SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10042						
Classification	Accident	**Date**	15 December 2021		**Time**	1520Z	
Type of Operation	Training (Part 141)						
Location							
Place of Departure	Wonderboom Aerodrome (FAWB)		Place of Intended Landing		Wonderboom Aerodrome (FAWB)		
Place of Accident	Approximately 2.2nm North-east of FAWB, Gauteng Province						
GPS Co-ordinates	Latitude	25°38´29" S	Longitude	028°15´43.6" E	Elevation	4110ft	
Aircraft Information							
Registration	ZU-WMM						
Model/Make	Sling 2 (Serial Number: 144)						
Damage to Aircraft	Substantial		Total Aircraft Hours		2477.9		
Pilot-in-command							
Licence Valid	Yes	Gender	Male		Age	37	
Licence Type	Airline Transport Pilot Licence (ATPL) Aeroplane						
Total Hours on Type	±26.5		Total Flying Hours		10 209.5		
People On-board	2+0	Injuries	0	Fatalities	0	Other (on ground)	0

What Happened

On Saturday afternoon, 15 December 2021 at approximately 1520Z, a flight instructor and a student pilot on-board a Sling 2 aircraft with registration ZU-WMM took off on a training flight from Runway 06 at Wonderboom Aerodrome (FAWB) in Gauteng province with the intention to return to FAWB, when the accident occurred. After take-off, during a simulated engine failure exercise, the engine could not achieve maximum revolutions per minute (rpm) and, thus, could not respond to throttle control inputs. The flight instructor did a fault-finding (including opening and closing the throttle a few times) but the engine manifold pressure (MP) and the engine rpm remained at idle, they could not increase to maximum power. The flight instructor took control of the aircraft and executed an emergency landing on an open field which was approximately 2.2 nautical miles (nm) north-east of FAWB. During landing on a wetland, the spring-loaded main landing gear detached from the underbelly attachment point. As a result, the nose landing gear bent, and the aircraft collided with the parameter fence whilst the left wing collided with a fence pole. The aircraft sustained substantial damage. The flight instructor and the student pilot were not injured; they disembarked the aircraft without assistance.

Figure 1: The aircraft at the accident site and the main landing gear strut in the foreground. (Source: Pilot)

What was found:

The aircraft was fitted with the engine control unit (ECU) which was downloaded by the aircraft maintenance organisation (AMO) on 16 December 2021. (Refer to Figure 2 for raw data downloads).

The ECU revealed the following:

- The engine was running as per normal throughout the flight with no abnormal indication parameters being recorded, with the exception of the indications of the throttle position sensor. This contradicts the throttle position statements by the student pilot and the instructor pilot.

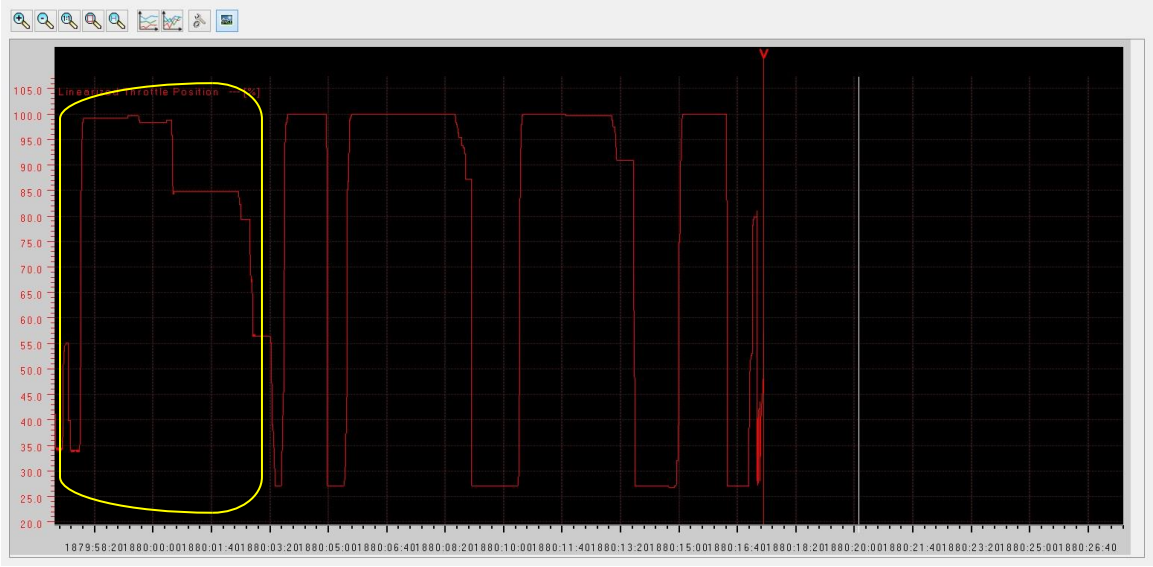

Figure 2: The throttle position sensor recordings.

- The throttle sensor position varied between 28% and a maximum of 50%. Up until the time the aircraft landed, the above recordings depict a clear indication of loss of engine power control attributed to an unresponsive throttle movement which was limited by the air filter housing.

