Statens haverikommission
Swedish Accident Investigation Board

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Accident involving helicopter SE-HNB at Östersund/Optand airport, Z County, Sweden, on the 29th of May 2002

Dnr L-034/02

SHK investigates accidents and incidents with regard to safety. The sole objective of the investigations is the prevention of similar occurrences in the future. It is not the purpose of this activity to apportion blame or liability.

Translated from the original Swedish by Dennis Lynn Anderson; at the request of the Swedish Accident Investigation Board.

In the event of discrepancies between the English and the Swedish texts, the Swedish version is to be considered the authoritative version.

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Swedish Civil Aviation Administration

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Report RL 2003:16e

The Swedish Accident Investigation Board (Statens haverikommission, SHK) has investigated an accident that occurred on the 29th of May 2002, at Östersund/Optands airport, Z County, Sweden, involving a helicopter with registration SE-HNB.

In accordance with section 14 of The Ordinance on the Investigation of Accidents (1990:717) the Board herewith submits a final report on the investigation.

Göran Rosvall

Sakari Havbrandt Henrik Elinder

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L-034/02
Report finalized 2003-04-24

Aircraft:registration, type	SE-HNB, Hughes 269C
Class, airworthiness	Normal, valid certificate of airworthiness
Owner/Operator	Mogmac AB
Date and time	2002-05-29, 12:05 hours in daylight *Note:* All times refer to Swedish daylight savings time (UTC + 2 hours)
Place of occurrence	Östersund/Optand airport, Z County, Sweden, (pos 6308N, 01449E; 376 meters above sea level)
Type of flight	Skill test
Weather	According to SMHI's analysis: wind southeast at 10 knots, visibility > 10 km, sky clear, temp./dew point +18/+3 °C, QNH 1017 hPa
Persons on board:	
crew	1+1
Injuries to persons	Minor injuries
Damage to aircraft	Substantial
Other damage	None
Pilot in command:	
Age, licence	20 years old, B licence (aeroplane-commercial)
Total flying time (helicopter)	31 hours, all on the type
Flying time previous 90 days	31 hours
Number of landings previous 90 days	230
Flying time (fixed wing)	169 hours
Flight examiner:	
Age, licence	62 years old, BH licence (helicopter-commercial)
Total flying time	>16,000 hours, of which >10,000 helicopter hours

The Swedish Accident Investigation Board (Statens haverikommission, SHK) was notified on the 29th of May 2002 that an accident had taken place involving a helicopter with registration SE-HNB, at Östersund/Optand airport, Z County, Sweden, on that same day at 12:05 hours.

The accident has been investigated by SHK represented by Olle Lundström to the 15th of September 2002, and from the 16th of September by Göran Rosvall, Chairman, Sakari Havbrandt, Chief Investigator Flight Operations, and Henrik Elinder, Chief Technical Investigator Aviation.

The investigation has been followed by The Swedish Civil Aviation Administration through Daniel Hummerdal.

History of the flight

The pilot in command had completed his training for the AH licence[1] and was to accomplish a skill test with a flight examiner from the Swedish Aviation Safety Authority. The flight training had proceeded without difficulties and in connection with this, he had performed about ten auto-rotations from altitude. His instructor had demonstrated initiation of auto-rotation after a simulated engine failure during takeoff, however he had never practiced this manoeuvre himself.

During the conversation that the flight examiner had with the instructor prior to the skill test, there was no mention of any items to be checked other than those which are specified in the valid objectives document for the AH licence. Prior to takeoff the flight examiner and the pilot discussed how the flight was to be accomplished. Both the pilot and the flight examiner were aware that it was the pilot who was the pilot in command for the flight, but that the flight examiner could take over the flight if an emergency situation should arise.

The sortie began with a navigational exercise, which included an emergency landing exercise. Subsequent to this, several normal landings and a couple of auto-rotation landings from altitude were accomplished at Östersund/Optand airport. After one of these landings the flight examiner informed the pilot that during the next takeoff he was to demonstrate initiation of auto-rotation after a simulated engine failure during climb straight ahead after takeoff. The pilot was somewhat surprised because this manoeuvre had not been mentioned during the briefing prior to the flight and was something which he had not practiced during his flight training. However he declined to point this out to the flight examiner.

During the following takeoff, when the helicopter was at an altitude of 200 to 300 feet, the flight examiner lowered the collective and reduced the engine power momentarily in order to simulate an engine failure. The pilot initiated an auto-rotation straight ahead, but the flight examiner thought that the airspeed was too low and therefore the exercise was discontinued. Afterwards the flight examiner stressed the importance of maintaining sufficient airspeed during the manoeuvre.

Somewhat later, the flight examiner once again intended, in the same manner as earlier, to evaluate the initiation of auto-rotation after takeoff. Also this time the flight examiner thought that the airspeed was too low and admonished the pilot to ”watch the airspeed”. The pilot then lowered the nose of the helicopter with the intent to increase the airspeed.
When they shortly thereafter approached the ground, the pilot thought that the descent rate was too high and performed a vigorous flare, but did not manage to prevent the helicopter from hitting the ground. During the impact, which took place with a nose-up attitude, the main rotor collided with the tail boom, which separated from the aircraft. The flight examiner experienced the sequence of events as happening rapidly and did not manage to intervene.

Subsequent to impact the helicopter rotated 180 degrees to the left prior to coming to rest. Substantial damage was caused to the helicopter. Those on board were not seriously injured and were able to evacuate the helicopter without assistance.

