HUMAN A.D. Heliprops

HELIcopter **PRO**fessional **P**ilots **S**afety Program
Volume 16 ★ Number 3 ★ 2004

Basics and *Professionalism*

I looked at the National Transportation Safety Board accident synopses for helicopter mishaps due to Unanticipated Yaw (often referred to as Loss of Tail Rotor Effectiveness – LTE) and found that there were almost one hundred occurrences during the last twenty years. Keep in mind that these statistics are for U.S. civil helicopters, and only for reportable accidents in which Unanticipated Yaw was found to be the probable cause. There is evidence that there are many, many more occurrences of Unanticipated Yaw that narrowly escape being reportable accidents.

NTSB FTW03LA134.
Hughes 369.

"The pilot and his passenger/observer were assisting local authorities during a search mission involving a boating incident on the lake. The pilot flew the helicopter 20-30 feet over the water on a north to south pass parallel to the shoreline… the pilot turned the helicopter left, to the north, out over the lake, and then turned west inbound toward the shoreline. While hovering out of ground effect on a west-southwest direction, the helicopter encountered a loss of tail rotor effectiveness and entered a spin to the right, which the pilot was unable to arrest. The helicopter impacted the water, and came to rest on its left side. The weather observation facility reported the wind from 130 degrees at 9 knots.

The National Transportation Safety Board determined the probable cause of this accident as the pilot's inability to control the helicopter after entering loss of tail rotor effectiveness. A contributing factor was the unfavorable wind."

INSIDE HELIPROPS

NTSB IAD01FA089.
Bell 206B.

"The purpose of the helicopter flight was to take aerial photographs of a large airport expansion construction project. The helicopter approached the construction site in an out-of-ground-effect hover taxi, with a quartering left tailwind. The helicopter turned to the right, and slowed to a stationary hover about 250 feet above the ground with a direct tailwind. Once in a hover, the helicopter made a rapid, right 180-degree

continued page 2

pedal turn around the mast, stopped momentarily, and then initiated another rapid pedal turn to the right. The helicopter turned at a faster rate than the initial turn, and continued into a spinning vertical descent to the ground. Examination of the helicopter revealed no mechanical anomalies. The collective was in a full up position, and the main rotor blades exhibited signatures consistent with low rotor rpm at ground contact.

The National Transportation Safety Board determined the probable cause of this accident as the pilot's improper decision to maneuver in an environment conducive to a loss of tail rotor effectiveness, and his inadequate recovery from the resultant unanticipated right yaw."

NTSB NYC98L043. Robinson R-22.

"The pilot was performing an out-of-ground-effect hover with a 10 knot tailwind. When the pilot raised the collective to maneuver, the helicopter began to spin to the right. The helicopter spun four times, descended, and impacted the ground. The pilot had about 100 hours of helicopter experience, and about 10 hours of out-of-ground-effect hover experience. After the accident the pilot told a police officer that he exceeded the limitations of the tail rotor.

The National Transportation Safety Board determined the probable cause of this accident as the pilot's improper out-of ground-effect hover procedures which resulted in a loss of tail rotor effectiveness."

NTSB IAD96FA107. 206B.

"Witnesses stated that they observed the helicopter hovering just above some 70 to 80 foot tall trees near the Creek. They said that the helicopter spun around slowly 3 to 4 times and that the main rotor was spinning slowly before the helicopter went behind the trees and crashed. The winds at the time were from 010 degrees at 6 knots. Examination of the wreckage found no evidence of pre-impact damage with the airframe, engine, or flight controls, however the aircraft was over its gross weight limitations for hovering out-of-ground-effect by 277 pounds.

The National Transportation Safety Board determined the probable cause of this accident as follows: The pilot's improper handling of the helicopter resulting in a loss of tail rotor effectiveness. A related factor was the pilot's disregard for the aircraft's weight and balance while hovering out-of-ground-effect."

NTSB ATL04TA137. 206B.

"At 1000 central daylight time a Bell 206B operating as a Public Use flight, collided with trees and the road… Visual meteorological conditions prevailed and no flight plan was filed. The helicopter was destroyed. The commercial pilot and private pilot rated passenger reported no injuries.

