HELLENIC REPUBLIC
MINISTRY OF INFRASTRUCTURE AND TRANSPORT

HELLENIC AIR AND RAIL SAFETY INVESTIGATION AUTHORITY H.A.R.S.I.A.

FINAL ACCIDENT INVESTIGATION REPORT

ACCIDENT OF AIRCRAFT PILATUS PC-6/B2-H4 WITH REGISTRATION NUMBER PK-SNF
IN THE SEA AREA OF KAKO OROS OF HERAKLION 2 NM EAST OF HERAKLION INTERNATIONAL AIRPORT ON 15th DECEMBER 2022

02 / 2025

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Aircraft Pilatus PC-6/B2-H4 with registration number PK-SNF in the sea area of Kako Oros, Heraklion, 2 NM east of Heraklion International Airport on 15th December 2022

The investigation of the accident was carried out by the Hellenic Air and Rail Safety Investigation Authority, according to:

- **Annex 13 to the Chicago Convention**
- **Regulation (EU) No 996/2010**
- **Law 5014/2023**

'In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and Law 5014/2023, the investigation of aviation accidents and incidents is not intended to attribute blame or liability. The sole objective of the investigation and the Final Report is the prevention of accidents and incidents.

Consequently, the use of this Report for any purpose other than accident prevention in the future could lead to misinterpretations.

Hellenic Air and Rail Safety Investigation Authority
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Ret. Lieutenant General H.A.F

Members

Deputy Chairman
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Attorney at the Supreme Court, PhD

Christos Valaris
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Gregory of Flessas
Airline Pilot

Petros Evgenikos
Civil Engineer-Transportation Expert

Secretary: Vasiliki Fouseki

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List of Abbreviations

ATC	Airport Traffic Controller
AAIASB	Air Accident Investigation and Aviation Safety Board
A/C	Aircraft
ATPL	Airline Transport Pilot License
CARS	Civil Aviation Safety Regulation
CPL	Commercial Pilot License
CPR	Cardiopulmonary resuscitation
DGCA	Directorate General of Civil Aviation
E	East
EASA	European Union Aviation Safety Agency
ELT	Emergency Locator Transmitter
EMAK	Special Disaster Response Unit
FCU	Fuel Control Unit
ft	Feet
gal	Gallons
gal/h	Gallons per hour
Gen	General
h	Hour
HAF	Hellenic Air Force
HARSIA	Hellenic Air and Rail Safety Investigation Authority
hPa	Hecto Pascal
KEPATHM	Athens - Macedonia Area Control Center
km/h	Kilometers per hour
kt	Nautical Miles per Hour
Lt	Lieutenant
lt	Litter
NM	Nautical Miles
N	North
MZFM	Maximum Zero Fuel Mass
min	Minute
MLM	The maximum landing mass
MM	Maintenance Manual
MTOM	Maximum Takeoff Mass
PIC	Pilot In Command
POH	Pilot’s Operating Handbook
psi	Pound per Square Inch
Ret	Retired
RPM	Revolutions by Minute
s	Second
SACAA	South African Civil Aviation Authority
SID	Standard Instrument Departure

SIC	Second In Command
UTC	Universal Time Coordinated
Z	Zulu Time

OPERATOR	**:**	**PT. SMART CAKRAWALA AVIATION**
OWNER	**:**	**PT. SMART CAKRAWALA AVIATION**
MANUFACTURER	**:**	**PILATUS AIRCRAFT LTD.**
TYPE OF AIRCRAFT	**:**	**PC-6/B2-H4**
COUNTRY OF MANUFACTURER:		**SWITZERLAND**
NATIONALITY	**:**	**INDONESIAN**
REGISTRATION MARKS	**:**	**PK - SNF**
LOCATION OF ACCIDENT	**:**	**SEA AREA OF KAKO OROS, HERAKLION, 2 NM EAST OF HERAKLION INTERNATIONAL AIRPORT**
DATE & TIME	**:**	**15 Dec 2022 & 09:52h**
Note	:	Times are local (Local Time = UTC + 2 h)

SYNOPSIS

On 15 December 2022, the PILATUS PC-6/B2-H4 aircraft with registration number PK-SNF took off with two persons on board from Heraklion International Airport (LGIR) to Hurghada International Airport (HEGN) in Egypt. The take-off took place at 09:49 h from runway 09 of Heraklion International Airport (LGIR). After about 2 minutes, while the aircraft was flying 3-4 NM east of the airport, the crew declared a state of emergency due to a loss of engine power. The aircraft made a 180-degree right turn and headed towards the departure airport. Due to the lack of power and the continuous loss of height, the Pilot made a forced ditching. The aircraft ditched-in the sea area of Kako Oros in Heraklion, 2 NM east of the International Airport of Heraklion and the two persons on board evacuated the aircraft without suffering any serious injuries. However, in their attempt to get to shore, one of the two persons died from drowning. The AAIASB was informed of the accident and an investigation team was appointed. AAIASB also informed the State of Registry, the State of Aircraft and Engine Manufacture, the State of Aircraft and Engine Design, the International Civil Aviation Organization, the European Aviation Safety Agency (EASA), the European Commission, the Hellenic Civil Aviation Authority and the Safety Incident Reporting Committee.

1 FACTUAL

1.1 History of the Flight

The PT Smart Cakrawala Aviation (the Operator) intended to conduct a delivery flight of Pilatus PC-6/B2-H4 aircraft with registration number PK-SNF from Switzerland to Indonesia. The Operator signed an agreement with Legacy Cargo Limited which provided flight delivery services for the purpose of the specific flight from Switzerland to Indonesia.

The first flight of PK-SNF (the aircraft) was conducted on 12 December 2022 from Buochs Airport (LSZC) in Switzerland to Maribor Edvard Rusjan Airport (LJMB) in Slovenia and lasted 2h 28 min. The second flight was made on the same day with departure airport Maribor Edvard Rusjan Airport (LJMB), destination airport Podgorica International Airport (LYPG) of Montenegro, and flight time 1h 46min. The First Pilot flew the first and second flights as the PIC in which no problem with the aircraft was reported. The Flight Operations Manager was also on board occupying the SIC seat on the cockpit. The rest of the delivery flight was continued by another Pilot (the Pilot) who started the trip from Podgorica.

On 13 December 2022, the Pilot, who was to carry out the remaining legs as far as Indonesia, arrived in Podgorica as he was unable to enter Switzerland earlier due to delays in issuing visa, as he said.

On 14 December 2022, the flight was operated from Podgorica International Airport (LYPG) to Heraklion International Airport (LGIR). The flight lasted 4h 44min without any reported problems. The aircraft landed at Heraklion International Airport at 14:30h. In the parking stand after the aircraft landed, the Pilot of the aircraft installed the safety pins on the flight surfaces, the engine covers and the propeller straps. The Pilot and the Flight Operations Manager, together with the crew of the other aircraft (PK-SND) who were performing a similar delivery flight, went to the hotel for a rest.

The next day, 15 December 2022, the crew woke up at around 06:30h in the morning and after breakfast and briefing, departed for the airport. They arrived at the airport around 07:50h and by that time everything was going well as the Pilot of the aircraft said. At around 08:30h the crew arrived on the aircraft (PK-SNF). The Pilot unlocked the doors and prepared the cabin while waiting for fuel. After preparing the cabin, he proceeded to remove the safety pins from the flight control locks, the engine cover and the propeller strap. When removing the safety pins

from the vertical/horizontal stabilizer lock, the pins located on the vertical portion of the device had been bent (Fig. 1). The photos were taken by the Pilot before the flight as he stated.

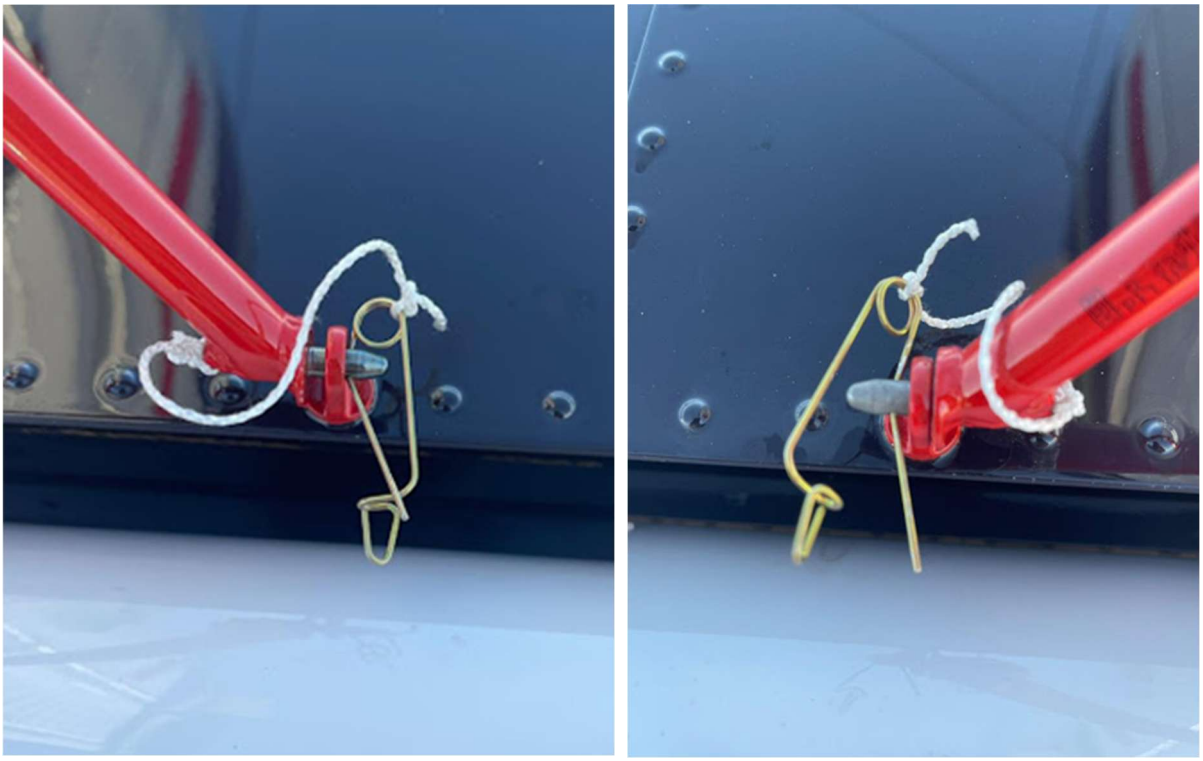


Figure 1 : Safety pins of the vertical/horizontal stabilizer.

Then, as Pilot stated, he started the pre-flight inspection by performing the following actions. He inspected the propeller and verified that all four blades were within limits. From there he inspected the left side of the engine using a step ladder. He confirmed that the engine had the correct amount of oil and inspected the general condition of the engine by specifically checking for any leaks from the fuel control unit (FCU). He checked all the electrical circuits of the engine and the electronic parts that were in good condition. The Pilot said that he focused specifically on checking the condition of the fuel control unit's mechanical connectors and that split pins were in place. He also inspected the emergency power solenoid to make sure it was free and operational. He went on to inspect the right wing, the fuselage of the aircraft, and opened the access bay door to check that all control cables and tail lock were in good condition. He also inspected the tail section of the aircraft and verified that the horizontal stabilizer bolts were in good condition. The movable surfaces were all in working order. He continued with the same procedure on the left side of the aircraft. Upon completion of the inspection, it was determined that the aircraft was in an airworthy condition as stated.

At 09:20h, the refueling of the aircraft was completed, the Pilot was satisfied that the fuel caps were closed and the presence of water was checked through drainage. In this flight, according to the General Manifest, the Pilot was the Pilot in Command (PIC) and the Flight Operations Manager was the co-pilot (SIC).

At 09:37:08h [1] the Pilot of the PK-SNF requested an engine start but was not initially accepted by the Heraklion Air Traffic Controller (ATC) as there was a delay in the request compared to what was submitted in the flight plan. The flight plan was renewed at the correct departure time and the Pilot was cleared to start at 09:38:44h. The Pilot stated that after receiving start clearance he cycled the propeller twice, he checked the standby power which was working correctly, he checked the trim interrupt and he completed the checks with verifying the stall warning and annunciators. He then set the generator and the accessories on.

At 09:45:09h, taxi clearance was requested. Due to the eastern route of the aircraft to Sitia and the favorable wind, the ATC proposed the alternative use of runway 09 instead of runway 27, which the Pilot eventually preferred. The Pilot requested permission to take off from the C-intersection of the runway and this was accepted. The available take-off distance from the C-intersection was 1722m.

Clearance for take-off was given at 09:48:15h. The Pilot set the engine speed to high idle, set the rear wheel to a “locked position” (LOCKED) and checked the flight controls. Thereafter, take-off data was given to the engine and all its indicator parameters were checked as he stated.

The aircraft took off from Heraklion International Airport (LGIR) to Hurghada International Airport (HEGN) in Egypt at 09:49:05h. The aircraft's call sign was PKSNF. The take-off was carried out without the Pilot encountering any problems.

At 09:49:34 the aircraft was at a height of 511ft (Fig 2), the gas generator speed (NG) was 93.3% RPM, the propeller speed (NP) 2008RPM, the engine torque (TQ) 42 psi, the fuel flow (FF) 51gal/h and the intermediate turbine temperature (ITT) 598 °C.

[1] The times displayed after this paragraph were taken from the aircraft's flight data recorder (APIBOX System).

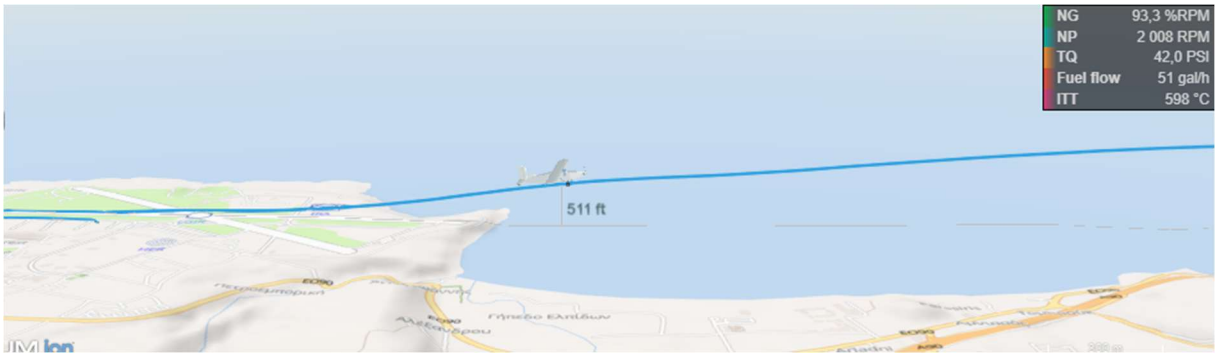


Figure 2 : Characteristics of engine performance of the aircraft at a height of 511 ft.

At 09:50:29 the Pilot of the aircraft asked the Flight Operations Manager to take the control of the aircraft and to continue its course as the Pilot "wanted to get some stuff in the back" of the aircraft. This was recorded from the (Apibox System).

