



Mr. John Brannen  
Senior Air Safety Investigator and  
Investigator in Charge  
National Transportation Safety Board  
4760 Oakland Street, Suite 500  
Denver, CO 80239

May 20, 2022

**RE: CEN20LA167** MD Helicopters 369E, serial number 0586E, registration number N8375F  
Houston, Texas, May 2, 2020  
Houston Police Department

Dear Mr. Brannen,

MD Helicopters appreciates the opportunity to participate in the NTSB investigation referenced above. Under 49 C.F.R. § 831.14 (1998), "Any person, government agency, company, or association whose employees, functions, activities, or products were involved in an accident or incident under investigation may submit to the Board written proposed findings to be drawn from the evidence produced during the course of the investigation, a proposed probable cause, and/or proposed safety recommendations designed to prevent future accidents." As such, MD Helicopters would like to take the opportunity to provide a summary of its observations and suggest a proposed probable cause for the accident based on facts gathered during the investigation.

MD Helicopters respectfully takes exception with the conclusion drawn in the NTSB Performance Study – Specialist Report. The report states that "Loss of tail rotor effectiveness is not consistent with the recorded winds at the time of the accident."

On May 2, 2020, about 0203 central daylight time, Houston Police Department Air Support Division experienced the tragic loss of a tactical flight officer (TFO) and serious injuries to one of their pilots when the MD Helicopters 369E aircraft they were flying impacted a building and subsequently terrain. The flight originated from William P. Hobby Airport (KHOU), Houston, Texas, to patrol the Houston area from above.

Following several scene calls, the flight crew received a call of a possible drowning victim about 4 NM west of George Bush Intercontinental/Houston Airport (KIAH), Houston, Texas. Once on scene, the pilot (seated in the left seat) began orbiting to the right to provide the TFO (seated in the right seat), as well as the FLIR-mounted camera, the best view of the situation on the ground. Just prior to the event, the pilot said he felt a strong vibration in the controls and, subsequently, the aircraft started to yaw to the right. Unable to regain control of the aircraft, the aircraft impacted the rooftop of a single-story building and then fell, impacting the ground below on its left side at the base of the building.

4555 E. MCDOWELL ROAD, MESA, AZ 85215  
MDHELICOPTERS.COM

The pilot reported the gross weight of the aircraft at takeoff was about 2838 lbs. He did not observe any mechanical issues during preflight, nor did he perceive any mechanical issues inflight prior to the event. He did, however, say he felt "a strong vibration in the controls just before the *loss of the tail rotor*."

When the aircraft started to spin, the pilot said he performed the "emergency procedure due to loss of tail rotor." He "pushed the collective down and nosed the aircraft forward pushing the cyclic forward to gain forward airspeed and airflow over the vertical stabilizer. The aircraft was still spinning" so he reduced power.

The Rotorcraft Flight Manual for the 369E helicopter has two emergency procedures related to anti-torque failures that result in a complete loss of tail rotor thrust. One pertains to the complete loss of thrust while in forward flight and the other to the complete loss of thrust while in a hover. The procedure for complete loss of thrust while in forward flight states to reduce power by lowering collective, adjust airspeed to between 50 and 60 knots, use left lateral cyclic in combination with collective pitch to limit left sideslip to a reasonable angle, and if conditions permit, place the twistgrip in the ground idle position once a landing area is selected and perform a normal autorotation.

FAA Advisory Circular 90-95 (AC 90-95) addresses unanticipated right yaw (often referred to as loss of tail rotor effectiveness or LTE), which it identifies as "a critical, low-speed aerodynamic flight characteristic which can result in an uncommanded rapid yaw rate which does not subside of its own accord and, if not corrected, can result in the loss of aircraft control." Rather than an emergency as a result of mechanical failure, unanticipated right yaw is an aerodynamic flight characteristic. According to AC 90-95, the NTSB has identified LTE as a contributing factor in loss of control accidents where inappropriate or late corrective action may have resulted in the development of uncontrollable yaw.