The pilot stated he was at a low airspeed between 20 to 25 knots at 200 feet AGL. The winds were on his tail. The helicopter started to weathervane to the right. He immediately applied left anti-torque pedal and increased power. The un-commanded turn rate increased. He decreased power, lowered the nose, and applied right cyclic. The turn rate increased. The helicopter collided with trees and a road while turning to the right, collapsing the right skid and rolling over on its left side. When asked if he experienced any mechanical problems with the helicopter before the accident, the pilot stated "No." When asked what happened the pilot stated "He encountered a loss of tail rotor effectiveness."

NTSB CHI00GA160. 269C.

"The police helicopter was providing night airborne surveillance support to a police ground unit…Witnesses on the ground said the helicopter was headed northwest when it "started spinning" and the "nose went straight down." An examination of the wreckage revealed no anomalies. The pilot had 149 total hours in helicopters all within the 84 days before the accident. The winds reported east of the accident site were 180 degrees at 12 knots.

The National Transportation Safety Board determined the probable cause as the pilot's failure to maintain translational lift while maneuvering, and the loss of tail rotor effectiveness. Factors related to this accident were the tailwind, low airspeed, low rotor rpm, and the pilot's lack of overall experience in helicopters."

Can Unanticipated Yaw be a serious problem? Of course it can. Of these six examples, four had fatal injuries. Granted, few instances of Unanticipated Yaw result in fatal accidents. Most LTE incidents result in nothing more than a surprised pilot; but many others take their toll of damaged or destroyed airframes.

Interestingly, almost all Unanticipated Yaw accidents occur in small, normal category helicopters. None in helicopters like the 412, S-76, or Puma. Why? Is it because the larger, transport category helicopters cannot experience Unanticipated Yaw? I don't think so.

"Almost all Unanticipated Yaw accidents occur in small, normal category helicopters. None in helicopters like the 412, S-76, or Puma. Why? Is it because the larger, transport category helicopters cannot experience Unanticipated Yaw? I don't think so. "

Consider airplanes for a moment. Can a Cessna 150 stall? Yes it can. Can a Lear 35 stall? Sure. Can a Boeing 747-400 stall? Indeed, a big airplane like that can experience a stall too. Wing stalls are a characteristic of all airplanes.

Now, are Cessna 150's stalled more frequently than Boeing 747-400's? Yes. Why? Probably due to a combination of the pilots who fly them and how they are typically flown/used. An airplane like a Boeing 747 is flown gently, by an experienced crew, under the watchful eyes of dispatchers and controllers, from one large weather-reporting airport to another large weather-reporting airport.

An airplane like a Cessna 150 is often maneuvered by a solo-student-pilot performing one basic maneuver after another during a short flight period, in uncontrolled airspace, with little or no immediate outside-assistance available.

Obviously, an inexperienced solo-pilot flying an unsophisticated aircraft near its limitations is more likely to be involved in a mishap than an experienced crew in an airplane/air system that helps the crew with their thinking and decision making.

Helicopters and Unanticipated Yaw have a similar relationship. Large helicopters as well as small helicopters can experience Unanticipated Yaw; it is a characteristic of single main-rotor helicopters. But Transport Category helicopters do not have a history of Unanticipated Yaw incidents because of the pilots who fly them, and how they are flown/used.

A helicopter like an S-76 is often crewed by two experienced, type-rated pilots performing normal takeoffs and landings from one prepared field to another. A helicopter like a 206B frequently has a solo (less experienced) pilot, conducting missions that require low, slow flight, with frequent sharp turns, climbs and descents in/over unprepared fields.

It should come as no surprise who has the greater opportunity to experience Unanticipated Yaw.

The argument can be made that the Transport Category helicopter crews avoid Unanticipated Yaw because they are more experienced, professional, acquainted with, and adherent to the basics of flying. But being professional, and an adherent to basics is not the exclusive domain of the experienced pilot flying large helicopters. The inexperienced helicopter pilot can also - *on his own* - ***develop a professional approach*** to all of his flying, and ***acquire the necessary basic information and skills*** to avoid Unanticipated Yaw.

A substantial portion of the basic information necessary to avoid Unanticipated Yaw is contained in the *Rotorcraft Flying Manual*, FAA-H-8083-21, that portion of which is printed in its entirety below. The only other ingredient now required is for you to read it, understand it, and adhere to it.

continued page 4

UNANTICIPATED YAW/LOSS OF TAIL ROTOR EFFECTIVENESS (LTE)

Unanticipated yaw is the occurrence of an uncommanded yaw rate that does not subside of its own accord and, which, if not corrected, can result in the loss of helicopter control. This uncommanded yaw rate is referred to as loss of tail rotor effectiveness (LTE) and occurs to the right in helicopters with a counter-clockwise rotating main rotor and to the left in helicopters with a clockwise main rotor rotation. This discussion covers a helicopter with a counter-clockwise rotor system and an antitorque rotor.