At 09:50:45 the aircraft was at a height of 1335ft (Fig. 3), gas generator speed (NG) was 93.6% RPM, propeller speed (NP) 1998 RPM, engine torque (TQ) 40.2 psi, fuel flow (FF) 49 gal/h and gas temperature between high-pressure and low-pressure turbine (ITT) 598 °C.

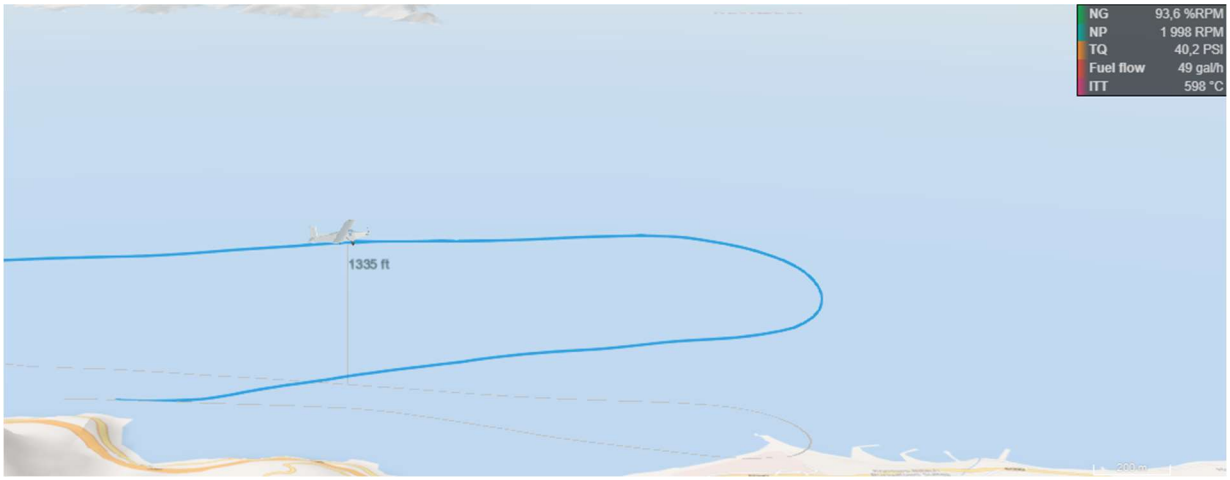


Figure 3 : Characteristics of engine performance of the aircraft at a height of 1335 ft.

At 09:50:49, the Pilot apparently in his attempt to get the stuff he wanted, noticed that the rear right door of the cabin was partially open (according APIBOX System) then he unlocked the seat belt to close the door. His torso turned and stretched to try to close the door and almost immediately he felt that the aircraft was losing power. At 09:50:55 the aircraft was at a height of 1444 ft (Fig. 4), gas generator speed (NG) was 93.0% RPM, propeller speed (NP) 1997 RPM, engine torque (TQ) 39.1 psi, fuel flow (FF) 12 gal/h and inter turbine temperature (ITT) 595 °C.

Note: According to the Pilot's statement, Pilot initially noticed a sound louder than normal in the cockpit, and then he turned to see that the door was open and slightly unlatched on the right side. Afterwards, he asked the Flight Operations Manager to assist him (flying the aircraft) in order to try to close the door.

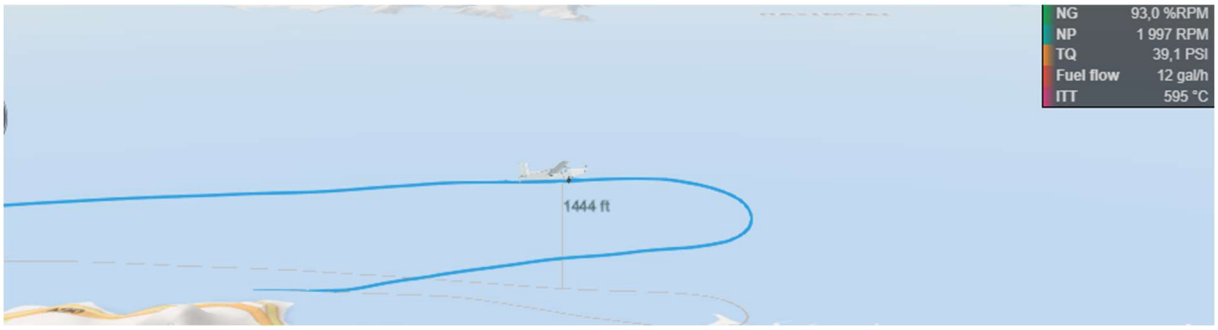


Figure 4: Characteristics of engine performance of the aircraft at a height of 1444 ft.

The Pilot immediately returned to his position and saw the indications of engine parameters reduce rapidly. He moved the power lever, but that didn't work. Then he tried to use the emergency fuel control system without any response. As he did so, he turned the aircraft to the right in order to make his way to the departure airport, maintaining a satisfactory degree of descent.

At 09:51:12 the aircraft was at a height of 1355ft (Fig. 5), gas generator speed (NG) was 15.0 % RPM, propeller speed (NP) 1038 RPM, engine torque (TQ) -0.2 psi, fuel flow (FF) 4 gal/h and inter turbine temperature (ITT) 219 °C.

Figure 5: Characteristics of engine performance of the aircraft at a height of 1355 ft.

The aircraft was losing altitude, and he had focused on trying to maintain a desired vertical speed and getting the engine back on track. At this point in time 09:51:15 h the Pilot reported a distress signal "Mayday" and engine failure to the ATC. The Pilot mentioned during the interview that around that time he put his shoulder strap on and he continued the efforts to restart the engine by setting the auxiliary fuel pump (Auxiliary Fuel Pump) in the open position, activating the ignition and the starter. At this stage he decided it was too late to feather the

propeller and so focused on his options for landing or ditching. As stated in the interview, the Pilot did not have the chance to close the fuel Shut-off valve as he was focused on controlling the aircraft.

At 09:51:49 approximately 17 sec before the landing the aircraft was at a height of 401 ft (Fig.6), the gas generator speed (NG) was 5.0 % RPM, the propeller speed (NP) 906 RPM, the engine torque (TQ) -0.2 psi, the fuel flow (FF) 1 gal/h and the inter turbine temperature (ITT) 146 °C.

Figure 6: Characteristics of the performance of the engine at a height of 401 ft.

As the Pilot said, the safest option he could see was ditching, so he tried to get as close to the shore as possible and prepare the aircraft appropriately. He chose to delay lowering the flaps until the last seconds to gain some distance. He kept the aircraft above sea level as long as he could, reducing its speed, first touching the main wheels on the surface of the water and trying to eliminate as much energy as he could. The aircraft ditched at 09:52:06 h.

The Pilot first remembers that the windshield hit his face, then released the seat belt and exited the aircraft through the broken front window. He swam to the right side of the aircraft to help the Flight Operations Manager who had already exited the aircraft, most likely through the door next to his seat. According to the Pilot, the two persons were slightly injured. There were only minor injuries to the Pilot's face and a slight nosebleed from the Flight Manager's nose. Pilot and Flight Operations Manager were thrilled to get out of the aircraft safely. They had a brief conversation about what could have happened, and the Flight Operations Manager told the Pilot that he heard a noise that looked like a "POP" when the aircraft lost power.

The aircraft was found with its front part in the water, while its tail remained out. The two persons that did not wear lifejackets were held by the aircraft as it sank relatively slowly. The life raft was inside the aircraft in the cabin behind the Pilot's and co-Pilot's seats. The crew initially did not try to open the door of the aircraft to take out the life raft as they thought the aircraft would sink faster. Then the Pilot tried to dive and enter the cabin of the aircraft but it was impossible. The aircraft, due to the sea currents, was moving away from the coast, when it

sank completely, they had no choice but to swim towards the coast. The Pilot, he said, was helping the Flight Operations Manager swim, but they were getting cold and tired. Then they stopped swimming and tried to rest. When the Pilot turned his head backwards, the Flight Operations Manager had moved too far away from him because of the water currents. The Pilot continued to scream for help and intensify his efforts to stay on the surface of the sea as he felt he would drown. At that moment, three people from EMAK (Special Disaster Response Unit) of Heraklion arrived who had swum from the coast. The people of EMAK helped to save the Pilot of the aircraft as he was exhausted. The Coast Guard vessel arrived a little later at 10:19h and picked up the Pilot with the help of EMAK. Immediately after, the Flight Operations Manager was found at a depth of three meters below sea level by EMAK people. When he was pulled aboard, he was unconscious. The people on board tried to bring him back by doing CPR, but it was not possible.

1.2 Injuries to persons

Injuries	Crew	Passengers	Total in the aircaft	Other
Fatal	1	0	1	0
Serious	0	0	0	0
Minor / None	1/0	0	1	0
Total	2	0	2	0

1.3 Damage to aircraft

The aircraft, a few minutes after the ditching, sank into the sea and was destroyed after suffering serious damage during the ditching, its stay at the bottom of the sea and its displacement by the sea currents.

1.4 Other damage

No other damage was reported.

1.5 Personnel Information

1.5.1 Pilot

The Pilot of the aircraft was a holder of a South African Civil Aviation Authority (SACAA) Commercial Pilot License CPL(A) with original issue date 01 Aug 2016, last issue date 24 Mar. 2022 and expiry date 31 Mar. 2023. PC-6 aircraft type was not endorsed at the

above-mentioned CPL (A) license nor at the License Details document of the SACAA in which all the aircraft types of the CPL (A) holder are depicted. The language proficiency certificate was level 6 with no time limit. He had a SACAA medical certificate in classes: 1 valid up to 31 Mar. 2023, 2 and 4 valid up to 31 Mar. 2027. The PC-6 aircraft type was endorsed by SACAA within the CPL(A) license and within the SACAA CPL(A) License Details document on 23 October 2023.

Also, the Pilot of the aircraft was a holder of a CPL license from the Indonesian Directorate General of Civil Aviation (DGCA) issued on 03 Nov. 2020 SEL class (A). The medical certificate attached to his license expired on 12 April 2022. The PPC (Pilot Proficiency Check) linked to his license expired on 31 Oct. 2022.

The Pilot had a Certificate of Validation which was issued by Indonesian Directorate General of Civil Aviation (DGCA) based on the SACAA CPL License. This certificate was valid from 06 Dec 2022 until 20 Dec 2022 inclusive and was only applicable for aircraft type PC-6 for ferry flight. Initially DGCA stated that for the issuance of the Certificate of Validation, it was relied on the South African Civil Aviation Authority (SACAA) CPL(A) license, the CV of the Pilot-In-Command as well as, the type-flight hours mentioned therein. After the issuance of the draft final report, the DGCA declared that the validated certificate was granted following a thorough assessment and verification of all pertinent records including:

1) The initial granting of a validation certificate. Date of issue 18/05/2018 Date of Expiry 18/05/2019.
2) The extension of the validation certificate. Date of issue 12/06/2019 Date of Expiry 18/04/2020.
3) The process of converting a Commercial Pilot License (CPL) issued by the South African Civil Aviation Authority (SACAA) into an Indonesian. DGCA CPL issue Date 03/11/2020.
4) The Curriculum Vitae (CV) of the PIC, accompanied by an evaluation of the flight hours recorded for specific aircraft types.

For DGCA, PC-6 is categorized as SE-Land, for which the Pilot had the capability. The aircraft PC-6 type training, and certification was carried out by another Indonesian operator where the Pilot had been working before the accident. No evidence was provided during the investigation for this training (Ground and Flight Training).

According to the Operator's records and declarations, Pilot flight times are as follows:

Total hours: 2847.4h
Hours on PC-6: 813.3h
Flight hours on type C208B: 1566.9h

The last	Hours flown
24 hours	4.5 hours
7 days	4.5 hours
90 days	5.5 hours

From the Pilot's flight hours record sheet, it appears that the flight hours on type PC-6 were carried out on Indonesian registered aircrafts. The Pilot had also performed a similar P.T. SMART AVIATION PC-6 delivery flight from Podgorica International Airport (LYPG) in Montenegro to Pondok Cabe Airport (WIHP) in Indonesia, which took place from 17 April 2022 to 25 April 2022. The Pilot's next flight was a Pilot Proficiency Check (PPC) flight on 06 October 2022 with a Cessna C208 aircraft as shown by the flight hours record sheet held by the Pilot. The flight was not recorded in the Operator's records. No other flight of the Pilot was recorded until 14 December 2022.

1.5.2 Flight Operations Manager

On board the aircraft of accident was the Flight Operations Manager of the aircraft Operator who was an ATPL-licensed Pilot with more than 23000 flight hours. The Pilot's license was not valid as his medical certificate had been expired on 31 March 2019. The Flight Operations Manager had been declared as crew in the general manifest issued on 15 December 2022 by the ground handling Operator at Heraklion International Airport.
In the Flight Manifest, which was issued on 09 December 2022 by the Ferry Company, the Flight Operations Manager is mentioned as First Officer (SIC). The Pilot stated that the Flight Operations Manager was the pilot assistant.

1.6 Aircraft information

The Pilatus PC-6 is a single-engine general-purpose aircraft designed by Swiss manufacturer Pilatus Aircraft and approved to fly with a single-Pilot crew. It is an aircraft that

has conventional landing gear. [2] The PC-6 first flew in 1959 and was built at Pilatus Flugzeugwerke in Stans, Switzerland. It was manufactured in both piston and turbo-prop versions. After 604 deliveries in 63 years, Pilatus ceased the production of this type of aircraft in 2022.

1.6.1 Manufacturer's General Information

Aircraft manufacturer	:	Pilatus Aircraft LTD
Model	:	PC-6/B2-H4
Serial number	:	1019
Year of manufacture	:	2022
Registration number	:	PK - SNF
Total flying hours since manufacture	:	12.10 h
Time since last inspection	:	12.10 h
Special Certificate of Airworthiness	:	Version 11 Dec 2022, Expiry 11 Jan 2023 issued by Directorate General of Civil Aviation (DGCA)
Aircraft Insurance Certificate	:	Valid 17 Jun 2022 – 16 Jun 2023
Aircraft Aeronautical Station License	:	Valid from 25 Nov. 2022 up to and including 25 Nov. 2024 issued by DGCA
Certificate of Registration	:	Number 4464, issued 11 Dec. 2022 valid until 10 Dec.2025 by DGCA
EASA FORM 52 Declaration of Conformity	:	Issued by manufacturer CH.21G.0002. Issue date 04 Nov. 2022
Export Certificate of Airworthiness	:	Issued by the Federal Office of Civil Aviation Switzerland number FBE320221107EX on 07 Nov. 2022

Engine

Engine Manufacturer	:	Pratt & Whitney Canada Corp.
Type	:	PT6A-27
Serial number	:	PCE-PG0570
Time since new	:	12.10 h

[2] Landing gear where there are two main wheels forward of the aircraft and a single wheel or brake at the rear.

