Aviation Investigation Final Report

Location:	Danville, Pennsylvania	**Accident Number:**	ERA13LA134
Date & Time:	February 14, 2013, 12:21 Local	**Registration:**	N481LF
Aircraft:	EUROCOPTER DEUTSCHLAND GMBH MBB-BK 117 C-2	**Aircraft Damage:**	Substantial
Defining Event:	Collision during takeoff/land	**Injuries:**	4 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

The pilot reported that, as the helicopter approached mountainous terrain near the hospital during a helicopter emergency medical services (HEMS) flight, he turned the helicopter slightly right to pass through a gap in the ridgeline and then continued to fly directly to the heliport. The pilot then radioed that he was "3 minutes out." About this time, the medical crew intubated the patient, and the communications center advised the pilot that two people were on the roof to assist him. He then observed two individuals on the rooftop helipad, which, "while not abnormal," was "not routine." He was "a bit concerned" because he wanted to make sure the personnel were clear of the helipad before landing. The pilot recalled that he was somewhat more attuned to the patient's condition because the medical crew was working hard to keep the patient alive and was moving around the cabin unrestrained. He continued descending the helicopter on a straight-in approach and began the final approach to the rooftop helipad. About 100 yards from touchdown, he noticed something "orange" out of the left window. At almost the same time, the flight paramedic mentioned that he also "saw something orange." The pilot then felt a "slight low frequency vibration," which was also noticed by the flight nurse. About 6 seconds later, he landed the helicopter on the helipad, executed an emergency shutdown, and then cleared the crew to exit.

A contractor who was operating a construction crane near the heliport reported that he was lowering a piece of equipment onto the roof of a building when he observed a helicopter approaching. Another contractor then observed one of the helicopter's blades contact the flag marker, which was mounted on the top of the construction crane boom, and "pieces of wood and flag…flying all over the place." Examination of the helicopter confirmed that the main rotor had contacted the flag marker and that one of its blades was substantially damaged. According to the pilot, neither he, the flight nurse, nor the flight paramedic had seen the construction crane before the helicopter contacted it while approaching the helipad.

Review of photographs taken after the accident revealed that the pilot's straight-in approach to the rooftop helipad passed over the location of the construction crane, which was positioned next to a nearby building. Flight crews had been notified of the construction crane's position 2 days before the accident, and the pilot believed that he had briefed the crew about the presence of the construction crane at the medical center. According to the notification, the crane was to be in position between about 0700 to 1000 local time and was going to have a beacon on top because of the proximity of the helipad. However, no beacon was installed, and the crane was still in use and in position 2 hours 21 minutes after the notification advised that the work was supposed to be completed.

No evidence was found indicating that the continued operation of the construction crane nor its presence was transmitted to the flight crewmembers when the flight was approaching the hospital. The investigation revealed that the communications technician was on the rooftop helipad at the time of the accident, not at her duty station manning the radio. The investigation also revealed that another helipad, which was located at ground level and was not near the construction crane, was available at the time of the accident and could have been used for the landing.

If the pilot had been provided with correct information about the construction crane's operation time and its presence or if he had used the available ground-level helipad, he would have been more likely to have avoided the crane. However, if the pilot had followed the guidance in the company's general operations manual, which required that a high-orbiting reconnaissance be completed before beginning the approach and that all published helicopter procedures for the heliport and helipad be observed (which in the case of the rooftop helipad designated a left traffic pattern), the accident could have been prevented. Instead, the pilot flew a straight-in approach, which placed the helicopter's flightpath near the construction crane, restricted his ability to see due to sun glare, and placed the helicopter in a position that obstructed his view of the construction crane, which would have been behind the instrument panel as the helicopter approached the rooftop helipad.

The National Transportation Safety Board has previously cited time pressure as a risk factor in HEMS flights. Due to the patient's critical condition, the pilot likely felt a sense of urgency to land, which influenced his decision to fly a straight-in approach to the rooftop helipad rather than to conduct a high-orbiting reconnaissance before initiating the approach. Although attempts are generally made to isolate HEMS pilots from the patient's condition while making go/no-go decisions, once onboard, it is difficult for pilots to be unaware of serious medical conditions that may be time critical, which leads to self-induced time pressures.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's decision to conduct a straight-in approach to the helipad, which resulted in the main rotor blade impacting a construction crane flag marker. Contributing to the accident was the erroneous information about the construction crane's operation time and the pilot's self-induced time pressure, which resulted from his awareness of the patient's medical situation during the flight.

