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Reports Show Pilot Error as the Major Cause of Helicopter Accidents in U.S. On-demand Operations

Accident reports for 1994 through 1998 also showed that each of the 48 accident aircraft was flown by one pilot and that all but one accident aircraft had turboshaft engines.

Joel S. Harris

U.S. National Transportation Safety Board reports on 48 accidents in 1994 through 1998 involving on-demand (commonly called unscheduled air-taxi) helicopter operations conducted under U.S. Federal Aviation Regulations Part 135 (Table 1, page 2) show that pilot error caused 28 accidents (58 percent).

Among other general findings of the reports were the following:

- Each of the 48 helicopters was flown by a single pilot;
- Forty-seven helicopters had turboshaft engines; one helicopter had a reciprocating engine;
- Forty-four helicopters were single-engine models; and,
- All the accidents occurred in the United States.

Among the pilots involved in the 28 pilot-error accidents, seven pilots had airline transport pilot (ATP) certificates and 21 pilots had commercial pilot certificates (Figure 1, page 5).

Among the pilots involved in the 20 accidents that did not involve pilot error, eight pilots had ATP certificates and 12 pilots had commercial pilot certificates.

The average total flight time (all aircraft) was 6,334 hours among the pilots involved in the pilot-error accidents; the average rotorcraft flight time was 5,220 hours (Figure 2, page 5) among these pilots.

The average total flight time was 8,654 hours among the pilots involved in the non-pilot-error accidents; the average rotorcraft flight time was 7,714 hours among these pilots.

Sixteen accidents were fatal (Figure 3, page 5); 46 people were killed. Nine accidents involved serious injuries[1] received by at least one helicopter occupant. Eight accidents involved minor injuries received by at least one helicopter occupant. Fifteen accidents resulted in no injuries.

Eighteen aircraft were destroyed, 27 aircraft were substantially damaged,[2] and three aircraft were not damaged (Figure 4, page 5).

Two accidents in which no aircraft damage occurred involved passengers who walked into rotating tail rotors.

One tail-rotor-strike accident occurred Nov. 20, 1994, in Juneau, Alaska. The accident report[3] said that the pilot of a Bell 206B "landed his aircraft and locked the controls down while the engine and rotors were turning at flight idle." The pilot exited the cockpit and began refueling the helicopter. A company employee approached the pilot and asked if he could get a ride to the next destination. The pilot agreed to take the employee on the flight.

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Table 1
U.S. On-demand* Helicopter Accidents, 1994–1998

