The Global Voice of Pilots

IFALPA

POSITION PAPER

25POS28
14 November 2025

Tailwind Operations

NOTE

This paper supersedes 18POS06, of the same name.

INTRODUCTION

Wind and all associated characteristics, such as cross- and tailwind, shear, turbulence, vortices, and gusts, are impactful for the execution of daily flight operations. Wind influences not only the aircraft's take-off and landing performance but also the aircraft handling characteristics and the piloting task in the approach and landing phase. This position paper focuses on the specific operational risks of flight operations in a tailwind.

Given the stochastic nature of wind speed and direction and the absence of accurate and timely wind speed measurements and reports, the hazards related to tailwind operations warrant a cautious approach and margins to maximum tailwind limitations and recommendations. To conduct flight safety in tailwind conditions, the related risks should be addressed, and a robust safety study should be the basis of any tailwind operation, training or runway assignment. Potential shortcomings in regulations, wind measurement, and training must be clearly identified to establish and implement the relevant mitigating measures.

HAZARDS AND SHORTCOMINGS

In many tailwind-related accident reports, several contributing factors have been identified: piloting techniques, poor decision making, runway assignment, wind changes, reporting inaccuracies and runway conditions. Related to these contributing factors, multiple shortcomings in training, operational procedures and regulations can be identified, which create a typical risk in the tailwind operation and require a mitigating strategy or a conservative approach. These shortcomings are listed in combination with proposed IFALPA position statements.

IFALPA POSITION

A. Flight Procedures

- Approach procedures should be designed in a way that allows pilots to execute safe flights according to stabilized approach criteria. A stable approach reduces the pilot's workload and the likelihood of a long flare, a long landing and runway excursions, especially during tailwind conditions and in adverse weather and runway conditions.

- Tailwind limitations in the AFM or FCOM must be considered as hard limits that should not be exceeded by the crew.

- Operators should be encouraged to refuse land and hold short operations (LAHSO) with tailwinds.

- Tailwind approaches on approaches with glidepath angles greater than 3.0 degrees are not recommended.

- Operators should ensure that SOPs include adequate monitoring and cross-checking of wind conditions and path stabilization by all cockpit crew members during approach and landing.

- Pilots should be instructed to recognize limitations of FMS-derived wind information and to judge the provided indication accordingly.

- Intersection take-offs are not recommended in tailwind conditions.

- IFALPA opposes any restrictions on the use of (full) reverse thrust.

B. Wind Measurement of Tailwind

- Accurate and reliable (tail)wind information should be measured and reported to the cockpit, based on anemometers for each runway, and these should represent the actual wind in the touchdown zone according to ICAO Annex 3.

- Wind information should not only include the touchdown zone but should also be representative for the last phase of the final approach path.

- IFALPA supports the research and development of augmented (or derived) wind reports to correct the measurements for siting errors or measurement inaccuracies and to improve the representativeness for the touchdown zone.

- IFALPA opposes close-by construction developments near the runway that significantly obstruct airflow around the approach path and near the anemometer and that will affect flight path stabilization.

C. Training

- During (recurrent) training, emphasis should be put on the different flight dynamics during take-off and during the approach, flare and landing in tailwind conditions.

- IFALPA supports confirmation of training of tailwind landings during exposure flights under supervision for every type or variant.

- IFALPA supports training in bounced landing recovery techniques.

- Pilots should be trained to assess the runway excursion risk in tailwind conditions, and to assess the landing performance, taking into account the variable nature of wind and actual runway conditions.

D. ATC

- In tailwind conditions, the actual take-off wind should be provided by ATC before take-off, and this wind report should be representative of the whole runway.

- ATIS wind should not be used as the final wind report, as significant changes in the wind are possible in the period from the ATIS wind report to the actual landing/takeoff.

E. Runway allocation

- IFALPA supports the current runway assignment criteria (5 and 15 kts) for noise abatement in accordance with ICAO PANS-ATM (Doc 4444) and stresses that gusts should be included in the wind criteria.

- IFALPA believes that these criteria should equally apply for capacity enhancement or other non-operational considerations.

- IFALPA believes that noise-abatement runway assignment criteria apply for all landing and take-off runways in case of simultaneous runway use.

- IFALPA stresses that the Pilot in Command has the final authority to accept or request a runway for safety reasons and that this request should be granted.

BACKGROUND INFORMATION

Definition

For this position paper, tailwind operations are defined as take-offs, approaches, and landings in wind conditions with a tailwind component. Aircraft manufacturers publish tailwind limitations or maximum demonstrated tailwind components in the Aircraft Flying Manual. In most cases of modern airline aircraft, these are in the order of 10 to 15 kts.

The actual wind is a random phenomenon and varies in time and location. It cannot be described, measured, reported, or dealt with in an exact manner. Wind reports may deviate considerably from actual wind values (see section on Shortcomings of Wind Measurement).

Background on safety statistics

Adverse wind conditions (strong crosswind and tailwind) are involved in a significant portion of approach and landing accidents (ref. 4, 5, 6). Ref. 4 shows that in many analyzed tailwind related accidents, the actual tailwind exceeded the approved limitations.

Tailwind-related overrun accident data shows that in 70% of the cases, the runway was wet or contaminated. Clearly, the combination of tailwind and a slippery runway is hazardous and should be avoided (ref 4,6).

History tells us that in more than half of tailwind related overrun accidents, floating and/or long or bounced landings took place (ref. 6). A high tailwind on approach may also result in unwanted excessive rates of descent and higher ground speeds and result in unstabilized or rushed approaches (ref 13).

Operators should develop a method to identify tailwind hazards and unstable approaches from integrated data of flight tracks, wind conditions, navigation procedures, and aircraft parameters. FDM can indicate precursors of unstable approaches with high tailwind and these data can be used to identify critical approaches, runways and airports with respect to tailwind operations.

Hazards in tailwind conditions

- Tailwind affects the required take-off and landing field lengths, especially on contaminated runways.

- The touchdown speed and required brake energy and brake temperature is increased.

- The probability of floating and long landing is increased.

- Wake vortex separation may be reduced in the presence of a light quartering tailwind.

- The rate of descent on the final approach path may exceed 1000-1200ft/min) and may trigger the GPWS “Sink Rate” warning.

- The tailwind during approach may cause engine thrust to become as low as flight idle, which increases the engine spool up time for jet engines and makes it difficult to reduce the approach speed and configure the aircraft without exceeding the placard speeds.

Wind measurement

ICAO Annex 3 provides wind measurement and reporting recommendations. Wind measurement and its presentation to the pilot inherently create inaccuracies and uncertainties. Wind measurement is neither done at the right place (the touchdown zone, final approach path), nor at the right time (time lag). To some extent, wind reports can be seen as a simplification of the actual wind field that is present along the runway. Wind data are filtered, and the high frequency content of the wind disturbances is not represented.

Not all wind changes in direction or speed will be communicated as reporting thresholds are in place: 5 kts (for noise abatement procedures) or 10 kts and 60 degrees in direction. In particular, variations in wind direction can rapidly increase the maximum tailwind component. For example, a wind report of 210/20 may entail wind variations between 200 and 260 degrees, without necessitating a new wind report.

ICAO Annex 3 states that wind must be measured and may not be mathematically corrected for known errors, although this correction or augmentation could produce more accurate and consistent wind data for the approach path and touchdown zone.

FMS-derived wind information can be of value to the pilot, but current Flight Management Systems do not provide a reliable and accurate wind indication to pilots in gusty and crosswind conditions. Due to flight physics as well as the position of the sensors and the inertial reference system in the aircraft, the wind direction and speed are not always calculated correctly. This is especially true when the aircraft moves around the longitudinal, lateral, or pitch axis and in a side-slip condition. Different wind values might also be presented to pilots when derived from separate data sources or when the inertial reference system positions have become less accurate after long flights.

Wind modeling

It is generally recognized that the quality of wind modelling of aircraft simulator software is deficient in simulating accurate wind and aircraft behaviour near the ground. According to NLR research, the quality of the mathematical ground model in combination with the motion and visual cues of a simulator is usually not high enough to allow sufficient confidence in the crosswind or tailwind evaluation results.

Wind models used on training simulators are simplified. Simulators lack sufficiently high response times, proper ground and aerodynamic models, high frequency turbulence simulation, and terrain induced wind effects. Two-dimensional wind modelling (empirical, wind tunnel, or mathematical) has limited validity for predicting unsafe wind situations. A given complex surface situation requires 3-dimensional modelling and advanced fluid dynamics. 3D-wind modelling is therefore recommended to identify the specific wind conditions at a specific aerodrome and the related hazardous wind phenomena.

