

الهيئة العامة للطيران المدني  
GENERAL CIVIL AVIATION AUTHORITY



# Accident

## – Summary Report –

AAIS Case N° AIFN/0015/2021

# Engine Shutdown after Takeoff

|                               |                                    |
|-------------------------------|------------------------------------|
| Operator:                     | AlJazirah Aviation Club            |
| Make and Model:               | Aeroprakt A-32                     |
| Nationality and Registration: | The United Arab Emirates, A6-XII   |
| Place of Occurrence:          | Al Jazirah Airport, Ras Al Khaimah |
| State of Occurrence:          | The United Arab Emirates           |
| Date of Occurrence:           | 13 November 2021                   |



This Investigation was conducted by the Air Accident Investigation Sector of the United Arab Emirates pursuant to Civil Aviation Law No. 20 of 1991, in compliance with Air Accident and Incident Investigation Regulation, and in conformance with the provisions of Annex 13 to the Convention on International Civil Aviation.

This Investigation was conducted independently and without prejudice. The sole objective of the investigation is to prevent future aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

The Air Accident Investigation Sector issued this Summary Report in accordance with national and international standards and best practice. Consultation with applicable stakeholders, and consideration of their comments, took place prior to the publication of this Report.

The Summary Report is publicly available at:

<http://www.gcaa.gov.ae/en/epublication/pages/investigationReport.aspx>

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## Investigation Process

The occurrence, involving Aeroprakt A-32 aircraft, registration marks A6-XII, was notified to the Air Accident Investigation Sector (AAIS) Duty Investigator (DI) by phone call to the Hotline Number (+971 50 641 4667) on 13 November 2021, at 11:26 LT.

After the Initial/On-Site Investigation phase and assessment of the damage, the occurrence was classified as 'Accident'.

The scope of this Investigation is limited to the events leading up to the occurrence. No in-depth analysis of non-contributing factors was undertaken.

### Notes:

1. Whenever the following words are mentioned in this Report with first capital letter, they shall mean the following:
  - (Accident) - this investigated accident
  - (Aircraft) - the aircraft involved in this accident
  - (Investigation) - the investigation into the circumstances of this accident
  - (Club) - AlJazirah Aviation Club
  - (Pilot) - the pilot of the accident flight
  - (Report) - this Accident Summary Report.
2. Photos and figures used in this Report are taken from different sources and are adjusted from the original for the sole purpose to improve the clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast, or addition of text boxes, arrows, or lines.
3. Unless otherwise mentioned, all times in the Report are United Arab Emirates local time (LT) (UTC plus 4 hours)

4. This Summary Report is structured using the relevant headings incorporated in the *Annex 13* Final Report format.

## Factual Information

### History of the Flight

On 13 November 2021, AlJazirah Aviation Club Pilot was scheduled to conduct 'first experience flight'.<sup>1</sup>

As per the closed-circuit television (CCTV), at 1112:47 LT, the Pilot and a passenger arrived at the Aircraft for the pre-flight check.

The Pilot briefly checked the forward part of the Aircraft and the engine. The Pilot did not conduct the full walk-around as per the standard operating procedures (SOP).

At 1115:00, the Pilot started the engine, and he commenced taxi after 30 seconds. At 11:18:13, the Aircraft lifted off.

Two seconds after the liftoff, the engine stopped while the nose was still up in climb attitude.

The Pilot turned the Aircraft left and attempted to land nearby the runway while maintaining nose-up attitude.

At 1118:19, the Aircraft stalled and the nose dropped abruptly.

At 1118:22, the Aircraft impacted the ground on a sandy area on the left side of the runway at approximately 230 meters from the runway threshold.

The Pilot and the passenger sustained serious injuries and were transported to the hospital for further checks.

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<sup>1</sup> First experience flight is a flight performed for the purpose of engaging the trainee in the sense of flying before joining the official training program

## Damage to Aircraft and Property

The Aircraft was substantially damaged. There was no damage to property or environment.

