

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
IG-512/CENIPA/2017

OCCURRENCE:	SERIOUS INCIDENT
AIRCRAFT:	PR-SEC
MODEL:	S-76C
DATE:	26AUG2011



NOTICE

According to the Law n° 7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination and execution of the activities of investigation and prevention of aeronautical accidents.

The elaboration of this Final Report was conducted taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document which reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.

The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.

The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with Appendix 2, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree n° 21713, dated 27 August 1946.

Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.

Consequently, the use of this report for any purpose other than that of preventing future accidents, may induce to erroneous interpretations and conclusions.

N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

SYNOPSIS

This is the Final Report of the 26AUG2011 serious incident with the S-76C aircraft, registration PR-SEC. It was classified as “Abrupt Landing”.

During the landing procedure on the P-35 platform, the aircraft abruptly hit the surface of the helideck.

The aircraft had limited damage in the landing gear.

The pilots and passengers were unharmed.

An Accredited Representative of the NTSB - National Transportation Safety Board – USA, (State where the aircraft was manufactured) was designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AAFD	Area of Final Approach and Takeoff
AJB	Brazilian Jurisdictional Waters
ANAC	National Civil Aviation Agency
CA	Airworthiness Certificate
CAVOK	Ceiling and Visibility OK
CB	Cumulonimbus cloud
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIV	Pilot's Flight Logbook
CM	Registration Certificate
CMA	Aeronautical Medical Certificate
CVR	Cockpit Voice Recorder
FPSO	Floating Production Storage and Offloading
IFRH	Instrument Flight Rating – Helicopter
METAR	Meteorological Aerodrome Report
NEP	National School of Piloting
NORMAM	Rule of the Maritime Authority
PCH	Commercial Pilot License - Helicopter
PLH	Airline Pilot License - Helicopter
PPH	Private Pilot License - Helicopter
SERIPA	Regional Aeronautical Accident Investigation and Prevention Service
SBFS	ICAO location designator – São Tomé – RJ
SBMM	ICAO location designator – Platform P-20, RJ
SLO	Obstacle Free Sector
TPX	Aircraft Registration Category of Non-Regular Public Air Transport
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	Model: S-76C	Operator: Senior Executive Air Taxi Ltd.
	Registration: PR-SEC	
	Manufacturer: Sikorsky Aircraft	
Occurrence	Date/time: 26AUG2011 - 1710 UTC	Type(s): "Abrupt Landing"
	Location: Platform P-35	
	Lat. 22°26'07"S Long. 040°04'10"W	Subtype(s):
	Municipality – State: Campos - RJ	

1.1 History of the flight.

The aircraft took off from the São Tomé Aerodrome - RJ (SBFS), to Platform P-35, at about 1650 (UTC), in order to transport personnel, with 2 pilots and 10 passengers on board.

During a landing operation, the aircraft made a short approach and touched the surface of the helideck, out of the touching area. In the sequence, it climbed and returned to the surface of the helideck, already at the limit of the touching area.

The aircraft had limited damage in the landing gear.

The 2 crewmembers and the 10 passengers left unharmed.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	2	10	-

1.3 Damage to the aircraft.

The aircraft had damage in the landing gear and in the landing gear attachment structure (Figure 1).



Figure 1- Damage in the landing gear attachment structure.

1.4 Other damage.

Nil.

1.5 Personnel information.**1.5.1 Crew's flight experience.**

	Hours Flown	
	Pilot	Student
Total	2.900:00	1.100:00
Total in the last 30 days	31:38	28:22
Total in the last 24 hours	04:28	04:28
In this type of aircraft	2.337:00	772:00
In this type in the last 30 days	31:38	28:22
In this type in the last 24 hours	04:28	04:28

N.B.: The Data on flown hours were obtained from the Pilots' Flight Logbook records.

1.5.2 Personnel training.

The Commander took the Private Pilot course - Helicopter (PPH) at the National School of Piloting (NEP) - RJ, in 1999.

The Student took the Private Pilot course - Helicopter (PPH) at the National School of Piloting (NEP) - RJ, in 2007.

1.5.3 Category of licenses and validity of certificates.

The pilot had the Airline Pilot License – Helicopter (PLH) and had valid Technical Qualification for aircraft SK-76 and IFRH.