Date	Location	Aircraft Type	PIC Certificate	PIC Total Time/ Rotorcraft Time (hours)	Aircraft Damage	Injuries
Jan. 20, 1994	Lebec, California	Aerospatiale AS-350D	commercial	6,000/5,000	destroyed	2 fatal
The helicopter struck a power-transmission cable while being landed at a site that was not familiar to the pilot.						
Feb. 23, 1994	Humuula, Hawaii	Aerospatiale AS-350B	commercial	5,757/5,272	substantial	2 serious; 5 none
The pilot encountered IMC at 10,500 feet and attempted to turn around; he was unable to maintain altitude when airspeed decreased and the helicopter encountered a downdraft.						
March 25, 1994	Hawaii	Hughes 369D	commercial	5,025/4,900	substantial	2 minor
The pilot lost visual contact with the ground when he encountered a steam cloud while hovering at five feet near a volcano vent. The helicopter then struck terrain.						
March 26, 1994	Wrangell, Alaska	Bell 206B	commercial	2,385/2,102	destroyed	1 minor; 1 none
The rotor blades struck a tree stump during a landing at a logging site.						
April 1, 1994	Telluride, Colorado	Aerospatiale AS-350B2	ATP	7,100/3,900	substantial	1 serious; 5 minor
While being maneuvered to land at 12,800 feet, the helicopter encountered downdrafts, settled and struck terrain.						
April 3, 1994	Lamoille, Nevada	Bell 206B-3	commercial	7,930/7,618	destroyed	4 fatal; 1 serious
The pilot landed at a remote site because of adverse weather. After waiting about two hours in falling snow, the pilot attempted to depart. The engine flamed out because of snow ingestion. During the autorotative landing, the helicopter struck a slope and rolled over.						
April 9, 1994	Valdez, Alaska	Hiller UH12E	ATP	18,000/2,200	substantial	2 none
The helicopter struck terrain after the fuel shut-off lever was moved inadvertently between the “on” position and the “off” position, which closed the fuel valve.						
July 13, 1994	Galveston, Texas	Aerospatiale AS-350B1	commercial	8,076/6,476	destroyed	4 fatal; 1 serious
The pilot lost control of the helicopter when a main-rotor servo became disconnected because of improper maintenance.						
July 14, 1994	Hanalei, Hawaii	Aerospatiale AS-350D	ATP	12,800/7,348	substantial	3 fatal; 4 none
The pilot conducted an autorotative landing on water after the engine-driven fuel pump failed. The helicopter did not have floats. The pilot and two passengers drowned.						
July 14, 1994	Molokai, Hawaii	Aerospatiale AS-350B	commercial	3,497/3,284	substantial	1 serious; 6 none
The float-equipped helicopter was hovering 150 feet over the ocean when rotor speed decreased, resulting in a forced landing on the water.						
July 19, 1994	Juneau, Alaska	Aerospatiale AS-350	ATP	2,130/2,114	substantial	7 none
The helicopter pitched forward while being landed on a glacier, and the main rotor blades struck the ice.						
July 29, 1994	Kenai, Alaska	Bell 206	commercial	6,950/6,950	substantial	2 serious; 3 none
The helicopter struck terrain while being landed on a mountain summit at 11,070 feet, which was above the helicopter’s certified maximum operating altitude.						
Aug. 11, 1994	Kukuihaele, Hawaii	Aerospatiale AS-350D	commercial	4,000/3,500	substantial	7 none
A cracked turbine-governor fitting caused a partial loss of power. The rotor blades struck rocks during the precautionary landing in rough terrain.						
Aug. 12, 1994	Whiting, New Jersey	Bell 206L-4	commercial	1,417/1,392	destroyed	3 fatal
The pilot encountered IMC during a night VFR flight. The helicopter descended steeply into terrain.						
Sept. 3, 1994	Volcano, Hawaii	Hughes 369E	commercial	2,705/NA	substantial	1 minor; 4 none
The pilot failed to maintain adequate rotor speed during takeoff from a landing site at 7,500 feet. The left skid struck a ridge, and the helicopter rolled over.						
Oct. 24, 1994	Kaupo, Hawaii	Eurocopter AS-350D	commercial	3,216/3,214	substantial	4 minor
Maintenance personnel failed to wash the engine compressor. The helicopter struck trees after losing power.						
Nov. 20, 1994	Juneau, Alaska	Bell 206B	commercial	2,357/2,357	none	1 fatal; 1 none
A company employee stooped to walk under the tail boom of the parked helicopter and was struck by the rotating tail rotor.						
Jan. 14, 1995	Los Angeles, California	Bell 206B	ATP	4,421/389	destroyed	2 fatal; 2 serious
The helicopter was being flown in fog and rain below a 300-foot broken ceiling when it struck wires about 150 feet (46 meters) above the ground.						
Jan. 28, 1995	Miami, Florida	Bell 206B	commercial	2,500/2,500	substantial	3 none
The helicopter landed hard in autorotative flight after losing engine power at 800 feet because of a loose fuel-control line.						
Feb. 14, 1995	Gulf of Mexico	Bell 206L-4	commercial	3,755/3,755	destroyed	5 fatal
The helicopter struck the water during a VFR flight in IMC.						
May 2, 1995	Venice, Louisiana	Bell 206L-3	ATP	9,806/8,216	destroyed	1 fatal; 2 serious
The helicopter was on final approach to an offshore oil platform when the engine ingested exhaust gases from a flare boom and lost power. The helicopter struck the platform and descended into the water.						

