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Strengths and Weaknesses of Professional Helicopter Pilots Observed During Simulator Training

Sophisticated simulators offer dynamic environments where even experienced pilots can hone their skills.

by
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Simulator realism demands appropriate responses from pilots, and the simulator instructor has the unique vantage point of being able to observe pilot performance under a wide array of normal and abnormal conditions.

As a result of simulator observations, several things that professional helicopter pilots generally do very well, and four areas where improvement is needed, have been identified.

Most advanced helicopter simulator training consists of model-specific recurrent training and generic instrument flight rules (IFR) training. Full motion/visual helicopter flight simulators are sophisticated enough that the U.S. Federal Aviation Administration (FAA) now approves the issuance of a helicopter airline transport rating based solely on a simulator check ride.

A typical training subject is a professional twin-turbine helicopter pilot. It is not unusual for such a pilot to have more than 10,000 flight hours. Although most of these pilots train and operate as a crew of two, a significant number of them fly in single-pilot operations.

Four Things Helicopter Pilots Do Well

1. Most professional helicopter pilots generally have excellent physical flying skills. In some cases, these skills border on the phenomenal. This level of ability can be attributed to a number of factors, including:

- Until recently very few helicopters, even large twin-turbines, were equipped with autopilots. This forced helicopter pilots to exercise and sharpen their physical flying skills.

- Helicopters make many more takeoffs and landings per flight hour than airplanes. These frequent takeoffs and landings are often performed in demanding, closely-confined heliport environments. With very little space in which to maneuver, the penalty for clumsy handling can be severe.

- Helicopters generally operate at lower altitudes where vigilance for traffic and obstructions and accompanying avoidance maneuvers are required. Autopilots, even when available, are usually used sparingly by pilots in this environment.

- Many of today's professional helicopter pilots are probably products of the military during the Vietnam War. Therefore, their individual flight time usually includes more than 20 years of flying experience.

2. Helicopter pilots in training scenarios often demonstrate a relaxed attitude toward emergencies and demanding circumstances. This may be due, at least in part, to their military training which emphasizes emergency training.

Another reason for this attitude is probably because most of these pilots have trained often in simulators. Simulator training, if it does nothing else, enhances a pilot's skills in calmly dealing with emergency procedures.

3. Helicopter pilots are usually eager to assist and be assisted by fellow crew members. "Hangar-flying" stories told by fixed-wing pilots in simulator training emphasize "the old captain whose only requirement of the first officer is to keep quiet and sit on his hands." This attitude is rarely found among the helicopter pilots in simulator training. Instead, helicopter pilots are eager to accept all the assistance that a first officer can provide. This attitude may be due to the high workload demands of the rotary-wing flight environment.

4. Helicopter pilots are very strong in knowledge of and desire to learn more about aircraft systems. Perhaps because helicopters abound with moving parts, their pilots want to understand the mechanical aspects of their craft.

Another reason for this desire for knowledge may be that many helicopter pilots have flying backgrounds that placed them in remote areas where maintenance expertise was not readily available. They were the only "experts" there. Assignments in remote areas of the world were good reasons for them to learn as much as possible about their aircraft.

Proficiency in Some Areas Requires Improvements

In spite of the strengths of the professional rotary-wing aviator, there are weaknesses that are routinely observed by simulator instructors. Although these shortcomings are not found in every pilot, they are observed often enough that instructors are sensitive to them.

1. There is a tendency to make errors and compound those errors when pressured by the need to "hurry-up" or "rush." This rushed feeling may occur in both normal and emergency situations and result from either internal or external pressures.

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The job of a simulator instructor is, in part, to provide situations where pilots must expand their abilities to achieve a successful outcome. A pilot who performs flawlessly in a slow-paced environment is likely to begin to make mistakes when rushed. A premature air traffic control (ATC) vector to final approach before the pilot has properly configured the aircraft and prepared himself for the approach may result in poor performance. Once mistakes begin, they frequently compound, with one error leading to another; the result may be an incident or accident.

U.S. Air Force Capt. Roberta L. "Bobbi" Russell[1] states that a common personality trait shared by pilots is that they are "controllers" — they have a need to be in control of situations. This sense of control is quickly lost if real or perceived pressures toward haste are allowed to prevail. When this sense of control is lost, confusion may result.