Time since last inspection	:	12.10 h

Propeller

Propeller Manufacturer	:	Hartzell
Type	:	HC-D4N-3P
Serial number	:	FY5114
Time since new	:	12.10 h
Time since last inspection	:	12.10 h

1.6.2 Maintenance

The aircraft was manufactured in 2022. It had 12.10h flight hours of which 3.34h were performed by the manufacturer during flight tests and 8.46h during flights performed from Buochs Airport (LSZC) to Heraklion International Airport (LGIR). The manufacturer carried out an engine power check on 16 August 2022.

In accordance with the operating specifications of the AOC which were recorded in the DGCA Form Nr 120-06a, PT.Smart Cakrawala Aviation was authorized by the Indonesian Directorate General of Civil Aviation to carry out maintenance work on a Pilatus PC-6/B2-H4 aircraft.

1.6.3 Fuel

The aircraft was certified by the manufacturer to use fuel with a CPW 204 specification. According to the aircraft flight manual fuel meeting this specification may be, among others, ASTM-D-1655 Jet A, Jet A-1 and Jet B. From the aircraft technical log page, it appears that there were 121 US gallons of fuel after the completion of the last leg from Podgorica International Airport (LYPG) to Heraklion International Airport (LGIR). On December 15, 2022, before the departure of the flight from Heraklion International (LGIR), aircraft was refueled with 167 US gallons of fuel type JET A-1. The total fuel before the flight in the aircraft is estimated at about 288 US gallons (1090 lt).

1.6.4 Weight of aircraft

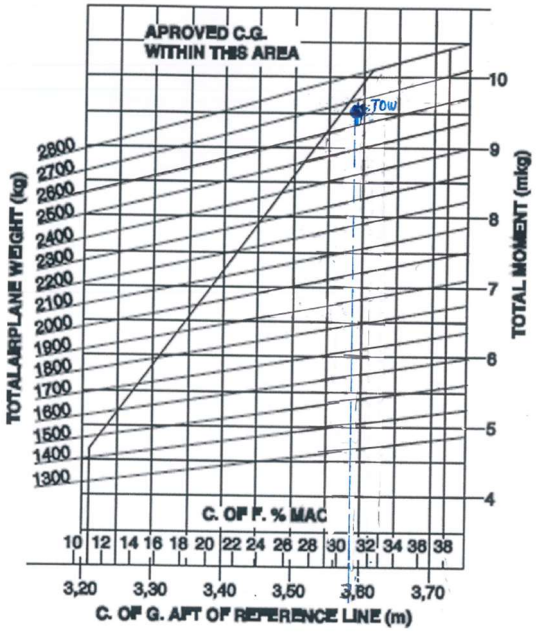
PC-6/B2-H4 had the following weight limits:

- Maximum Take-off Weight (MTOW) 2800 kg (6173 lb)

- Maximum Zero Fuel Weight (MZFM) 2400 kg (5291 lb)
- Maximum Landing Weight (MLW) 2660 kg (5864 lb)

Aircraft weights for LGIR-HEGN flight:

- Empty weight: 1472,22 Kg
- Pilot weight: 85kg
- Flight Operations Manager weight: 95 kg
- Weight at station 5.28, luggage, life raft, aircraft documents, etc.: 130 kg
- Fuel Weight in Main Tanks and Spare Tanks: 875 kg
- Calculated Total Take-off Weight: 2657,22 kg
- Calculated Total Moment: 9520,55 Kg m
- Center of Gravity: 3,58m
- The center of gravity position is at 30.68% of the MAC (Mean Aerodynamic Chord).



1.6.5 Aircraft Fuel System

1.6.5.1 General description of the fuel system

According to the Maintenance Manual, the aircraft's fuel is stored in two main fuel tanks with a capacity of 85 US gallons (321 lt) each, as well as in two optional tanks with a capacity of 64

US gallons (246 lt). The total amount of fuel that can be stored in the tanks of this aircraft is 298 US gallons (1128 lt). The two main tanks are located in integrated fuel tanks in each wing, while the two optional tanks are located in external tanks under the wings.

A fuel collector tank with an integrated auxiliary fuel pump is installed in the fuselage. The fuel passes through a fuel shut-off valve (fuel system valve) to the engine driven pump. The valve is manually operated from the cockpit, making it possible to isolate the fuel supply of the engine in case of emergency, but also allowing the removal of engine parts without the need for fuel drain. The valve lever shall be in the open 'OPEN' position in normal engine operation. To come to the closed position, the red button must first be pressed and then the switch rotated to the "CLOSE" position.

Figure 7 Fuel shut off valve Control lever

Water that may accumulate in fuel tanks is drained into a water collection tank through pipes located at the lowest point of the tanks.

The fuel filter is mounted in the engine compartment before the engine-driven fuel pump and is installed with a bypass relief valve. Between the fuel filter and the engine-driven fuel pump is installed a fuel flow transmitter. It supplies electrical signals which are in proportion to the rate of fuel. These signals are transmitted to the signal conditioner. The signal conditioner changes the frequency signals into an analog output which is displayed on the fuel flow indicator and the fuel used totalizer.

The engine-driven pump is a low-pressure fuel pump installed on the engine to give a continuous supply of fuel to the high-pressure fuel pump which supplies the fuel control unit.

A fuel bypass system is integrated in the low-pressure pump to allow fuel flow through the pump in the event of a failure.

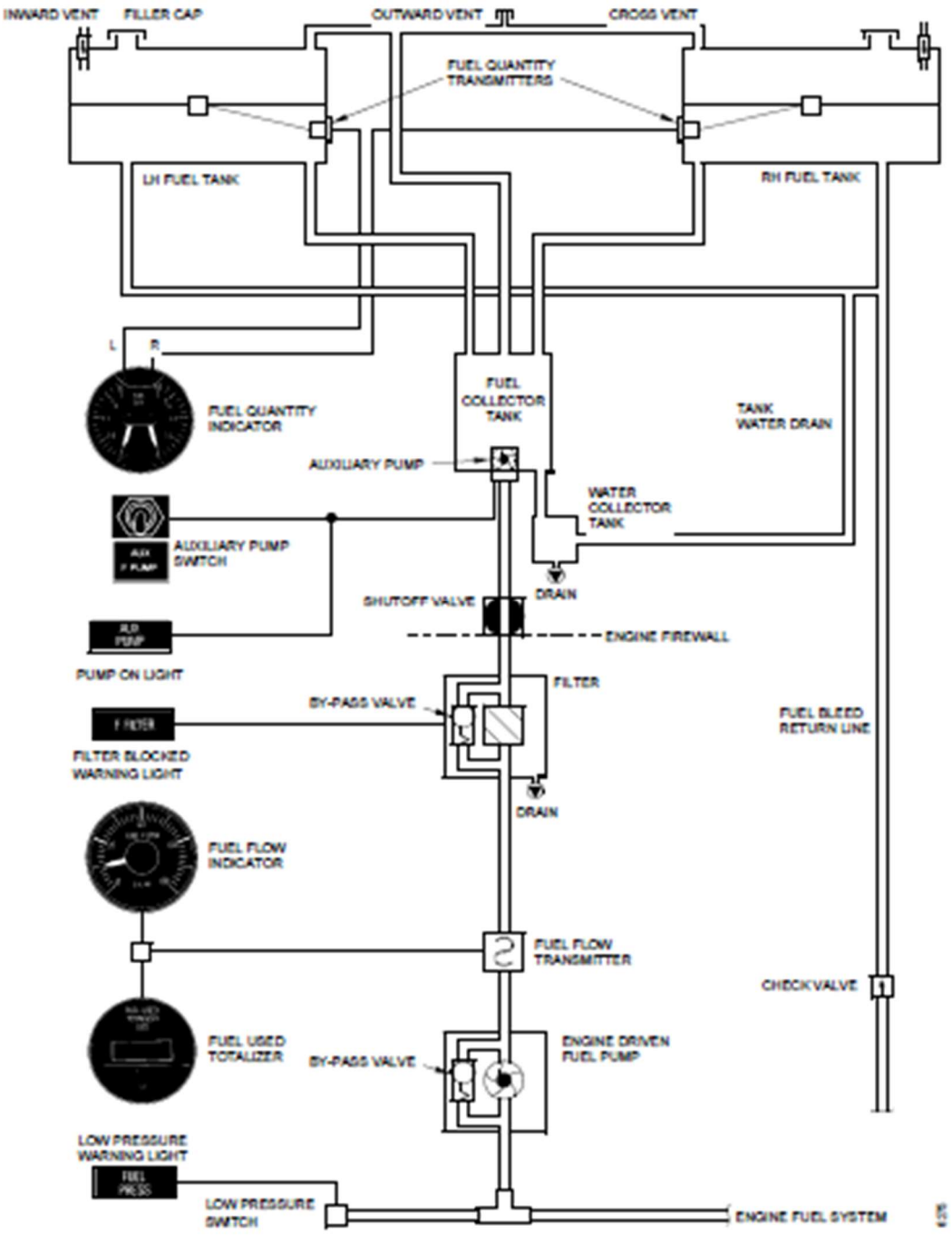


Figure 8 Schematic of the Fuel System

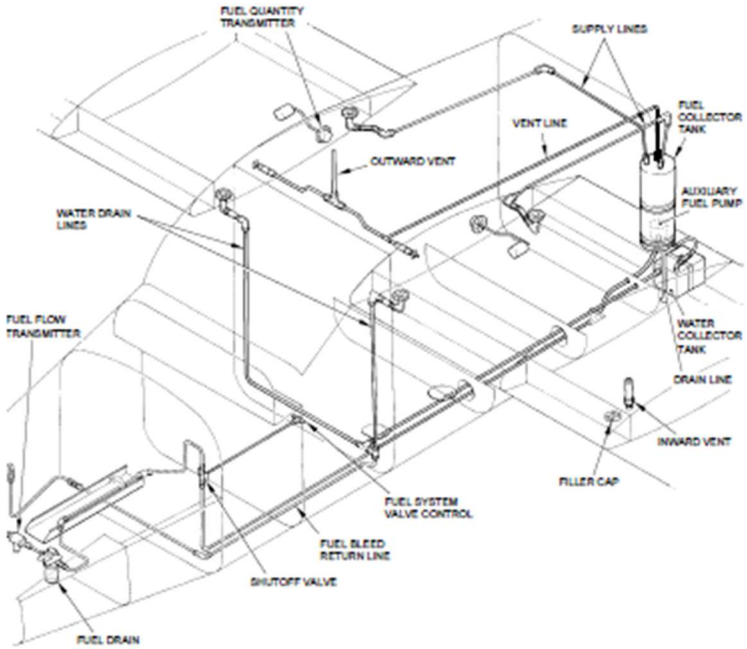


Figure 9 Operation of the Fuel System

1.6.5.2 Fuel system operation

The fuel is transferred from the fuel tanks by gravity to the fuel collector tank from there by means of the auxiliary pump the fuel is routed to the fuel filter through the fuel shut-off valve. The fuel filter has a bypass valve that allows fuel to flow further to the engine if the filter is clogged. If this happens, a “F FILTER” indication will be illuminated in the instrument panel of the cockpit. The fuel passes through the fuel flow meter and then through the engine-driven low-pressure pump to the high-pressure pump that supplies fuel to the fuel control unit. If low fuel pressure is detected at the engine driven pump outlet, then low fuel pressure is indicated on the annunciator panel ‘FUEL PRESS’.

1.6.6 Engine Operating Limits

The following tables show the engine operating limits.

A. Speeds and Temperatures (B2-H4 Aircraft)

B2-H4 Aircraft					
Condition	Torque	ITT	Ng	Np	Time Limit
Take off	47.3	725	101.5	2000	Unlimited
Maximum Climb Maximum Cruise	47.3	695	101.5	2000	Unlimited
Low Idle	-	660	51 to 53		Unlimited
Starting	-	1090 (1)	-	-	2 seconds
Acceleration	53.0	825	102.6	2420	2 seconds
Reverse Thrust	47.3	725	101.5	2000	60 seconds

1.7 Meteorological information

Meteorological conditions at Heraklion International Airport (LGIR), as recorded in the next METAR issued on 15 Dec 2022 at 09:50 h, they gave a wind speed of 14 kt from 160, temperature of 21°C, dew point of 15°C and barometric pressure of 1015 hPa.

```
METAR LGIR 150750Z 16014KT 9999 FEW020 21/15 Q1015 NOSIG
```

Also, shortly before take-off, the ATC informed the Pilot of the aircraft that the wind has a speed of 13 kt from 160°.

1.8 Aids to navigation

Not applicable.

1.9 Communications

The Pilot's communications with the ATC were performed without any problems.

1.10 Aerodrome information

Heraklion International Airport (LGIR) has two runways, 09/27 with dimensions of 2714 x 45m and 12/30 with dimensions of 1566 x 50m.
Its latitude is 35° 20′ 23′′ N and its longitude is 25° 10′ 49′′ E.

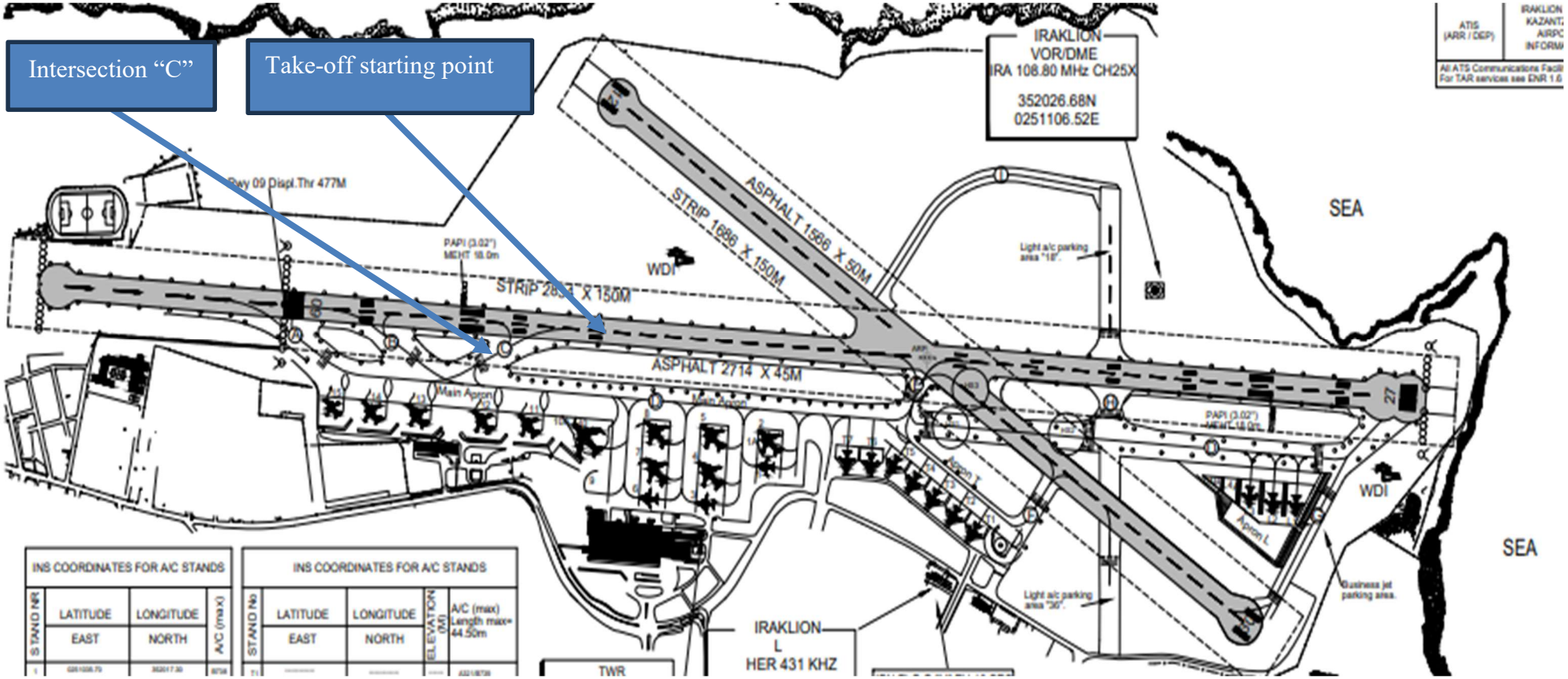


Figure 10 Heraklion Airport

1.11 Flight recorders

1.11.1 APIBOX System

The aircraft was equipped with a cockpit voice recorder and flight data recorder (APIBOX System). The data is stored on an SD memory card installed on the right side of the cockpit instrument panel and on a SD memory card installed on a hardened device located in the tail section of the aircraft that has crash and fireproof characteristics.