Table 1
U.S. On-demand* Helicopter Accidents, 1994–1998 *(continued)*

Date	Location	Aircraft Type	PIC Certificate	PIC Total Time/ Rotorcraft Time (hours)	Aircraft Damage	Injuries
May 3, 1995	Sea Bright, New Jersey	Aerospatiale AS-350D	commercial	5,500/5,500	substantial	2 none
An engine-bearing failure resulted in an attempted autorotative landing on water. During the flare, the tail rotor struck the water and separated.						
May 31, 1995	Skagway, Alaska	Aerospatiale AS-350B	commercial	2,480/2,170	substantial	7 none
After the occupants boarded, the helicopter slid on ice and rolled onto its side. The engine was not running.						
June 26, 1995	Highland, California	Hughes 369D	commercial	12,000/NA	substantial	1 serious; 3 minor
The helicopter was being flown with the doors removed when unsecured passenger belongings exited the cabin and struck the tail rotor.						
July 18, 1995	Paxson, Alaska	Hughes 369D	commercial	14,000/14,000	substantial	2 none
Fuel contamination resulted in a loss of engine power at 5,000 feet. The main rotor severed the tail boom during the autorotative landing.						
Aug. 27, 1995	Oklahoma City, Oklahoma	Bell 206L-1	ATP	7,583/7,583	substantial	4 none
An engine turbine governor failed during takeoff from a rooftop helipad. The helicopter was landed on an uneven field.						
Oct. 11, 1995	Hana, Hawaii	Hughes 369HS	commercial	2,825/2,805	substantial	4 minor; 1 none
The engine lost power during takeoff because of a leaking fuel-filter bypass switch. The main rotor severed the tail boom during the autorotative landing.						
Feb. 10, 1996	Gulf of Mexico	MBB BO-105S	commercial	11,288/11,288	destroyed	2 fatal
The helicopter struck the water at high speed and in a near-level attitude. The report said that IMC was a possible factor.						
June 21, 1996	Sabine Pass, Texas	MBB BO-105S	ATP	20,459/17,663	destroyed	4 fatal
The helicopter struck water in the Gulf of Mexico after the main-rotor-transmission sun gear failed.						
July 24, 1996	Warren, Idaho	Bell 206B	ATP	3,600/3,600	destroyed	1 fatal; 2 minor
The helicopter rolled onto its side while parked, with the rotors turning, on a makeshift landing platform.						
Aug. 4, 1996	Healy, Alaska	MD 369D	commercial	9,000/9,000	none	4 minor; 5 none
The helicopter's tail-rotor drive shaft was severed during a mid-air collision at 400 feet with a Cessna 185. The pilot made a partially controlled emergency landing. The airplane was landed without further incident.						
Sept. 13, 1996	Cantwell, Alaska	Bell 206B	commercial	8,310/8,160	destroyed	1 serious; 2 minor
The helicopter struck terrain during a VFR flight in IMC.						
Sept. 13, 1996	Morgan City, Louisiana	Bell 206L-1	ATP	16,000/14,500	substantial	1 minor; 5 none
The pilot lost tail-rotor control at 500 feet after the tail-rotor blades were struck by an unknown object. The float-equipped helicopter came to rest on its side in the Gulf of Mexico.						
Oct. 14, 1996	Venice, Louisiana	Bell 206L-3	commercial	13,967/13,967	substantial	4 none
The helicopter lost power on takeoff when frogs were ingested into the engine. During landing, a main-rotor blade flexed and severed the tail boom.						
Nov. 12, 1996	Hana, Hawaii	Hughes 369D	commercial	5,350/5,130	substantial	5 none
Failure of the engine-spur-adapter gear shaft resulted in an autorotative landing in mountainous terrain.						
Nov. 28, 1996	Gulf of Mexico	Eurocopter AS-350B2	ATP	5,378/NA	destroyed	3 fatal
After a tail-rotor pitch-change link disconnected because of a fatigue fracture, the pilot attempted unsuccessfully to land on a drilling platform.						
Dec. 9, 1996	Gulf of Mexico	Aerospatiale AS-350B	commercial	5,391/5,187	substantial	2 none
The pilot lost tail-rotor control when the tail struck a crane during a hover turn on an offshore oil platform.						
Dec. 12, 1996	Penn Yan, New York	MBB BO-105	commercial	4,450/4,450	destroyed	3 fatal
The medical-evacuation helicopter struck rising terrain during a night VFR flight in IMC.						
Feb. 21, 1997	Milolii, Hawaii	Hughes 369D	commercial	8,575/8,575	substantial	3 serious; 1 minor
The helicopter was landed hard after the tail rotor failed for undetermined reasons.						
Feb. 24, 1997	Mountain Spring, Nevada	Bell 206B	ATP	10,994/10,923	destroyed	1 serious; 2 minor
The pilot aborted two approaches to a mountain helipad at 8,514 feet when the helicopter encountered turbulent winds on short final. The helicopter struck terrain during the third landing attempt.						
March 4, 1997	Jamaica Beach, Texas	Bell 206L-1	ATP	11,593/6,009	destroyed	1 minor; 4 none
The pilot lost control of the helicopter after encountering IMC during a VFR flight in the Gulf of Mexico.						
June 12, 1997	Weston, Colorado	Bell 206L-3	commercial	1,800/798	substantial	5 none
The pilot attempted to conduct a 360-degree climbing turn to clear a ridge. The helicopter encountered unfavorable winds during the turn, lost airspeed, settled into trees and rolled over.						