Findings

Personnel issues	Flight planning/navigation - Pilot
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Task monitoring/vigilance - Pilot
Organizational issues	(general) - Operator
Environmental issues	Ground equipment - Accuracy of related info
Personnel issues	Motivation/respond to pressure - Pilot
Environmental issues	Glare - Effect on personnel

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Landing	Collision during takeoff/land (Defining event)

On February 14, 2013, about 1221 eastern standard time, a Eurocopter MBB-BK-117 C-2, N481LF, operated by Geisinger Medical Center, doing business as Life Flight, was substantially damaged when the main rotor contacted a flag marker, mounted on a construction crane, during approach, at Geisinger Rooftop Heliport (79PN), Danville, Pennsylvania. The pilot, flight nurse, flight paramedic, and patient were uninjured. Visual meteorological conditions prevailed for the Title14 Code of Federal Regulations (CFR) Part 135 helicopter emergency medical services (HEMS) flight, which originated at Muncy Valley Hospital Heliport (7PS5), Muncy, Pennsylvania at 1210.

According to the pilot, they departed their base at Primrose Heliport (25PS), Minersville, Pennsylvania for 7PS5 to pick up a patient for an interfacility transfer. After arriving at 7PS5 at 1142, the patient was loaded and they departed for 79PN at 1212. The patient was "doing poorly" and there was some initial consideration as to whether the patient was alive and whether to fly him at all. After departure, the pilot climbed to 2000 feet above mean sea level (msl) and flew on an approximate 160 degree magnetic heading, direct to 79PN.

As the helicopter approached the mountains near Danville the pilot turned slightly right to pass through a gap in the ridgeline and continued to fly direct to the heliport. The pilot then radioed in that he was "3 minutes out." Around this time the medical team intubated the patient, and he was advised by the communications center that there were two people on the roof to assist him. He then observed two individuals on the rooftop landing pad, which "while not abnormal" was "not routine". He was "a bit concerned" as he wanted to make sure the personnel were clear of the helipad prior to him getting any closer.

The pilot recalled that he was somewhat more attuned to the patient's condition as the medical crew was working hard to keep the patient alive and were moving about the cabin unrestrained. He continued descending, and commenced his final approach to the rooftop helipad. About 100 yards from touchdown he noticed something "orange" out of the left window. At almost the same time the flight paramedic mentioned that he "saw something orange". The pilot then felt a "slight low frequency vibration". This vibration was also noticed by the flight nurse. About 6 seconds later, he landed on the landing pad, executed an emergency shutdown, and then cleared the crew to exit.

According to contractors who were operating a construction crane near the heliport, they were lowering a piece of equipment onto the roof of a building when one of them observed a helicopter approaching. Another one of the contractors then observed that "all of a sudden." He saw one of the blades of the helicopter hit the safety flag (flag marker) which was mounted on the top of the construction crane boom, and "pieces of wood and flag were flying all over the place." At this point, the contractors stopped all operations with the construction crane, to confirm that all of their personnel were uninjured,

and to insure that the boom and cable did not receive any damage.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	55
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	September 11, 2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 14, 2013
Flight Time:	3035 hours (Total, all aircraft), 12 hours (Total, this make and model), 2310 hours (Pilot In Command, all aircraft), 40 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

According to Federal Aviation Administration (FAA) and pilot records, the pilot held an airline transport pilot certificate with ratings for rotorcraft-helicopter, commercial privileges for airplane single-engine land, airplane multiengine-land, and instrument airplane, and held type ratings for the SK-64 and SK-65. He also held a flight instructor certificate with ratings for rotorcraft-helicopter and instrument helicopter. His most recent FAA first-class medical certificate was issued on September 11, 2012. He reported 3,035 hours of total flight experience, 12 of which was in the accident helicopter make and model.