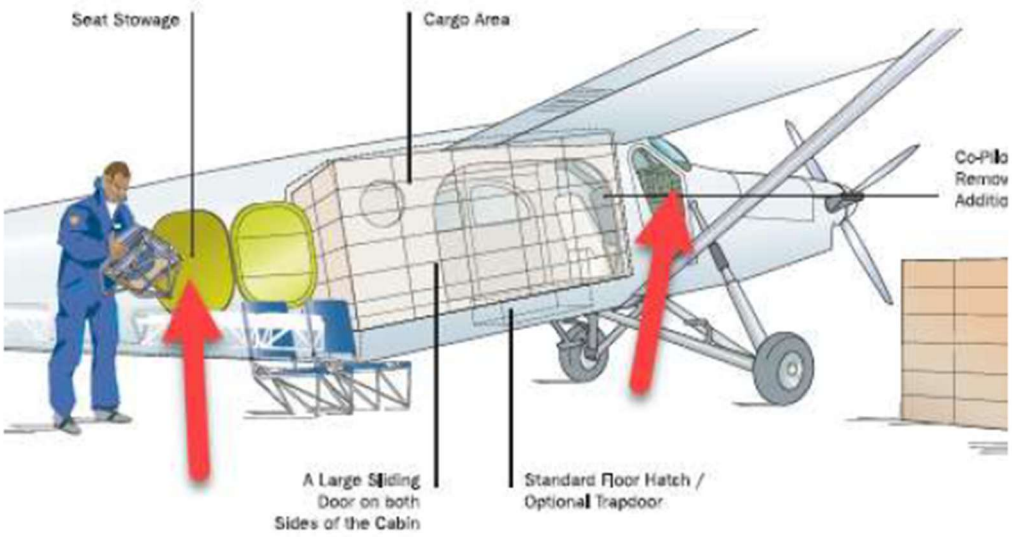


Figure 11 The installation points of the APIBOX System unit

Divers managed to collect the memory card located on the instrument panel of the cockpit. Attempts were made to remove the tail section unit from the aircraft, but this was not possible as access to the point where the unit was installed was impossible. Note that both memory cards store the same flight data.

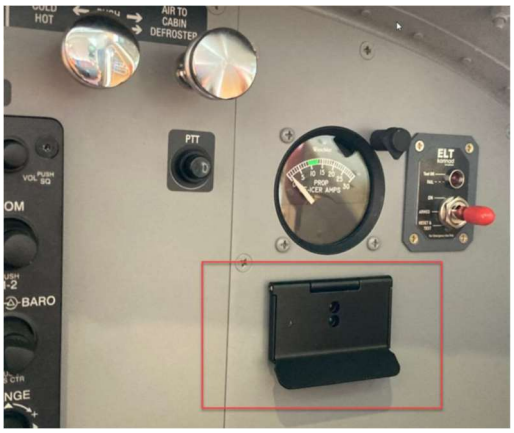


Figure 12 Storage of data on a memory card in a USB flash drive on the right side of the cockpit instrument panel

Figure 13 Storage of instruments on a memory card on a USB flash drive in the caudal part of the flash drive

The memory card was transferred to the AAIASB offices. With the help of the program "iAero Debriefing Software" and following the instructions of the manual "DEBRIEFING ADMINISTRATOR HANDBOOK FOR APIBOX SYSTEM", the flight data was obtained.

In Table 2 of Annex 5.1 shows some of the aircraft and engine parameters taken from the APIBOX recording system.

Graph 2 of Annex 5.2 shows some time-related aircraft and engine parameters taken from the APIBOX recording system from 07:50:41h to 07:52:15h inclusive.

1.11.2 Video material

The video footage recorded by a camera at Heraklion International Airport was given to HARSIA[3] by the Hellenic Civil Aviation Authority (HCAA). In this footage, it does not appear that people approached the aircraft during its parking at Heraklion International Airport, except for its crew.

1.12 Wreckage and impact information

1.12.1 Accident area description

The aircraft ditched into a sea area east of Heraklion Airport and at approximately 1.65nm from the threshold of runway 27.

[3] HARSIA Hellenic Air and Rail Safety Investigation Authority is the multi modal safety investigation authority which replaced the AAIASB Air Accident Investigation and Aviation Safety Board in January 2023.

The coordinates of the ditching point from the aircraft flight recorder are as follows:
a) Latitude is 35° 20’ 9.6’’ North b) Longitude is 25° 13’ 24.42’’ East
The distance from the coast was about 160 m and the depth of the sea at the point where the aircraft sank was approximately 10m.

Figure 14 Aircraft Course PK-SNF

1.12.2 Aircraft impact

After landing, the aircraft remained on the surface for a few minutes with its front part in the sea and later sank.

Figure 15 Semi-submerged Aircraft

1.12.3 Examination

The aircraft was not recovered.

In photographs taken by the divers, the aircraft appears at the bottom of the sea with the upper part resting on it.

Figure 16 The sunken aircraft

Figure 17 The sunken aircraft

Figure 18 Detail from the front of the b/w

Figure 19 Detail from the dashboard

Also, from figure 20 below it appears that the fuel system valve lever was in the closed position “Closed”.

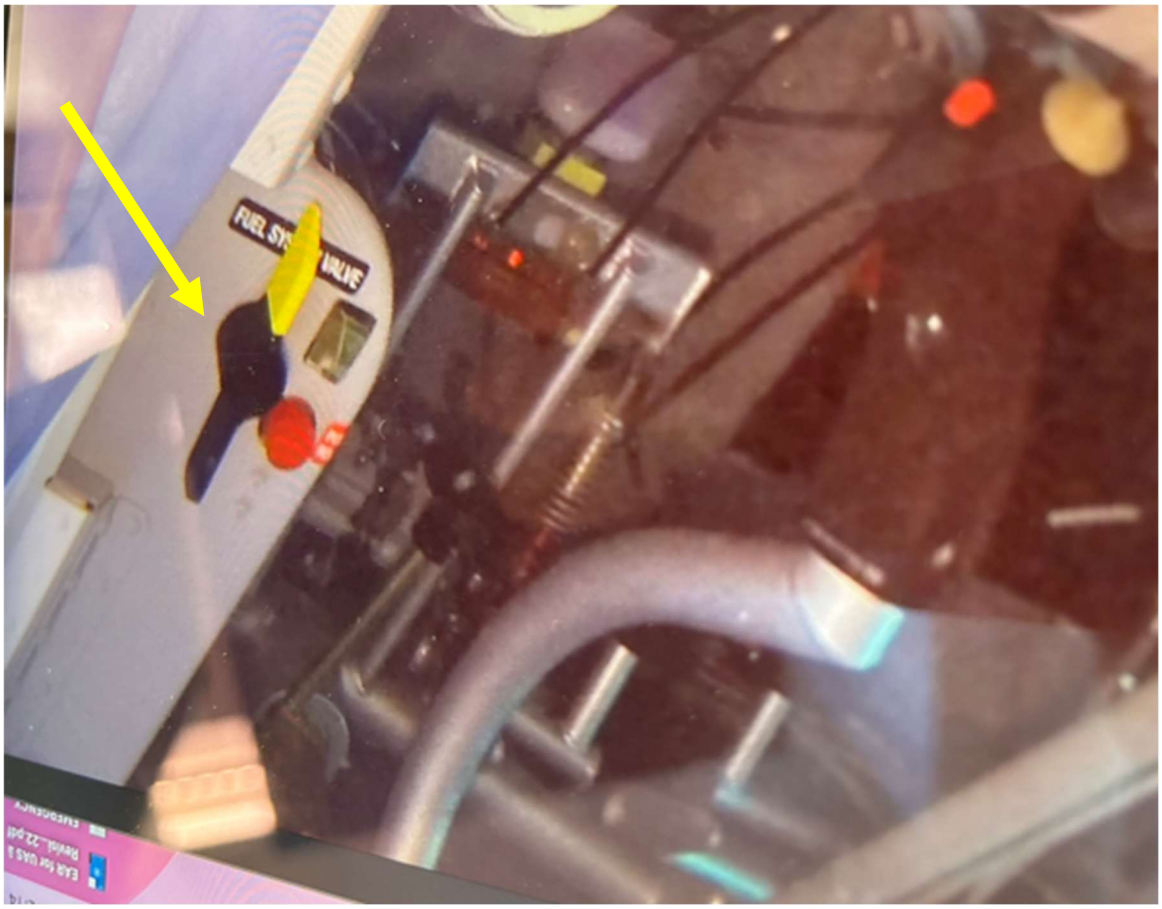


Figure 20 The fuel system valve lever in Closed position

1.13 Medical and pathological information

The toxicological examination of the two occupants did not reveal the use of substances and alcohol.

The Pilot of the aircraft went with the ambulance to the emergency department of the General Hospital "VENIZELIO-PANANIO" where he was examined. There was no evidence that physiological factors or incapacitation affected the performance of flight crew members.

The forensic examination carried out on the Flight Operations Manager found that his death was due to drowning in seawater.

1.14 Fire

Not applicable.

1.15 Survival aspects

The Pilot of the aircraft came out of the front window of the cockpit which had broken upon impact, while the Flight Operations Manager came out of the aircraft using the right front door of the aircraft. The aircraft had a life raft that they did not use because they could not get it out of the aircraft. The two occupants were not wearing life jackets.

They tried to swim towards the shore. The Coast Guard's floating vessel picked them up with the help of EMAK. When the Flight Operations Manager was pulled aboard, he was unconscious.

From the transcript of the conversations from ATC frequencies and telephone connections, the following can be seen:

- 09:50:55 [4]The aircraft declares Mayday Mayday
- 09:51:07 Activation of Emergency Plan
- 09:52:04 Contact with fire brigade
- 09:52:07 Aircraft ELT activation on frequency 121,500
- 09:54:09 The ATC communicates with the Airport Officer who committed to notify the Port Authority
- 09:54:34 KEPATHM briefing on the incident
- 10:03:04 Contact of ATC with Port Authority
- 10:03:12 Confirmation of the Port Authority that vessels have been notified
- 10:15:32 Helicopter takeoff for search and rescue
- 10:19:45 Detection by port vessel and process of picking up people.

The recovery of the passengers of the aircraft took place at a position 35° 20 ′ 15.1188 ′ ′ North, 25° 13 ′ 24.24 ′ ′ East, approximately 290 m from the coast.

[4] The times shown in paragraph 1.15 are those recorded in the systems of the Civil Aviation Authority. There is a difference of 20 seconds with respect to the times recorded by the aircraft's flight recorder, which is ahead of the CAA recorder.

1.16 Tests and research

A test was carried out to determine the amount of fuel after the fuel shut-off valve and to simulate closing the valve from the left cockpit position.

1.16.1 Amount of fuel after the fuel shut-off valve.

A test was carried out to determine the amount of fuel remaining in the system after leaving the fuel shut-off valve in its closed position for this test, the accredited representatives and technical advisors of the safety investigation authorities involved cooperated. The test was conducted using a Pilatus PC-6/B2-H4 aircraft similar to the aircraft which took place on 21 March 2023 at a maintenance facility in Indonesia.

After following all the procedures referred to in the instructions in Annex 1, fuel was collected from the “fuel flow divider” and from the “fuel bleed return line”.

Figure 21 Test to determine the amount of fuel after leaving the shut-off valve in a closed position

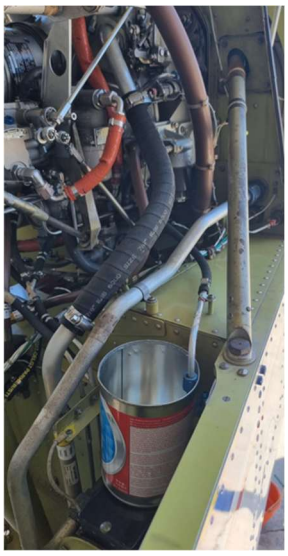


Figure 22 Collection of the amount of fuel during the test

The fuel collected had a volume of 460ml.

It was calculated by the technical consultant of the manufacturer of the engine, the amount of fuel consumed by the engine within 6 seconds, with an average fuel flow to it is 50 gal/h.

(50 gal/h)/(60 min*60 sec)*6 sec*3.785 (l/gal)*1000 ml=315 ml

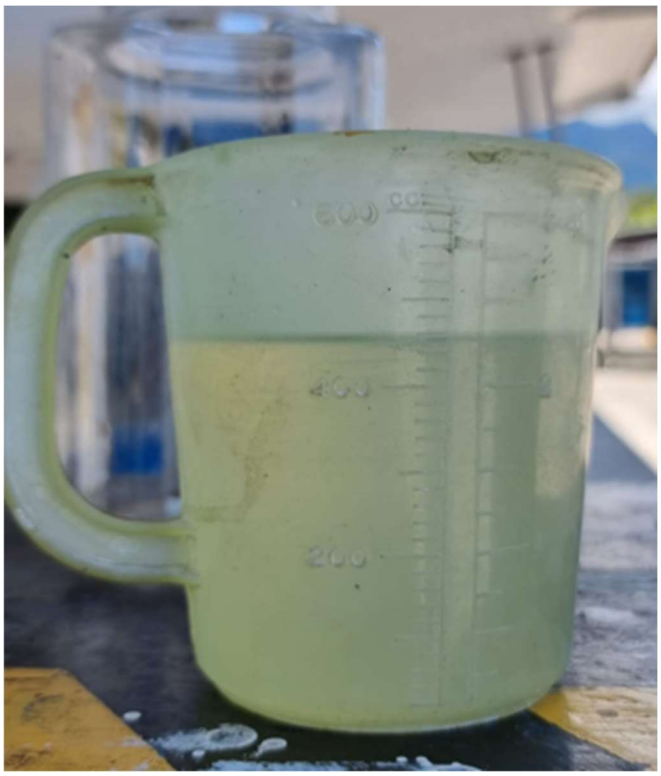


Figure 23 The amount of fuel collected after the test

1.16.2 Fuel shut-off valve installation test from open to closed position

On 26 April 2023, the accredited representative of the state of manufacture of the engine and the technical adviser visited another PC6-B2/H4 aircraft with serial number 972 in order to familiarize themselves with the operation of the control lever of the fuel shut-off valve and to investigate the possibility of inadvertently placing the valve in a closed position.