A Service Bulletin (SB) 19 was issued by the manufacturer on the aircraft type model; the accident aircraft adhered to this SB on 2 November 2021 at 48.9 hours prior to the accident.

The SB is meant to prevent the possible loss of engine power control.
Sling Aircraft (Pty) Ltd Service Bulletin 19:

SB 19 released on 1 October 2021 with an effective date of 1 October 2021 stated that: *This service bulletin provides the instruction for continued airworthiness for the throttle cables installed in the 912 and 915 iS fitted aircraft*.
Throttle cables should be replaced on all affected operational aircraft during mandatory periodic inspection (MPI), including kit-built aircraft still under construction prior to first flight. However, prompt corrective action is required for aircraft experiencing throttle lag or non-responsive throttle.
Figure 2 shows the corrective action and compliance time for the three expected response types, namely: responsive, lagging and non-responsive throttle.

Figure 3: The throttle quadrant at idle and full power settings. (Source: AMO)

- Further investigation of the throttle system on the accident aircraft throughout the entire range of travel showed the following: The air-filter housing had witness marks from the throttle lever cable (see figure 4). During investigation, the throttle lever was recycled, and it revealed that during flight, the air-filter housing is pushed back by high (strong) airflow and, as a result, it limits the movement of the throttle lever into full forward position. The throttle cable attachment bolt does not swivel; hence, the lock nut is used as the throttle cable tends to bend when the throttle lever is pushed forward. Therefore, the flexible cable does not reach full position when the throttle lever is pushed forward.

Figure 4: Witness marks left on the air-filter housing.

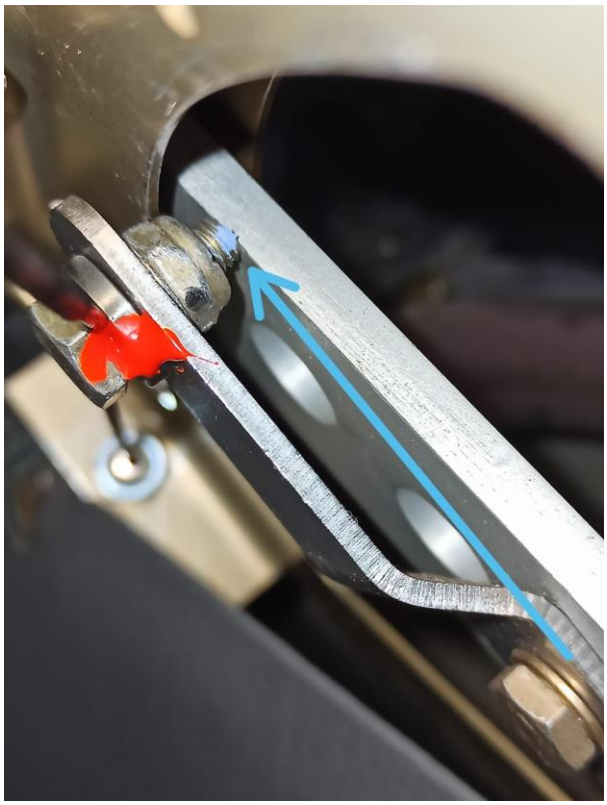

Figure 5: Throttle cable attachment bolt pushing against the air-filter housing.

- Investigation of a further two aircraft in the same aviation training organisation (ATO) fleet indicated the same witness marks of air-filter housing and interference with the throttle lever cable.
- The cause was found to be the throttle system design which remains susceptible to the inner cable buckling not feeding through the sheath, causing loss of engine power control.
- This problem has occurred in aircraft equipped with the initial throttle system design as well as the revised SB-19 throttle cable design. However, this appears to be the first recorded accident due to this problem.

- The last annual maintenance inspection of the aircraft was certified on 2 November 2021 at 2429.0 airframe hours. The aircraft had accumulated an additional 48.9 airframe hours in operation since the last inspection was completed. There were no reported or recorded defects prior to the accident flight as all damage was related to the accident.
- The cause was found to be the throttle system design which remains susceptible to the inner cable buckling which was not feeding through the sheath, causing loss of engine power control.

Probable cause:

Loss of engine power due to the air-filter housing limiting the movement of the throttle lever cable into full forward position and causing the engine rpm not to reach the desired power. During a forced landing on a wetland, the spring-loaded main landing gear got stuck and detached from the underbelly attachment point; and the aircraft collided with a parameter fence.

Safety Action/s

As this problem does not appear to give any prior warning and has dire consequences, which is perceived as a major safety concern by the operator; the remaining fleet was grounded by the operator until an acceptable solution is found, possibly after consultation with the manufacturer so as to eliminate the possibility of loss of throttle control from happening again.

Safety Recommendations:

Safety recommendation: It is recommended that the DCA issue a grounding order until such time the throttle system is redesigned to eliminate the possibility of in-flight loss of engine power.

Safety message: The owners and operators of this type-designed aircraft are to ground their aircraft until such time the throttle system is redesigned to eliminate the possibility of in-flight loss of engine power.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 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****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

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

Disclaimer

This report is issued by:

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