Table 1
U.S. On-demand* Helicopter Accidents, 1994–1998 *(continued)*

Date	Location	Aircraft Type	PIC Certificate	PIC Total Time/ Rotorcraft Time (hours)	Aircraft Damage	Injuries
July 26, 1997	Pollock Pines, California	Bell 206B	commercial	7,000/7,000	none	1 serious; 4 none
A passenger walked toward the helicopter from the rear and was struck by the rotating tail rotor.						
Sept. 12, 1997	Brinkley, Arkansas	Hughes 369HS	ATP	18,000/3,500	substantial	4 none
During a flight with the cabin door removed, the pilot lost tail-rotor control when an object struck the tail rotor.						
Oct. 12, 1997	Sago, West Virginia	Bell 206B	commercial	14,000/14,000	destroyed	4 fatal
The helicopter struck terrain after losing engine power because the turbine governor had been overhauled improperly.						
Jan. 11, 1998	Sandy, Utah	Bell 222UT	ATP	6,257/4,871	destroyed	4 fatal
The medical-evacuation helicopter struck mountainous terrain after taking off at night in adverse weather.						
April 17, 1998	Cameron, Louisiana	Bell 206B	ATP	13,371/13,272	substantial	5 none
The helicopter lost engine power for undetermined reasons during final approach. The main rotor severed the tail boom during the hard landing.						
June 7, 1998	Corpus Christi, Texas	Bell 206B	commercial	9,583/7,760	substantial	4 none
The helicopter was on final approach to land when a tail rotor drive shaft coupling separated for undetermined reasons.						

ATP = Airline transport pilot IMC = Instrument meteorological conditions MBB = Messerschmitt-Bolkow-Blohm
MD = McDonnell Douglas NA = Not available PIC = Pilot-in-command VFR = Visual flight rules

* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris and U.S. National Transportation Safety Board

"The employee started to walk toward his truck to retrieve his luggage and, in doing so, ducked under the tail boom of the helicopter," the report said. "The employee was struck [and killed] by the tail-rotor blade."

The report said that the employee "had worked around helicopters in the past and had received company training concerning the dangers of helicopter rotor blades." The report said that the probable cause of the accident was "the employee's disregard for company training and policies about the dangers of helicopter rotor blades." The report said that a factor in the accident was "running [the] aircraft with the rotors turning."

The other tail-rotor-strike accident resulted in serious injuries to the victim.

Forty accidents occurred during daylight hours, four accidents occurred at night, and four accidents occurred during dawn or dusk.

Thirty-seven accidents occurred in visual meteorological conditions, and 10 accidents occurred in instrument meteorological conditions (IMC). One accident report said that the weather conditions were unknown.

None of the accident aircraft was being operated under instrument flight rules at the time of the accident.

The 48 accidents resulted from the following major factors: complete loss of engine power or partial loss of engine power; loss of tail-rotor control; adverse weather conditions; pilot loss of aircraft control for nonmechanical reasons; miscellaneous mechanical factors; and other factors (Figure 5, page 6).