The Student had the Commercial Pilot License – Helicopter (PCH) and had valid Technical Qualification for aircraft SK-76 and IFRH.

1.5.4 Qualification and flight experience.

The instructor was qualified and had experience in that kind of flight.

The student was qualified to perform that type of flight and was receiving instruction for operational elevation to the Commander function.

1.5.5 Validity of medical certificate.

The pilots had valid Aeronautical Medical Certificate (CMA).

1.6 Aircraft information.

The aircraft, serial number 760538, was manufactured by Sikorsky Aircraft, in 2003 and was registered in the category of Non-Regular Public Air Transport (TPX).

The Certificate of Airworthiness (CA) was valid.

The airframe and engine logbooks records were updated.

The last inspection of the aircraft, the "50 hour-type" was performed on 24AUG2011 by the Senior Executive Air Taxi Ltd., Macaé – RJ, having flown 06 hours and 42 minutes after the inspection.

The last overhaul of the aircraft, the "1500 hour-type" was performed on 31JUL2011, by the Senior Executive Air Taxi Ltd., Macaé – RJ, having flown 51 hours and 42 minutes after the inspection.

1.7 Meteorological information.

The conditions were favorable for the visual flight.

The P-20 Platform (SBMM) local weather report (METAR), about 5 nautical miles from the scene of the crash, contained the following information:

SBMM 261700Z 34018KT CAVOK 24/21 Q1019 W///S4 =

It was verified that the conditions were favorable for the visual flight, with visibility over 10km, no existing cloud below 1,500m, absence of CB-type clouds and any significant weather phenomenon. The wind had the direction of 340 °, with intensity of 18kt.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

The helideck presented technical conditions for helicopter landings and departures during the daytime period and for landings and takeoffs, in an emergency, at night.

The altitude in relation to the sea level was 23 meters.

The maximum length of the largest helicopter to operate was 20.88 meters.

The helideck, located in the rear of the ship, and in a lower position in relation to the Floating Production Storage and Offloading (FPSO) "PETROBRAS 35" (P-35) structures, was certified considering the concept of stationary, or either at a fixed point, of predetermined coordinates, and must operate at 22°26'07 "S / 040°04'10" W.

The aforementioned helideck was located at the rear of the ship (Figure 1).



Figure 1 - View of the FPSO P-35, with emphasis on the helideck at the rear of the ship.

According to information from PETROBRAS, the two chimneys located at the rear of the platform, just above the helideck, were no longer in operation. They served only to circulate air between the deck of the ship (Figure 2).

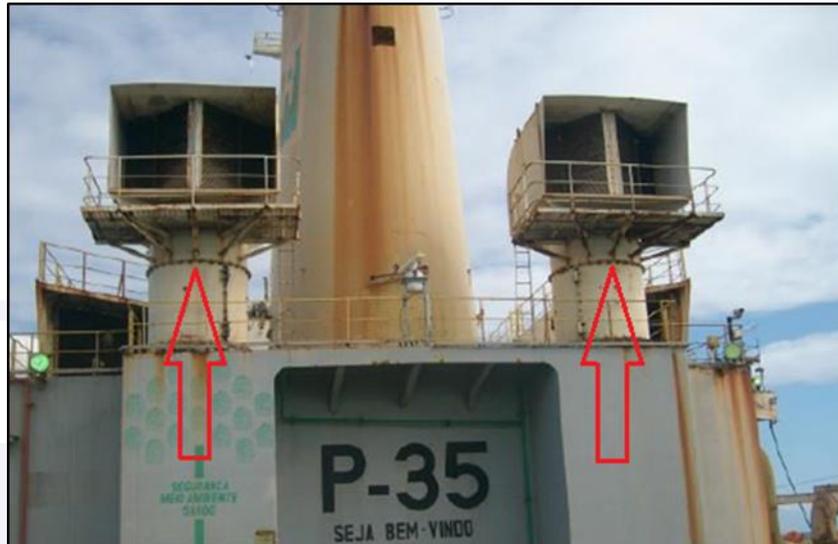


Figure 2 - View of the two chimneys in the stern of platform P-35.

Once, they served to release gases from the propulsion system. However, this system was removed on the conversion of the ship into a stationary platform.

1.11 Flight recorders.

The aircraft was equipped with a Cockpit Voice Recorder (CVR), type AR-602C, manufactured by the Honeywell Company, which was sent to the CENIPA'S LABDATA. The voice records were preserved under conditions of use and validity.