Aircraft and Owner/Operator Information

Aircraft Make:	EUROCOPTER DEUTSCHLAND GMBH	**Registration:**	N481LF
Model/Series:	MBB-BK 117 C-2	**Aircraft Category:**	Helicopter
Year of Manufacture:	2010	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	9392
Landing Gear Type:	Skid	**Seats:**	5
Date/Type of Last Inspection:	January 10, 2013 Continuous airworthiness	**Certified Max Gross Wt.:**	7900 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo shaft
Airframe Total Time:	636 Hrs as of last inspection	**Engine Manufacturer:**	TURBOMECA
ELT:	Installed, not activated	**Engine Model/Series:**	ARRIEL 1E2
Registered Owner:	Geisinger Medical Center	**Rated Power:**	708 Horsepower
Operator:	Geisinger Medical Center	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	Life Flight	**Operator Designator Code:**	3GMA

The accident aircraft was a twin-engine medium utility–transport helicopter of conventional construction, configured for emergency medical use. It utilized a four-bladed main rotor with a hingeless rotor system, fiber-reinforced plastic blades, and a semi-rigid, two bladed tail rotor. It was powered by two turboshaft engines each producing 708 shaft horsepower.

According to FAA and maintenance records, the helicopter was manufactured in 2010. The helicopter's most recent continuous airworthiness inspection was completed on January 10, 2013. At the time of the inspection, the helicopter had accrued 635.6 total hours of operation.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SEG,464 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	11:53 Local	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	2°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Muncy, PA (7PS5)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Danville, PA (79PN)	**Type of Clearance:**	None
Departure Time:	12:10 Local	**Type of Airspace:**	Class G

The reported weather at Penn Valley Airport (SEG), Selinsgrove, Pennsylvania, located 15 nautical miles southwest of the accident site, at 1253, included: calm winds, 10 miles visibility, clear, temperature 04 degrees C, dew point -03 degrees C, and an altimeter setting of 29.96 inches of mercury.

Airport Information

Airport:	Geisenger Rooftop Heliport 79PN	**Runway Surface Type:**	Metal/wood
Airport Elevation:	674 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	H2	**IFR Approach:**	None
Runway Length/Width:	60 ft / 50 ft	**VFR Approach/Landing:**	Straight-in

Two heliports were located at Geisinger Medical Center.

The first heliport (49PN) was located at ground level and was designated by the medical center as Helipad H1. It was a circular asphalt helipad, 46 feet in diameter, equipped with perimeter lights.

The second heliport (79PN) was located on the roof of the hospital and was designated by the medical center as Helipad H2. It was 60 feet long by 50 feet wide, rectangular shaped, aluminum surfaced helipad.

A left hand traffic pattern was designated for both heliports.

Wreckage and Impact Information

Crew Injuries:	3 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	40.967777,-76.605552(est)

Examination of Construction Crane

Examination of the construction crane revealed that the metal pole that held the flag marker was damaged and the wooden pole that the flag marker was attached to was missing.

Examination of Helicopter

Examination of the helicopter confirmed that the main rotor had come into contact with the flag marker.

Two blades; the Green Blade, and the Blue Blade of the four-bladed main rotor were damaged. The Green Blade incurred minor tip damage. The Blue Blade was substantially damaged and required replacement.

According to the pilot neither he, the flight nurse, nor the flight paramedic, had seen the construction crane prior to coming into contact with it while approaching the landing pad.

Tests and Research

Construction Crane Information

Review of photographs taken after the accident revealed that the helicopter's final approach passed over the location of the construction crane which was positioned next to a building known as the "Annex" where it was being used to remove condensers from the roof.

Interviews with the crane operator revealed that at time of the accident, the construction crane's boom had been inclined upward on a 66 degree angle and extended out 133 feet, and was aligned with the helicopter's flight path along its final approach.

Flight crews had been notified of the construction crane's position on February 12, 2013. Prior to their departure from 25PS, the pilot believed that he had briefed his crew about the presence of the construction crane at the medical center.

According to the notification, the crane was to be in position about 0700 to approximately 1000 and was going to have a beacon on top, because of the proximity of the helipad. However, no beacon was

installed; the crane was in use, and still in position, 2 hours and 21 minutes after the notification advised that contractors removing the condensers from the roof were supposed to have completed their work.

Communications Information

According to the Geisinger Medical Center General Operations Manual (GOM), Maximum use of radio facilities would be made on all departures and arrivals.

During the investigation it was determined however, that one of the people observed by the pilot on the rooftop helipad when the helicopter was inbound was the Communications Technician that would normally man the radio in what was known as the "Glass House" next to the helipad on the roof of the hospital.

