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Guide to Mitigating Common Flight Risks

Top 10 Selected Flight Risk Factors in 2023

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The Most Common Risks Faced by Operators

Thousands of assessments are submitted to Nimbl's risk assessment tool every year. We've reviewed the data and discovered the top 10 selected risk factors flight departments are facing and have provided suggested mitigations.

How to mitigate risk

1 | Identify.

Complete a risk assessment to identify the primary hazards.

2 | Assess Impact.

A good risk assessment tool will do this for you automatically. It should have a set risk value for each factor previously determined by your team, automatically tally the risk score, and notify you when you have reached a medium or high-risk level.

3 | Mitigate.

Assess any elevated risk values against the department's SOPs for guidance on implementing mitigations due to higher risk levels. There are four key strategies to mitigate risk:

Avoid	Eliminate the risk.
Transfer	Share or transfer the risk to another party.
Reduce	Implement actions to help reduce the likelihood or impact of the risk.
Accept	Accept the risk as is, but carefully monitor it.

Mitigations

Aircraft

- Review deferred and inoperative equipment to ensure the aircraft will be appropriately equipped for the areas of operation.
- Ensure survival equipment appropriate to the route to be flown is on board.

Crew

- Ensure travel documents (e.g., visas, passports, vaccination records, etc.) are current and on board the aircraft, for passengers and crew members.
- Review health guidance at the destination and for any return flights.
 - Consider carrying additional medical supplies based on the health situation.

Procedural

- Review normal and emergency procedures in your International Operations Procedures Manual for the applicable areas.
  - Ensure your IOPM is up to date, as international procedures and requirements are constantly changing. If you have not received international procedure updates within the last 8 months you should update your manual.
- Review the flight plan to ensure aircraft capabilities are accurately represented by the listed equipment codes.
- Review travel and security alerts for areas you will be going to. Provide this information to appropriate personnel and passengers as applicable.
- Create a plan for an expedient departure from the destination if an emergency were to arise. Brief crewmembers and passengers on the plan.
- If possible, plan several diversion airports along the route of flight. When choosing these airports, you may wish to consider:
  - Medical services available at or near the airport.
  - Aircraft maintenance services available at the airport.
  - The potential for a language barrier if emergency services are needed.
  - Legal / political ramifications of landing in the country.
  - Entry / exit requirements.
  - If lodging will be available for crewmembers and passengers, in the event of an overnight stay.

09 | Thunderstorms at departure and/or destination

Mitigations

- Closely review weather forecasts for signs of wind shear.
- Review PIREPs to see if other pilots are reporting shear, turbulence, or other hazardous conditions.
- Brief passengers, if carried, on potential turbulence encounters when operating near thunderstorms and convective activity, including the importance of adhering to the "Fasten Seat Belt" sign and/or command.
- If possible, change departure and/or arrival time to avoid operating when the thunderstorm / convective activity is forecast to be present at the airport.
- Review the aircraft deferral log to ensure wind shear detection and avoidance equipment and weather radar systems, as installed, are operative. If any of these items are inoperative, refer to the MEL for additional procedures and guidance.
- If thunderstorms are expected at the departure airport, select an alternate departure airport in the event an immediate return must be made and conditions are not suitable for landing.
- If thunderstorms are expected at the destination airport, ensure an alternate destination airport is selected in the event conditions at the destination are not suitable for landing.
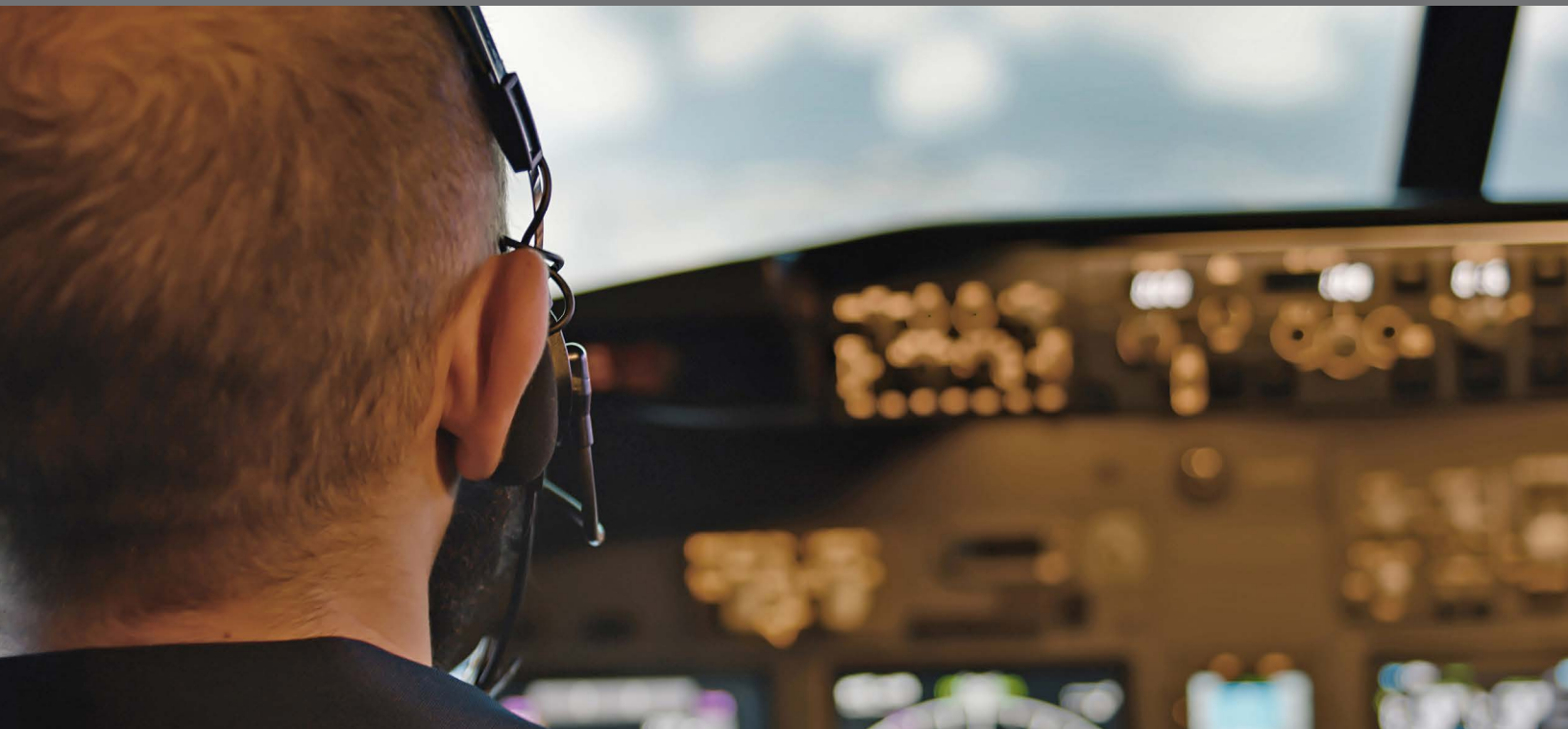
08 | Single Duty Day starting between 0500 - 0659

Mitigations

- Reduce the time the crew needs to show up prior to flight, while ensuring this does not affect safety of the flight (e.g., flight planning is rushed).
- Increase the crew's rest opportunity prior to the trip.
- Provide for an increased crew rest period after the flight.
- Utilize a day room for crewmembers to rest during downtime.
- Avoid combining flights with an early start time with extensions to duty.

07 | Nighttime Operation

Mitigations

Fatigue

- Ensure crews are well rested. Try to avoid night operations in conjunction with extensions to duty or flight time limits.
- If crew members are departing from a time zone different from home base, consider the impact of the difference on crew fatigue.
- If any portion of the flight will be conducted during the Window of Circadian Low (WOCL), ensure crew members are provided additional rest opportunities prior to the flight.

Visibility

- Ensure crews are familiar with the airport layout and have looked over the airport diagram. This will help with situational awareness and reduce chances of an incident during taxi, such as striking an object or crossing an active runway without clearance. Consider requiring the diagram to be readily available on the flight deck or open on an iPad during the flight.
- Review airport procedures for any unique considerations (such as Runway Status Lights or "hot spots").
- Encourage a progressive taxi if crews are unfamiliar with the airport.
- Closely review airport publications and NOTAMs for construction on aprons or taxiways and runway closures.
- Select a destination and alternate with precision approaches. Consider the use of landing aids such as EFVS, if installed.
    - o If using EFVS, ensure the department and crews are authorized to use EFVS at the airport, if required.
- Consider whether the areas surrounding the departure, arrival, and alternate airports are populated or rural/overwater with very few lights and whether it is a full moon or moonless night. This will help set expectations for visibility during takeoff, approach, and landing.

Passenger Safety

- Ensure passengers are always in a well-lit area and visible or escorted when in low-light areas.

Procedural

- Check aircraft deferrals for any inoperative items that could affect aircraft performance or visibility (e.g., aircraft lights).
- If able, utilize additional aircraft lights (such as those mentioned in the FAA's "Operation Lights On" program) to make the aircraft easier to see.
- Carefully review aeronautical charts and aircraft performance data to ensure the aircraft can safely clear any significant obstacles that exist in the takeoff and climb path (particularly when conducting a VFR flight).
- Complete a report within your SMS to track the risk and the effectiveness of the mitigations that were implemented.