LTE is not related to an equipment or maintenance malfunction and may occur in all single-rotor helicopters at airspeeds less then 30 knots. It is the result of the tail rotor not providing adequate thrust to maintain directional control, and is usually caused by either certain wind azimuths (directions) while hovering, or by an insufficient tail rotor thrust for a given power setting at higher altitudes.

For any given main rotor torque setting in perfectly steady air, there is an exact amount of tail rotor thrust required to prevent the helicopter from yawing either to the left or right. This is known as tail rotor trim thrust. In order to maintain a constant heading while hovering, you should maintain tail rotor thrust equal to trim thrust.

The required tail rotor thrust is modified by the effects of the wind. The wind can cause an uncommanded yaw by changing tail rotor effective thrust. Certain relative wind directions are more likely to cause tail rotor thrust variations than others. Flight and wind tunnel tests have identified three relative wind regions that can singularly, or in combination, create an LTE conducive environment. These regions can overlap, and thrust variations may be more pronounced. Also, flight testing has determined that the tail rotor does not actually stall during the period. When operating in these areas at less than 30 knots, pilot workload increases dramatically.

MAIN ROTOR DISC INTERFERENCE (285°-315°)

Refer to Figure 1. Winds at velocities of 10 to 30 knots from the left front cause the main rotor vortex to be blown into the tail rotor by the relative wind. The effect of this main rotor vortex causes the tail rotor to operate in an extremely turbulent environment. During a right turn, the tail rotor experiences a reduction of thrust as it comes into the area of the main rotor disc vortex. The reduction in tail rotor thrust comes from the airflow changes experienced at the tail rotor as the main rotor disc vortex moves across the tail rotor disc. The effect of the main rotor disc vortex initially increases the angle of attack of the tail rotor blades, thus increasing the tail rotor thrust. The increase in the angle of attack requires that right pedal pressure be added to reduce tail rotor thrust in order to maintain the same rate of turn. As the main rotor vortex passes the tail rotor, the tail rotor angle of attack is reduced. The reduction in the angle of attack causes a reduction in thrust and a right yaw acceleration begins. This acceleration can be surprising, since you were previously adding right pedal to maintain the right turn. This thrust reduction occurs suddenly, and if uncorrected, develops into an uncontrollable rapid rotation about the mast. When operating within this region, be aware that the reduction in tail rotor thrust can happen quite suddenly, and be prepared to react quickly to counter this reduction with additional left pedal.

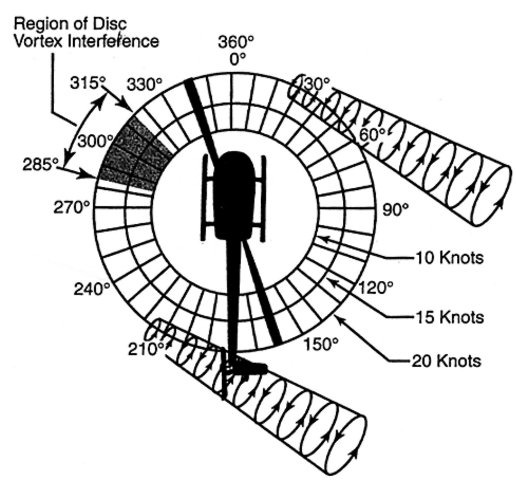

Figure 1: Main Rotor Disc Vortex Interference

WEATHERCOCK STABILITY (120°-240°)

In this region, the helicopter attempts to weathervane its nose into the relative wind. Refer to Figure 2. Unless a resisting pedal input is made, the helicopter starts a slow, uncommanded turn either to the right or the left depending on the wind direction. If the pilot allows a right yaw rate to develop and the tail of the helicopter moves into this region, the yaw rate can accelerate rapidly. In order to avoid the onset of LTE in this downwind condition, it is imperative to maintain positive control of the yaw rate and devote full attention to flying the helicopter.