Loss of engine power resulted in 15 accidents, four of which were fatal. Causes of engine-power loss included internal-component-fatigue failure, engine-governor failure, snow ingestion, inadequate maintenance and fuel contamination.

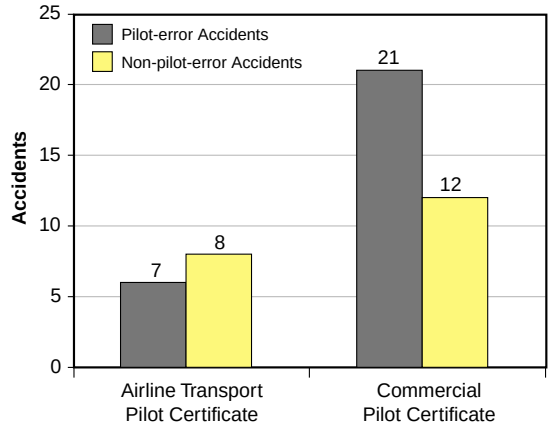
The snow-ingestion accident occurred April 3, 1994, in Lamoille, Nevada. The report[4] said that the pilot landed a Bell 206B-3 at a remote site because of adverse weather. While the pilot and four passengers waited for the weather to improve, snow accumulated on the helicopter. Engine covers were not available. The engine air-induction system had snow baffles and particle separators; the engine did not have an automatic re-light ignition system.

"The plenum at the engine intake was inaccessible to the pilot, [and this prevented] removal of any snow that may have accumulated," said the report.

About one hour after landing, the pilot started the engine and operated it for approximately 15 minutes to 20 minutes. About two hours after landing, he started the engine and operated it for approximately five minutes. Then, after discussing the situation by radio with the company director of operations, the pilot attempted to take off.

Density altitude was approximately 7,000 feet. Takeoff weight was approximately 2,940 pounds (1,334 kilograms); the helicopter's maximum certificated takeoff weight is 3,200 pounds (1,452 kilograms).

Certificates Held by Pilots Involved in 48 U.S. On-demand* Helicopter Accidents 1994–1998

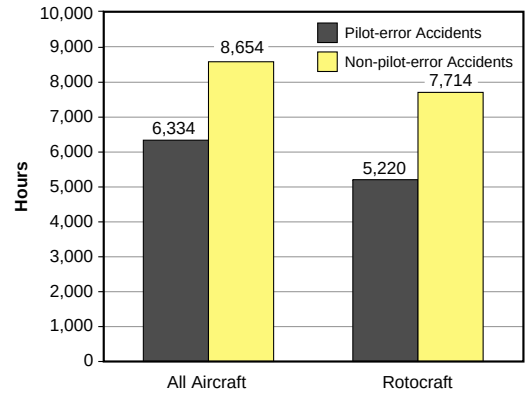


* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris

Figure 1

Average Flight Experience of Pilots Involved in 48 U.S. On-demand* Helicopter Accidents, 1994–1998



* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris

Figure 2

"The flight manual showed that at 2,940 pounds, the maximum density altitude for a safe autorotative landing was 2,500 feet," said the report.

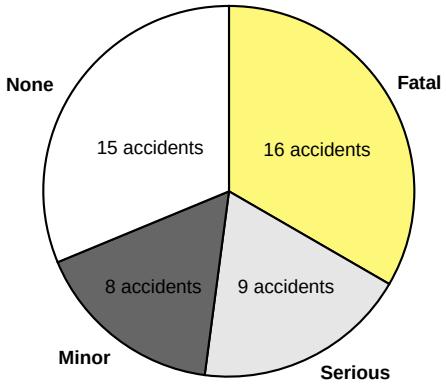
The engine lost power soon after takeoff. During autorotation, the helicopter struck a slope and rolled over. The pilot and three passengers were killed; one passenger was seriously injured.

The report said that the probable cause of the accident was "the ingestion of foreign material (snow) into the engine, which resulted in a flameout." The report said that a factor in the accident was "improper planning/decision [making]" by the pilot and by the company director of operations.

