

Applicability: All Helicopter AOC Holders

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1 HELICOPTER OFFSHORE OPERATIONS – CROSSWIND CONSIDERATIONS

1.1 Introduction

1.1.1 The Air Accidents Investigation Branch (AAIB), in Report No. 3/04 has published its findings from the accident to Eurocopter AS332L Super Puma, G-BKZE, onboard the West Navion drilling ship 80 nautical miles West of the Shetland Isles on 10 November 2001.

1.1.2 The helicopter landed on the helideck of the ship and was being refuelled with the rotors running. The commander remained on board whilst the co-pilot disembarked and assisted the ship's crew. About five minutes after landing, unknown to the pilot and unnoticed by the ship's crew, the West Navion's Dynamic Positioning (DP) system reverted to Manual heading control and the ship's heading started to drift slowly to the right. The wind at that time was westerly at 32 kts with gusts to 42 kts, and, as the ship's heading drifted, the helicopter was subjected to an increasing crosswind component from the left. Seven minutes after the ship's heading started to drift, the helicopter toppled over to its right. The helicopter came to rest on its right side and the co-pilot, who was the only person outside the helicopter on the helideck, was severely injured by flying debris.

1.1.3 Other instances of unexpected helicopter roll, during offshore helideck operations, have been reported. The most recent involved another AS332L whilst stationary, rotors running, on the fixed deck of the Tartan A platform. In this incident, the helicopter rolled to the left by approximately 10° when, due to a passing squall, there was a marked veer in the wind with strong gusts giving an estimated crosswind component of 27 kts from the right. The co-pilot, alone in the cockpit but with passengers, elected to take-off and fly a circuit before re-landing and recovering his commander, because of his concern for the safety of the helicopter.

1.2 Discussion on the West Navion Accident

1.2.1 Weather conditions on the day were demanding but within specified operating limits. Having ascertained that ship motion limits had not been exceeded, the investigation concentrated on the combination of aerodynamic and inertial forces to which the helicopter had been subjected.

1.2.2 An analysis of the forces acting on the helicopter indicated that aerodynamic forces, arising from the increasing lateral wind component to which the helicopter was subjected as the ship yawed to the right, caused the most significant toppling moments. Research indicates that with minimum collective pitch applied (MPOG), the main rotor can still develop a significant amount of lift. Indeed, the lift developed by the Sikorsky S76 when on the ground is known to be approximately 30% of its weight in a 20 kts wind. Whilst crosswind limits are published for hovering flight and rotor engagement, no such limits are available to flight crews conducting parked, rotors running, operations.

- 1.2.3 Simply applying a crosswind limit would be unsound without taking into consideration the effects of deck motion, aircraft mass and loading, total relative wind and when inclement weather conditions are forecast or observed. A change in wind direction after touchdown could lead to an increase in crosswind component and due account of the probability of a significant change in wind direction should be considered. The effects of crosswind are not symmetric and depend, to a large degree, on the direction of rotation of the helicopter's main rotor.
- 1.2.4 The attitude of the helicopter on deck was also considered a factor. On landing, the helicopter adopted a 2.5° roll attitude to the right, relative to the surface of the helideck, due to the effects of the landing gear geometry and the normal procedure of landing with the parking brake applied. After landing, it is now recommended that the helicopter attitude is levelled as near as possible in relation to the deck. Releasing and reapplying the brakes to let the helicopter settle may help to achieve this.

1.3 Observations

- 1.3.1 The lift generated by the main rotor system of a helicopter running at MPOG on a helideck can be as much as a third of the mass of the helicopter at wind speeds as low as 25 kts.
- 1.3.2 Main rotor lift on deck has a major influence on whether the helicopter will tip or slide when the helicopter is subjected to other forces. The lift generated will be minimum when the helicopter is facing directly into the wind (mast tilt) or the rotor disk is angled into the wind (cyclic displacement).
- 1.3.3 Crosswind components as low as 25 kts can be significant in contributing to the conditions likely to cause a helicopter to topple when on a helideck with rotors running at MPOG.
- 1.3.4 A fuselage roll attitude, other than level relative to the helideck, can be a significant factor in contributing to the conditions likely to cause the helicopter to topple when located on a helideck rotors running at MPOG.

1.4 Further Research

- 1.4.1 Information for classifying helidecks, via the Helideck Limitations List (HLL) and imposing pitch, roll and heave operating limits has been in use for many years, and was derived empirically rather than by scientific analysis. The CAA is conducting ongoing research into the measurement of helideck motion and the associated forces on helicopters on deck. Operating limitations in future are likely to be set using a helideck acceleration-based motion severity index (MSI), a wind severity index (WSI), individual helicopter operating limits and a helideck status scheme to control deck-handling procedures. As a result of the latest incident it may be that a modified system, omitting the deck motion element, would be appropriate for fixed helidecks.
- 1.4.2 This work has revealed the difficulty in setting pure crosswind limits for deck operations and the CAA considers that the optimal way to progress the spirit of the AAIB Report No. 3/04 recommendation is to actively support the ongoing work on the MSI/WSI to its conclusion and implementation. In the meantime, operators should remain cognisant of the effects of crosswinds, gusts and deck motion on deck operations and take appropriate action to mitigate the hazards as far as is practical.

1.5 Recommendations

- 1.5.1 **Operators conducting operations to offshore helidecks, whether fixed or moving, should produce guidance for crews covering at least the following topics:**

FLIGHT OPERATIONS DEPARTMENT COMMUNICATION - 10/2005

Procedures for operating on decks during adverse weather conditions, including squalls

- Aircraft attitude levelling on deck
- Crew remaining at the controls
- Procedures for passenger changeover
- Refuelling.

Captain M A Vivian
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14 April 2005

Recipients of new FODCOMs are asked to ensure that these are copied to their 'in house' or contracted maintenance organisation, to relevant outside contractors, and to all members of their staff who could have an interest in the information or who need to take appropriate action in response to this Communication.

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