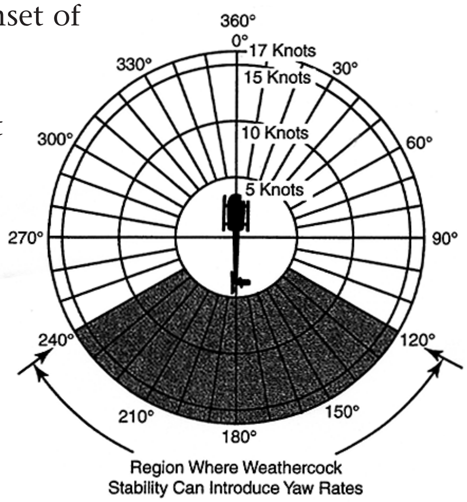

Figure 3: Weathercock Stability

TAIL ROTOR VORTEX RING STATE (210°-330°)

Winds within this region cause a tail rotor vortex ring state to develop. Refer to Figure 3. The result is a non-uniform, unsteady flow into the tail rotor. The vortex ring state causes tail rotor thrust variations, which result in yaw deviations. The net effect of the unsteady flow is an oscillation of tail rotor thrust. Rapid and continuous pedal movements are necessary to compensate for the rapid changes in tail rotor thrust when hovering in a left crosswind. Maintaining a precise heading in this region is difficult, but this characteristic presents no significant problem unless corrective action is delayed. However high pedal workload, lack of concentration and overcontrolling can all lead to LTE.

When the tail rotor thrust being generated is less than the thrust required, the helicopter yaws to the right. When hovering in left crosswinds, you must concentrate on smooth pedal coordination and not allow an uncontrolled right yaw to develop. If a right yaw rate is allowed to build, the helicopter can rotate into the wind azimuth where weathercock stability then accelerates the right turn rate. Pilot workload during a tail rotor vortex ring state is high. Do not allow a right yaw rate to increase.

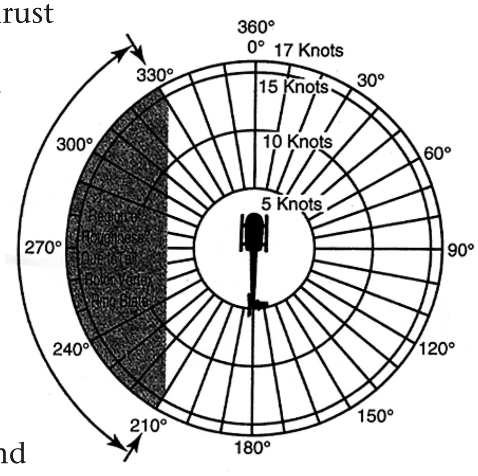

Figure 2: Tail Rotor Vortex Ring State

LTE AT ALTITUDE

At higher altitudes, where the air is thinner, tail rotor thrust and efficiency is reduced. When operating at high altitudes and gross weights, especially while hovering, the tail rotor thrust may not be sufficient to maintain directional control and LTE can occur. In this case, the hovering ceiling is limited by tail rotor thrust and not necessarily power available. In these conditions gross weights need to be reduced and/or operations need to be limited to lower density altitudes.

REDUCING THE ONSET OF LTE

To help reduce the onset of loss of tail rotor effectiveness, there are some steps you can follow.

1. Maintain maximum power-on RPM. If the main rotor RPM is allowed to decrease, the antitorque thrust available decreases proportionally.

2. Avoid tailwinds below an airspeed of 30 knots. If loss of translational lift occurs, it results in an increased power demand and additional antitorque pressures.

continued page 6

3. Avoid out-of-ground-effect operations and high power demand situations below an airspeed of 30 knots.

4. Be especially aware of wind direction and velocity when hovering in winds of about 8-12 knots. There are no strong indicators that translational lift has been reduced. A loss of translational lift results in an unexpected high power demand and an increased antitorque requirement.

5. Be aware that if a considerable amount of left pedal is being maintained, a sufficient amount of left pedal may not be available to counteract an unanticipated right yaw.

6. Be alert to changing wind conditions, which may be experienced when flying along ridgelines and around buildings.

RECOVERY TECHNIQUES

If a sudden unanticipated right yaw occurs, the following recovery technique should be performed. Apply full left pedal while simultaneously moving cyclic control forward to increase speed. If altitude permits, reduce power. As recovery is effected, adjust controls for normal forward flight.

Collective pitch reduction aids in arresting the yaw rate but may cause an excessive rate of descent. Any large rapid increase in collective to prevent ground or obstacle contact may further increase the yaw rate and decrease rotor RPM. The decision to reduce collective must be based on your assessment of the altitude available for recovery.