In a study of helicopter crews using a Bell 222 simulator,[2] pilots were given a catastrophic tail rotor failure shortly after takeoff. In more than 80 percent of the situations, those instructed to land immediately after encountering the malfunction crashed. However, pilots instructed to climb to a safe altitude and stabilize there until they felt prepared to land crashed in less than 20 percent of the situations.

The antidote to losing control of a situation when confronted with a hurry-up feeling may be a purposeful effort to slow things down. For example, if ATC gives a

pilot an approach clearance that he does not feel ready for, he should request additional time. When an emergency demands a pilot's reaction, he should remember that there are few emergencies in twin-engine helicopters that require immediate action. Attempting to rush an emergency procedure in a situation that does not require immediate action may be far more dangerous than doing nothing at all. Most helicopter simulator instructors are familiar with the scenario in which the non-flying pilot, in an effort to react quickly to an engine failure, inadvertently shuts down the remaining "good" engine.

2. Imprecise and misleading cockpit communications in normal and emergency circumstances are also a frequent problem. A joke told by helicopter pilots is that the three things most commonly said in the cockpit are: "Was that for us?", "What did he say?" and "The heck with it, let's go VFR (visual flight rules)." The first two quotes are concerned with communications — the lack of it.

Communication is defined as a process by which information, thoughts and feelings are exchanged in a clearly understood manner. Ineffective communications can be disruptive, generate misunderstandings and cause mistakes. The consequences can be serious, even disastrous.

According to a U.S. National Aeronautics and Space Administration (NASA) study,[3] "no other essential activity in aircraft operations is as vulnerable to failure through human error and performance limitations as spoken communications." This is certainly true in the helicopter cockpit.

NASA Aviation Safety Reporting System (ASRS) reports from pilots underscore a variety of communications problems. An analysis of these reports reveals that some of the factors leading to miscommunications between ATC and pilots include:

- Hearing one number and reading back another. For example, the controller does not hear — or does not listen to — the incorrect pilot readback. The pilot accepts the lack of response as confirmation that the readback was correct;

- Hearing the expected response. This may be a case of "habit conditioning." For example, a pilot receives a clearance to "descend and maintain three thousand feet" while inbound to his home airport. However, he "hears" ATC say "two thousand feet" because that is the altitude he is routinely assigned.

- Assuming that the other crew member heard the clearance. One of the widely recognized potential weaknesses of a multi-pilot crew is the belief that "the other guy" will take care of it.

Cockpit miscommunications between crew members can be equally dangerous. As a result, many instructors encourage crews to enunciate all actions in the cockpit and warn them not to assume that the other crew members are equally aware of what is taking place in the cockpit.

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3. The lack of pre-defined cockpit duties, especially during malfunctions and emergencies, can also pose problems. In a multi-crew helicopter cockpit, it is essential that each crew member have specific duties in both normal and abnormal situations.

Eager-to-help crew members may neglect the discipline of cockpit duties, even when they are strictly defined by standard operating procedures (SOP). Simulator instructors regularly observe pilots who become distracted by malfunctions. Instead of flying the aircraft and letting the first officer troubleshoot, or exchanging duties, both crew members become absorbed in analyzing and dealing with what are often minor aircraft malfunctions.

Practicing pre-defined duties in training will eventually have its desired effect. Pilots become aware of the need for, and the potentially tragic consequences of neglecting, a disciplined division of cockpit duties.

4. Many helicopter pilots also lack instrument flying knowledge and proficiency. Helicopters have been traditionally VFR aircraft. This is changing. Many modern twin-turbine helicopters are fully equipped for IFR flight. They may include the latest in electronic flight instrument systems (EFIS) and four-axis autopilots. Many helicopter pilots have embraced the challenge of IFR flight. However, some pilots remain uncomfortable with the IFR/ATC environment. One reason for this is a lack of confidence. This often results from inexperience in instrument and ATC procedures. One of the contributing factors to pilots remaining deficient in IFR experience is intentional avoidance of the ATC system. The helicopter's low VFR minimums make VFR flight both possible and legal in conditions better suited to IFR. Therefore, a helicopter pilot may be slow in building instrument experience because of the studious avoidance of IFR flight.

Although this deficiency is becoming increasingly rare

through the cumulative effects of training and experience, it remains a significant factor.

The professional helicopter simulator instructor is in the unique position of seeing both the best and the worst that pilots have to offer, but lessons learned from this environment can and should be a benefit to all rotary-wing pilots and operators. ♦

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