SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10453						
Classification	Accident		**Date**	11 May 2024		**Time**	1100Z
Type of Operation	Private (Part 94)						
Place of Departure	Delareyville Aerodrome (FADL) North West Province		Place of Landing			Springs Aerodrome (FASI), Gauteng Province	
Place of Occurrence	Private farm outside Delareyville Aerodrome (FADL) in North West Province						
GPS Co-ordinates	Latitude	26° 41´52.96" S	Longitude	025° 28´07.54" E		Elevation	4 434 ft
Aircraft Information							
Registration	ZU-EGA						
Make; Model; S/N	Magni Gyro; M-22 (Serial Number: 22-06-3554)						
Damage to Aircraft	Minor		Total Aircraft Hours	1 229.0			
Pilot-in-command							
Licence Type	Airline Transport Pilot Licence (ATPL)		Gender	Male		Age	56
Licence Valid	Yes	Total Hours	4 900	Total Hours on Type		883	
Total Hours 30 Days	24.5		Total Flying on Type Past 90 Days	12.5			
People on-board	1 + 1	**Injuries** 0	**Fatalities**	0	**Other (on ground)**		0

What Happened

On Saturday morning, 11 May 2024, a pilot and a passenger on-board a Magni Gyro M-22 aircraft with registration ZU-EGA were on a private flight from Delareyville Aerodrome (FADL) in North West province to Springs Aerodrome (FASI) in Gauteng province. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that he conducted a pre-flight inspection of the aircraft and nothing abnormal was found. The aircraft had 80 litres (l) of Mogas in the tanks. After the passenger had boarded the aircraft and the engine started, the pilot taxied to the threshold of Runway 03 where he performed the pre-take-off checks. After confirming that the engine indications were within the green arch, the pilot opened the throttle to 5 600 revolutions per minute (RPM) with rotor speed of 380 RPM and commenced with the take-off run. The aircraft rotated and, during the climb at approximately 65 feet (ft) above the ground level (AGL), it lost height; however, the engine's RPM remained the same. There was no sign of engine malfunction. After noticing that the aircraft was not climbing, the pilot opted to execute a forced landing on a farm near FADL. During the landing roll on the sunflower field, the nose wheel was caught in a furrow and the gear strut collapsed, which brought the aircraft to a stop. Thereafter, the pilot switched off the master switch. The aircraft was substantially damaged; there were no injuries reported.

Figure 1: The aircraft after it was recovered from the sunflower field. (Source: Pilot)

Post-accident

The following weather information was released by the South African Weather Service (SAWS) for Mafikeng Aerodrome (FAMM) on 11 May 2024 at 1100Z. FAMM is located 45.6 kilometres (km) north of FADL.

Wind Direction	220°	Wind Speed	5kt	Visibility	10km
Temperature	29°C	Cloud Cover	Clear	Cloud Base	None
Dew Point	0°C	QNH	1023 hPa		

Weight and balance:

Item	Weight
Empty weight	281kg
Front seat	98kg
Rear seat	84kg
Fuel	57.6kg
Total	**520.6**

According to the aircraft Pilot's Operating Handbook (POH), the maximum take-off weight is 500 kilograms (kg); the aircraft was over limit by 20.6kg.

Density altitude calculations

- Airport elevation of FADL is 4434 feet
- Temperature 29°C
- Dew point 0°C
- Altimeter setting: QNH x 0.02953
  = 1023 x 0.0.2953
  = 30.209 inches Mercury (in Hg)

Pressure altitude(ft)= (Altimeter setting – 29.92) x 1000 + airport elevation
= 30.209 (in Hg-29.92) x 1000 + 4434ft
= (0.289) x 1000 + 4434
= 289 + 4434
= 4723 ft

Temperature deviation= Current temperature – standard temperature
= 29°C -15°C
= 14°C

Humidity = $\frac{\text{(dew point – temperature)}}{\text{(243.5 x 17.67) - dew point}}$

= $\frac{\text{(0-29)}}{\text{(4302.645)-0}}$

= $\frac{-29}{4302.645-0}$

= -0.0067

Density Altitude = Pressure Altitude + (120 x temperature deviation) + (10 x humidity)

= 4723 + (120 x 14) + (10 x (-0.0067)

= 4723 +1680 + (-0.067)

= 4723 + 1680-0.067

= 6402.9 ft

The density altitude was determined to be 6402.9 ft. At this density altitude, the rotor will produce less lift which would result in a reduced rate of climb, a lowered maximum altitude, and an increased take-off roll.

Findings

1. The pilot was initially issued the National Pilot Licence (NPL) on 28 May 2018. The licence was reissued on 15 June 2023 with an expiry date of 15 May 2025. His Class 4 medical certificate was issued on 29 February 2024 with an expiry date of 28 July 2027, the pilot had no restrictions listed on his medical certificate.

2. The last 50-hour annual inspection on the aircraft was certified on 25 May 2023 at 1 013 total airframe hours, after which a Certificate of Release to Service (CRS) was issued with an expiry date of 31 May 2024 or at 1 050 hours, whichever comes first. The aircraft had accrued 1 046.6 hours at the time of the accident flight, which meant that it was flown for 33.6 hours after the inspection.

3. The Authority to Fly (ATF) was initially issued on 24 May 2019; it was renewed on 17 July 2023 with an expiry date of 31 May 2024.

4. The Certificate of Registration (C of R) was issued to the present owner on 24 May 2018.

5. The calculated weight and balance showed that the aircraft weighed 520.6kg during take-off. The aircraft's maximum take-off weight is 500kg. This means that the aircraft was overweight by 20.6kg.

6. The density altitude was determined to be 6402.9 ft.

Probable Cause(s)

The aircraft was overweight during take-off, and it lost height during the initial climb. The pilot conducted a forced landing on a farm and the nose wheel was caught in a furrow, which caused the gear strut to buckle.

Contributing Factor(s)

Failure to consider the effects of high-density altitude.
Safety Action(s)
None.
Safety Message
None.
About this Report
The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation and that will determine the scope of an investigation. For this occurrence, a limited 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 limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desk top enquiries 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 occurrence. *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.*
Purpose
In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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 AIID, which are reserved.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa