German Federal Bureau of
Aircraft Accidents Investigation

Investigation Report

7X010-0/07
February 2009

Identification

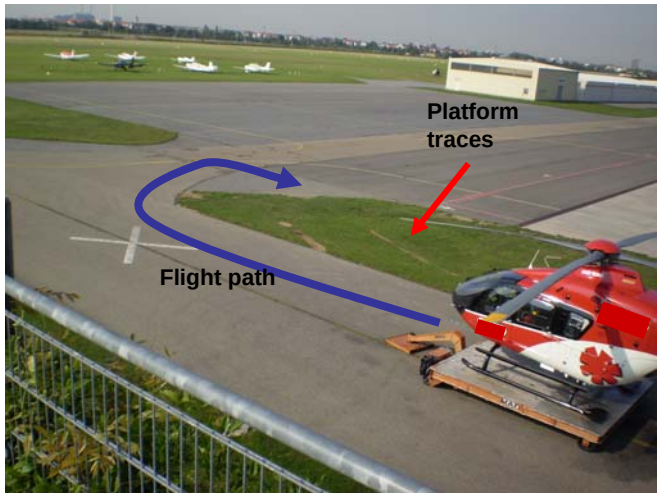
Type of occurrence:	Serious incident
Date:	23 August 2007
Location::	Mannheim
Type of aircraft:	Helicopter
Manufacturer / Model:	EUROCOPTER / EC135 P2+
Injuries to persons:	No injured persons
Damage to aircraft:	Aircraft not damaged
Other damage:	None
Source of information:	Investigation by BFU

Factual information

History of the flight

At 10:36 a.m.[1] the Air Rescue Center was alarmed for a primary rescue operation. The pilot and the paramedic entered the helicopter, standing on the helicopter transport platform and connected to the outboard power supply. According to the statements of the pilot and the emergency physician, the emergency physician stood outside the helicopter and monitored the starting of the engines. After a hand signal of the pilot, he pulled out the connector of the outboard power supply. He closed the flap at the helicopter and placed the connector on the floor in front of the platform. After that, the paramedic entered the helicopter and reported the cabin ready for take-off.

According to the statement of the pilot and the observation of external witnesses, the pilot now wanted to take off for the operation. He brought the helicopter to a hovering position vertically above the platform and then tilted forward in order to gain forward speed. During acceleration, suddenly a steep “nose down” attitude occurred; according to external witnesses, it was up to 80 degrees, and the rotor blade tips were only approximately 1 m away from the ground. In this attitude, the helicopter platform was dragged. After that, the helicopter rolled to the right around the longitudinal axis; during this, an additional turn to the right of 180 degrees around its vertical axis occurred. In this process, the cable of the outboard power supply, jammed between the cross beam and the right skid, was released. Afterwards the helicopter could be landed normally.



Personnel information

The 58 year old pilot held a valid air traffic helicopter pilot license ATPL(H) according to JAR-FCL. His overall flight experience was 7,736 hours, of these 55

[1] All times given are in local time unless indicated differently.

hours on this type and 34 hours within the last 90 days.

He was employed at the Air Rescue Center in Mannheim for 22 years.

Aircraft information

The Eurocopter EC135 P2+, year of construction 2007, had the serial number 0572. It was equipped with two Pratt and Whitney 206 B2 engines. The maximum take-off weight was 2910 kg.

For this helicopter type, the pilot is unable to see the right skid when the door is closed. The outboard power supply connection is located on the right fuselage side on the level of the rear cross beam in a height of approximately 80 cm.

Meteorological information

According to the Meteorological Aviation Report (METAR), CAVOK conditions with wind from 170 Grad with 5 kt and a temperature of 19 °C prevailed at the moment of the incident. Air pressure (QNH) was 1014 hPa.

