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Unusual Attitudes: Helicopters and Instrument Flight

Flight into adverse weather conditions poses risks even for experienced, instrument-rated pilots. Special skills and training are needed to increase safety and reduce accidents.

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by

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While attempting to remain under visual flight rules (VFR) in marginal weather conditions, an instrument-rated pilot flying an instrument-equipped helicopter crashes into a hillside. There are no survivors.

Within a month, a similar incident occurs. This time the aircraft collides with a power line. Aviation statistics show that this deadly scenario continues to occur with tragic frequency. Despite training and awareness programs, pilots operating legally under VFR continue to collide with obstructions or terrain because poor visibility prevents avoidance, or inadvertent instrument meteorological conditions (IMC) induce spatial disorientation

from which the pilot cannot recover in sufficient time to regain aircraft control.

There are many reasons why a pilot on a VFR flight will continue flying into deteriorating weather conditions while depending on visual references to navigate and maintain aircraft control. Some of these reasons are practical in nature while others are personal and vary among pilots.

The only other options to continuing the flight under VFR are landing in a suitable open area or climbing into IMC. These options are often dismissed because both require a major change in the original flight plan and

create complications that the pilot has little time to contemplate fully. Having to plan a new course of action completely would require the pilot to dilute his concentration with matters other than safely flying the aircraft. An in-flight mission change is no small task — even when everything is going well.

The option of landing short of the destination runs counter to the pilot's purpose for flying in the first place. The importance of the flight has already been established prior to takeoff, and the pilot has the intention of completing the flight. External pressures, from passengers or others involved in the operation, add to the pilot's own internal pressure to complete the flight with as little disruption as possible.

The second, and least desirable, option requires transitioning to instruments and continuing under instrument flight rules (IFR) without adequate preparation. Even a pilot proficient in instrument procedures is at a serious disadvantage when confronted with the prospect of climbing into instrument conditions when no planning for an IFR operation has been made.

For most helicopter pilots, instrument flights are not compatible with their missions and, although they may be required by their employers to possess instrument ratings, they may not have had the opportunity (or been required) to maintain instrument competency. Therefore, a pilot may not be inclined to venture into an IFR environment because of a lack of confidence in his or her ability to control the aircraft adequately by reference to instruments. The pilot would, at the same time, have the tasks of navigating to an airfield for an instrument letdown to visual conditions and communicating with air traffic control (ATC) to allow for proper separation from other aircraft.

Ego can also influence go/no-go decisions. The pilot elected to take off when the weather conditions were supposedly forecast and known. Could the pilot be considered guilty of poor judgment if flight under VFR could not be continued? It may be that the pilot had gotten through bad weather many times before. Would landing short of the destination make it appear that the pilot was frightened or lost flying skills?

A natural conclusion is that good judgment was used when the decision was made to take off and that the flight can somehow be completed. Any other conclusion might threaten to undermine the self-confidence all pilots must have in order to compete in their chosen profession. Still, objective self-evaluation is imperative when facts begin

to suggest that potentially dangerous pilot attitudes are at work.

A U.S. Federal Aviation Administration (FAA) report, *Aeronautical Decision Making for Helicopter Pilots*, concluded: "Pilots, particularly those with considerable experience, as a rule try to complete a flight as planned, please passengers, meet schedules and generally demonstrate the 'right stuff.' [But] this basic drive can have an adverse affect on safety and impose an unrealistic assessment of piloting skills under stressful conditions. Even worse, these repetitive patterns of behavior, based on unrealistic assessments, produce piloting practices that are dangerous, often illegal and will ultimately lead to mishaps."

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Regulations and possible certificate action further discourage pilots from choosing the only option that allows the flight to be completed safely after adverse weather conditions have been encountered, i.e., transitioning to instruments, climbing to a safe obstacle clearance altitude and declaring an emergency. Although a pilot is allowed by U.S. Federal Aviation Regulations (FAR) to deviate from regulations in an emergency, the FAA can initiate punitive action against pilots if it is determined that the emergency was caused by violations of other regulations. Such FAA action can result in loss of certification.

Aircraft accidents cannot simply be accepted as the cost of doing business. While accident prevention can be expensive in terms of dollars lost when flights are canceled because of weather and the cost of recurrent training for pilots, it is worth the price when it prevents loss of life and aircraft.

Another FAA study, *Aeronautical Decision Making for Air Ambulance Helicopter Pilots: Situational Awareness Exercises*, said weather-related accidents involving low visibility or spatial disorientation are the most serious and most easily prevented types of accidents. The study, which focused on accidents involving helicopters on emergency medical missions, said that 67 percent of all fatal aeromedical accidents were weather-related. "The vast majority (71 percent) of these [accidents] occur during the hours of darkness and during the en route segment of flight," the NTSB report said. It said that 40 percent of all emergency medical flight operations are at night.

The FAA air ambulance study concluded: "Pilots either are not being adequately trained, are forgetting their training or are not maintaining their proficiency in those special skills and knowledge demanded by flying in the dark.

The prudent aeromedical pilot must be proficient in keeping the helicopter upright by reference to instruments, even if he is not instrument rated.”

The studies also conclude that weather-related accidents involving low visibility and spatial disorientation are among the most serious and easily preventable kinds of accidents in other less specialized kinds of helicopter operations. The FAA report on helicopter pilot decision making said: “The most frequently cited weather condition cause/factor of accidents was unfavorable wind conditions. However, fog, low ceiling and rain were the most common weather conditions cited in fatal rotorcraft accidents.”