Initially, it was observed that it is possible to turn the fuel system valve upwards (in its closed position), without pressing the red button that isolates the lever locking mechanism. There was only a small resistance, as well as a small noise, without marks or deformation of the mechanism.

Figure 24 Fuel system valve test

Figure 25 Fuel system valve test (continued)

Then there was a simulation of the movement of the Pilot's body in his attempt to close the door. A person (who is 180 cm tall, roughly the same as the Pilot) was asked to sit in the left seat and close the rear right door. Initially, the person could not reach the door without unfastening the seat belt. He was asked to unfasten the seat belt and try again. As the person stood up and stretched his body to close the door, he lifted his foot and moved the fuel system valve towards the close position. He tried several times and managed to close the fuel system valve with his foot several times with relative ease.

Figure 26 Simulation of Operator body movement, closing of the right door of the cabin

Figure 27 Simulation of Operator body movement, cab right door closing (continued)

1.17 Organizational and Administrative Information

1.17.1 Air Carrier Information

The PT SMART CAKRAWALA AVIATION had a valid AOC from the Indonesian Directorate General of Civil Aviation under number 135-062, first issued on 28 Aug. 2018, revised on 25 Aug. 2022 and expiry date 28 Aug. 2027. In accordance with the operating specifications of the AOC as recorded in DGCA Form Nr. 120-06a, PT. Smart Cakrawala Aviation may operate flights for carriage of passengers, cargo or mail for remuneration or other valuable consideration within the Republic of Indonesia. There was a special certificate of airworthiness issued on 11 December 2022 by the Indonesian Directorate-General of Civil Aviation for the purpose of delivery flight of PK-SNF aircraft from Buochs Airport (LSZC) in Switzerland to Pondok Cabe Airport (WIHP) in Indonesia. The certificate was valid until 11 January 2023 and was accompanied by operating specifications with number AU.406/18/14/DKPPU-2022.

According to the Operator, the company providing flight delivery services of PK-SNF was responsible for the provision of the Pilots. The Operator also referred to the general terms of

the contract between the Operator and the Ferry Company, stating that the service company was responsible for the appointment of the crew of the delivery flight of the aircraft.

1.17.2 Information about the company providing flight delivery services (Ferry Company)

For the purposes of the delivery flight of the PK-SNF aircraft from Buochs Airport (LSZC) in Switzerland to Pondok Cabe Airport (WIHP) in Indonesia, PT. SMART AVIATION had signed a written agreement with Legacy Cargo Limited (Ferry Company). The Ferry Company would provide operational support services and ferry assistance for the delivery flight of the aircraft. According to the Ferry Company representative, services included flight and route planning, weather briefing, liaising with handling agents, hotel accommodation, obtaining permit and overflight permission, 24-hour flight monitoring, communication to and from the aircraft with satellite devices, crew travel assistance and any other assistance required. It also stated that the Pilots of the accident flight were selected from a Pilot base owned by PT. SMART AVIATION.

In the agreement that exists between PT. SMART AVIATION and the company that provided operational support services for the delivery flight of the aircraft, the following are included:

The Ferry Company retains exclusive proprietary control of the aircraft during the mission. No persons or cargo may be transported during the mission unless specific written authorization is granted by the Ferry Company. Subject to prior approval, the owner or representative of the aircraft may accompany the Pilot-In-Command of the delivery flight on the mission provided that the Pilot-In-Command of the delivery flight retains his or her full position as Pilot-In-Command throughout the mission.

The designated crew shall be responsible for operating the aircraft in accordance with the flight manual/operating handbook, the manufacturer's specifications and recommendations, and in accordance with all aviation laws and regulations of the FAA, EASA and local civil aviation authorities.

1.18 Additional information

1. According to the Indonesian Regulation CASR 61.57 Revision 05, 04-Aug-2017 on recent experience:

No person may act as Pilot in command of an aircraft carrying passengers, nor of an aircraft certificated for more than one required Pilot flight crewmember, unless within the preceding 90 days, he has made three take offs and three landings as the sole manipulator of the flight controls in an aircraft of the same category and class and, if a type rating is required, of the same type. If the aircraft is a tailwheel airplane, the landings must have been made to as full stop in a tailwheel airplane.

The flight crew training and checking requirements are contained in the operations manual, Part A Rev 09, 11-Aug-2022, paragraph 5.1.3 (Table 1) Rev 09, 11-Aug-2022.

Table: 1 Operations Manual Part A 5.1.3

NO	TRAINING/CHECK	PIC	SIC	Turboprop MTOW less than 12500 lbs
1	Company Indoctrination (1)	X	X	1 Time
2	Pilot Proficiency Check (2)	X	X	PIC-12 Months
3	Aircraft Type Recurrent (1)	X	X	12 Months
4	Dangerous Goods Awareness (1)	X	X	12 Months
5	Crew Resource Management (1)	X	X	12 Months
6	Windshear (1)	X	X	12 Months
7	Aviation Security (1)	X	X	12 Months
8	Crew Member Emergency Training (1)	X	X	24 Months
9	Safety Management System (1)	X	X	1 Time

2. According to the Indonesian Regulation CASR 61.75 Revision 05, 04-Aug-2017 on Pilot License Issued on Basis of a Foreign License paragraph (j)

"*Foreign Pilot License Validation. The holder of a current private, commercial or airline transport pilot issued by a foreign contracting state to the Convention on International Civil Aviation may have its license validated for the purpose of operating an Indonesian registered civil aircraft under the following conditions :*

(1) The originality of the license is confirmed by the issuing authority prior to the issuance of validation

(2) The validity period of the validation is only for 1 (one) year after the date of its issuance or as long as the original medical certificate remain valid. The validity may be extended when the Director finds it to be necessary, but in any case it can be extended only once for a maximum period of 1 (one) year.

(3) A foreign pilot license may be used only once as basis for issuing a validation under this Part.

(4) The original validation document or paper , bearing all the the privileges granted and its limitations, shall be carried with the original license while performing duties.

3. The DGCA procedures SI8900-5.2 Personnel Licensing Procedures and Flight Operations Inspector Tasks and Responsibilities, Chapter 13 Procedures for Validation Of Flight Crew stipulates among others the following:

- In Section 1 Background, 3 General Requirements

g. a foreign pilot license may be used only once as basis for issuing a validation under Indonesian CASR Part 61

j. The applicant who already held the 2nd validation of license, may be issue another validation after 12th calendar month since the last validation expiry date. The validation process shall be through original process of validation.

- In Section 1 Background, 7 Duration

The validity period of the license is only for 1 (one) year after the date of its issuance or as long as the original medical certificate remain valid. The validity may be extended when the Director finds it to be necessary, but in any case, it can be extended only once for a maximum period of 1 (one) year.

- In Section 2 Procedures, 2 Schedule Appointment

As soon as the letter verified has been received from the foreign CAA and the foreign license has been verified by the foreign CAA, advise the applicant to provide the following documents to the appointment:

A. for Issuing Initial Certificate of Validation:

1) Application Letter;
2) Properly Completed Application Form DGCA 61-01;
3) Copy of current and valid License from mother license;
4) Current Proficiency Check / Simulator from foreign licensing authority;
5) Copy of Medical Certificate from mother license;
6) Authentication Letter from mother license;
7) Copy of current Passport;
8) Copy of Updated Curriculum Vitae / CV;
9) Copy of Medical Certificate issued by Indonesia Medical Aviation Centre;
10) Completed and Satisfactory result of knowledge
11) Completed and Satisfactory result of Skill Test (except for ferry flight)

12) Completed Copy of Valid Logbook within late 3 (three) months;
13) Copy of IMTA and KITAS;

B. For Issuing Renewal Certificate of Validation:

1) Application Letter;
2) Properly Completed Application Form DGCA 61-01;
3) Copy of current and valid License from mother license;
4) Current Proficiency Check / Simulator;
5) Copy of Medical Certificate from mother license;
6) Current Authentication Letter from mother license;
7) Copy of current Passport;
8) Completed Copy of Valid Logbook within late 3 (three) months;
9) Copy of current and valid IMTA and KITAS;
10) Copy of current and valid License;
11) Current Proficiency Check / Simulator;
12) Copy of Medical Certificate;
13) Authentication Letter from foreign CAA for upgrading PPL to CPL;
14) Copy of IMTA and KITAS;
15) Receipt PNBP.

4. The Operations Manual, Part A, paragraph 12.7, sets out the procedures for aircraft delivery and re-delivery flights to the seller. According to paragraph 12.7.3 "Crew requirements" of these flights,

"*the designated PIC must be trained and must have demonstrated his competence to handle the aircraft in all maneuvers associated with a flight of this type"*. In addition, it is described that the Pilot-In-Command must be responsible for the delivery/re-delivery flights and ensure that all limitations in the AFM and Operations Manuals, parts A/B/C, are complied with.

5. The Operations Manual, Part A, paragraph 5.2.3.4 stated the following:

"Any Pilot who has not completed 3 takeoffs and landings within the previous 90 days shall regain competency by undergoing the following recency of experience training:
a. A minimum of 3 take-offs and landings as PF in the preceding 90 days which is not carrying passengers. These may be carried out in the aircraft or an approved flight simulator of the type to be used.
b. After an absence of more than 90 days from flying duties or operation of a specific type or variant, Pilots must undergo flying and technical refresher

training, specified in the Operations Training Manual, before again operating on a commercial flight in the capacity for which they were certified. The exact training requirements may be dependent on length of absence, and will be specified by the Chief Pilot.
c. The 90-day period prescribed above may be extended up to a maximum of 120 days provided a suitable initial period of line flying is conducted under the supervision of a nominated commander".

6. The Operations Manual, Part C, Revision 06, February 2022, paragraphs 2.3.2 and 2.3.3, states the following:

- *"Aircrew life jackets shall be kept in the aircraft. Life jackets are to be worn for all over water flights".*
- *"Passenger life jackets and life raft shall be kept in the aircraft and are maintained by the Base Safety Equipment Section. Life jackets are to be worn on all over water flights. During flight any excess life jackets and ear defenders are to be kept in dedicated bag inside the baggage compartment".*

1.19 Useful or effective investigation techniques

Not applicable.

2 ANALYSIS

The analysis is based on the information collected by the flight data recorder (APIBOX System), the interviews taken, the photographic and video material, the documents collected during the investigation and the tests carried out on aircraft of the same type.

2.1 Flight

On 12 December 2022, the flight segments for the transfer of the aircraft from Switzerland to Indonesia began. On that day, flights were performed from Buochs Airport (LSZC) in Switzerland to Maribor Edvard Rusjan Airport (LJMB) in Slovenia and from Maribor Edvard Rusjan Airport (LJMB) to Podgorica International Airport (LYPG) in Montenegro. No problems were reported by the Pilot-In-Command of these flights who did not continue for the next legs which would have been done by the Pilot involved in the accident.

On 13 December 2022, the Pilot, who would carry out the remaining legs as far as Indonesia, arrived in Podgorica as he was unable to enter Switzerland earlier due to visa delays, he said.

On 14 December 2022, the flight from Podgorica International Airport (LYPG) to Heraklion International Airport (LGIR) was conducted without any reported problems. On board the aircraft was the Pilot in command and the Flight Operations Manager of PT Smart Aviation.

On 15 December 2022, after an overnight rest at a hotel in Heraklion, the crew went to Heraklion International Airport (LGIR) where the aircraft involved was parked. The Pilot began preparations for the flight. When removing the safety pins from the vertical/horizontal stabilizer lock, the pins located on the vertical portion of the device had been bent. From the video footage recorded by a camera at Heraklion International Airport and provided to HARSIA by the Civil Aviation Authority, it does not appear that the aircraft was approached by people during its parking at Heraklion International Airport. The pins probably were bent because of the wind blowing in the airport area during the night and did not contribute to the accident.

The Pilot then began the pre-flight inspection with no findings. Upon completion of the inspection, it was determined that the aircraft was in an airworthy condition.

At 09:20h the refueling of the aircraft was completed, the Pilot was satisfied that the fuel opening covers were closed and the presence of water was checked through drainage. The aircraft was refueled with 167 US gallons of JET A-1 fuel. Total pre-take-off fuel on board is estimated at about 288 US gallons (1090 lt). The center of gravity of the aircraft just before

take-off was within the limits set by the manufacturer and therefore did not affect the accident. According to the general manifest submitted to the competent authorities of LGIR on 15 December 2024, the crew of the aircraft were the Pilot (Pilot-in-command) and the Flight Operations Manager of the Operator was co-Pilot.

At 09:38:44h [5] the Pilot of the PK-SNF received start clearance, he cycled the propeller twice, he checked the standby power, which was working correctly, he checked the trim interrupt and he completed the checks with verifying the stall warning and annunciators. It then set the generator and the accessories on.

At 09:45:09h the aircraft requested a taxiing permit. Due to the eastern route of the aircraft to Sitia and the favorable wind, the Operator was offered the alternative of using runway 09 instead of runway 27, which he eventually preferred. The Pilot requested permission to take off from the C-intersection of the runway and this was accepted.

Clearance for take-off was given at 09:48:15h. The Pilot set the engine speed to high idle, put the rear wheel in a locked position and checked the flight surfaces. Thereafter, take-off data was given to the engine and all its indicator parameters were checked. The ATC informed the Pilot of the aircraft shortly before take-off that the wind direction was 160° and the speed 13 kt. Weather conditions did not play a role in the accident.

The aircraft took off from Heraklion International Airport (LGIR) to Hurghada International Airport (HEGN) in Egypt at 09:49:05h. The take-off was carried out without the Pilot encountering any problems. During taxiing for take-off, the gas generator speed (NG) was 93.3% RPM, the propeller speed (NP) 2006 RPM, the engine torque (TQ) 42 psi, the fuel flow (FF) 51 gal/h and the inter turbine temperature (ITT) 597 °C. The values reported were within the manufacturer's limits.

At 09:49:34h the aircraft was at a height of 511 ft, the gas generator speed (NG) was 93.3% RPM, the propeller speed (NP) 2008 RPM, the engine torque (TQ) 42 psi, the fuel flow (FF) 51 gal/h and the inter turbine temperature (ITT) 598 °C. The engine parameters were within the limits.

At 09:50:29h the Pilot of the aircraft asked the Flight Operations Manager to take control of the aircraft and continue its course in order to catch some things from the back of the aircraft's cabin.

[5] The times shown are from the flight data recorder (APIBOX System) of the aircraft.

At 09:50:45h the aircraft was at a height of 1327 ft, the engine parameters were within the manufacturer's limits. The control of the aircraft should have been taken by the Flight Operations Manager.