If the rotation cannot be stopped and ground contact is imminent, an autorotation may be the best course of action. Maintain full left pedal until rotation stops, then adjust to maintain heading.

Basics

"After 37 years as a flight instructor I have a few observations that I think directly affect safety and accidents.

If I could identify one thing that seems to be a common thread, it would be almost anything to do with "basics." I often get into an aircraft with a seasoned pilot and observe mistakes being made in using or not using a checklist; and misunderstandings of the items in the checklist. I see maneuvers degraded by varying degrees and combinations of basic mistakes. Many of these maneuvers are "botched" because the pilot has rushed himself or not left enough room or time to complete a basic maneuver properly.

I see many NEW pilots who don't understand something as simple as wind drift correction, crab angle, slips, and their affect on a normal approach. And unfortunately, I read about accidents that are a direct result of basic mistakes.

Instructors need to pay more attention to teaching fundamentals, as they are the elements of every complex maneuver that we do. Instructors have the responsibility of making sure that the formative hours of a student pilot are as perfect as possible. Habits, good and bad, are developed in the early days.

I think safety is a mindset. Something that always has to be in the back of the pilot's mind, yet a conscious element of every move he makes. An instructor's responsibility is to make sure that this fundamental safety-mindset is a basic in everyday flying. Then there will be fewer accidents caused by poor judgment and weak basic-piloting skills."

Wayne Brown/BHTI

There I Was... *Accounts sent to us by readers*

GAZELLE

"This was back in the mid-seventies. We were reaching the end of the process to certify the Gazelle for single-pilot IFR. At that time the U.S. FAA unwritten rules were that a candidate helicopter must operate for five hours in the clouds in a heavy traffic environment. I was the company pilot and Ramon was the FAA pilot. He, of course, was the FAA's evaluating pilot to assure that our testing procedures were correct, and that the aircraft's performance met the requirements.

Ramon and I discussed this at length. We considered a number of airports and decided that the Los Angeles area offered the best combination of heavy traffic and the opportunity to fly in the clouds. We departed Grand Prairie, Texas for our first enroute destination - Phoenix. The weather on this route that day would have us in and out of the clouds. By the way, the FAA certification rules specified that the pilot in the left seat was not supposed to help the pilot in the right seat (remember this was a test for single-pilot-IFR). We stopped in El Paso for fuel and continued on to Phoenix. Ramon was in the right seat. The minimum enroute altitude (MEA) for this leg was 10,000 feet. We climbed up and leveled off at our assigned altitude of 10,000 feet. There we were in the clouds, cruising at about 105 knots. There was no precipitation. There wasn't much for me to do in the left seat. I couldn't see the ground,

"Neither one of us had any significant experience with icing. We both thought that as long as we were not in precipitation, and the OAT was above freezing, we would not pick up ice."

so I monitored our progress along the route on the chart, and watched the instruments. In that kind of cruise situation things don't change very much nor very fast. But somewhat suddenly the airspeed indication dropped down to 80-85 knots without any changes of power or altitude?!? I wasn't sure if Ramon was doing something, and if he was, what it was. A little while later the airspeed indicator was back at a steady 105 knots. Maybe Ramon was finished with whatever he was doing and everything was back to normal.

A few minutes later there it was again – the airspeed down to 80-85 knots but no changes in anything else! Then it decelerated further to 70 knots along with a power increase. Now Ramon spoke up. "Hey, 70 knots, what gives?" He was wondering if I was doing something to provoke the change in airspeed. We verified that the Outside Air Temperature was still steady at about 6-7 degrees C. Neither one of us had any significant experience with icing. We both thought that as long as we were not in precipitation, and the OAT was above freezing, we would not pick up ice.

The indicated airspeed dropped as low as 60 knots due to a buildup of ice. When I looked more closely I could see that ice had formed on the skid cross-tube. We called Albuquerque Center and told them that we may not be able to maintain our altitude because of the ice buildup. (Other than for the engine and pitot tube this aircraft did not have any anti/de-icing systems).

Another airplane called Albuquerque and reported that they too picked up ice where we were, but they later flew out of it. We too expected to fly out of this icing condition soon.

We nervously watched the ice continue to accumulate on the skid crosstubes to a depth in about one-and-a-half inches! Just a short while before we broke out of the clouds the airspeed came back up to 105 knots. When we were back out in the clear and in the sunshine the ice dissipated/broke away.

