.6 hours since the last MPI.

3.9 At the time of the incident, the engine hours were as follows:
- Total time since new: 4 018.2 hours
- Total time since overhaul: 844.2 hours

3.10 Approximately 220 L of fuel were on-board the aircraft after the forced landing.

3.11 The aircraft was used to carry out crop spraying operations (Part 137).

3.12 The closest reporting weather station to the incident is FACT, approximately 20 nm to the south-west of the incident site.

3.13 The weather was not a contributing factor in the incident.

3.14 A borescope inspection was carried out on the engine after the incident. No internal faults were identified by the AMO.

3.15 Various troubleshooting procedures were carried out on the fuel and engine bleed systems after the accident by the AMO. No fault could be isolated.

4 PROBABLE CAUSE/CONTRIBUTING FACTOR

4.1 The investigation revealed that the cause of the accident was as a result of unsuccessful forced landing due to engine failure. The cause of the engine failure could not be determined as the engine ran normally during the engine run following the accident.

5 REFERENCES USED ON THE REPORT

5.1 None.

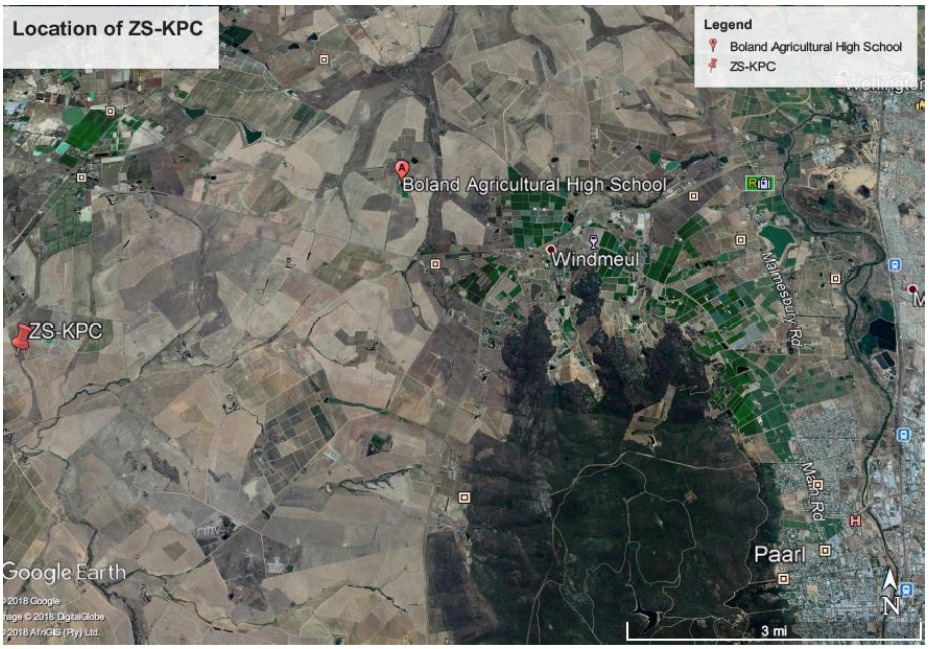

Figure 1: Google Earth map showing the location of the incident site and the Boland Agricultural High School.