At 09:50:49h, the Pilot apparently in his attempt to catch the things he wanted, noticed that the rear right door of the cabin was partially open. He had unfastened the seat belt either when he wanted to grab things in the rear of the cabin or when he tried to close the right cabin door. The Pilot turned and stretched his torso to close the door and felt that the aircraft lost its power. In this effort, the Pilot may have inadvertently moved the fuel shut off valve of the fuel system upwards (in its closed position). This probably caused an interruption in the fuel supply to the engine.

At 09:50:55h the aircraft was at a height of 1444 ft, gas generator speed (NG) was 93.0% RPM, propeller speed (NP) 1997 RPM, engine torque (TQ) 39.1 psi, fuel flow (FF) 12 gal/h and inter turbine temperature (ITT) 595 °C.

During the investigation, it was confirmed that it is possible to turn the fuel system valve upwards (in its closed position) without pressing the red button that isolates the lever locking mechanism, there was only a slight resistance during rotation as well as a sound without any marks or distortion of the mechanism. This sound is likely to be similar to the sound (POP) heard by the co-Pilot shortly before loss of engine power. In addition, the movement of the Pilot's body was simulated in his attempt to close the door, which confirmed the possibility that the Pilot inadvertently with his foot moved the fuel shut-off valve to a closed position. As he said in his interview, the Pilot did not change position on the lever of the fuel shut-off valve as he was focused on controlling the aircraft. In photographs taken by the divers, the aircraft appeared at the bottom of the sea and the fuel shut off valve was depicted in the closed position.

The Pilot initially thought that the power lever had been inadvertently moved. He immediately returned to his position and saw the engine parameter readings drop rapidly. He moved the power level, but that didn't work. He then tried to use the emergency fuel control system without any response. As he did so, he turned the aircraft to the right in order to head towards the departure airport, maintaining a satisfactory degree of descent.

At 09:51:12h the aircraft was at a height of 1355 ft, the gas generator speed (NG) was 15.0 % RPM, the propeller speed (NP) 1038 RPM, the engine torque (TQ) -0.2 psi, the fuel flow (FF) 4 gal/h and the intermediate turbine temperature (ITT) 219 °C. The fuel flow to the engine had stopped.

Figure 28 The aircraft is located at a height of 1355 ft.

The aircraft was losing altitude and he had focused on trying to maintain a desired descent speed and getting the engine back on track. He estimated he had less than a minute before the ditching. At this point in time 09:51:15h he reported a distress signal “May Day” due to engine issue to the ATC. Pilot mentioned during the interview that around this time he put his shoulder strap on and he continued his efforts to restart the engine by setting the Auxiliary Fuel Pump in the open position, activating the ignition and the starter. At this stage he decided it was too late to feather the propeller and so focused on the options he had for landing.

At 09:51:49h approximately 17 sec before ditching, the aircraft was at a height of 401 ft, the gas generator speed (NG) was 5.0 % RPM, the propeller speed (NP) 906 RPM, the engine torque (TQ) -0.2 psi, the fuel flow (FF) 1 gal/h and the intermediate turbine temperature (ITT) 146 °C.

Figure 29 The aircraft is at a height of 401 ft

As the Pilot said, the safest option he could see was ditching, so he tried to get as close to the shore as possible and prepare the aircraft appropriately. The aircraft ditched at 09:52:06h.

The Pilot and co-Pilot left the aircraft with only minor injuries. They had a brief conversation about what could have happened, and the Flight Operations Manager told the

Pilot that he heard a noise that looked like a "POP" when the aircraft lost power. This noise probably came from the pressure exerted by the Pilot's foot on the fuel system valve lever and its change of position.

The aircraft was equipped with a boat, but the occupants were unable to get it out as they believed that by opening the door of the aircraft, it would sink faster. The aircraft, due to the sea currents, was moving away from the coast. So, when it sank completely, they had no choice but to swim to the shore. The wind blowing at that time, the reduced water temperature due to the winter season and the fact that they were not wearing life jackets, made it difficult to swim towards the shore. The operations manual, Parts C.2.3.2 and 2.3.3, states that the life jackets of the flight crew shall be kept on board the aircraft and must be worn for all flights over sea. The aircraft had no life jackets, while the life raft was placed behind the cockpit seats, which made it difficult to use.

The people of EMAK, who swam to them, first found the Pilot of the aircraft who was already exhausted. The Coast Guard vessel picked up the Pilot with the help of EMAK at 09:19h, about 30min after the ditching. Immediately after, the Flight Operations Manager was found at a depth of three meters below sea level by EMAK people. When he was pulled aboard, he was unconscious.

2.2 Crew

Documents collected during the investigation revealed that the Pilot-In-Command of the aircraft held a CPL(A) license from the Civil Aviation Authority of South Africa (SACAA) valid up to 31 Mar. 2023, but the type of PC-6 was not endorsed within the CPL(A) license or within the CPL(A) license details document of the SACAA in which all the aircraft types of the CPL (A) holder are depicted. Therefore, he was not licensed by the Civil Aviation Authority of South Africa (SACAA) to be a Pilot on a type aircraft PC-6. On 23 Oct 2023, ten months after the accident, SACAA endorsed the Pilatus PC-6 type on Pilot’s CPL(A) license and within the details document of the SACAA CPL(A) license.

The Indonesian Directorate General of Civil Aviation (DGCA) had issued a CPL(A) validation certificate for a PC-6 aircraft type, for flights without passengers, based on the SACAA CPL(A) license and valid from 06 Dec 2022 to 20 Dec 2022 inclusive. The CPL(A) license validation certificate should be limited only to the types and classes of aircraft that existed in the original CPL(A) license issued by SACAA. Initially DGCA stated that for the issuance of the Certificate of Validation, it was relied on the South African Civil Aviation Authority (SACAA) CPL(A) license, the CV of the Pilot-In-Command as well as, the type-

flight hours mentioned therein, thus 808.8 hours of flight experience on the PC-6 type in air transport within Indonesia. After the issuance of the draft final report, the DGCA declared that the validated certificate was granted following a thorough assessment and verification of all pertinent records including:

1) The initial granting of a validation certificate. Date of issue 18/05/2018 Date of Expiry 18/05/2019.
2) The extension of the validation certificate. Date of issue 12/06/2019 Date of Expiry 18/04/2020.
3) The process of converting a Commercial Pilot License (CPL) issued by the South African Civil Aviation Authority (SACAA) into an Indonesian. DGCA CPL.issue Date 03/11/2020
4) The Curriculum Vitae (CV) of the PIC, accompanied by an evaluation of the flight hours recorded for specific aircraft types.

DGCA procedures SI8900-5.2 "Personnel Licensing Procedures and Flight Operations Inspector Tasks and Responsibilities, Chapter 13 Procedures for Validation of Flight Crew Section 2 Procedures" mentioned in 1.18 of this report require a series of documents to be submitted for the initial issuance or renewal of validation. These procedures were not fully followed for the issuance of the validation certificate issued on 06 December 2022. Additionally, procedures stated in Section 1 Background, 3 General Requirements were not clear to prevent the possibility of issuing a validation certificate when a DGCA CPL license already exists.

Also, according to DGCA, the PC-6 aircraft is classified as SE-Land and the Pilot holding this class on his license can fly any aircraft belonging to the SE-Land class. The DGCA stated that the Pilot had received PC-6 type training from the previous Operator, but this training was not provided during the investigation.

During the investigation, it was also found that the Pilot held a CPL(A) license from the Indonesian Directorate General of Civil Aviation (DGCA) was not valid, as the medical certificate and the PPC attached to this license had expired on 12 April 2022. It is not possible to assess why the DGCA did not ask the Pilot to first renew the expired medical certificate and PPC and then proceed with the renewal of the CPL(A) license.

From the Pilot's flight record, it appears that he had performed a similar SMART AVIATION PC-6 delivery flight from Podgorica International Airport (LYPG) in Montenegro to Pondok Cabe Airport (WIHP) in Indonesia, which took place from 17 April

2022 to 25 April 2022 inclusive. The Pilot's next flight was a Pilot Proficiency Check (PPC) flight with three recorded take-offs/landings, which took place after 163 days, on 6 October 2022 with a Cessna C208 aircraft, as shown by the flight hours record held by the Pilot. The flight in question was not recorded in the Operator's records, but only in the Pilot's records. There was no other flight until 14 December 2022. According to the SMART Aviation Operations Manual Part A 5.2.3.4 no person may act as Pilot-In-Command of an aircraft unless, within the preceding 90 days, he/she has conducted three take-offs and three landings as Pilot of the same type of aircraft. Cessna C208 is not considered the same type. It has a three-wheeled landing gear[6] that is different from the PILATUS PC6 that has a conventional landing gear. During the investigation there was no document proving that the Pilot underwent training. Also, there was no initial training that the Pilot should have performed through, nor any assessment on the part of the organization as stated in the SMART Aviation Operations Manual Part A 5.1.3.

In addition, the Operations Manual Part A in paragraph 12.7 sets out the procedures for aircraft delivery and re-delivery flights to the seller. According to paragraph 12.7.3 "Crew requirements", the Pilot should be trained and should demonstrate his/her ability to operate the aircraft in all maneuvers related to the flight. Also, the Pilot-In-Command of the aircraft must be responsible for the delivery/re-delivery flight and ensure that all limitations of the aircraft flight manual and operations manuals, Parts A/B/C, are complied with. No evidence was found during the investigation that the Pilot had the necessary training and that his/her flight skills were checked. The above-mentioned Part of the Operations Manual does not clearly specify what training the Pilot should have and how the Pilot's competence is assessed.

The Operator stated that the Ferry Company was responsible for providing and selecting the Pilots of the delivery flight of the PK-SNF while the representative of the Ferry Company stated that the Pilots come from the Operator. In the agreement, it is unclear who is responsible for the Pilots. It was not clear which of the two sides was responsible for selecting the Pilots. Pilots should be under the quality system and control of the owner of the aircraft. A specific certificate of airworthiness had been issued for the delivery flight by the Indonesian Directorate General of Civil Aviation on behalf of the Operator.

Flight Operations Manager of PT Smart Aviation was declared in the flight list issued on 09 Dec 2022 by the Ferry Company for the flight delivery of the aircraft as co-Pilot. The

[6] There are two main wheels (or wheel systems) under the blades and a third smaller wheel at the front.

Flight Operations Manager was a Pilot of aircraft with an ATPL license that was not valid as his medical certificate expired on 31 March 2019. The aircraft is approved to fly with a crew, one Pilot. As mentioned by the two Pilots of the previous legs, the Flight Operations Manager had the role of observer and assistant when and if needed.

2.3 Aircraft

The PILATUS PC-6/B2-H4 aircraft involved, with registration number PK-SNF, was built in 2022 and was new. PT. SMART CAKRAWALA AVIATION received it from the manufacturer from Buochs Airport (LSZC) in Switzerland, in order to transfer it to Pondok Cabe Airport (WIHP). A specific certificate of airworthiness had been issued by the Indonesian Directorate-General of Civil Aviation for the purpose of the delivery flight. The aircraft had an EASA Form 52 certificate of conformity with number AQ-22-2011 for new aircraft issued on 04 Nov. 2022 as well as a certificate of airworthiness for export from the Federal Aviation Administration of Switzerland FBE320221107EX on 07 Nov. 2022. The aircraft was properly certified and had all the necessary documents for the delivery flight in accordance with the regulations.

2.4 Examination of the A/C and its system.

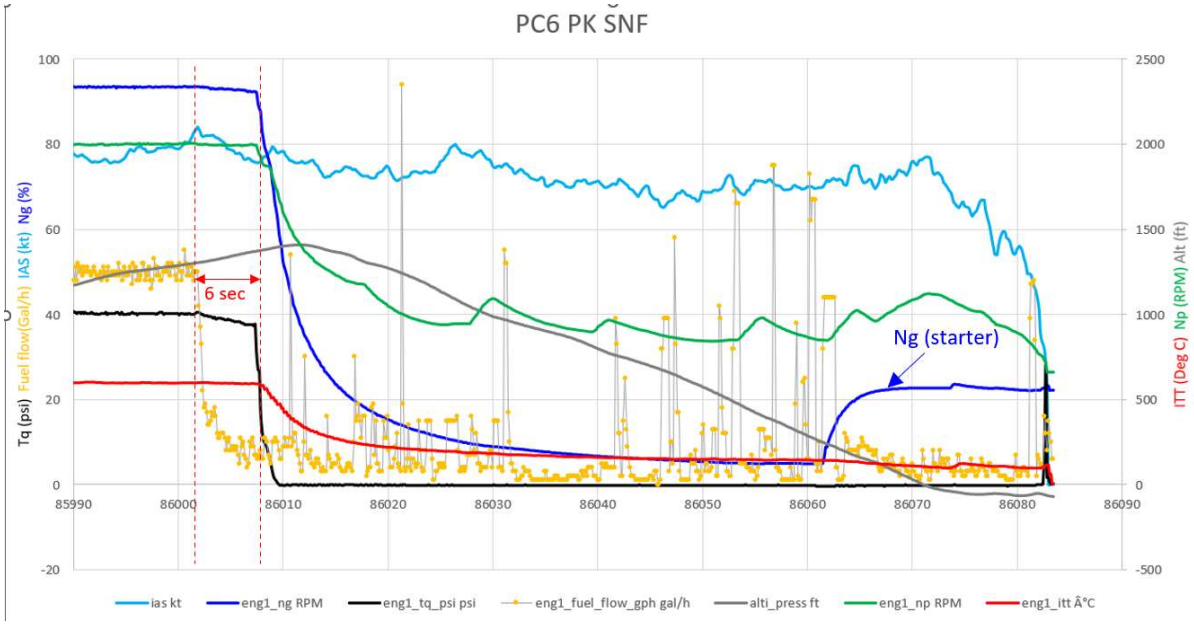
During the investigation of the accident, it was not possible to recover the aircraft from the seabed.

From the photos and video footage taken after the accident, it appears the switch of the fuel shut-off valve in a closed position. When the valve is in the closed position, there is isolation of the fuel supply to the engine and therefore stopping the engine. As the Pilot mentioned during the interview, he did not intervene in the switch of the fuel shut-off valve, as he was focused on controlling the aircraft. Probably the Pilot, in his attempt to close the right door of the passenger compartment, inadvertently moved the switch of the fuel shut-off valve from an open to a closed position, causing the fuel flow to the engine to be interrupted.

In a test carried out on the same type of aircraft to check the functional behavior of the fuel shut-off valve lever and to investigate the possibility of inadvertently placing the valve in a closed position, it was observed that it is possible to turn the fuel system valve upwards (in its closed position) without pressing the red button that isolates the lever locking mechanism. When moving the valve lever, there was a small resistance as well as a small noise without

marks or deformation of the mechanism. Also, the movement of the Pilot's body was simulated in his attempt to close the door. A Pilot (who is 180 cm tall, roughly the same as the Pilot of the accident) was asked to sit in the left seat and close the rear right door. At first, the Pilot could not reach the door without unfastening the seat belt. He was asked to unfasten the seat belt and try again. As the Pilot stood up and stretched to close the door, he lifted his foot and moved the fuel system valve. He tried several times and managed to close the fuel system valve with his foot several times with relative ease.