Aerodrome information

The Air Rescue Center was located at the Mannheim-City Airport. It has an asphalt runway with a length of 1066 m and an elevation of 309 ft MSL. The helicopter was parked as usual in the north-easterly area of the apron, on its platform in front of the Air Rescue Center.

Flight data recorders

The helicopter was not equipped with flight data recorder and cockpit voice recorder. These were not mandatory.

Wreckage and impact information

The incident took place directly at the airport Mannheim-City at the take-off point of the helicopter.

The helicopter lifted the front of the platform and dragged it for about 10 m. The outboard cable showed damaged areas directly at the voltage converter and at a length of 4,3 m.

There was no damage at the helicopter except for scratches in the paintwork.

The mast moment had been exceeded; an obligatory technical control performed after the incident did not show any objections. According to the technical findings, other limit values were not exceeded.

Fire

There was no fire.

Organizational and management information

The Mannheim Air Rescue Center belongs to an operating company approved by the Luftfahrt-Bundesamt (German Federal Aviation Administration), operating several Air Rescue Centers in Germany. This company operates helicopters of the types Bo105, BK117, and EC135.

The Mannheim Air Rescue Center operates helicopters of the type BK117 for many years. This helicopter type has the outboard power supply connection at the front part of the fuselage. Since 5 July 2007, a helicopter of the type EC135 had been operated occasionally as a spare helicopter. Since 1 April 2008, the EC135 is the predominantly used type.

In a procedure about the handling of the outboard power supply connection cable, published in the station guideline (edition 03 by the date of 1 March 2007) of the affected Air Rescue Center, it was determined that, after starting the engines, the pilot shall give a hand sign to the emergency physician or the paramedic in order to pull the connector and show the disconnected connector to the pilot, and then to place the connector onto the ground in front of the platform. There was a note in brackets stating that the cable should not be positioned over the forklift pulling device in order to avoid a jamming of the cable.

The emergency physicians as well as the paramedics were instructed yearly about the procedures at and with the rescue helicopter according to the require-

ments in Appendix 1 to JAR-OPS 3.005 (d), (e) and 3.965. According to the statements of the station manager, the handling of the outboard power supply cable was addressed explicitly on these occasions.

According to the final report of the committee “Rescue” of the Ministry for Labour, Social Affairs, Health, and Women of the federal state of Brandenburg from the year 2004, there are target lead-times for air rescue from alarm until take-off all over Germany. For rescue transport helicopters (RTH), these are generally 120 seconds. For operations as intensive transport helicopters (ITH), these times can be prolonged.

Additional information

The helicopter transport platform had the dimensions of 4.0 m x 3.5 m; its weight was approximately 1,940 kg. The platform was an industrially manufactured cargo trailer for universal use. For operation at the Air Rescue Center, it was equipped with a voltage converter and corresponding cabling. The outboard power supply cable had a length of 5.9 m. A predetermined breaking point was installed 1.2 m in line before the cable end in form of a plug-in connection/quick release coupling. The cable harness diameter was 2 x 20 mm, the cables were sheathed with black material.

Internationally, the ICAO describes standards and specifications for the design of helipads in Appendix 14, volume II.
In Germany, the operation of helipads is regulated in the general administrative regulation about the approval of the installation and the operation of heliports since 2005. Here, the requirements according to § 6 LuftVG, § 38 to 53 LuftVZO, as well as the guidelines according to ICAO Appendix 14, volume II, are implemented.
Indications or notes for the use or design of mobile helicopter transport platforms, from which helicopters can take off and land, can neither be found in ICAO Appendix 14 volume II, nor in the regulations on commercial flight operation according to JAR-OPS 3, nor in the general administrative regulation, nor in national regulations of other countries.

Accidents in which a mobile helicopter transport platform had substantial influence:

BFU 3X449-96 on 11 October 1996:
The platform the helicopter was parked on started moving after starting the engines, before the operational rotor rpm could be reached. The helicopter collided with a hangar.