Training aspects

The lack of realistic tailwind and gusty wind conditions in simulator training should be further evaluated and may require further consolidation of the pilot’s experience during actual flights.

Extra attention should be given to the impact of tailwind when landing on slippery runways. IFALPA supports confirmation of training during exposure flights under supervision for every type or variant.

Runway orientation and allocation

Runway orientation and runway allocation have a direct impact on the encountered tailwind. According to the ICAO Annex 14 recommendation, the runway orientation of an airport should take into account the statistics of prevailing winds to guarantee a minimum usability factor (95%) for the specific aerodrome. The maximum crosswind is specified (20 kts), but not the maximum tailwind for runways with single direction use.

Actual runway assignment criteria for the actual take-off and landing are based on wind reports and forecasts and should take into account the uncertainties of wind measurements, wind reports and related tailwind hazards and have sufficient margin to the operator's tailwind limits.

Take Off Performance

Specific risks are identified for take-off in tailwind conditions. For Take-Off-Performance calculations, the highest tailwind should be taken into account (and by regulation factored by 150%) and cross-checked with actual wind readings upon take-off. In tailwind conditions, the actual take-off wind (along the runway) should be provided by ATC at the moment of the take-off.

Tail clearance may be an issue, and this risk should be addressed during training and in a crew briefing during actual operation.

Landing Performance

Landing distance increases with tailwind. As a rule of thumb, the landing distance increases by 20 percent for the first 10 kts tailwind. The runway length may become limiting and other hazards (such as runways other than dry, wind disturbances, no RESA) may become more relevant. A correct landing performance assessment before landing in tailwind conditions is of paramount importance, with the following considerations:

- The latest weather data and Runway Condition Report should be assessed before landing.
- Conservative weather and runway data should be used to calculate actual landing distances.
- Margins should be included to account for variations and uncertainties.
- Deteriorating circumstances during approach should be noted.
- Other options with increased safety margins should be considered.
- Select the correct level of automation for the approach and landing.
- Select the proper flap setting, approach speed, autobrake setting, and intended use of thrust reverse.

Wake vortices and tailwind

Separation criteria for Final Approach are based on Runway Occupancy Time (ROT) on the ground and safe wake vortex separation during approach (see ref. 4). The wake generated by an aircraft will normally descend below its flight path. In a tailwind situation, the wake may be blown back onto the glide slope, and a wake encounter is more likely than under normal headwind conditions. This phenomenon may be observed especially when the wind is not strong enough to decay the wake.

In the landing phase, this tailwind condition can move the vortices of an aircraft forward into the touchdown zone and cause a hazard to following landing traffic.

Separation minima on final approach should take wind conditions into account and prevent a hazardous wake encounter for actual wind and tailwind conditions.

REFERENCES

1. International Civil Aviation Organization (ICAO). *Annex 3 – Meteorology.* Fourth Edition, July 2004.
2. International Civil Aviation Organization (ICAO). *Annex 14 – Aerodromes.* Third Edition, July 1999.
3. International Civil Aviation Organization (ICAO). *Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS),* Document 8168, Volume I, Flight Procedures, Part IV, Chapter 2.
4. van Es, G.W.H., & Karwal, A.K. *Safety Aspects of Tailwind Operations.* NLR-TP-2001-003, January 2001.
5. *Analysis of Existing Practices and Issues Regarding Near-Ground Wind Gust Information for Flight Crews.* NLR-CR-2012-143, 2012.
6. *Safety Aspects of Criteria Governing Cross- and Tailwind.* Final Report and Recommendations, Committee on Cross- and Tailwind Criteria (Rinnooy Kan Committee), March 17, 2000.
7. *A Study on the Safety Aspects of Criteria Governing Cross- and Tailwinds.* NLR-CR-2000-082.
8. Flight Safety Foundation. *ALAR Briefing Note 8.6 – Wind Information.*
9. Federal Aviation Administration (FAA). *AC 91-79A – Mitigating the Risk of an Overrun upon Landing,* 2016.
10. International Air Transport Association (IATA). *Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices,* 2nd Edition, ISBN 978-92-9229-317-8, 2016.