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The Danger of Playing Favorites

IN THIS FIRST OF OUR NEW SERIES ON UNIQUE WAYS TO SHARE AND CULTIVATE FLIGHT EXPERIENCE, WE EXAMINE WHY TREATING THE MAIN ROTOR LIKE A FAVORED SON CAN LEAD TO LTE.

by Kevin Nelson

Do you have a favored son? You do if you operate helicopters. One might call the main rotor system a "favored son" when teaching new helicopter pilots or building experience with existing pilots. This analogy often reduces that "deer in the landing light" look one gets after describing loss of tail rotor effectiveness (LTE) to someone for the first time.

KNOWING IS NOT NECESSARILY UNDERSTANDING

As we all know, the concept of tail rotor authority and the loss of it (referred to alternately as LTE, ULY or URY) is now a well-documented aerodynamic phenomenon. It is an evaluated test standard for certification in helicopters and is part of training somewhere in our careers. We know about it and can describe it sufficiently for any checkride. So, why then do LTE accidents still happen? And, why so frequently?

The FAA Advisory Circular AC 90-95, issued in 1995 to address the principle of uncommanded or unanticipated right/left yaw in helicopters, is clear in its purpose and ably defines the concept. Several entities, including the United States Army, helicopter manufacturers and helicopter operators, have worked hard to define and avoid this hazard of rotary-wing flight. Much has been written on the topic, including when Dan Megna, with help from Don Bloom (the "father" of LTE), wrote an effective and comprehensive look on how LTE was discovered, what it is and how it can be prevented *(see p.62, Vertical, Feb-Mar 2005).*

In teaching this phenomenon, we can diagram vortices, describe wind azimuths/speeds and flight envelopes in which a helicopter could encounter this dangerous condition. We can even relate stories of LTE experience or show video clips of our brethren trying to fly out of LTE. The students can then confidently tell instructors or pilot examiners what LTE is and how to avoid it. Yet, among many other things, when a distraction, lack of experience, oversight of conditions, complacency or the pressure of a mission occurs, they and *we* can become victims of our own doing.

LTE is not tremendously complex, it doesn't strain a pilot's brain to the breaking point, but it does


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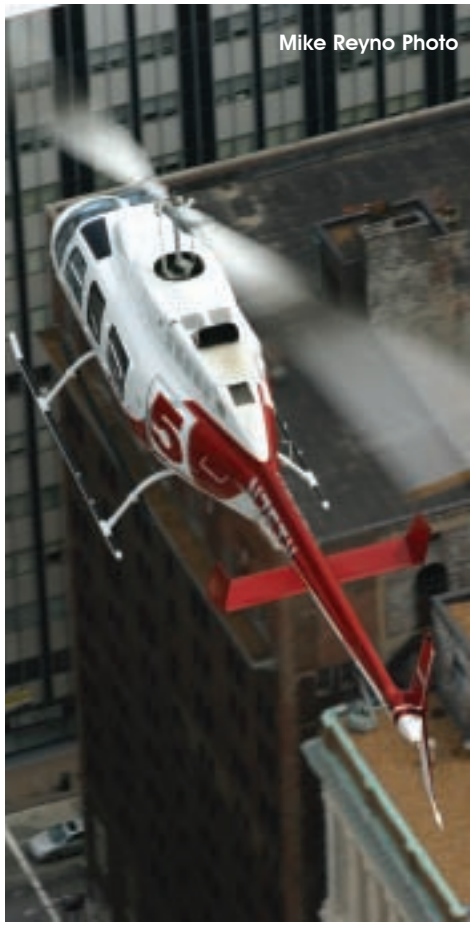
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take a good deal of understanding. If we are fully training pilots to prevent this error, why are we not nearly eliminating this accident cause? Can we help instill a deeper understanding of LTE to all pilots, new and seasoned? I believe we can, one student at a time, with analogous methods of introduction. This style of teaching can serve as a foundation or framework of a truer understanding, one that complements the specifics of LTE, as we find in AC 90-95. And, if we are able to build this greater awareness, understanding and proactive behavior in pilots, LTE accident rates should go down.