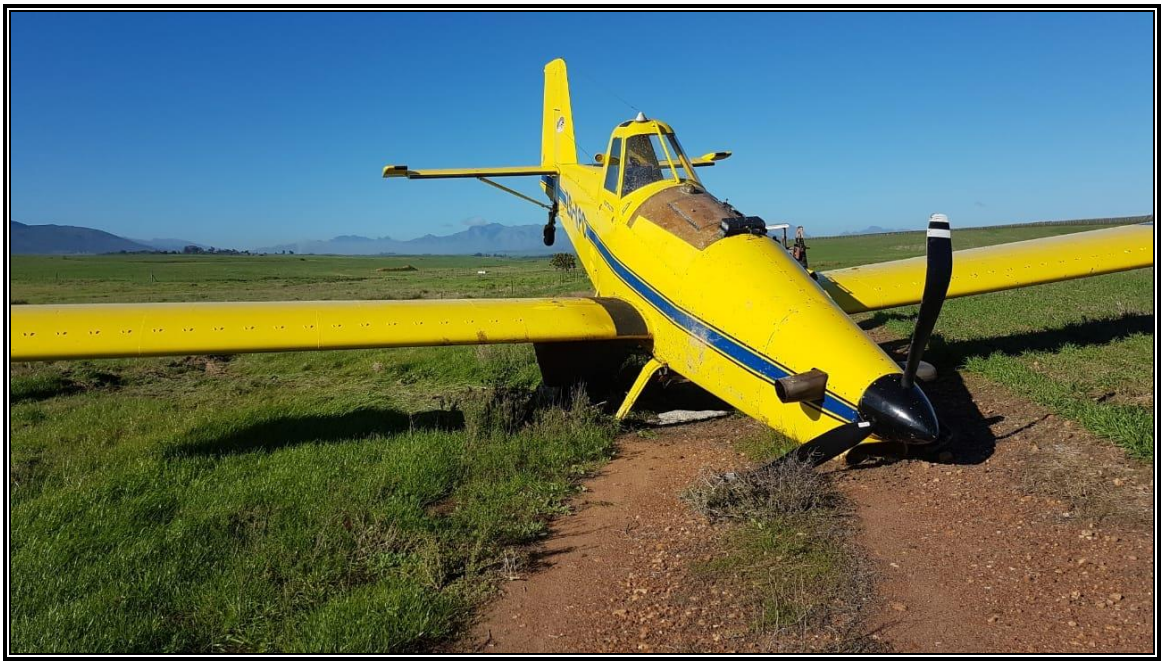

Figure 2: The aircraft as it came to rest (photo: AC le Roux).

Figure 3: Damage to aircraft structure.