Another accident caused by foreign-material ingestion occurred Oct. 14, 1996, in Venice, Louisiana. The report[5] said that a Bell 206L-3 was at approximately 50 feet on takeoff when the pilot heard "a big pop" and felt the helicopter begin to shake. The pilot conducted a precautionary landing. He told investigators that he initiated a "deceleration to land" because of wires in front of the helicopter. During the landing, a main-rotor blade flexed and severed the tail boom. None of the four occupants was injured.

The report said that the probable causes of the accident were "a loss of engine power due to frogs being ingested into the engines as a result of the pilot's failure to perform a thorough preflight [inspection] and the pilot's improper touchdown technique."

Injury Severity in 48 U.S. On-demand* Helicopter Accidents, 1994–1998

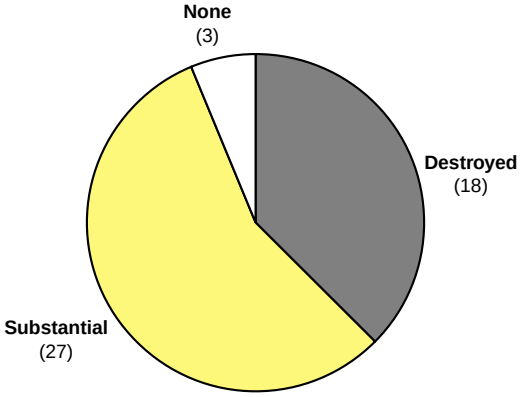


* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris

Figure 3

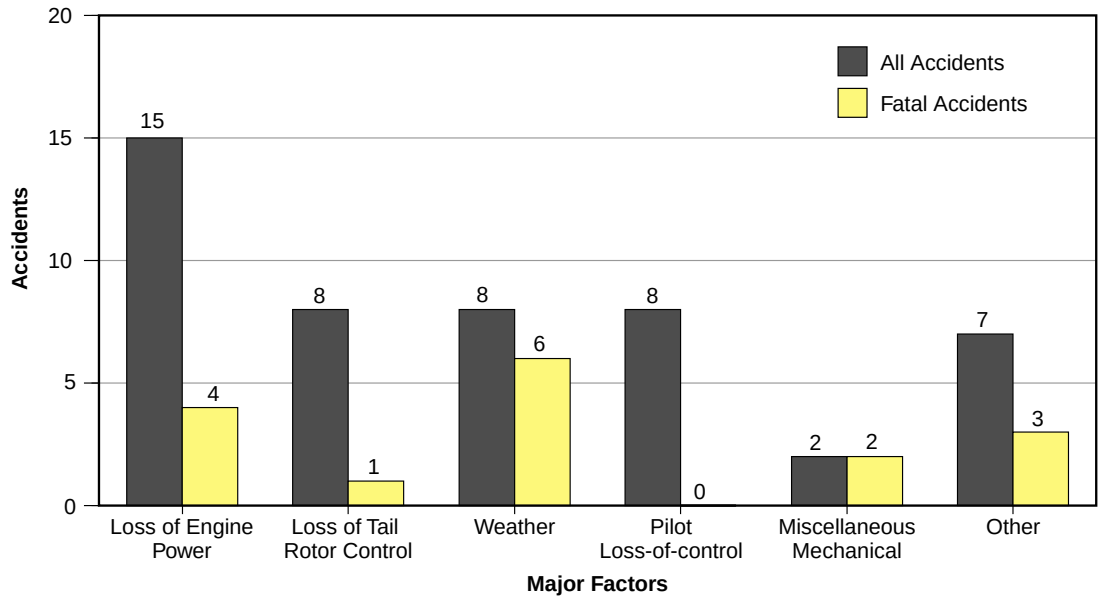
Aircraft Damage in 48 U.S. On-demand* Helicopter Accidents, 1994–1998



* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris

Figure 4



* Unscheduled operations under U.S. Federal Aviation Regulations Part 135.

Source: Joel S. Harris

Figure 5

The reciprocating-engine helicopter accident occurred April 9, 1994, in Valdez, Alaska. The report[6] said that the accident resulted from a total loss of power when the fuel shutoff valve in a Hiller UH12E was moved inadvertently to a position between the "on" position and the "off" position.