## Personnel Information

### Pilot's qualification

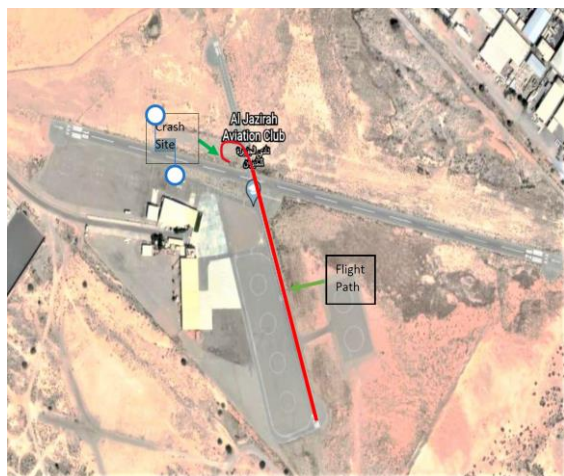


Figure 1. Takeoff, flight path, and crash point

The Pilot held a valid Light Sport Aircraft (LSA) license and Class LSA medical certificate issued by the General Civil Aviation Authority (GCAA) of the United Arab Emirates.

The total flying hours of the Pilot was 625, from which 604 hours were on the type involved in this Accident.

### Club's Information

AlJazirah Aviation Club provides training for pilots for qualifying them for LSA license.

In addition to the training operations, the Club provides a scheme for recreational flying.

The Club operates from its owned AlJazirah Airport.

### Aircraft Information

#### General type information

Aeroprakt A-32 is a two-seat, high-wing strut braced monoplane of classic aerodynamic layout with closed cockpit, non-retractable landing gear, and steerable nose wheel.

The type is equipped with Rotax-912 engine with tractor three-blade, on-ground adjustable pitch propeller.

Aeroprakt A-32 is approved for flying in visual flight rules (VFR), and it is certified under LSA category. Figure 2 illustrates a similar type aircraft.



Figure 2. Aeroprakt A-32 similar to the Accident Aircraft

### Stall speed

According to the *pilot operating handbook (POH)*, the stall speed of the Aeroprakt A-32 is 60 kilometers per hour (KPH).

The stall speed is labeled by a white arc in the airspeed indicator (ASI). (Figure 3)



Figure 3. Airspeed Indicator (speeds in kilometers)

As per the *POH*, the white arc start presents the stall speed at maximum takeoff weight with full flaps configuration which is 40 KPH.



### Aircraft maintenance records

The maintenance records of the Aircraft did not reveal technical defects prior to the Accident.

### Weather Information

The Club utilizes the weather information of Ras Al-Khaimah Airport (OMRK), which is located 30 kilometers from AlJazirah Airport. The weather observation during the flight revealed that at 1100 LT, the wind was north-west at 6 knots. The visibility was more than 10 kilometers with no cloud base. The temperature was 30 degrees Celsius with a dew point of 15 degrees Celsius. Barometric pressure was at QNH 1017, without further significant change on weather.

### Airport Information

AlJazirah Airport is privately owned and operated by the Club. It is located approximately 25 kilometers south-west of the city of Ras Al Khaimah, the United Arab Emirates. The airport has two runways: runway 16/34 and 10/28. Runway 16/34 is 500 meters long and 8 meters wide, whereas runway 10/28 is 768 meters long and 14 meters wide. The airport operates during day hours only.

### Organizational and Management Information

The Club is a light sport activities provider approved by the GCAA. The Club operates gyrocopters and microlights.

### Pre-flight SOP and checklists

As per the *SOP*, it was mandatory to apply the checklists for engine start, taxiing, engine check, takeoff, flight, and landing.

### Engine-out procedure immediately after takeoff

According to the *POH*, for engine out immediately after takeoff, the procedure was as follows:

- “
- Direction: NO TURN BACK
  - Airspeed: 100 KPH (54 knots)
  - Throttle: IDLE
  - Ignition: OFF
  - Master Switch: OFF
  - Fuel Valves: CLOSE
  - Landing: STRAIGHT AHEAD.”

When the pilot encounters an engine failure immediately after takeoff, runway heading must be maintained and speed of 100 KPH shall be maintained to allow for safe gliding. The ignition and master switch must be turned off to avoid fire, and the fuel valve must be closed. The landing shall be carried out in a suitable area straight ahead on the aircraft path.