The AC goes on to say, "LTE is not related to a maintenance malfunction and may occur . . . at airspeeds less than 30 knots." It may occur in any maneuver, with greater susceptibility in a right turn, that requires the pilot to operate in a high-power, low-airspeed environment. Correct and timely response is critical. If the response is incorrect or slow, the yaw rate may rapidly increase to a point where recovery is not possible.

If a pilot experiences a sudden unanticipated right yaw, the recommended recovery technique in the AC is to apply full left pedal and simultaneously move the cyclic stick forward to increase airspeed, and, altitude permitting, reduce power to reduce torque. As recovery is effected, adjust the flight controls for normal forward flight.

It appears the pilot misidentified unanticipated right yaw resulting in the use of an emergency procedure for complete loss of tail rotor thrust instead of the recommended recovery technique for unanticipated right yaw resulting in the development of a rapid, uncontrollable yaw from which recovery was not possible.

Of the four relative wind regions discussed in AC 90-95, which can singularly or in combination create an LTE-conducive environment, loss of translational lift can occur in *all* relative wind azimuths. The AC states that "this characteristic is most significant when operating at or near maximum power and is associated with LTE for two reasons. First, if the pilot's attention is diverted as a result of an increasing right yaw rate, the pilot may not recognize that relative headwind is being lost and hence, translational lift is reduced. Second, if the pilot does not maintain airspeed while making a right downwind turn, the aircraft can experience an accelerated right yaw rate as the power demand increases and the aircraft develops a sink rate."

The FAA's Helicopter Flying Handbook defines translational lift as the improved rotor efficiency resulting from directional flight. It is the result of an increase in horizontal air flow through the rotor disk. A loss of translational lift results in an unexpected high power demand and increased anti-torque requirements.

While transitioning to forward flight, the helicopter goes through effective translational lift (ETL) where the rotor disk completely outruns the main rotor disk vortices and begins operating in relatively clean air. ETL usually occurs between 16 and 24 kts. As the helicopter accelerates, and prior to reaching ETL, differences in lift occur on specific areas of the rotor disk. These differences in lift are called transverse flow effect. The result is a tendency for the helicopter to roll slightly to the right as it accelerates through about 20 kts or the relative headwind is about 20 kts. Transverse flow effect also results in increased vibrations of the helicopter at airspeeds about 12 to 15 kts. A loss of translational lift occurs at about 25 kts, depending on the wind.

The ADS-B data for the accident flight indicated that about 4 minutes prior to the accident, the aircraft arrived on scene and performed two right-hand orbits. The helicopter then turned right to a southeasterly heading (upwind), which appeared to parallel the bayou off to the right, and slowed to about 10 kts groundspeed. The bayou ran from the northwest to the southeast of their position and then turned east. Just before the helicopter reached the portion of the bayou running east, it turned right, accelerated from 10 to 30 kts groundspeed, and was shown to circle to the north (downwind). The helicopter then turned to the left and flew straight for about 5 seconds before the ADS-B data ended.

A video taken by a witness on the ground showed the helicopter spinning to the right in a nose-low, descending spiral. The video did not capture the beginning of the spin or the impact with the building or terrain.

The helicopter appeared to be operating at an airspeed below translational lift where the tail rotor is required to produce nearly 100% of the directional control. As the aircraft began its final right turn to the north (downwind) and began to yaw to the right, the required amount of tail rotor thrust to stop the yaw was not available nor applied. As the helicopter continued to rotate, it entered the area of main rotor disk vortex interference, further reducing tail rotor thrust. As the rotation continued, the helicopter entered the area of tail rotor vortex ring state, resulting in oscillations of tail rotor thrust. As rotation continued, the helicopter entered the area of weathercock stability, acting to rapidly accelerate the yaw rate. As the helicopter continues to rotate, the impact of the relative wind positions builds on each other, and amplify one another.

MD Helicopter proposes the following probable cause of this accident to be:

Loss of control due to a sudden unanticipated right yaw, its misidentification, and the application of inappropriate corrective actions, resulting in the development of an uncontrollable yaw from which recovery was not possible.

Sincerely,



Joan Gregoire  
Chief Air Safety Investigator