The graph 1 below shows some aircraft and engine parameters taken from the APIBOX recording system from 07:50:41h to 07:52:15h inclusive. There is a delay of about 6 sec between the drop in fuel flow and the drop in engine parameters Ng, ITT, Tq & Np. Considering that the Operator inadvertently closed the fuel shut-off valve, the above-mentioned delay of 6 seconds may be due to the fuel present in the fuel system after the shut-off valve and up to the combustion chamber.



Graph 1 Aircraft and engine parameters taken from the APIBOX recording system

During the accident investigation, the amount of fuel consumed by the engine within 6 sec with an average fuel flow to the engine of 50 gal/h was calculated.

(50 gal/h)/(60 min*60.sec)*6 sec*3.785 L/Gal US*1000 ml/L=315 ml

A check was carried out to determine the amount of fuel remaining in the system after leaving the shut-off valve when it is closed. The test was performed on a Pilatus PC-6/B2-H4

aircraft with serial number S/N 1014. Fuel was collected from the “fuel flow divider” and from the “fuel bleed return line”, which had a volume of 460 ml.

However, the approximate quantity of 315 ml fuel shall be of the same order of magnitude as the measured quantity of 460 ml. It should be borne in mind that the engine flame-out point did not occur on the last drop of fuel available (460 ml). Also, after the possible closure of the fuel shut off valve, the engine's fuel pump operating in a closed system, most likely went into negative pressure (vacuum) which may account for difference of fuel quantity calculated vs measure.

3 CONCLUSIONS

3.1 Findings

3.1.1 Aircraft

- The aircraft was properly certified and had all the necessary documents for the delivery flight, in accordance with the regulations.
- The aircraft was airworthy.
- The Pilatus PC-6 is certified for single-Pilot operation.
- The mass and center of gravity of the aircraft were within the prescribed limits.
- There was no evidence of aircraft failure or malfunction of its systems prior to the accident.
- The aircraft sank after ditching and it was destroyed.
- The fuel system valve lever was found in a closed position.
- Fuel tanks were full before the flight.
- The engine stopped working after the fuel flow to it was interrupted.
- The right door of the aircraft's cabin was not in a closed position before take-off.

3.1.2 Crew

3.1.2.1 Pilot In Command (Pilot)

- The Pilot-In-Command of the aircraft held a valid South African Civil Aviation Authority (SACAA) CPL(A) license.
- The PC-6 aircraft type was not endorsed at his CPL(A) SACAA license on the day of the accident.
- Aircraft type PC-6 was endorsed to the CPL(A) SACAA license and to the SACAA analytical detailing document in Oct. 2023.
- The pilot had a valid SACAA medical certificate.
- Certificate of Validation for SACAA's CPL(A) license had been issued by the Indonesian Directorate-General of Civil Aviation (DGCA), applicable only for aircraft type PC-6 and for flights without passengers.
- DGCA procedures SI8900-5.2 "Personnel Licensing Procedures and Flight Operations Inspector Tasks and Responsibilities, Chapter 13 Procedures for Validation of Flight Crew" were not fully followed during the issuance of the validation certificate.

- DGCA procedures SI8900-5.2 “Personnel Licensing Procedures and Flight Operations Inspector Tasks and Responsibilities, Chapter 13 Procedures for Validation of Flight Crew” were not clear to prevent the possibility of issuing a validation certificate when a DGCA CPL license already exists.
- For DGCA, PC-6 is categorized as SE-Land.
- The Pilot held a DGCA CPL(A) issued on 03 Nov. 2020 in which the medical certificate and the PPC had been expired.
- The Pilot had 813.3h on the PC-6 type. All hours had been conducted on an Indonesian aircraft registry.
- The Pilot has been flying Indonesian-registered aircraft since 2019.
- He had not received any training in accordance with the provisions of the P.T. SMART AVIATION Operation Manual.
- The Pilot's actions after the engine malfunction showed a possible inability to understand the fuel system.

3.1.2.2 Co-Pilot (Flight Operations Manager)

- The Flight Operations Manager of the operating company was a Pilot with an ATPL license that was not valid.
- He had more than 23,000 h of flights in his career.
- He did not have a valid medical certificate.
- The Flight Operations Manager was declared as crew in the general manifest issued on 15 December 2022.
- In the flight manifest issued on 09 Dec 2022 by the Ferry Company for the flight delivery of the aircraft, the Flight Operations Manager is mentioned as co-Pilot.

3.1.3 Aircraft owner/Operator

- The Operator of the aircraft had an AOC from the Indonesian Directorate General of Civil Aviation in force.
- The Operations Manual, Part A, lists the procedures for aircraft delivery and redelivery flights to and from the seller, which need to be improved.
- For the Operator of the aircraft, the Ferry Company was responsible for the appointment of the Pilots of the delivery flight of the PK-SNF aircraft.
- The agreement between the Operator of the aircraft and the Ferry Company is unclear.

3.1.4 Company providing flight delivery services (Ferry Company)

- For the representative of the aircraft carrier, the Pilots of the flight were selected from a pool of Pilots available to the aircraft owner.
- According to the agreement, the service provider retains exclusive ownership control over the flight.

3.1.5 Flight recorders

- The aircraft was equipped with a cockpit voice recorder and flight data recorder, which assisted the investigation.

3.1.6 Medical

- There is no evidence that physiological factors affected the flight crew.
- There is no evidence that the Pilot suffered from any sudden illness that could have affected his ability to control the aircraft.
- No substances and alcohol were found to be used in the toxicological examination of the two occupants.
- The forensic examination carried out on the Flight Operations Manager found that his death was due to drowning in seawater.

3.1.7 Survival

- On the aircraft there was a life raft but the crew did not manage to get it out of the ditched aircraft.
- There were no life jackets on the aircraft.
- In the Operations Manual, it is stated that the crew should wear life jackets for flights over sea.

3.2 Possible Causes

Possible inadvertent placement of the fuel system shut-off valve lever in the closed position during the Pilot's attempt to close the right cabin door of the aircraft resulted in the interruption of the fuel supply to the engine.

3.3 Contributing factors

- Possible lack of adequate Pilot training.
- Non-compliance with the procedures in the Operator’s operating manual.
- Non-available life jackets for the crew.
- Life raft inaccessible position.
- Take-off with the rear right door of the aircraft in a non-closed position.
- The agreement between the Operator of the aircraft and the Ferry Company was unclear.

4 SAFETY RECOMMENDATIONS

4.1 To the Indonesian Civil Aviation Authority

The Pilot of the accident flight was a holder of the South Africa Civil Aviation Authority (SACAA) Commercial Pilot License CPL(A). The investigation revealed that the Pilot had been flying on an Indonesian register since 2019. In addition to the CPL(A) issued by the SACAA, the Indonesian Directorate General of Civil Aviation (DGCA) issued a CPL license in 2020 for the Pilot in command. Furthermore, for the purpose of this delivery flight, a CPL Certificate of Validation, with PC-6 endorsment, was issued by the Indonesian DGCA based on the CPL(A) license which was issued by SACAA.

2025-05AV: It is recommended that the Indonesian DGCA review and possibly modify the Pilot licensing procedures to avoid the possibility of issuing a validation certificate when a DGCA CPL license already exists.

4.2 To PT. SMART CAKRAWALA AVIATION

In the Operations Manual Part A in paragraph 12.7, the procedures for delivery/Re-delivery flights to the seller are described in accordance with paragraph 12.7.3 "Crew Requirements" of these flights, the “PIC must be trained and must have demonstrated his competence to handle the aircraft in all maneuvers associated with a flight of this type”.

It must be the responsibility of the PIC of the aircraft to be Delivery/Re-delivery Flight to ensure that the following restrictions are observed in respect of such flight:

- The aircraft must be airworthy in every respect with the exception of the faulty system and/or its accessories;
- All limitations in the AFM / POH and Operations Manual Parts A/B/C must be complied with.

2025-06AV: It is recommended that PT SMART CAKRAWALA AVIATION review and possibly modify the procedures regarding aircraft delivery/re-delivery flights, including the training, qualifications, and evaluation requirements of the crew of these flights.

During the investigation of the accident, there was a difference of opinion on the choice of Pilots between the owner of the aircraft and the company providing aircraft transport services. The agreement/contract did not clarify the responsibilities of each of the parties who signed it.

2025-07AV: It is recommended that PT SMART CAKRAWALA AVIATION reviews and possibly standardizes the procedures regarding aircraft delivery/re-delivery contracts with companies providing flight delivery services, so the obligations of each party involved are clear and distinguished.

During the investigation of the accident, it was found that there were no personal life jackets that the passengers should wear when flying over the sea. The Operations Manual, Part C para. 2.3.2 and 2.3.3, indicate the following:

- Aircrew Life Jackets

Aircrew life jackets shall be kept in the aircraft. Life jackets are to be worn for all over water flights.

- Passenger Life Jackets and life raft.

Passenger life jackets and life raft shall be kept in the aircraft and are maintained by the Base Safety Equipment Section. Life jackets are to be worn on all over water flights. During flight any excess life jackets and ear defenders are to be kept in dedicated bag inside the baggage compartment.

2025-08AV: It is recommended that PT SMART CAKRAWALA AVIATION, take the appropriate actions to ensure before the flight that aircraft flying over water are equipped with the necessary life-saving equipment such as life jackets.

Nea Philadelphia, 08th of April 2025

THE CHAIRMAN
G. Dritsakos

THE MEMBERS

C. Valaris

G. Flessas

P.Evgenikos

THE SECRETARY

V. Fouseki

5 ANNEX

5.1 Aircraft and Engine Parameters from the APIBOX Recording System

Table 2 shows some of the aircraft and engine parameters taken from the APIBOX recording system.

More specifically, the columns from left to right show the time (Time UTC), altitude in feet (Alt ft), ground speed (Ground Speed kt), compressor speed (NG RPM), propeller speed (NP RPM), engine torque (TQ psi), fuel flow (FF gal/h), intermediate turbine temperature (ITT °C) as well as a column with notes.

Table 2

UTC Time	Alt	Ground Speed	NG	NP	TQ	Fuel Flow	ITT	Remarks
HH:MM:ss	ft	kt	RPM	RPM	psi	gal/h	°C	
09:42:02	97	0	0		0.2	0	14	A/C on the ground
09:42:05	97	0	17.9		0.6	7	15	Engine Start
09:42:19	97	0	35.9	175	2.7	16	470	Engine Start
09:45:01	98	0	53.6	1175	3.1	17	511	Engine Running on ground
09:45:02	98	0	53.6	1174	3.3	18	511	Engine Running on ground
09:46:36	99	2.2	62.9	1284	5.8	23	495	Taxi to Runway
09:48:11	90	8.9	67	1326	7.4	22	552	Taxi to Runway
09:48:29	82	16.6	74.9	1528	11.8	28	491	Previous Previous post: Before Rolling - Start
09:48:37	81	19.7	90.4	2021	34	53	539	Rolling
09:48:50	85	54.5	93.3	2010	41.6	51	592	Rolling
09:49:04	150	76.6	93.4	2014	42	49	598	Lift off
09:49:23	331	84	93.3	2010	42.2	52	599	Climbing
09:49:30	459	79.7	93.3	2005	42	52	598	Climbing
09:49:40	577	82	93.4	2005	41.8	51	597	Climbing
09:49:50	645	90.3	93.2	2007	41.4	52	598	Climbing
09:49:55	698	91.9	93.3	2008	41.4	49	597	Climbing
09:50:00	756	93.8	93.3	2001	41.2	51	599	Climbing

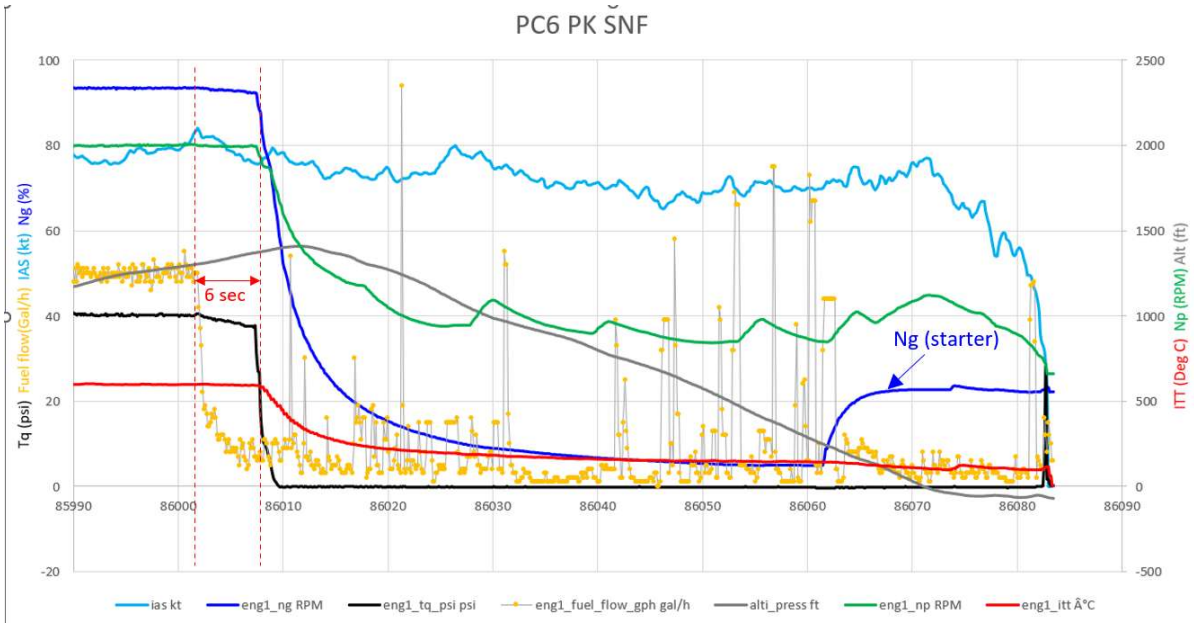
09:50:05	809	96	93.5	2001	41.2	51	596	Climbing
09:50:10	868	95.3	93.5	2003	41	50	599	Climbing
09:50:15	928	95	93.3	2001	41	48	602	Climbing
09:50:20	987	95	93.4	2002	40.7	52	602	Climbing
09:50:25	1040	95.9	93.4	2004	40.5	50	602	Climbing
09:50:30	1093	97	93.5	2003	40.7	52	600	Climbing
09:50:31	1102	97.3	93.5	2001	40.7	50	600	Pilot gave the Controls to Ops Manager
09:50:41	1265	90.1	93.5	1999	40.2	51	600	Pilot Trying to Explain
09:50:50	1390	89.3	93.4	2001	40.5	48	598	Door is open/Trying to close door
09:50:54	1427	91.1	93.3	2000	39.7	18	600	Fuel Flow decrease
09:50:55	1437	91.2	92.9	1994	39.1	12	596	Engine Parameters decreasing
09:50:56	1450	91.4	92.9	1993	38.5	8	596	Engine Parameters decreasing
09:50:57	1463	91.4	92.8	1996	38.3	7	594	Engine Parameters decreasing
09:50:58	1477	90.7	92.3	1995	37.6	4	592	Engine Parameters decreasing
09:50:59	1489	91	92.4	1995	37.3	9	594	Engine Parameters decreasing
09:51:00	1499	91.5	78.6	1872	9.3	11	562	Engine Parameters decreasing
09:51:01	1506	91.2	59	1675	0	8	472	Zero fuel flow
09:51:03	1517	87.5	39.9	1436	0	8	371	Maximum climb
09:51:04	1516	85.4	33.3	1350	-0.2	6	325	Starting descend
09:51:05	1506	84.1	27.4	1277	0	4	294	Starting descend
09:51:06	1489	82.2	23.5	1229	0	5	270	Starting right turn towards airport
09:51:07	1471	82.2	21.3	1198	0	3	257	A/C returning back to airport
09:51:08	1452	81	19.9	1187	0	10	246	A/C returning back to airport
09:51:09	1431	79.4	18.4	1178	-0.2	16	238	A/C returning back to airport
09:51:10	1410	77.2	16.8	1113	0	7	227	A/C returning back to airport
09:51:11	1389	71	15.3	1050	0	16	220	A/C returning back to airport
09:51:12	1367	71	14.2	1012	-0.2	5	214	A/C returning back to airport
09:51:13	1343	68.9	13.3	984	-0.2	14	210	A/C returning back to airport
09:51:14	1317	67.3	12.7	968	-0.2	5	207	A/C returning back to airport
09:51:15	1286	66.3	12	951	0	15	201	Mayday
09:51:16	1250	65.9	11.3	941	0	5	198	Loss of altitude
09:51:17	1215	64.8	10.6	943	-0.2	15	195	Loss of altitude