The recorded data showed that the crew noticed an excessive sinking of the aircraft in the short end.

1.12 Wreckage and impact information.

The first touch of the abrupt landing occurred outside the touching area, at the limit of the final approach and takeoff area (AAFD) and very close to the helideck protection net (Figure 3).



Figure 3 - Location of the first touch point.

According to the Maritime Authority Standard (NORMAM 27) for the approval of helidecks installed in ships and offshore platforms:

Area of Final Approach and Takeoff (AAFD) – it is the area in which the final phase of the approach maneuver for hovering or landing is completed and at which the takeoff maneuver is initiated; and

Touching Area: it is part of the Final Approach and Takeoff Area (AAFD), with dimensions defined by a circular band in yellow color, which contains the identification mark "H", in which the touch of the helicopter is recommended when landing.

It is highlighted, next, the trajectory covered by the PR-SEC in the short end to the landing in the helideck of the P-35 (Figure 4).



Figure 4 - Short end for landing in the helideck.

It can be seen that, after the first touch outside the touching area, the aircraft jumped, and stopping at the limit of this area (Figures 5, 6, and 7).



Figure 5 - Moment of the first touch of the abrupt landing outside the touching area.



Figure 6 - Detail of the "jump" after the first touch.



Figure 7 - Breakpoint of the aircraft.

The cameras located in the platform's helideck captured the sequence.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

Not Investigated.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

The pilots, who had previously operated together on the P-35 platform, enjoyed a friendly relationship and mutual trust.

The flight's crew was the same to see wreckage on the sea of their company's aircraft, which had crashed the previous week, victimizing co-workers. They were also the first to visualize the empty boats, soon after the accident, since they accompanied the flight by the "fonia", just before the occurrence.

According to interviews, carried out by the company shortly after this accident, these crewmembers seemed fatigued and depressed, showing a dejected mood due to what happened.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

Nil.

1.18 Operational information.

The aircraft was within the weight and balance parameters specified by the manufacturer. The aircraft, whose maximum takeoff weight was 11,700 Lb, took off from the São Tomé Aerodrome (SBFS) weighing 11,539lb, and at the time of landing, it was with 11.229lb. The destination of the aircraft was the P-35 platform.

The commander had been promoted to the role of instructor of that aircraft a short time ago, and was instructing in that model for the first time, that is, he occupied the seat on the left, after a long period flying in the seat on the right.

The instructional pilot, who had always occupied the left seat, was beginning the instruction phase for operational elevation to the commander's role on the right seat.

In this type of platform, whose anchorage is of Turret type, there is a tendency of the platform to be aligned with the wind. In these conditions, according to reports from pilots experienced in offshore operation, air mass turbulence in the vertical of the helideck can occur, with the possibility of descending bursts, due to the passage of the wind through the vertical structures of the ship.

The Turret anchorage allows the ship to move freely around the Turret, a kind of pivot located on the front of the ship, in which the mooring ropes are fixed to the bottom of the sea (Figure 8).

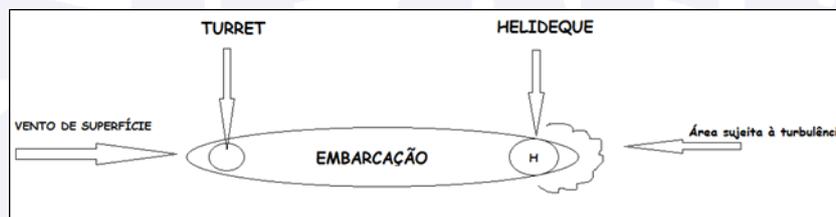


Figure 8 - Turret anchorage.

With this type of anchorage, the ship, in fact, tends to align with the wind, but is also influenced by the direction of the waves' movement and the surface sea current.

The pilots were well aware of the characteristics of that helideck, since they had operated there before, and also knew their restrictions and recommendations regarding the care of the landing and take-off operations in cases of strong winds and mainly aligned with the longitudinal axis of the ship.

The pilots reported that when they reached the P-35 traffic circuit, weather conditions were favorable and the wind, which was 340° of direction and 18kt of intensity, apparently did not compromise the safety of the operation.