Reasonable minimums for VFR operations can reduce but not eliminate the risk of encountering inadvertent IMC. Recurrent instrument training can greatly improve a pilot’s ability to avoid unsafe situations or safely recover from IMC that cannot be avoided.

Accurate risk assessment and pilot judgment also play key roles, the FAA study said. “One bad decision often leads to another (in the decision chain). One poor decision, e.g., inaccurate assessment of deteriorating weather, increases the availability of false information that may then negatively influence decisions that follow. As time progresses, the alternatives available may decrease, and the option to select the remaining alternatives may be lost. For example, if a pilot elects to fly into hazardous weather, the alternative to circumnavigate the weather is automatically lost.”

Considering the difficulty of accurately forecasting precise weather conditions, especially in areas remote from weather observing stations, it is likely that pilots flying in those areas will sometimes encounter reduced ceilings and visibilities although the forecast is generally favorable for VFR flight. Weather phenomena are seldom uniform even over short distances.

FAR 91.155 allows helicopters to operate in uncontrolled airspace below 1,200 feet (360 meters) above ground level (AGL) with no specified visibility as long as clearance from clouds is maintained and the aircraft is flown at a speed that will allow the pilot to avoid obstacles. Many obstacles, however, are difficult to see at any speed even when there is no atmospheric restriction to visibility. It requires little deterioration of ceiling or visibility to create a dangerous environment while flying within several hundred feet of the ground.

Operating close to the ground, even helicopters with their superb maneuvering capabilities cannot always enable

pilots to avoid obstacles such as wires or antennas. Abrupt maneuvers to avoid these and other obstacles in low weather conditions may prevent collision but may also place the helicopter in an unusual attitude. If the pilot subsequently encounters IMC, and it requires more than just a few seconds to regain visual meteorological conditions (VMC), spatial disorientation may cause the pilot to lose control of the aircraft and impact terrain or obstacles.

A U.S. National Transportation Safety Board (NTSB) report, *Commercial Emergency Medical Service Helicopter Operations*, noted: “Even if the pilot is instrument rated, current and proficient in helicopters, success in coping with inadvertent instrument flight is not guaranteed. The FAA has reported that in tests with qualified instrument pilots, it took as long as 35 seconds for some of the pilots to establish full control of the aircraft by instruments after the loss of visual contact with the surface [ground]. These tests were conducted with fixed-wing aircraft, which are inherently more stable than helicopters.”

Helicopters at cruise speeds, the NTSB said, can also easily overrun the pilot’s ability to see and avoid hazards or deteriorating weather. “The effect of speed on the ability of the pilot to recognize a hazard (such as a cloud bank) and to react can be significant. It takes a helicopter pilot an average of 5 seconds to recognize a hazard, to determine what corrective action is needed and to respond. A helicopter traveling at 120 knots (138 mph) will cover 1,012 feet (303.6 meters) in these 5 seconds. If the pilot reverses course and starts the turn, the helicopter continues to move toward the hazard for a distance equal to the radius of the turn. In a 30-degree banked coordinated turn at 120 knots, this is 2,208 feet (662.4 meters). Therefore, a pilot flying at 120 knots who recognizes a hazard and initiates a course reversal will travel 3,220 feet (966 meters) before starting to move away from the hazard. It should also be recognized that a 30-degree banked turn in marginal visibility can induce spatial disorientation in pilots if they are relying on outside visual cues to control the aircraft.”

What can be done to prevent accidents that occur when it becomes impractical or perhaps even impossible to continue flight under VFR? Normal precautions in preflight planning cannot eliminate the risk of weather encounters completely. Virtually every professional pilot will eventually find himself in a situation in which weather threatens the safety of a flight.

The following recommendations will significantly reduce the risk of weather-related accidents for VFR flights:

***Reasonable
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- Each operator should have weather minimums for VFR operations that are sufficient to provide reasonable assurance that pilots will not inadvertently encounter unsafe low ceilings and visibilities while en route.
- Pilots should be provided with a company-approved procedure to guide them if they encounter an inadvertent IMC situation. This procedure should specify minimum safe altitudes for obstacle clearance, current instrument navigation charts and ATC facilities that a pilot can contact for assistance.
- Provide recurrent pilot instrument training even if normal flight operations include frequent IFR operations. Without practice, the skills and knowledge necessary to prepare a pilot for successfully handling adverse weather degrade over time. In addition, maintaining instrument proficiency is more complex than simply satisfying the FAA requirement for recency of instrument flight experience. It includes studying regulations, the *Airman's Information Manual* and flight or simulator training with a qualified instructor.

The NTSB safety report also concluded: "Spatial disorientation or vertigo can be so overpowering that even when pilots are aware that it is occurring and are trained to rely on instrumentation, they may have difficulty in controlling an aircraft. The importance of spatial disorientation cannot be overstated, [because] 90 percent of general aviation accidents involving disorientation as a cause or factor are fatal. Special training and proficiency maintenance are required to reduce the risks involved in flying in IMC."

A flight operation that emphasizes flight safety and provides thorough instrument recurrent training for its pilots will experience a reduced risk of accidents while maximizing the use of flying hours.◆

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