THE BENEFIT OF ANALOGIES

The method I use came from a distant past of teaching downhill skiing. It was understood that few people, while sliding down the hill, can remember how to turn their skis if all they were taught was procedural techniques using complex terms. Consider a novice skier, maybe a father of 2.5 kids from suburban-land, worried about his mortgage and family commitments. Are we surprised that he can't recall how to turn his skis when there is a tree fast approaching? Have you ever felt like that in a helicopter? Do you think student pilots might feel like that?

Our brains have limited channels to function on, and overload can push away those complex terms and procedures that ski or flight instructors try to ingrain in us. Things such as: inexperience; a pilot in a new aircraft, environment or mission; and even pilots plagued by complacency, can all closely resemble that novice skier speeding headlong toward a big fir tree. This is where familiar analogies can help embed an ability to realize an imminent problem, and teach behaviors or train reactions to deal with that problem.

Loss of the tail rotor's effectiveness can most often occur when hovering out of ground effect when longlining; in slow flight maneuvering, like ENG operations and SAR; and generally in high power demands. But, the pilot must make LTE a continual preventive thought in all flight regimes since they don't have a gauge that tells them when they are nearing the LTE limit.

THE REDHEADED STEPCHILD

So, back to how the main rotor is like a favored son. We start with the family: the whole aircraft, crew and passengers. The parents are the pilots and crew; we call the shots for the family. The food, shelter and security of the family are, by analogy, the fuel, power and performance the engine and transmission gives us. Elements such as the wind, gross weight, distractions, ATC, regulatory rules and aerodynamic forces are the *realities of life*, like bankers, taxes, health concerns, in-laws, credit card debt and traffic hassles. The main rotor system, meanwhile, is the favored son. He gets the most attention. We are tuned into this blood child of ours, keeping him well fed and nurtured — ensuring he can sustain the altitude that keeps the *cumulus granite* or plowed field from reaching up to get us (i.e., we pull collective and utilize the torque or temp we have available on the gauge in front of us).

Then comes the proverbial "redheaded stepchild," our tail rotor system. (No offense intended to any redheads or stepchildren.) He sits at the end of the dinner table, barely noticed. He is an integral part of the family, no doubt, but is underappreciated and neglected... until we notice his chores aren't being done. We seldom see him, and never while he is doing his chores. We only see him when he gets up in the morning (pre-flight checks). We focus instead on the favored son, diligently looking for any signs of stress or colds coming on (monitoring of gauges and altitudes). Meanwhile, we literally kick our redheaded stepchild when he gets out of line (yaw); and pay little attention to the few scraps we have to throw him so he doesn't become malnourished (a little torque spike is hardly noticed). Besides, there are no gauges that tell us our stepchild is about to reach a limit or lose lift! The best we have is the pedal position.

We always invest our parenting and family resources first on the favored son. Worse, when we need to feed him the most to avoid becoming ill, stressed or cranky (like when lifting out of a confined area or HOGEs in high density or pressure altitudes), the redheaded stepchild's chore level increases proportionally. This possibly leaves our stepchild with nothing left to stay healthy. To make matters worse, we may have failed to sense or avoid various ills and dangers like food poisoning, a virus or sprained ankle (the winds in the azimuths described in AC 90-95), and he can become ill without us seeing the imminent signs of him about to collapse... there, down at the end of the table. That impending collapse may then require us to reduce resources going to the favored son (causing a sudden descent or even a crash!).

Some families, of course, have stronger stepchildren than others. But some families know, ahead of time, that their redheaded stepchild (tail rotor) is susceptible to illness with even slight neglect.

The lesson in all this analogous thinking is: *know and be aware of your aircraft*, every part of it. Try this extended metaphor out on a fledgling helicopter pilot and let us know if it helps with gaining that deeper understanding, or maybe some day helps them respond in that moment of truth.

The various conditions, missions and aircraft we fly in the helicopter industry command us to be vigilant and proactive, intuitively forecasting performance outcomes before entering a flight regime. We must not lose sight of what our redheaded stepchild needs in order to be healthy enough to perform the chores we so critically need done (yaw control) — especially given the viruses that lurk in the shadows trying to make him sick.

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