The fuel shutoff valve is "located near the cockpit floor, in the area where the pilot and passenger normally place their feet," said the report.

The report said, "Testing revealed that, with the lever at half travel, the fuel valve was fully closed."

The two occupants were not injured, but the helicopter was damaged substantially during the forced landing.

Loss of tail-rotor control resulted in eight accidents, including one fatal accident. The tail-rotor control losses were caused by tail-rotor-component failures, contact with objects during hovering flight, tail-rotor strikes by objects that exited the cabins of helicopters being flown with the doors removed and a midair collision with an airplane.

The fatal loss-of-tail-rotor-control accident involved a Eurocopter AS-350B2 during a flight Nov. 28, 1996, between two drilling platforms in the Gulf of Mexico. The report[7] said that the pilot radioed that the tail-rotor gearbox chip light had illuminated and that he was experiencing a "very high vibration [that] settled down a little bit at a slower airspeed." A few minutes later, the pilot reported that he was flying the helicopter toward a platform three nautical miles (5.6 kilometers) away.

The pilot then reported that, during his first attempt to land on the platform, he could not control the tail rotor. He said that he would attempt one more landing on the platform and that, if he was unable to land on the platform, he would fly the helicopter to Galveston, Texas. This was the last radio transmission received from the pilot.

The wreckage of the helicopter was found in about 50 feet (15 meters) of water approximately 35 feet (11 meters) from the platform. The platform control shed, which is located below the platform helipad, was damaged, and helicopter debris was found on the control-shed level and on the level below the control shed. The pilot and the two passengers were killed in the accident.

Examination of the helicopter's tail-rotor system revealed that a pitch-change link had disconnected because of a fatigue fracture.

The report said that the probable cause of the accident was the "pilot's failure to use the proper emergency procedure as outlined in the [aircraft] flight manual."

The report said, "The operator's standard operating procedure for a loss of tail-rotor control is to comply with the instructions given in the flight manual. The flight manual's instructions are, in part, to make a shallow approach [with a slight left sideslip] to a run-on landing [in a clear area]."

Two loss-of-tail-rotor-control accidents occurred when the helicopters were being flown with the doors removed and objects exited the cabins and struck the tail rotors.

One of the accidents occurred Sept. 12, 1997, in Brinkley, Arkansas, and involved a Hughes 369HS helicopter that was transporting a television crew to high-school football games. The report[8] said that the pilot had removed the left rear door to facilitate aerial photography of the football games.

The helicopter was in cruise flight at approximately 500 feet when the pilot heard a loud bang and the helicopter yawed right.

"The pilot said that movement of the directional-control pedals was ineffective," the report said. "He made a run-on landing, but the helicopter impacted two levees, separating the right skid from the aircraft. The aircraft rotated to the right and came to a stop upright." None of the four occupants was injured.

Examination of the helicopter revealed that the tail-rotor drive shaft had separated and that the leading edge of one tail-rotor blade had small indentations that were similar in appearance to a zipper.

"[The indentations had] a brass-like appearance, which may be transferred metal," said the report. Tests by the aircraft manufacturer confirmed that the material transferred to the tail-rotor blade leading edge was brass.

The report said that the probable causes of the accident were "the in-flight collision of the tail-rotor blade with an object that had a brass zipper on it and the subsequent overload and failure of the tail-rotor drive shaft." The report said that a contributing factor was "the unsuitable terrain for the forced landing."

Adverse weather conditions were involved in eight accidents, six of which were fatal. The accident reports cited the following probable causes: "continued VFR [visual flight rules] flight into IMC," "inadvertent IMC" and "flight into known adverse weather." Several reports also cited spatial disorientation of the pilots.

One weather-related accident occurred during a medical-evacuation flight Jan. 11, 1998, in Sandy, Utah. The report[9] said that the pilot of a Bell 222UT was dispatched from a hospital helipad to rescue a skier who had been injured in an avalanche. No snow was falling at the hospital when the helicopter departed, but light-to-moderate snow was falling where the pilot landed the helicopter to pick up the skier. After landing, the pilot learned that adverse weather had developed at the hospital.