Helicopter Approach and Restrictions to Visibility

According to the pilot, he approached the heliport from the north which was not the way they would usually come in to the helipad. They usually would approach from the south.

Review of witness statements revealed that despite the prevailing visibility of 10 miles, the helicopters straight in flight path would have restricted the pilot's ability to see the construction crane as he would have been subject to sun glare, and as he approached the construction crane, it would have been below him at his 11 o'clock position as he approached the helipad.

Examination of the cockpit layout also indicated that as he approached the construction crane, the crane would not have been in the pilot's direct line of sight, as his view of the construction crane and portions of the Annex roof would have been obstructed by the helicopter instrument panel.

Approach Procedures

According to the Geisinger Medical Center GOM (12.9.6 VFR Approach Procedures), visual flight reference (VFR) approaches and departures to and from approved heliports or helipads were required to be accomplished with great caution:

1. A high orbiting reconnaissance was required to be completed by the pilot prior to beginning the approach.

2. Pilots were required to use continued vigilance during all phases of approach and departure, searching for obstacles and debris in the landing zone.

3. Pilots were required to make maximum use of the prevailing wind during the approach and departure procedures while maneuvering to remain a safe distance from obstacles.

4. All published helicopter procedures for the heliport and helipad were supposed to be observed.

Organizational and Management Information

Life Flight started in 1981 as a HEMS operation providing critically ill or injured patients rapid access to advanced life support, and transportation to critical care facilities.

Life Flight operated 24 hours a day from 5 bases averaging 2,600 flights per year. They initially operated under contracted air carrier certificates. In 2012, they were issued their own Title 14 CFR Part 135 air carrier certificate.

At the time of the accident, they operated 6 helicopters, each of which was equipped with a night vision system, traffic collision avoidance system, and terrain avoidance system operating in both visual meteorological conditions and instrument meteorological conditions. During inclement weather they would utilize instrument flight rules to continue operations in adverse weather conditions including rain, snow, and decreased visibility.

Normal cruising Altitude for the life flight program was between 3,000 and 5,000 feet above mean sea level.

In addition to emergency response, Life Flight also transported premature newborns, cardiac patients, critical care, and organ transplant patients.

Life Flight helicopter crews consisted of a pilot, flight nurse, flight paramedic, and in certain circumstances, a flight physician or specialty nurse.

All pilots were airline transport rated and instrument current. All communications specialists were emergency medical technicians and were experienced in emergency medical service and medical communications and were credentialed by the National Association of Air Medical Communications Specialists.

Communications between the helicopters and hospitals was done through a wide range of radio frequencies and satellite telephone.

Flight following consisted of monitoring using real time satellite tracking by a dispatch and operations center that was staffed by two Communications Technicians.

Additional Information

In order to improve safety, Geisinger Medical Center took the following actions:

1. In the event there is a crane in the vicinity of the hospital they would acquire multiple images of the crane from different angles to confirm location, angle, and exact height.

2. If a crane was placed in the direct path of flight to the rooftop helipad, the helipad would be temporarily closed. All incoming flights would land at the secondary helipad and patients would be

transported to the Emergency Room via ground transportation.

3. To be sure the flight crews were aware of changes or notices, they will require an email confirmation that the flight crew has received the notice and that they have read and understood it.

4. Shift change and briefing reports will have stronger emphasis placed on discussing every detail with the oncoming crew during shift changes.

5. They will ensure that the communications center is fully staffed and that no Communications Technician is on the roof top helipad off-loading patients.

6. Communications Technicians will announce advisory hazards not only for takeoffs but during approaches as well, and the announcements will be made over one program-wide frequency, rather than a separate frequency for a particular helipad.

7. Required all pilots, flight paramedics, nurses and physicians, communication technicians, maintenance technicians, managers and support staff to participate in Air Medical Resource Management (AMRM) training to enhance the safety culture by promoting group cohesiveness and adaptation during change.

8. Created a Safety Manager position to develop and organize programs that support operational excellence, prevent accidents and incidents, and manage risk.

Administrative Information

Investigator In Charge (IIC):	Gunther, Todd
Additional Participating Persons:	Tracy Plessinger; FAA/FSDO; Harrisburg, PA Richard G Smith; Geisinger Health Systems - Life Flight; Danville, PA Axel Rokohl; BFU; Germany Nathalie Gilliers; BEA; France
Original Publish Date:	November 13, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=86230