We learned not to fly in freezing conditions in the clouds."

continued page 8

A STORY TO SHARE

"This true story has been literally haunting me since I learned of it first-hand. I don't think there is a time when I am pre-flighting a helicopter or getting ready to fly that this event does not crop up in my mind. Knowing that safety is always first, perhaps, after learning of this event, my fellow pilots will also reflect on this happening and take that little extra ounce of effort to make sure Murphy does not rear his ugly head at the wrong time.

Anyway, my chief pilot George told me of his experience when flying air tours in his friend's JetRanger over a recent weekend.

George is a good pilot, and is always extremely safety conscious. I had no objection for him to do any extra work as long as it didn't interfere with his weekly responsibilities for my company.

Anyway, George lined up two helpers, who weren't pilots, but still very knowledgeable about being around aircraft, etc. One of these helpers was responsible for handling the sales, and the other was the official passenger loader/unloader. As you know, these mini-tour flights are short in duration, and the rotors never stop until the last tour is over.

Things were going well on this hot summer day, and demand was good. After several hours things were going quite well. Upon the conclusion of what turned out to be the last tour, the four passengers were being unloaded. The "loader" saw to it that the four passengers disembarked the helicopter, and then asked them to follow him to the safety area, away from the helicopter, and away from the nose of the helicopter. In the group was a father and a young daughter. They were in line, walking away from the helicopter, but were third and fourth in line. In other words, they were the last in line leaving the helicopter area.

As everyone started walking single-file away from the helicopter, the father decided to lift up his daughter and put her on his shoulders! The loader was facing the opposite direction and was not able to see this happening! Also, the father opted to pick up the girl while still within the radius of the turning rotor blades.

In utter horror, George looked at the father picking up the daughter, and in an instant, George was able to pull completely aft on the cyclic (and I think some up collective too), and by a miracle, the angle of the rotor disc with full aft cyclic just barely cleared the daughter's head who was now on the shoulders of her father.

Can you imagine the adrenaline rush George had; and can you imagine the horrific sight had the main rotor blades struck the daughter?

After this occurrence, George rightfully called the tour operation concluded, expressed his anger at the helpers, and flew the JetRanger back to the hangar. George told me that his loaders were getting tired and were in need of a rest, and that he should have suspended the tours earlier so all could rest a while.

I don't know what the moral of this story is. It just could be that no pilot can be too cautious or too careful. I do know one thing however, that George and I will never forget this story and this event. Hopefully, now sharing this frightening experience with my fellow pilots, it will plant a seed and compel each one of us to expend that extra effort that will provoke anticipatory thoughts about how something could go wrong, and how that potential can be addressed before a catastrophe occurs.

With this precautionary effort, and attempting to anticipate the downside of any aspect of our flights and operations, perhaps we too will be lucky like George was, or better yet, we will never have to be "lucky" in such a life threatening experience."

Every pilot who has been in the cockpit of a helicopter on the ground with its rotors turning while passengers approached or departed the helicopter can appreciate the drama of that last story. A pilot in such a situation is nearly helpless to control personnel who are moving around a turning helicopter. Somehow the atmosphere around this hissing, growling, wind-making machine sets the stage for people who move closely about it to pay attention to the wind and the noise and

continued page 10

Q& Your Answers...

In the last issue we asked pilots to tell us about their,

High Hover Operations. What, How and Why?

We received few responses. Here they are.

A "Our aircraft is a surplus OH-58 doing law enforcement work as a public use aircraft. We do long-line with 50 to 150 foot lines. We are picking up Marijuana from grow-sites in the mountains. On search and rescue, we sometimes insert rescuers to remote areas with a 150-foot synthetic line, and extract the rescuer and the victim. These jobs require operations in the Height-Velocity Curve. We are only in that area for the time it takes to get the load or people hooked up or unhooked. For Marijuana we have a remote electric hook, which decreases the time to unhook loads. All the ground crews who do this receive training in these operations before we do the actual work. Only the pilot is on board doing long line, and we bring a fuel truck to the site for extended operations to keep the aircraft weight down."

A "My flying is almost exclusively with a photographer/cameraman aboard. Such a platform is used to film sights that can be captured only from a slow or stationary helicopter. It seems that the targets of my photographers' interests require specific sun-lines and heights above the ground that often do not coincide with my pilot's interest in avoiding the Height-Velocity Diagram and keeping my nose into the wind. Before we go flying I explain what my constraints are, and indicate that I will do my best to give him what he wants and minimize the risk to both of us. I don't tell him how to do his filming. I try not to let him tell me how to fly."