09:51:18	1181	64.8	10	945	-0.2	4	189	Loss of altitude
09:51:20	1121	64.4	9.5	989	-0.2	7	187	Loss of altitude
09:51:21	1093	65.6	9.1	1083	-0.2	7	183	Loss of altitude
09:51:22	1071	67	8.8	1070	-0.2	4	179	Loss of altitude
09:51:23	1051	67.4	8.5	1030	-0.2	5	176	180o right turn completed
09:51:24	1030	67.2	8.3	1001	-0.2	2	175	Reported issue with engine
09:51:25	1009	67.8	8	974	-0.2	1	171	Aircraft descending
09:51:26	994	65.9	7.7	951	-0.2	1	171	Aircraft descending
09:51:27	977	64.7	7.5	938	-0.2	1	169	Aircraft descending
09:51:28	959	64	7.3	921	-0.2	1	164	Aircraft descending
09:51:29	941	63.8	7	908	-0.2	2	162	Aircraft descending
09:51:30	920	63.1	6.9	899	-0.2	4	163	Aircraft descending
09:51:31	897	63.1	6.7	923	-0.2	1	160	Aircraft descending
09:51:32	872	64.6	6.6	962	-0.2	5	158	Aircraft descending
09:51:33	848	65	6.4	953	-0.2	33	158	Aircraft descending
09:51:34	825	65.6	6.3	937	-0.2	25	156	Aircraft descending
09:51:35	804	65.4	6.2	920	-0.2	2	153	Aircraft descending
09:51:36	784	64.8	6.1	903	-0.2	1	153	Aircraft descending
09:51:37	765	64.4	5.9	883	-0.2	0	153	Aircraft descending
09:51:38	743	64.8	5.8	865	-0.2	10	150	Aircraft descending
09:51:39	719	65.4	5.6	858	-0.2	3	150	Aircraft descending
09:51:40	693	65.8	5.5	851	-0.2	1	151	Aircraft descending
09:51:41	665	65.9	5.4	845	-0.2	2	149	Aircraft descending
09:51:42	638	66.1	5.3	842	-0.2	13	152	Aircraft descending
09:51:43	609	67.2	5.1	846	-0.2	12	147	Aircraft descending
09:51:44	578	67.2	5.1	850	-0.2	32	150	Aircraft descending
09:51:45	546	68.1	5	879	-0.2	5	147	Aircraft descending
09:51:46	516	68.9	5	937	-0.2	7	147	Aircraft descending
09:51:47	487	70.1	4.9	978	-0.2	13	144	Aircraft descending
09:51:48	457	70.9	5	949	-0.2	7	144	Aircraft descending
09:51:49	429	71	5	917	-0.2	1	147	Aircraft descending
09:51:50	400	70.9	5	890	-0.2	1	145	Aircraft descending

09:51:51	371	71.5	4.9	870	-0.2	14	145	Getting Ready for Ditching
09:51:52	343	71	4.9	853	-0.4	5	143	Getting Ready for Ditching
09:51:53	317	70.4	8.8	847	-0.4	44	142	Getting Ready for Ditching
09:51:54	291	69.8	16.2	928	-0.4	1	139	Getting Ready for Ditching
09:51:55	266	71.2	18.9	989	-0.4	8	136	Getting Ready for Ditching
09:51:56	242	72.1	20.8	1012	-0.2	9	131	Getting Ready for Ditching
09:51:57	220	72.4	21.6	975	-0.2	8	125	Getting Ready for Ditching
09:51:58	199	72.4	22	965	-0.2	5	123	Getting Ready for Ditching
09:51:59	174	71.8	22.3	1009	-0.2	5	120	Getting Ready for Ditching
09:52:00	147	72.2	22.5	1035	-0.2	3	115	Getting Ready for Ditching
09:52:02	88	73.1	22.7	1088	-0.2	3	110	Getting Ready for Ditching
09:52:04	37	77.3	22.7	1116	-0.2	3	102	Getting Ready for Ditching
09:52:06	16	74.6	23.3	1050	-0.2	3	123	Getting Ready for Ditching
09:52:08	5	69.8	22.8	1017	-0.2	3	115	Getting Ready for Ditching
09:52:10	7	64.8	22.6	930	-0.2	2	108	Getting Ready for Ditching
09:52:12	1	60.4	22.2	885	-0.2	2	99	Ditching
09:52:13	0	57.2	22.1	828	-0.2	47	98	
09:52:14	0	52.7	22.5	757	0	4	98	

5.2 Aircraft and engine time parameters

Graph 2 of Annex 5.2 shows some time-related aircraft and engine parameters taken from the APIBOX recording system from 07:50:41h to 07:52:15h inclusive.



Graph 2 Aircraft and engine parameters taken from the APIBOX recording system

5.3 Procedure (v02) to determine quantity of fuel in the fuel system downstream from the shut-off valve.

PC-6/B2-H4 with PT6A-27.

1. Ground the aircraft.

2. Place a suitable fire extinguisher within reach.

3. In the cockpit, close the fuel shut-off valve.
   Press the red button and rotate the valve 1⁄4 turn to the left.

4. Put absorbent paper under the fuel flow divider on the engine.

5. Disconnect the fuel line at the fuel flow divider (fitting indicated by the red arrow in Figure 1).
   Cut, remove and discard the safety wire.

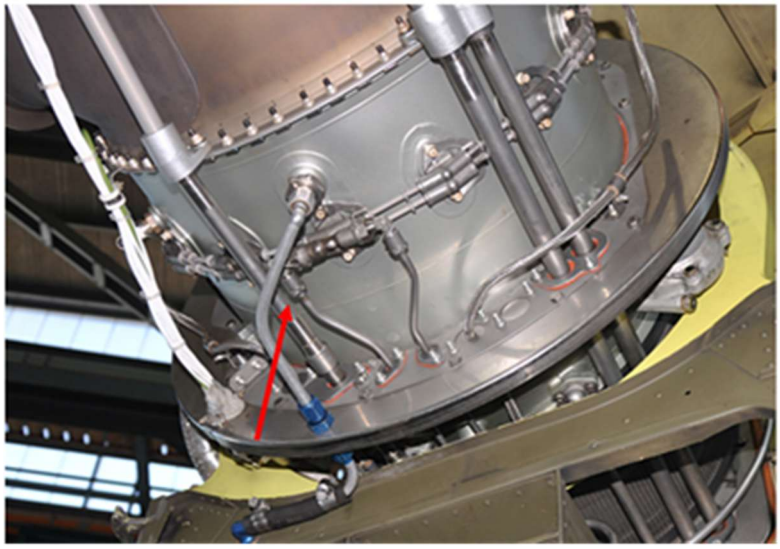


Figure 30 Fitting on the fuel flow divider

6. Collect all fuel that flows from the disconnected fuel line in a clean container.
   For example, install a 90° elbow on the fuel line and place a container under the elbow.
   Or, prepare a flexible hose with a suitable AN fitting at one end and connect it to the fitting that was disconnected in step (2). Then place the other end in a container.
   Note: The container must have a capacity of at least 3 Liters.

7. Put absorbent paper around the fuel bleed return line under the fitting indicated by the red circle in Figure 2.

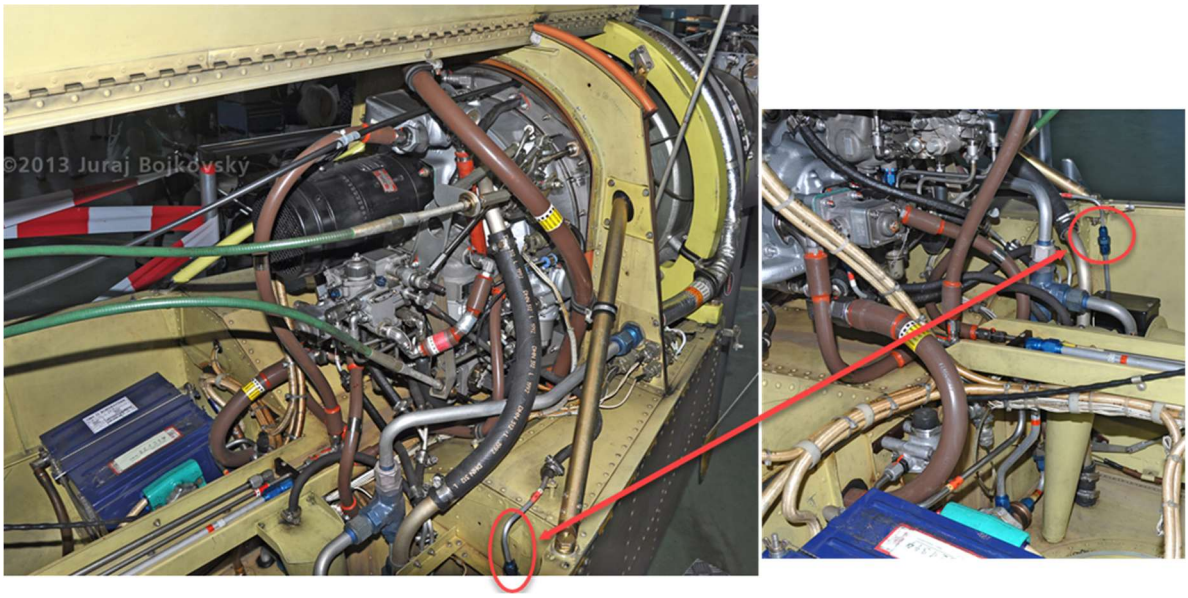


Figure 31 Fitting on fuel bleed return line

8. Disconnect the fitting on the fuel bleed return line indicated by the red circle in Figure 2.

9. Note: There should be no fuel flowing from the lower section of the line (towards the firewall). If fuel flows then this indicates a malfunction of the non-return valve. If fuel flows from the lower section, immediately re-connect the fitting and replace the non-return valve.

10. Collect the fuel that flows from the upper section (from the engine) of the fuel bleed return line in a clean container.
    Note: The container should have a capacity of at least 0.5 liter.

11. Place absorbent paper around the fuel shut-off valve.
    A small amount of fuel may flow from the fitting on the fuel outlet line at the fuel shut-off valve in the next steps (nut indicated by yellow arrow in Figure 3).

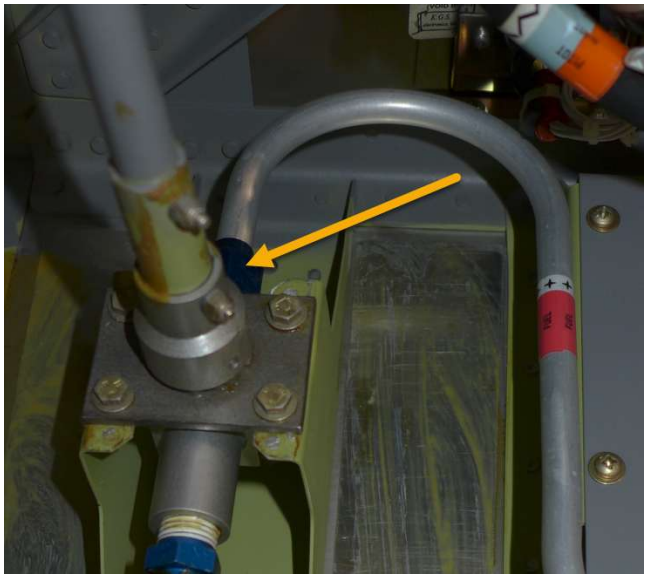


Figure 32 Fitting on fuel shut-off valve

12. Prepare for an engine motoring run.

Idle Control Lever	-	Flight Idle
Starter Switch	-	OFF
Ignition Switch	-	OFF
Generator Switch	-	OFF
Radio Master:		
Batt Radio	-	OFF
Gen Radio	-	OFF
Battery Master Switch	-	ON, CHECK VOLTAGE

13. Perform the engine motoring run (two people are required for this step).

Starter Switch - ON

AND SIMULTANEOUSLY:

Loosen the fitting on the fuel outlet line at the fuel shut-off valve and then disconnect the fitting.

CAUTION: Maintain Starter operation for 10 seconds, then allow starter to cool one minute before re-engaging.
DO NOT EXCEED STARTER LIMITATION (30 SECONDS).

14. Repeat the engine motoring run, as required, until no more fuel flows from the fuel line on the engine and from the fuel bleed return line.

Starter Switch - ON

CAUTION: Maintain Starter operation for 10 seconds, then allow starter to cool one minute before re-engaging.
DO NOT EXCEED STARTER LIMITATION (30 SECONDS).

15. Turn off electrical power.

Battery Master Switch - OFF

16. Remove the containers with the fuel collected.

17. Remove all devices (elbow, hose, etc.), if applicable, that were installed in step (5). Be sure to also collect any fuel that is trapped in the devices.

18. Connect the fitting that was disconnected in step (4) (red arrow in Figure 1). Torque the nut 90 to 100 lb in and install safety wire (ref. EMM P/N 3013242, Chapter 73-10).

19. Connect the fitting on the fuel bleed return line (red circle in Figure 2).

20. Connect the fitting on the fuel outlet line at the fuel shut-off valve (yellow arrow in Figure 3).

21. Clean any fuel spills in the cockpit or in the engine compartment.

22. Perform an engine ground run.

23. Inspect the three fittings that were disconnected during this procedure.

No Leaks Are Permitted.

24. Determine the amount of fuel collected and report to the KNKT.

25. Make a release to service in the aircraft logbook.

- - - END - -