Mitigations

Runway Selection

- Request use of a longer runway (if available and operationally feasible), particularly if aircraft stopping-performance is a concern.
- Utilize a grooved runway if available.

Performance

- Apply an additional safety margin to calculated stopping distances.
- Review the aircraft manufacturer's procedures for maintaining directional control on a contaminated runway.
- Review the aircraft deferral log to ensure braking, anti-skid, and thrust reverse systems (as installed) are operative. If any of these items are inoperative, refer to the MEL for additional procedures and guidance.

Procedural

- Suggest an alternate destination or departure time to avoid weather or to gain a more favorable headwind/crosswind component.
- Establish "intended landing" and "committed to stop" points and reiterate them during the approach briefing.
- Closely review missed approach procedures.
- Review the aircraft manufacturer's operating manuals for procedures for wet runway landings and any applicable landing distance increases.
- Complete a report within your SMS to track the risk and the effectiveness of the mitigations that were implemented.
- If icing conditions are observed or probable:
  - Utilize aircraft de-icing equipment in accordance with manufacturer guidance, as appropriate.
  - For departure, ensure adherence to anti-icing hold-over times.

05 | Repositioning Flight (no passengers or cargo)

Mitigations

- Review SOPs and reiterate the importance of adhering to them.
- Review aircraft maintenance and deferral logs for any items that may have been recently worked on or are inoperative which may affect safety of flight.
- If the aircraft is being operated with inoperative equipment, review the Minimum Equipment List (MEL) for any additional provisions, restrictions, and considerations.
- Review aircraft performance calculations closely. Aircraft performance may differ with a "light" aircraft.

If the repositioning flight is following a maintenance event, crews should:

- Review what is / was inoperative, repaired, or replaced.
- Discuss the procedures to be used in the event the aircraft does not perform as expected.
- Review weather to ensure conditions are appropriate for the flight.
- Debrief the personnel that conducted or supervised the maintenance to understand the full scope of the work performed.
- Allot more time to perform a very thorough preflight inspection, with particular emphasis on any switches or system controls that may differ from their standard setting.
- Review aircraft performance calculations to account for a lower or non-standard W&B.
- If the leg is being operated under different regulatory rules (e.g., 14 CFR Part 91 instead of 14 CFR Part 135), crews may still want to consider adhering to the more restrictive requirements.
- Complete a report within your SMS to track the risk and the effectiveness of the mitigations that were implemented.

Did you know?

FAA SAFO 08024 reports that "approximately 25% of accidents involving turbine powered aircraft during the past decade have occurred during non-revenue flights (e.g., ferry flights for maintenance purposes or re-positioning flights to pick-up passengers)."

"Two common factors found by the National Transportation Safety Board to have been contributory in non-revenue flight accidents are:
1. The flight crew's failure to adhere to standard operating procedures (SOPs) and,
2. The flight crew's failure to operate the airplane within its performance limitations."

04 | Uncontrolled Airport

Mitigations

Airport Familiarization

- Conduct a thorough review of surrounding airspace, including other types of operations that may be occurring in the area (glider activities, pilot training, parachute operations, etc.).
- Review the digital chart supplement (Airport/Facility Directory) or airport-published procedures for any special airport procedures.
- Ensure crews have the applicable VFR sectional chart available.
- Check NOTAMs for the airport and surrounding area.

Procedural

- Review flight planning to ensure it includes allowances for flight clearances as these may take longer to get at a non-towered airport.
- When approaching the area, follow best practices with regard to outside scanning for traffic.
- Utilize enhanced vigilance as not all aircraft may be communicating via radio.
- Review the standard radio broadcast terminology to be used when operating at non-towered airports.
- Listen to and announce position and intentions on the applicable local frequency to coordinate actions with other traffic.
- If able, utilize additional aircraft lights (such as those mentioned in the FAA's "Operation Lights On" program) to make the aircraft easier to see.
- Increase takeoff and landing minimum requirements to allow for crews to identify other traffic more easily.
- Increase weather minimum requirements when inclement weather is expected.

Mitigations

Weather Review

- Review weather for temperature (including its effect on density altitude) and wind conditions (wind shear, downdrafts, turbulence, and mountain wave activity).
- Review PIREPs for any reported weather conditions.