### Fuel shutoff valve

As per the statement of the chief flight instructor (CFI), and according to *POH*, there were two ways for pilot-induced engine shutdown inflight: (1) turn the engine's ignition off; or (2) having the fuel shutoff valve in closed position (horizontal).

As part of the Investigation, the CFI demonstrated these two ways of shutting down the engine during taxi up until the takeoff. The Investigation compared the simulated flight to the Accident flight (as extracted from the CCTV video footage) and found that the engine failure of both flights was similar and occurred at almost the same take-off parameters. The demonstrated engine performance, when it was shut down by fuel shutoff valve, was very similar to the engine performance during the Accident flight.

### Stall<sup>2</sup> and recovery procedure

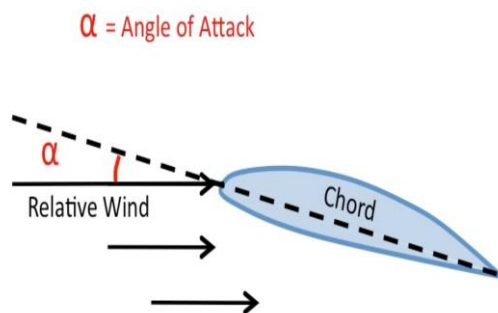
According to the Club's *training manual*, the stall recovery procedure requires the pilot to:

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<sup>2</sup> Stall is an aerodynamic condition, which occurs when smooth airflow over the airplane's wings is disrupted, resulting in loss of lift. Specifically, a stall occurs when the Angle of Attack<sup>2</sup> (AOA)—the angle between the chord line of the wing and the relative wind—exceeds the wing's critical AOA. It is possible to exceed the

critical AOA at any airspeed, at any attitude, and at any power setting. [Source: FAA Flying Handbook Chapter 4]

- Lower the nose to reduce the angle of attack (AoA);
- Apply full engine power; and
- Pitch up when the airspeed reaches 100 KPH.



**Figure 4.** Angle of Attack during stall

[Source: FAA Flying Handbook, Chapter 4]

### Additional Information

The CCTV showed that the pre-flight check accomplished by the Pilot was partial and not in adherence with the SOP which requires a check listed pre-flight check.

The CCTV also revealed that the time elapsed between the Pilot boarding the Aircraft until engine start was not matching with the average estimated time for fulfilling the *before engine start checklist*.

The Pilot stated that “He does not follow the checklist regularly and he only reviews the checklist once every two weeks.” He also stated that the reason behind such habitual behavior was his accumulated experience on Aeroprakt A-32. He also stated “I do not need a checklist for an aircraft that I fly every day, I know it.”

## Analysis

### The Pre-flight Check

The behavior of the Pilot concerning slipping the *pre-flight checklist* indicates an overconfidence attitude. He was at that time assuming that he was able to accomplish these tasks from memory.

In general, the lack of adherence to a written checklist can be observed by during operations, and can also be prevented by various means.

The mandatory referral to the checklists should be a normal pilot’s behavior in order to achieve safe flying and prevent errors from occurring.

Moreover, emphasis on the philosophy of applying checklists will increase the pilots’ awareness and encourage adherence with such critical sequential steps. This concept can be promoted among the pilots community by training classes and guidance along with real case scenarios.

Also, more focus on human factors and how it can affect a pilot’s performance and the safety of the flight needs to be emphasized to raise the awareness about the importance of such a concept.

### Procedure of Engine Failure after Takeoff

The Investigation compared the engine behavior after shutdown with the simulated engine shutdown and concluded that the engine behavior after closing the fuel shutoff valve was almost identical in both cases. The engine shutdown in both flights occurred when the aircraft was at takeoff with high power setting.