In this way, after performing the normal expected procedures and confirming that the helideck was clear of obstacles, they continued to land. The approach was made within the obstacle-free sector in accordance with operational standards, and smoothly until the entry into its final segment. However, the trajectory described by the aircraft in the short final approach did not guarantee the landing at the center of the touching area, which occurred at the limit of the Final Approach and Takeoff Area (AAFD), next to the protection net.

The platform was steered with 011 ° heading, which indicated an angular misalignment around 030° between the direction of the wind and the longitudinal axis of the platform. According to the pilots, this difference was not sufficient to ensure that the vertical air mass of the helideck was "clean" (jargon used to indicate that the mass of air on the helideck is free of turbulence, bursts, exhaust gases ...).

From the images record of the final segment of the approach, it was observed that the approach axis of the aircraft almost coincided with the direction of the wind, between 330° and 340° (Figure 9)

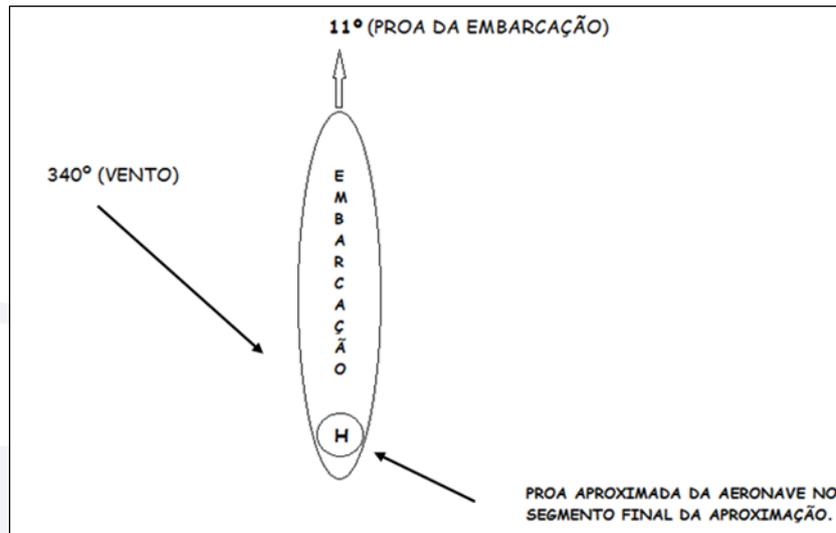


Figure 9 - Sketch of the approach.

The images captured by the helideck cameras showed that the approach was performed with the platform to the right of the axis and with the nose slightly up. In this profile, the occupant of the left chair, the instructor, had his helideck field of vision substantially reduced, especially in the last stretch of the approach.

The aircraft commander who, during the interviews, stated that he had not seen the helideck in the final stretch of the approach confirmed this condition.

The approach profile, required for platform landing, when performed on an S-76 aircraft, usually results in a visibility restriction in its final segment for the occupant of the seat located in the opposite side of the landing.

It could also be observed from the recorded images that the bow of the aircraft was out of phase with the longitudinal axis of the ship. The touch of the aircraft in the helideck was performed almost transverse to the axis of the platform (Figure 7).

The instructor reported that he and the student were well aware of the limitations of that type of platform, and for this reason have always been cautious in that type of operation. He said that "after a controlled approach", in the short final, the aircraft lost the lift near the touching area, due to the "turbulence caused by the structure of the ship", and that the pilot tried to cushion the landing using power, but it was not used in its entirety.

The pilot said that he did not actually apply all the available power to avoid an abrupt touch, because he thought that when he got close to the touching area he could rely on the ground effect to help reduce the sinking rate and, consequently, conditions to land safely.

He further stated that although he considered the possibility of any change in the air mass near the helideck in order to increase the sinking rate of the aircraft, he did not feel any abnormal vibration or turbulence during approach.

1.19 Additional information.

NORMAM 27, a document of the Brazilian Navy, which had the purpose of establishing instructions for registration, certification and homologation of helidecks located on ships or offshore platforms operating in Brazilian Jurisdictional Waters (AJB), defined, among other requirements:

- the location of a helideck on fixed offshore platforms, merchant ships and offshore ships is almost always a compromise between the various basic requirements of the project, such as space constraints and the need to perform various functions;

- the location of the helideck must be carefully chosen to meet these different needs;
- the AAFD must be positioned, in relation to the other structures, in such a way that there is an **Obstacle Free Sector (SLO)** above and below the level of the helideck that allows an aircraft to approach and take off safely or even if it presents loss of engine power;
- The AAFD must also be located in order to minimize the occurrence of turbulence on the helideck, caused by the wind flow in the structures of the installation;
- there shall be no burner combustion gases, which alter the environmental parameters for which the flight was planned. Sudden increases in ambient temperature may cause decreased engine performance and rotor efficiency at a critical stage of the helicopter operation. Designers should therefore be very careful about the location and elevation of gas discharges from AAFD;
- the project must provide for the installation of several environmental conditions sensors in the helideck area in order to provide pilots with as a faithful picture of the conditions in the AAFD as possible. Motion sensors must be positioned on the floor of the helideck. If it is not possible, the displayed values of pitch, roll, heave, heave rate and inclination should be corrected for the height and position of the helideck, while thermometers and wind sensors must be installed, mandatorily, near the helideck;
- in cases where not all the parameters established in this standard for the design of the helideck can be fully satisfied, it may be necessary to impose restrictions on helicopter operations; and
- the touching area should be in the center of the AAFD.

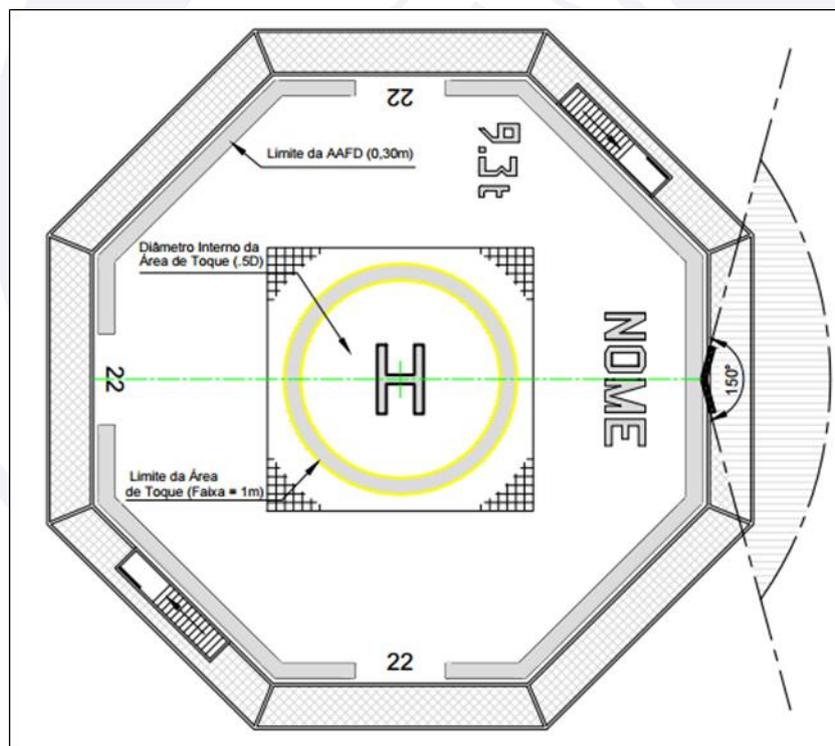


Figure 10 - Limits of the touching area and the AAFD.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

The commander was an experienced pilot, he had 2,337 hours of flying time on that model, and had been promoted to the role of instructor in that aircraft a short time ago. The flight object of this investigation was his first ministering instruction in the S-76, that is, he occupied the seat on the left, after a long period flying in the seat on the right.

The pilot receiving the instruction had more than 700 hours of flying in that model, always occupying the left seat, and he was beginning the instruction phase for operational elevation to the commander's function. For this reason, he was occupying the right seat.

The aircraft, whose maximum takeoff weight was 11,700bp, took off from São Tomé Aerodrome (SBFS) weighing 11,539lb and at the time of landing, it was weighing 11,229b.

The FPSO P-35 was a stationary type of platform ship, with predetermined coordinates. In this type of platform, the anchorage allows the ship to move freely around the turret, a kind of pivot located in the front of the ship, in which are fixed the moorings that hold it in the seabed. In this case, in general, the longitudinal axis of the ship tends to be aligned with the wind.

In addition, the P-35 had a helideck located in the rear of the ship, and in an inferior position to the structures of the boat.

This type of construction favored the occurrence of turbulence, originated by the wind flow in the structures of the installation.

The investigation found out that the pilots were well aware of the characteristics of that helideck, since they had operated there before, and were also aware of their restrictions and recommendations regarding the care of landing and take-off operations in the case of strong winds and mainly aligned with longitudinal axis of the ship.

During the flight, following the execution of the visual traffic circuit and confirmation that the helideck was clear of obstacles, the final landing approach axis was defined, which the course was practically coincident with the direction of the surface wind, between 330° and 340°. In the field of vision of the pilots, the boat was to the right.

The wind informed moments before the occurrence was of 340° of direction, with intensity around 18kt. The bow of the ship was aligned at 011°, that is, the ship was not totally aligned with the wind. In this case, there was an angular difference around 30° between the bow of the boat and the wind direction.

This fact indicated that the conditions were favorable to land and take-off operations. That is, they suggested that the wind could be "clean" (jargon used by pilots to indicate which airflow over the helideck is free of turbulence, bursts, exhaust gases, etc.).

However, the possibility of a sudden change in the conditions of the air mass near the helideck cannot be completely ruled out, which, presumably, may have created the necessary conditions for increasing the sink rate in the short end.

The location of the helideck, at the stern of the ship and in a lower position in relation to the vertical structures, favored wind turbulence and the occurrence of descending flows in the touching area.

Even if there was no turbulence in the final approach area, a probable loss of wind effectiveness in the short end, caused by a change in its direction, would imply a necessary anticipation in the application of the engine power to the landing.

Therefore, the landing approach occurred according to the operational rules, guided by the wind, within the obstacle-free sector and without problems until the entry into its final segment.

However, the instructor's vision was obscured by the position of the aircraft relative to the platform and by its flying attitude that was slightly up.

The condition described above, fit the profile of the standard approach employed by the S-76 in its final phase. In this profile, only the pilot in instruction, that is, the occupant of the right seat had the total visualization of the helideck in the final segment of the approach.

In this sense, enough evidence was found to support the condition that there was a restriction of the instructor's field of vision, as can be confirmed in the captured images. They demonstrated that, in those conditions, with the platform on the right and with the up attitude, it was not possible for the occupant on the left seat to visualize the touching area in the final segment.

This interpretation corroborates with the finding that there was also an angle discrepancy between the bow of the aircraft and its approach axis in the short end, causing the aircraft to approach in an almost transversal course in relation to the longitudinal axis of the platform. In this way, it can be deduced that this aspect also contributed to the restriction of the instructor's field of vision.

Because of his restricted vision, the instructor may have had difficulty guiding the pilot in the final stretch of the approach and therefore no longer alerted or interfered with the flight commands to alleviate the sinking reason and avoid the abrupt touch.

It is expected that the instructor, as a facilitator of learning, will present higher levels of attention and perception during an instruction, considering the possible needs for corrections and interventions on the student's operation, reversing situations of non-conformity during the flight.

In the case of the instructor on board, this expectation was even greater, since it was the first instruction he assumed in flight. However, it was also known that the pilots, having already flown together sometimes, already had a well-established flight dynamics, reinforced by the friendly and reliable relationship they maintained between them.

In this sense, the team dynamics kept between them, added to the difficulty of the instructor to visualize the touching area in the final segment, may have favored his confidence in the student to conduct the approach in the final without a more restricted visual and operational monitoring. Mainly because it was not the first time that crew landed with the S-76 in that helideck.

Although previous landings in the locality have occurred in a differentiated condition, with the pilot instructor operating on the right seat as flight commander, successful previous experiences generally reinforce a natural tendency of the human element to rely on the success of these results to substantiate attitudes, which they think are similar to those that have been successful.

In this case, as the instructor had already landed with the student in that helideck, although not in the instructor condition, it is possible that this reinforced his safety to repeat it, impairing the maintenance of the levels of situational awareness required to the instructor at that moment, making it difficult to adopt necessary measures to avoid the serious incident.

Consequently, the student went beyond the limits of the irreversibility of the incident, to the point of precluding the safe approach to the area in which the landing would be successfully completed.

It was not possible to discard the hypothesis that the feeling of fatigue and discouragement experienced by the pilots during the previous week, due to the death of work colleagues in an aeronautical accident, influenced the instructor and student's willingness to instruct flight. Such an event may have sharply depressed the mood of these crewmembers, favoring a climate of tolerance in the cabin, inhibited instructor initiatives to correct the student, given the relationship of mutual trust already reported between them.

The situation described above was known by the management of the company, which apparently did not consider such factors for proper management of the risks involved in the crew recruitment, still emotionally mobilized about the death of co-workers from the same organization.

It can be inferred that there may have been inadequate managerial planning regarding the pilots schedule, given that, in addition to the already narrated fact, this was the first flight of the commander as an instructor, and the student was initiating the instruction phase to assume the role of commander of that aircraft model.

The student pilot reported that he did not apply all the available power to avoid an abrupt touch, because he judged that, when he reached the touching area, he could rely on the ground effect to help reduce the sinking rate and, consequently, land safely.

This expectation proved to be misleading since the aircraft made an abrupt landing, outside the touching area, at the limit of the AAFD, next to the protection net. In this way, it can be affirmed that there was a failure of judgment related to the inadequate performance of the commands in an effective way, since all the available power was not used to try to correct that flight condition.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilots had valid Aeronautical Medical Certificate (CMA);
- b) the pilots had valid SK-76 and IFRH Technical Qualifications;
- c) the pilots were qualified and experience in that kind of flight;
- d) the aircraft had valid Airworthiness Certificate (CA);
- e) the aircraft was within the weight and balance parameters specified by the manufacturer.
- f) the airframe and engine logbooks records were updated;
- g) the aircraft took off from the São Tomé Aerodrome (SBFS), to Platform P-35, to carry out an air transport and instruction flight;
- h) the commander was performing his first mission as an instructor on the aircraft;
- i) the student was beginning the instruction phase to ascend to the function of commander;
- j) The P-35 was a stationary type of platform ship, from affixed point, with predetermined coordinates.
- k) the helideck was located at the rear and bottom of the platform ship;
- l) this positioning did not meet all the parameters recommended in NORMAM 27, regarding the position of the Final Approach and Takeoff Area (AAFD);
- m) the helideck was subject to the turbulence of the air mass, with the possibility of descending bursts, due to the passage of the wind by the vertical structures of the ship;
- n) in the turret-type anchorage, the ship tends to align with the resultant surface wind, direction of wave movement and surface sea current;
- o) the pilots were well aware of the helideck's characteristics, its restrictions and the recommendations regarding the care with landing and take-off operations;

- p) the approximation was carried out according to the operational rules, within the obstacle-free sector;
- q) the maximum takeoff weight of the model was 11,700 lbs. São Tomé's takeoff weight was 11,539lb, and the platform's landing weight was 11,229lb;
- r) the wind at the time of the occurrence was with 340° of direction and 18kt of intensity, and the ship was on course 011°;
- s) the approach axis of the aircraft in the final segment of the approach was coincident with the direction of the wind, between 330° and 340°;
- t) in the final approach, the boat was on the right side of the field of vision of the pilots;
- u) in the final segment of the approach, the instructor could not visualize the helideck;
- v) the final trajectory described by the aircraft did not guarantee landing in the touching area;
- w) the aircraft made an abrupt landing, outside the touching area, at the limit of the AAFD, next to the protection net;
- x) the aircraft had limited damage in the landing gear; and
- y) The pilots and passengers were unharmed.

3.2 Contributing factors.

- **Handling of aircraft flight controls – a contributor.**

The circumstances under which this one occurred indicated that the pilot did not apply the commands properly, since in the final segment of the approach to landing, the aircraft was driven to a flight condition whose trajectory and sinking rate precluded reaching the central area of the touching zone.

- **Attention – undetermined.**

The instructor's field of vision in the final stretch of the approach was restricted. This may have impaired his adequate attention to external stimuli, interfering with the quality of the student's orientation and possible intervention on the flight commands, in order to alleviate the sinking rate and avoid the sudden touch of the helicopter.

- **Tasks characteristics – undetermined.**

The profile of the approach required for platform landing, when performed in an S-76 aircraft, naturally results in a restriction of the visibility, in its final segment, to the occupant of the seat located on the opposite side of the landing, impairing the precise perception of this crewmember over the entire external environment.

- **Emotional state – undetermined.**

Considering the relationship of trust maintained between the pilots, by the history of operations that they already had together, it was not possible to discard the hypothesis that the feeling of fatigue and discouragement experienced by the same ones in the previous week, due to the death of co-workers in an aeronautical accident, has favored a climate of tolerance in the cabin. This may have inhibited instructor initiatives for the student correction.

- **Team dynamics – undetermined.**

The friendly and dependable team dynamics kept between the pilots because of their history of operations together, coupled with the instructor difficulty of viewing the touching area in the final segment, may have favored his confidence in the student to perform the

approach in the short final. Without a more limited visual and operational follow-up, especially since it was not the crew's first time landing with the S-76 in that helideck.

- **Airport infrastructure – undetermined.**

The P-35 had a helideck located in the rear of the ship, and in an inferior position to the structures of the boat. This positioning did not meet all the parameters recommended in NORMAM 27, regarding the position of the Final Approach and Takeoff Area (AAFD).

It is possible to infer that the mass of air passing through the structure of the ship may have come swirling on the helideck, or that has caused descending bursts in its vertical, making it difficult to control the aircraft in the short final.

- **Instruction – contributed.**

The instructor, based on his experience and observation of the available parameters, should have been able to identify the situation in a timely manner and take the necessary steps to avoid the incident.

Failing to properly analyze all the variables present, the instructor consented that the training pilot exceeded the limits of the irreversibility of the incident, to the point of precluding the safe approach to the area in which the landing would be successfully completed.

- **Piloting judgement – a contributor.**

The pilot stated that he did not apply all the available power to avoid an abrupt touch because he judged that, when he reached the touching area, he could rely on the ground effect to help reduce the sinking rate and, consequently, land safely. This expectation proved to be wrong since the aircraft made an abrupt landing outside the touching area and at the limit of the AAFD near the protection net.

- **Perception – undetermined.**

The instructor's restricted view of the external environment to his right in the final stretch of approach; the dynamics of a friendly and reliable team historically established among pilots; and the possible climate of - greater cabin tolerance due to the emotional state of the pilots, may have contributed to the maintenance of lower situational awareness than the one required by the instructor, impairing adequate levels of alertness that should be kept in an instructional condition.

- **Organizational processes – undetermined.**

Scheduling a crew still emotionally mobilized about the death of co-workers from the same organization has proved to be an inadequate organizational process that may have hampered the maintenance of situational awareness necessary for conducting an instructional flight.

- **Management planning – undetermined.**

The possible contribution of this aspect is related to the planning performed by the company, at the managerial level of the air activities. Especially regarding the allocation of human resources to carry out an instruction flight, in which this would be the first flight of the commander as an instructor of that aircraft model, for a pilot who was making his first flights on the right seat, justly for operational elevation to the commander's function.

4. SAFETY RECOMMENDATION.

A measure of preventative/corrective nature issued by a SIPAER Investigation Authority or by a SIPAER-Link within respective area of jurisdiction, aimed at eliminating or mitigating the risk brought about by either a latent condition or an active failure. It results from the

investigation of an aeronautical occurrence or from a preventative action, and shall never be used for purposes of blame presumption or apportion of civil, criminal, or administrative liability.

In consonance with the Law n°7565/1986, recommendations are made solely for the benefit of the air activity operational safety, and shall be treated as established in the NSCA 3-13 “Protocols for the Investigation of Civil Aviation Aeronautical Occurrences conducted by the Brazilian State”.

Recommendations issued at the publication of this report:

To the Brazil’s National Civil Aviation Agency (ANAC):

IG-512/CENIPA/2017 - 01

Issued on 17/05/2018

Act with the airlines to provide offshore services in order to adopt measures aimed at objective actions of risk management, considering the possibility of turbulence and descending airflows during landing and takeoff operations in helidecks with similar characteristics to the P-35, especially when the surface wind is aligned with the longitudinal axis of the platform.

IG-512/CENIPA/2017 - 02

Issued on 17/05/2018

Act with the offshore aviation operators in the sense that their respective operations sectors include in their training programs and crew formation specific criteria regarding the schedule of crewmembers under instruction, in order to avoid that newly graduated instructors fly with students who are in early phases, regardless the student's total flight experience.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

The operating company provided specific psychological support for the two pilots involved and began structuring a human factors management system for technical crews.

On May 17th, 2018.