A "I fly OH-58's on RAID missions. We have some neat new FLIR equipment that has excellent capabilities that allow us to hover above the high-hover point on the Height-Velocity Diagram – typically 800-900 feet. Our previous equipment required us to hover lower – inside the H-V Diagram, and to make pedal turns to track the target.

We hover high to find a suitable location to be able to

continued page 11

What is your Answer?

"What, in your opinion would be the most likely cause of the next accident in your organization?"

If this question is worded in a manner that seems to be too much of a self-fulfilling prophesy, then how about

"What is the greatest risk in your flight operations?"

Email your answer to:
jszymanski@bellhelicopter.textron.com

You can also fax your answer to 817-278-2428
or Mail them to:

Bell Helicopter Textron, Inc.
Jim Szymanski
HELIPROPS Manager
P.O. Box 482
Fort Worth, Texas 76101

not notice the most lethal element – the almost invisible rotor blades. It is understandable how a first-time passenger may not recognize the hazard; but crewmen who regularly operate in and around turning helicopters should certainly know better.

The following mishap reports illustrate how quickly something deadly can occur, and how pilots are not immune to lapses in attention.

R-22. "A child was struck by the main rotor on coast-down after engine shut-down. The pilot exited the aircraft, grabbed up the child, and held the child up above his head. The main rotor hit the child." One fatal.

AS-365N. "A disembarking passenger was struck by the main rotor and killed. The aircraft had landed and parked in front of the hangar to let off two passengers for transfer to a Citation jet." One fatal.

407. "While dropping of a group of VIP passengers, one of the passengers (16 year-old boy) jumped up to try to touch the turning main rotor blades; not once, but twice. On the second attempt the main rotor blades struck and removed four fingers." One serious-injury.

369E. "The copilot exited the aircraft to help passengers out of the rear of the aircraft. Upon reentering the cockpit the copilot hit his head on the door-frame, causing severe bleeding. The pilot shut down the aircraft to assist, and as he walked out under the rotor disc, the coasting-down main rotor hit him in the back of the head." One serious-injury. One minor injury.

AS-350. "The aircraft was on the ground at flight idle when another aircraft landed nearby. The rotorwash of the landing helicopter caused the main rotor blades of the helicopter on the ground to flex down and strike an employee of the helicopter company." One fatal.

407. "During power line maintenance the aircraft landed and the pilot got out to brief ground personnel. The cyclic was left in the centered position with the rotor turning. Upon returning to the helicopter the pilot was struck by two main rotor blades. One fatal."

S-76. "While the helicopter was sitting on an offshore oil platform with the engine at flight idle, a passenger attempting to board the aircraft was hit on the head by a rotor blade." One fatal.

500D. "At about 1100 a Hughes 500D sustained substantial damage when a ground crewmember inadvertently threw a rope into the idling main rotor system. During a telephone conversation with the investigator-in-charge, the pilot said the helicopter was sitting and running at flight idle while he and two helpers prepared a sling load. He said he was climbing into the helicopter, and did not see the activity, but one of the helpers standing near the cargo door threw a rope to the other helper. He said the rope was inadvertently tossed into the main rotor system, and wrapped around the rotor head. The pilot said that the main rotor blades and rotor head received structural damage during the encounter with the rope." Substantial damage.

These mishap reports show that whenever anyone is outside and near a turning helicopter on the ground bad things can happen quickly. A pilot in such a situation must be attentive to all the people in and around his helicopter, and use all the resources at his disposal to watch, brief, and control them.

If the situation allows, taking the time to board passengers and crew before engine/rotor starting, and to disembark them after the engine/rotors have stopped, seems the most prudent; especially with passengers who are unfamiliar with helicopters. In this instance you can provide a preflight briefing to tell them what or what-not to do.

Preflight briefings are great, but many operations must be conducted with the engine/rotors turning, and the accompanying noise and downwash. Your ability under these conditions to communicate with approaching/departing personnel orally or visually may be non-existent.

Use ground guides whenever possible.

Use arm-and hand signals if that is the only means at your disposal.

You may need to be assertive with your passengers – particularly those who are not accustomed with being told what to do.