"The dispatcher telephoned the pilot ([who was] using a cellular phone) to advise him that hospital weather conditions had deteriorated due to a fast-moving front," the report said. "She said [that] it was 'snowing really hard,' the winds were gusting to 37 knots and visibility was less than 300 feet [92 meters]."

Weather also deteriorated at the pick-up site. One witness said that the helicopter took off in blizzard conditions. "It was snowing, and the wind was gusting to 35 knots [65 kilometers per hour]," the witness said.

Another witness said that the helicopter circled the landing zone while climbing, then "turned north and disappeared from view." The witness then heard "a slight, muffled boom."

The four occupants were killed when the helicopter struck mountainous terrain in darkness. The report said that the probable cause of the accident was "flight by the pilot into known adverse weather conditions."

Eight accidents occurred when the pilots lost control of their helicopters for nonmechanical reasons; none of the accidents was fatal.

One loss-of-control accident occurred Sept. 3, 1994, in Volcano, Hawaii. The report[10] said that, while conducting a sightseeing flight with four passengers, the pilot encountered IMC and landed the helicopter to wait for the weather to clear. The landing site was at 7,500 feet.

After the weather cleared, "a low battery [charge] prevented the engine from starting," said the report.

The company dispatched another helicopter (a Hughes 369E, the accident helicopter), with a pilot and a maintenance technician aboard, to retrieve the passengers. The pilot and maintenance technician remained at the landing site with the disabled helicopter while the pilot and passengers from the disabled helicopter departed in the accident helicopter.

During lift-off, the passengers "heard and observed the low-rotor-rpm annunciator," and the helicopter's nose moved about 45 degrees to the right. The left landing gear skid struck a small ridge, and the helicopter rolled over. One occupant received a minor injury. The four passengers, the two pilots and the maintenance technician remained overnight at the accident site and were rescued the following day.

The report said that the probable causes of the accident were "the pilot's failure to maintain adequate main-rotor rpm and the resultant inadvertent skid contact with the ground."

Miscellaneous mechanical factors were involved in two accidents, both of which were fatal.

One of the accidents occurred July 13, 1994, near Galveston, Texas. The report[11] said that the pilot of an Aerospatiale AS-350B1 felt a bump "similar to turbulence" while climbing through 2,000 feet. The pilot said that he felt two more bumps — the second of which was more pronounced than the first — and then lost control of the helicopter. The helicopter descended into the Gulf of Mexico. The four passengers were killed, and the pilot was seriously injured.

During reconstruction of the recovered helicopter, "the left lateral servo-rod end was found disconnected from the servo extension," said the report. The servo changes the attitude of the helicopter by changing the angle-of-attack of the main-rotor blades.

The report said that the probable cause of the accident was "inadequate torquing of the left lateral servo by maintenance personnel, which allowed it to become disconnected from the controls, leading to an in-flight loss of control."

Seven accidents, including three fatal accidents, resulted from other factors: Two accidents occurred when main-rotor blades struck objects; two accidents occurred when people walked into rotating tail-rotor blades; two accidents occurred when helicopters were landed at sites that were unsuitable for landing; and, one helicopter struck wires during an approach to a mountain helipad.♦

Notes and References

1. The U.S. National Transportation Safety Board (NTSB) defines a serious injury as "any injury which: (1) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes or nose); (3) causes severe hemorrhages, nerve, muscle or tendon damage; (4) involves any internal organ; or (5) involves second-[degree burns] or third-degree burns, or any burns affecting more than 5 percent of the body surface."
2. NTSB defines substantial damage as "damage or failure which adversely affects the structural strength, performance or flight characteristics of the aircraft and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor [blades] or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes or wing tips are not considered 'substantial damage.'"
3. NTSB accident report ANC95LA012.
4. NTSB accident report SEA94FA096.
5. NTSB accident report FTW97LA016.
6. NTSB accident report ANC94LA045.
7. NTSB accident report FTW97FA051.
8. NTSB accident report FTW97LA347.
9. NTSB accident report FTW98FA093.
10. NTSB accident report LAX94LA352.
11. NTSB accident report FTW94FA231.

About the Author

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