It was most likely that the engine had stopped because of fuel starvation. The field investigation revealed that the fuel shutoff valve was on the ‘closed’ position. However, the Investigation could not determine whether the valve was left at the ‘close’ position from the beginning of the flight, or it was moved to that position by a Pilot’s command or inadvertently, or it was moved during the Pilot and passenger evacuation. (Figures 5 and 6)



**Figure 5.** Fuel shutoff valve - Open position



Figure 6. Fuel Shutoff valve - Closed position

## The Pilot's Actions after Engine Failure

As per the CCTV recordings, and according to the Pilot's statement, the Aircraft was in a roll and pitch-up attitude, simultaneously, causing the nose to drop into a stall. The pitch-up happened after the engine stopped causing the Aircraft to stall and impact the ground. The propeller's blades were damaged and bent backward because of the impact.

As per his testament, the Pilot perceived that the Aircraft was entering into a stall as indicated by the ASI which displayed a rapid movement of the gauge pointer towards the white arc range.

The Pilot stated that, when the Aircraft entered into that attitude, he was focused on landing the Aircraft safely, but the insufficient altitude did not allow for safe recovery.

Immediately after the engine shutdown during liftoff, the Pilot elected to turn the Aircraft to the left and attempted to land on the runway that was abeam the Aircraft as it was very close. The Pilot judgment and decision-making was not based on the SOP of engine failure after takeoff. He was focused to land the Aircraft as soon as possible.

The Investigation believes that the Pilot's decision to immediately land instead of appropriately apply the SOP of engine failure during climb, was affected by his judgment of low altitude and having the other runway in-sight.

The abrupt left turn and pitch-up put the Aircraft into stall which characteristics were noticed by the nose-drop as shown by the CCTV footage and confirmed by the Pilot who showed

to the Investigation adequate knowledge in stall and its recovery procedures.

The Investigation believes that the Pilot's non-adherence with the stall recovery SOP was the panic he suffered, which degraded his judgment and reaction. The instinct to land as soon as possible was the primary driver for his decision.

The Investigation views engine failure after takeoff at low altitude as an emergency that needs an immediate action. However, the immediate action should not imply that a pilot neglects the SOP instead of applying it with a fast sense.

Therefore, the Investigation believes that if the Club incorporates into the system a take-off brief to be conducted by the pilots before commencing the takeoff, it will help the pilots recall the procedures of the engine failure after takeoff and will put him/her in the correct mindset to react in case an engine failure occurs. The brief will most likely reduce the element of surprise caused by engine failure and minimize non-standard pilot's reaction.

## Conclusions

### Findings

- (a) The Club was appropriately certificated by the GCAA.
- (b) The Aircraft was airworthy for the flight.
- (c) The Pilot possessed a valid GCAA LSA license and medical certificate.
- (d) The Pilot was trained in the Club for his LSA license.
- (e) As the training records showed, the Pilot had completed the training requirement up to the standard level.
- (f) Prior to the flight, the Pilot did not complete the walk around in accordance with the standard procedures outlines.
- (g) The time elapsed between the Pilot closing the Aircraft door until engine start was not enough to complete the lengthy *preflight checklist*.
- (h) The in-flight engine shutdown was identical to an engine shutdown due to fuel starvation caused by fuel valve being closed.



- (i) The Pilot did not follow the procedure of engine failure after takeoff and instead he turned left the Aircraft while pitching up.
- (j) The Aircraft stalled during the turn and impacted the sandy area next to the runway.
- (k) Both the Pilot and the passenger were seriously injured.

## Causes

The Air Accident Investigation Sector determines that the cause of the Accident was the inappropriate Pilot's reaction after the in-flight engine shutdown and non-adherence with the SOP, which calls for maintaining the runway heading as a part of the engine failure's procedure.

## Contributing Factors

The Air Accident Investigation Sector determines that the following factors had contributed to the Accident:

- (a) The Pilot's non-adherence to the *preflight checklist* due to his over-confidence.
- (b) The lack of awareness of the importance of following the procedures and their role in preventing errors.

## Safety Recommendations

The Air Accident Investigation Sector recommends that AlJazirah Aviation Club:

### SR01/2022

Enhance the training of pilots with a focus on human factors elements such as the importance of following the checklists, and emergency procedures. This requires to be embedded in theoretical syllabus, proper assessments, and flight checks.