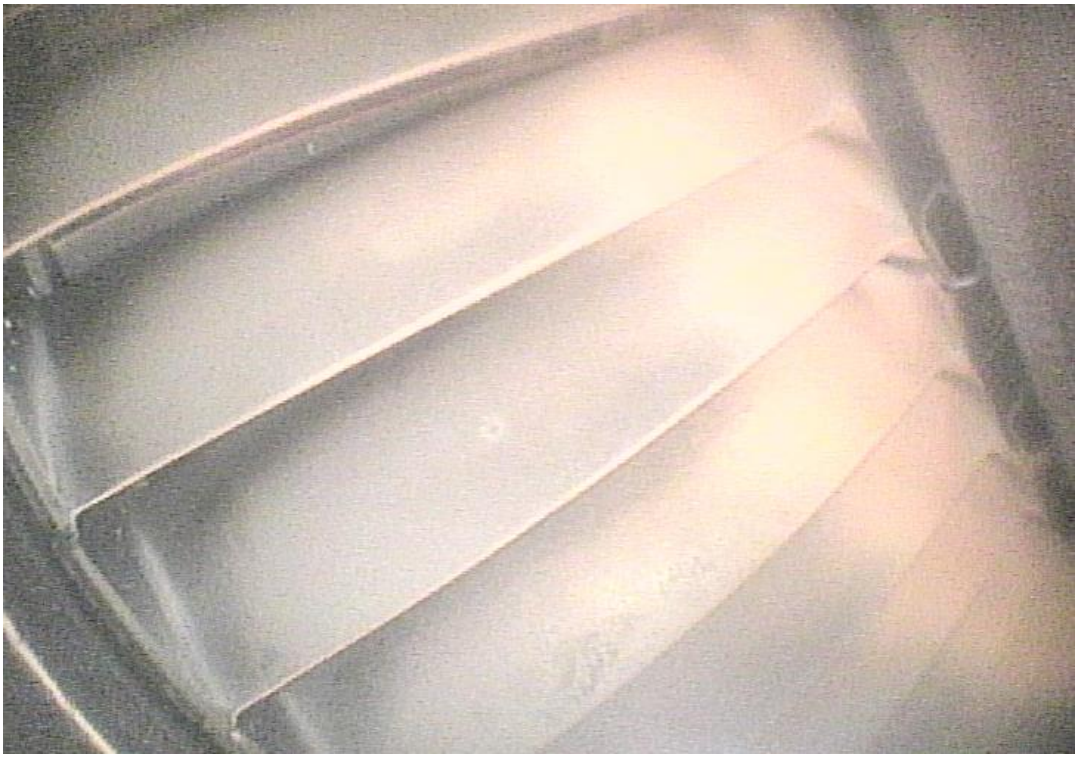

Figure 3: Turbine blades.

5 SAFETY RECOMMENDATION

5.1 None

6 ORGANISATION

6.1 The AMO carried out a variety of troubleshooting procedures to fault-find the cause of the surge. On completion, no factor could be isolated to be the cause of the engine surge.

7 TYPE OF SAFETY ACTION

7.1 None

8 SAFETY MESSAGE

8.1 None

9 APPENDICES

9.1 Appendix A: Troubleshooting report carried out by the AMO

This report is issued by:

Accident and Incident Investigation Division
South African Civil Aviation Authority
Republic of South Africa

APPENDIX A

ORSMOND AERIAL SPRAY (Pty) Ltd
Tel: +27 58 303-5261
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P.O. Box 144 – Bethlehem 9700
Bethlehem Airfield
Free State – South Africa

ZS-KPC accident Investigation

ZS-KPC was recovered in the Cape and returned to Bethlehem.

The airframe fuel filter was inspected on site by Lami Smit (Licensed AME) in the Cape and found to be clean.

Approximately 400ml of fuel was found in the filter bowl.

Before the removal of the wings the fuel was drained and a total of 182 l was recovered.

The aircraft was brought back to Bethlehem. The prop blades were removed and replaced with serviceable units. The engine was bled and started. Start was normal and emergency circuit function test was normal.

Aircraft was secured and a full power check was carried out which delivered 100% torque and 100 % ng. Air check at 80%ng was normal. Emergency circuit test was normal.

All hoses were checked and no obstructions found. Left and Right fuel tank interiors were checked and found to be clean.

Left and right fuel outlet fittings removed. Right fitting was clear. Left fitting had a remnant of a cable tie lodged in the bend.

Wing put on a stand and set up to flight attitude and to 3 degree dihedral. Wing tank refuelled with 90 l fuel to simulate the fuel remaining and flight attitude.

Gravity fuel flows carried out and the following results were obtained:

Unrestricted fitting 360 l/hr

Restricted fitting 171.5 l/hr

The tanks drain into a central header tank. Total fuel supply gravity fed only would thus be 531.5 l/hr.

The tank was refuelled to 90l again and the fuel system connected to the airframe fuel system. Fuel flows were carried out with the airframe fuel pump running. Fuel delivery was measured at the engine fuel inlet point. The results were obtained from a single wing feed to the header tank. The pump must be on during flight. The following results were obtained:

Unrestricted fitting with pump on 900l/hr

Restricted fitting with pump on 720l/hr

The wing was then put on trestles and set up to ground attitude with a 3-degree dihedral. Fuel was pumped in to simulate the capacity a wing could hold when being refuelled presuming the loading area was completely level. It was determined that the wing can hold 248 l thereby giving a total fuel capacity of 496l. The flight manual states that there are two 63 gallon tanks of which 6 gallons are unusable.

There was a fuel upload of 132l right wing and 100l left wing total 232l as per fuel log sheet 003201. The upload was at Malmesbury on the morning of the incident.

According to the loaders a fuel upload of 125l was made at the Landbouskool strip. The upload was into the left wing tank only. This upload was during the 4th load.

From the Guidance System the following time frames can be established:

Initial take-off time: 08:24 (local)

4th Load fuel uplift: 09:28 (local)

Time of Incident: 10:47 (local)

Probable Cause:

In flight aircraft engine surge resulting in pilot executing forced landing. Cause of surge undermined.