Handling passengers and crew is a **SERIOUS** matter. They are in your hands. Make it a **PERSONAL** issue. ***Treat them as you would your mother.***

SERIOUS PERSONAL

2004 U.S. Civil Helicopter Accident Statistics

During 2003, in U.S. civil helicopter operations, we experienced 36 accidents that claimed 67 lives.

As we mentioned in the Human A.D. Volume 15 Number 4, this is a terrible statistic. In response to those fatalities in 2003 we launched a campaign to reduce the number of fatalities in 2004. The theme of this campaign is based on two simple concepts – **SERIOUS** and **PERSONAL**.

The first is that every facet of the helicopter industry is a ***serious*** business. Designing, testing, certificating, manufacturing, regulating, flying and fixing helicopters are serious matters. Aviation is unforgiving of Carelessness or Neglect. Mistakes and poor Judgment can quickly result in Damage, Injury or Loss of Life.

The second is that everyone involved in this business must make it a ***personal*** issue. Everyone who touches a Helicopter has a hand in Preventing or Causing a Mishap. Mishaps can cause personal grief for you, your family, friends and colleagues.

It is sad to report that as of 24 August, we have had 29 accidents this calendar year that have claimed 48 lives. That is a rate that will exceed last year's unacceptable number. We cannot tolerate a repeat of 2003's statistics. We must stop this rate – NOW.

That will require everyone who is involved in the helicopter industry to pledge to be SERIOUS about their contribution, and recognize that no matter how close or far one is from direct helicopter operations you have a PERSONAL responsibility to do your job right the first time and every time.

SAFE IN 2004

Take it Serious. Make it Personal.

Q & A (con't)

transmit our electronic data to a ground receiving-station. I've never practiced entering an autorotation from a high hover, but I imagine I would do so by lowering the collective, of course, and lowering the nose to pick up some airspeed."

We also have done some firefighting work where we pick up water in a bucket. I feel more vulnerable during the water pickups than I do during the high hover work.

A "We've operated 206B's and BO105's, and are getting into the 427 and 407. Almost all of our work - 95 percent - is powerline patrol. Our territory is in Indiana and Ohio. Every year we patrol 8,000 miles of lines – three times as a visual patrol and once as an Infrared patrol. All of this work has to be done down low near the wires – 40 to 300 feet above the ground. Dependent on how the lines are laid, we fly at speeds from 50 to 110 knots. When we find things that need an additional look we hover at the height required. That of course is dependent on the height of the structure - again, that can be 40 to 300 feet above the ground. We carry only the necessary crew.

I have taken training at the factory to see what autos would be like when entered from the top of the H-V Diagram, as well as outside the knee of the H-V Diagram. That is good, but the terrain and right-of-way along and beneath the power lines we patrol is not always so good. In northern Indiana it is generally flat, open farm-land that offers OK spots for a forced landing. But in southern Indiana the terrain is not so good. There it is hilly, rocky and with lots more big trees. Continuously flying in the wire environment is the biggest immediate risk, but there are others – birds being one of them."

HUMAN A.D.
Heliprops

The **HELIPROPS HUMAN A.D.** is published by the Training Academy, Bell Helicopter Textron Incorporated, and is distributed free of charge to helicopter operators, owners, flight department managers and pilots. The contents do not necessarily reflect official policy and unless stated, should not be construed as regulations or directives.

The primary objective of the **HELIPROPS** program and the **HUMAN A.D.** is to help reduce human error related accidents. This newsletter stresses professionalism, safety and good aeronautical decision-making.

Letters with constructive comments and suggestions are invited. Correspondents should provide name, address and telephone number to:

Bell Helicopter Textron Inc.
Jim Szymanski
HELIPROPS Manager
P.O. Box 482
Fort Worth, Texas 76101

or e-mail:
jszymanski@bellhelicopter.textron.com

Yes!


HUMAN A.D.
Heliprops
VIBRATIONS

I would like to receive my own copy of the **HELIPROPS HUMAN A.D.**

Please complete this coupon and fax, email or mail to the address below.

Name ______________________________

Title ______________________________

Company ______________________________

Address ______________________________

____

City ______________________________

State ______________________________

Zip ______________**Country** ______________

Volume 16 Number 3

Bell Helicopter Textron Inc.
Jim Szymanski, HELIPROPS Manager
P.O. Box 482 • Fort Worth, Texas 76101

Fax 817-278-2428
or e-mail:
jszymanski@bellhelicopter.textron.com

Bell Helicopter
A Textron Company
P.O. Box 482
Fort Worth, Texas 76101