ATSB 200300982 on 19 March 2003:
The pilot in command did not raise the helicopter to a hover height sufficient to prevent contact with the mobile platform. Note: The helicopter collided with the lateral projecting end strip of the platform.

BFU 3X012-0/05 on 11 March 2005:
During take-off from the transport platform, the helicopter caught a projecting wheel, rolled to the left and touched the ground with the main rotor and the tail boom. The seriously damaged helicopter came to a rest on its left side.

Analysis

Generally, rescue helicopter crews prepare pending operations technically and mentally. Tasks within the crew are distributed according to the operation manual of the operator or the station guideline of the Air Rescue Center, respectively, in order to guarantee quick, structured, and safe workflows.

The flight was planned as a primary operation. The objective was to have a take-off within 120 seconds with very little initial information, in order to reach the destination quickly. Despite of experience and operative routine of all implied persons, this situation caused certain stress and excitement.

The procedure of the station guideline assigned tasks to individual persons and pointed out problematic issues. The procedure with respect to the outboard power connection was established at a time when the helicopter type BK117 was used exclusively on the site. This helicopter type had the outboard socket on the front right. This caused the emergency physician or the paramedic to stand in front of the helicopter to pull out the cable, and to lay the cable on the ground in front of the helicopter. The helicopter platform with the voltage converter on the front left of the platform was designed for this helicopter type. This arrangement

allowed laying the cable in the shortest possible way and never over the skids.

Since seven weeks, the helicopter type EC135 had been used temporarily as spare helicopter. Here, however, the outboard socket is located on the rear right, at a level of approximately 80 cm. This required the laying of the cable around the helicopter, from the voltage converter at the front left of the platform to the outboard socket at the rear right of the helicopter. Due to the given cable length of 5.9 m, the cable had to be laid over the right skid for this. Now, the emergency physician or paramedic stood on the rear right side of the helicopter when pulling the connector, and at the front right side when showing the connector to the pilot. When laying down the connector to the ground, the cable had to be removed deliberately from the right skid in order to avoid the formation of a loop.

In this case, the emergency physician placed the connector on the ground without becoming aware that a cable loop had formed around the tip of the right skid. The missing color contrast between the black skid and the black cable may have contributed to this.

Due to the design of the EC135, the pilot was not able to see the right skid, or the cable over it, respectively. When starting to hover above the platform he could not notice the cable; he was abruptly surprised when the cable tightened during acceleration.

The helicopter platform was lifted at the front and dragged on the rear rollers, because the cable didn't tear and because there was no predetermined breaking point directly at the voltage converter. The existing predetermined breaking point was unable to fulfil its function because the cable was jammed to the skid in line before it. The reasons why an accident didn't occur were the facts that the cable tore after the turn of the helicopter and the pilot recovered control of the helicopter.

Conclusions

The serious incident was caused by a loop of the outboard power connection cable formed around the tip of the right skid when the unplugged cable was deposed. During take-off, the helicopter came into an uncontrolled attitude for a short time due to the captivation.

The following factors have contributed to the serious incident:

- time pressure during the start preparations for the rescue operation
- operation of a platform with restricted aptitude
- change of helicopter type

Safety recommendations

Action taken by the operator and the Air Rescue Center:

Due to this serious incident, the operator checked all cable guides of the used transport platforms in respect to the used helicopter types, and changed them when necessary. The Air Rescue Centers of the operator were advised to optimize training, taking into consideration the different risks and to mark the outboard power supply cables with colors.

The affected Air Rescue Center responded with a conversion of the transport platform. The position of the voltage converter was changed from front left to front right, and the outboard power supply connection cable was laid fixed along the edge of the transport platform, so that only a short length of cable with installed quick-release coupling is used for connecting to the outboard power connection socket.

Safety recommendation issued by the BFU:

Recommendation no. 08/2009

The ICAO should determine specifications for the design of mobile helicopter transport platforms in Appendix 14, volume II.

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