### SR02/2022

Include a take-off briefing, as a part of the SOP, to be carried out by the pilots before commencing the takeoff at the holding point. This will assist the pilot to recall the procedures of the engine failure after takeoff and will put him/her in the correct mindset to react in case an engine failure occurs. The briefing will most likely reduce the surprise effect and minimize non-standard pilot's reaction.

**This Report is issued by:  
Air Accident Investigation Sector  
General Civil Aviation Authority  
The United Arab Emirates**

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## Appendix A. Checklist



### AIRCRAFT CHECKLIST A - 32

#### AFTER START UP

|                                |             |                                  |         |
|--------------------------------|-------------|----------------------------------|---------|
| 1. Preflight Inspection        | COMPLETE    | 1. Throttle (set)                | IDLE    |
| 2. Seatbelts / Harness         | SECURE      | 2. Oil Pressure (2 bar/30 PSI)   | CHECK   |
| 3. Doors                       | CLOSED      | 3. Oil Temp (30°C min. for taxi) | CHECK   |
| 4. Passenger Briefing          | COMPLETE    | 4. CHT (50°C min. for taxi)      | CHECK   |
| 5. Flaps                       | UP          | 5. Radio, Nav/Strobe Lights      | ON      |
| 6. Flight Controls             | FULL & FREE | 6. Radio & Intercom Check        |         |
| 7. All Electrical Switches     | OFF         | 7. Transponder (if installed)    | STANDBY |
| 8. Battery Switches            | ON          |                                  |         |
| 9. Master & Ignition Switches  | OFF         |                                  |         |
| 10. Fuel Valves (Left/Right)   | OPEN        |                                  |         |
| 11. Fuel Quantity (Left/Right) | CHECK       |                                  |         |
| 12. Trimmer                    | NEUTRAL     |                                  |         |
| 13. Altimeter                  | SET         |                                  |         |

#### TAXI CHECKS

|                                |       |
|--------------------------------|-------|
| 1. Brakes                      | CHECK |
| 2. Compass (turning)           | CHECK |
| 3. Turn & Slip (ball movement) | CHECK |

#### PRE LINE UP CHECKS

|                               |                                 |
|-------------------------------|---------------------------------|
| 1. Parking Brakes             | CLOSED                          |
| 2. Oil Temp. (min. 50°C)      | CHECK                           |
| 3. Throttle set to            | 3600-4000 RPM                   |
| 4. Mag. Drop (Left/Right max) | 300 RPM<br>(max. diff. 120 RPM) |
| 5. Throttle                   | IDLE                            |
| 6. Oil Temp. (max)            | 130°C                           |
| 7. Check the Runway           | CLEAR                           |
| 8. Check the Approach         | CLEAR                           |

#### PRE LINE UP CHECKS

|                             |             |
|-----------------------------|-------------|
| 1. Battery/Ignition Switch  | ON          |
| 2. Trimmer                  | NEUTRAL     |
| 3. Flaps                    | AS REQUIRED |
| 4. Control                  | FULL & FREE |
| 5. Nav/Strobe/Landing Light | ON          |
| 6. Doors                    | CLOSED      |
| 7. Seatbelts/Harness        | SECURED     |
| 8. Avionics                 | AS REQUIRED |

#### START UP

##### COOL START

|                                   |            |
|-----------------------------------|------------|
| 1. Throttle                       | IDLE       |
| 2. Choke                          | FULL OPEN  |
| 3. Parking Brakes                 | CLOSED     |
| 4. Warning Call                   | CLEAR PROP |
| 5. Ignition Switches (Left/Right) | ON         |
| 6. Starter Switch (max. hold 10)  | CRANK      |
| 7. Check Oil Pressure             | RISING     |
| 8. Choke (after engine starts)    | CLOSE      |

##### WARM START

|                                   |            |
|-----------------------------------|------------|
| 1. Throttle                       | IDLE       |
| 2. Choke                          | CLOSED     |
| 3. Parking Brakes                 | CLOSED     |
| 4. Warning Call                   | CLEAR PROP |
| 5. Ignition Switches (Left/Right) | ON         |
| 6. Starter Switch (max. hold 10)  | CRANK      |
| 7. Check Oil Pressure             | RISING     |

**PLEASE RETAIN THIS CHECKLIST IN THE AIRCRAFT**