As far as SHK has been able to determine, there is no requirement that an applicant for the AH licence shall be able to demonstrate initiation of auto-rotation after a simulated engine failure at low altitude after takeoff. This is however something which is required during a skill test for BH[2] licence. In certain cases a flight examiner may however, according to the

[1] AH – National private pilot licence - Helicopter
[2] BH – National commercial pilot licence- Helicopter

Swedish Aviation Safety Authority, evaluate manoeuvers which are not included within the valid BCL[3] requirements, after agreement with the concerned instructor pilot.

According to the Licensing Regulations (BCL-C) 1.6, paragraph 5.4.3.2, the applicant on a skill test for single pilot crew shall be the pilot in command. During a skill test a flight examiner should normally not manipulate any aircraft flight controls himself but direct the applicant to perform the flight manoeuvres, which are to be evaluated. In helicopter operations however, the flight examiner must influence the flight controls during for example evaluation of descent recovery and blade pitch control failures.

Conclusions

The accident

As far as SHK is able to determine, there is no requirement that an applicant during the skill test flight for the AH licence must be proficient in the performance of the initiation of auto-rotation after a simulated engine failure at low altitude during takeoff. In any case, this manoeuvre constitutes a measure of risk. This is especially true with respect to the type of helicopter under discussion here. With its lightweight rotor, an engine failure during takeoff creates particularly high demands with respect to immediate and correct measures in order for the landing to be successful. Neither had the manoeuvre been practiced during the pilot's training, nor had any special agreement been made between the instructor pilot and the flight examiner that it should be evaluated.

In light of the facts that a simulated engine failure at low altitude during takeoff with this type of helicopter, as stated above constitutes a risk, and that this was not an item which was included in the licence requirements;

SHK is of the opinion that it was incorrect for the flight examiner to subject the applicant to this test. Actually the pilot could have objected to performing the manoeuvre with reference to his never having practiced it during his training. However, considering the disadvantageous position that a applicant assumes towards a flight examiner in a skill test situation, it is easy to understand that the pilot did not object or refuse to perform the manoeuvre. Also, he counted on the flight examiner intervening should a hazardous situation arise.

Even if the flight examiner had forewarned the pilot that an engine failure was to be simulated during takeoff, it can be questioned if it was correct for the examiner himself to manipulate the collective and momentarily reduce engine power.

As was mentioned previously, the initiation of an auto-rotation during climb is a difficult manoeuvre. As the pilot had never practiced this earlier, it is understandable that he did not perform it correctly and that the airspeed became too low. When the flight examiner brought his attention to this, the pilot attempted to increase the airspeed by lowering the nose of the helicopter, which was a natural action on his part considering the situation. However the lowering of the nose caused an excessive rate of descent with respect to the low altitude of the helicopter at the time. Therefore he failed to accomplish a normal flare prior to touchdown and the helicopter hit the ground hard.

The fact that a flight examiner does not have the pilot in command responsibility during a skill test, and normally shall not participate in the manoeuvreing of the aircraft during the flight other than if an acute emergency situation arises, may result in the examiner waiting too long to

[3] Civil Aviation Regulations

intervene while waiting for the pilot himself, despite everything, to be successful in overcoming a difficult situation. This may have been a contributory cause of the examiner in the existing circumstances realizing too late that the pilot would not manage the situation and therefore did not intervene in time.

Risks during skill tests

This accident has, in light of the discussion above, together with two previous accidents which SHK has investigated (C 1996:38 and RL 2000:53), also brought up the question of whether skill tests may be flights with a greater degree of risk.

Accidents that can be surveyed by SHK, which have taken place in connection with skill tests, are relatively few in absolute numbers. However, the relative number is such, considering that skill tests occur on a much smaller scale than other types of flights, that it would seem that the skill tests situation itself entails an elevated level of risk. SHK has pointed out factors in the previous discussion which can generally be supposed to lead to the level of risk during skill tests becoming elevated, i.e. that the flight examiner makes aircraft flight control inputs which surprise the applicant and lead to hazardous situations. Another such situation can be that the flight examiner waits so long to intervene while waiting for the applicant, despite everything, to cope with a dangerous situation, that it becomes difficult even for the examiner himself to manage the situation when he or she has finally been forced to intervene.

The fact that the pilot in command responsibility formally lies with the applicant while the flight examiner, by virtue of his experience and authority as an examiner implies among other things, total direction of the flight without any pilot in command responsibility. These may also be factors affecting the applicant's and the examiner's methods of functioning during an ensuing hazardous situation.

Since in any case the teamwork between the flight examiner and the applicant constituting a flight crew during a skill test has a great significance for the safety of flight, there is reason to especially address this subject area in connection with the training of flight examiners.

Furthermore, there is reason to develop suitable information material for applicants scheduled for skill tests, which clearly describes the conditions of responsibility between the flight examiner and the applicant and what rights and obligations each person has.

Causes of the accident

The accident was caused by rate of descent becoming too high in connection with initiation of auto-rotation after a simulated engine failure during take-off and that the flare was performed too late. Contributory has been that the Safety Authorities flight examiner subjected the pilot to a flight situation which he had not mastered in training and which was not included in the licence requirements.

Recommendations

The Swedish Aviation's Safety Authorities is recommended to

- investigate whether particular risk factors exist during skill tests and if so, to identify and minimize these *(RL 2003:16e R1)*,
- in connection with flight examiner training, especially address those flight safety problems that may arise during skill tests where the

applicant has the pilot in command responsibility, while the flight itself is directed by the flight examiner. *(RL 2003:16e R2)* and

– to develop suitable information material for applicants of skill tests, which clearly describes the conditions of responsibility between the flight examiner and the applicant and what rights and obligations each person has. *(RL 2003:16e R3)*.