Airport Familiarization

- Review the airport's location in relation to terrain (CFIT, weather effects, etc.).
- Review runway information, particularly if operating on a sloping runway. Check the AFM for any landing or takeoff distance increases.
- Closely review approach and departure procedures to ensure:
    - o Aircraft performance can meet any restrictions or terrain clearance requirements.
    - o The planned operation can be conducted in accordance with any approach or departure restrictions (such as airport curfews).
    - o Crew members and/or the flight department are authorized to conduct the approach (if authorization is required).
    - o The assigned crew members are comfortable with conducting the approach.
- Closely brief missed approach procedures, with particular emphasis on obstacle/terrain clearance requirements.

Procedural

- Increase weather minimum requirements when inclement weather is expected.
- Consider aircraft capabilities in relation to Minimum Enroute Altitudes (MEAs) / Minimum Obstacle Clearance Altitudes (MOCAs) of the surrounding area. This is particularly important if the aircraft has deferred, inoperative, or missing equipment that impacts performance.
- If possible, adjust crew pairing to include a crewmember familiar with the airport and/or operating in mountainous regions.
- Provide additional training to crew members in mountainous airport operations, particularly if a complex approach or departure procedure is required.
- Adjust the departure time so that the mountainous airport operations occur during daylight hours.
- Review inoperative equipment (MEL items) to ensure systems relevant to terrain and ground proximity detection (such as the GPWS and radio altimeter) are operative.
- Complete a report within your SMS to track the risk and the effectiveness of the mitigations that were implemented.

02 | First Officer with less than 200 flight hours in A/C type

Mitigations

Crew

- Pair the flight crew member with a more experienced crew member.
- Be sure to cover what each crew member will be responsible for during normal, abnormal, and emergency situations.
- Utilize the crew member on routes they are familiar with.
- Pair the crew member with another crew member they have worked with previously.

Procedural

- Review aircraft checklists for normal, abnormal, and emergency operations prior to flight.
- Plan more thorough briefings with adequate time to discuss questions, comments, and concerns.
- Brief with more experienced crew members in type and/or maintenance for any specific issues to be aware of during the flight.
- Plan the flight during daylight hours and good weather conditions.
- Increase the flight minimums (weather, landing minimums, etc.).
- Conduct a postflight debrief to review items that went well, areas of improvement, lessons learned from the flight, and answer questions and talk through elements of the flight.
- Complete a report within your SMS to track the deviation from your normal procedures as well as the effectiveness of the mitigations that were implemented.

01 | **First Officer with less than 100 flight hours in the last 90 days**

Mitigations

- Pair the crew member with another crew member that has more recent experience.
- Increase the flight minimums (weather, landing minimums, etc.).
- Assign a different crew member. If all crew members fall under this risk factor, assign crew members based on who is most familiar with the route, flight, and/or aircraft.
- Complete a thorough briefing of the flight from beginning to end. Crews may consider doing a tabletop to run through the flight and potential contingencies.
- Complete a report within your SMS to track the deviation from your normal procedures as well as the effectiveness of the mitigations that were implemented.
- Plan for additional time to conduct briefings, preflight inspections, and preflight / postflight paperwork.

Overview

2022 vs 2023

- The top factors related to low flight time, mountainous airports, and uncontrolled airports remained the same for a third year in a row.
- Low flight times remained in the top two spots though low flight time in the last 90 days overtook the aircraft time in 2023.
- Early starts to the duty day moved up on the list from 2022 to 2023, emphasizing an increased need to be aware of issues surrounding fatigue.
- International trips were also on the list, something that hasn't appeared since 2019.
- Repositing flights remained on the list in the same spot.
- Wet and contaminated runways and nighttime and twilight operations remained on the list but were selected less often.

Top 10 selected factors in 2023

1. First Officer with less than 100 flight hours in the last 90 days
2. First Officer with less than 200 flight hours in A/C type
3. Mountainous Airport
4. Uncontrolled Airport
5. Repositioning Flight (no passengers or cargo)
6. Wet runway
7. Nighttime Operation
8. Single Duty Day starting between 0500 - 0659
9. Thunderstorms at departure and/or destination
10. International Trip

Other insights and thoughts

In 2023 many of the selected risks were mission related risks vs the currency and fatigue issues seen in 2022. Some operators may have found personnel and contract solutions for the workforce issues experienced in previous years. This is also echoed by the risk of low flight time in the last 90 days becoming selected more than low time in type; operators may have been able to find or train up personnel, increasing their time in type, or have been able to rely on contract pilots with sufficient time.

The reemergence of International Trip also indicates that operators are once again picking up the international flights many had stopped since the pandemic. As operators see more international flights come on to their schedule it is important to ensure they have all the procedures, authorizations, and training in place to accommodate these flights. Lead times on these elements can be months, so it is best to get them in place well before you need them.