



**Statens haverikommission**  
Swedish Accident Investigation Board

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## ***Report RL 2007:15e***

### **Accident with helicopter LY-HCS at Heby, U county, on 21 June 2005**

Case L-18/05

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Translated by Interpreter Centre, City of Göteborg, from the original Swedish at the request of the Swedish Accident Investigation Board.

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

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Statens haverikommission (SHK) Swedish Accident Investigation Board

*Postadress*  
P.O. Box 12538  
102 29 Stockholm

*Besöksadress*  
Teknologgatan 8 C  
Stockholm

*Telefon*  
08-555 017 70

*Fax*  
08-555 017 90

*E-post/*  
info@havkom.se

*Internet*  
www.havkom.se



Swedish Civil Aviation Authority

601 73 NORRKÖPING

### **Report RL 2007:15e**

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The Swedish Accident Investigation Board (Statens haverikommission, SHK) has investigated an accident that occurred on 21 June 2005 at Heby, U county, involving a helicopter with registration LY-HCS.

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.

Carin Hellner

Göran Lilja

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1	Lithuanian Certificate of Airworthiness	

## Report RL 2007:15e

L-18/05

Report finalised 2007-10-12

<i>Helicopter; registration, type</i>	LY-HCS, Mi-2
<i>Class/airworthiness</i>	Experimental, valid Certificate of Airworthiness
<i>Owner</i>	UAB Aerolib, Vilnius, Lithuania
<i>Time of occurrence</i>	2005-06-21, 10:24 hours, in daylight. <i>Note:</i> All times are given in Swedish daylight saving time (UTC + 2 hrs).
<i>Place</i>	Heby, U county, (pos. 5956.48N 01651.76E <sup>1</sup> ; approx. 50 m above sea level.
<i>Type of flight</i>	Private
<i>Weather</i>	According to SMHI:s1 analysis: Southerly wind 5 kts, good visibility, no low clouds, temp./dp +22/+13 °C, QNH 1014 hPa
<i>Persons on board:</i>	
<i>crew</i>	1
<i>passengers</i>	5
<i>Injuries to persons</i>	One person was seriously injured and died three days later. See 1.13 below. Five were slightly injured
<i>Damage to helicopter</i>	Substantially damaged
<i>Other damage</i>	Minor damage to road surface and street lighting and a house nearby.
<i>Pilot:</i>	
<i>Sex, age, licence</i>	Male, 50 years, expired Hungarian helicopter licence under renewal, Swedish AH licence without valid type rating. 380 hours, of which 250 hours on the type.
<i>Total flying time:</i>	
<i>Flying hours previous 90 days</i>	7 hours, all on the type.
<i>Number of landings previous 90 days</i>	21, all on the type

The Swedish Accident Investigation Board (SHK) was notified on 21 June 2005 that a helicopter with registration LY-HCS had an accident at 10:24 hours that day at Heby, U county.

The accident has been investigated by SHK represented by Carin Hellner, Chairperson, Dan Åkerman, Chief Investigator until 2006-08-01 and Göran Lilja, Chief Investigator after that date.

SHK was assisted by Sven Holmberg, operations expert, Lars-Peter Peltomaa, technical expert, and Tommy Åkerblom, medical expert.

The investigation was followed by Ragnar Boge, Swedish Civil Aviation Authority.

### Summary

The helicopter was hired on 21 June 2005 to fly five persons from Heby to Ljusterö as part of the celebration of one of the passenger's 100th birthday. The pilot started from his base at Vassunda at 09:20 hours that day after

<sup>1</sup> Read as degrees, minutes and decimals of minutes

obtaining weather information. According to this, the wind was from the south at 9 kts. and the temperature +21° C. On arrival at Heby, the helicopter was flown over the site which was then judged to be suitable. The helicopter was then landed against the wind at the intended site. The engines were stopped and the embarkation begun.

The pilot then started the engines, checked that the power output and the rotor speed were normal, hovered vertically, reversed and began a climb.

The pilot realized that the engines were not giving full power when the helicopter was approximately three metres off the ground. The flight was continued forward, veering slightly to the right. The rotor clipped some twigs from a tree and the main rotor struck a street lighting pole. The helicopter sank, contacted the ground, rolled over and remained lying. One passenger and persons nearby who hurried to the rescue began fighting the fire which had broken out while the pilot helped the other passengers out of the wreck.

A technical investigation has detected foreign matter in the fuel injection system of one of the engines which reduced the possible fuel flow through this by approximately 50 %. On the basis of the above investigation, the engine manufacturer has estimated that the engine functioning normally could give full start power of 415 hp while the power of the malfunctioning engine was limited to approximately 180 hp. The combined available power was thus estimated to be approximately 595 hp.

The accident was caused by a power loss not discovered sufficiently early to interrupt the take-off.

### **Recommendations**

None.

# 1 FACTUAL INFORMATION

## 1.1 History of the flight

The purpose of the flight was to fly four adults and a child aged 7 from Heby to Ljusterö as part of the celebration of one of the passenger's 100<sup>th</sup> birthday. Take-off from Heby was planned for 10:00 hours on 21 June 2005. The pilot started from his base at Vassunda at 09:20 hours on that day after obtaining weather information. According to this, the wind was from the south at 9 knots and the temperature +21° C. On arrival at Heby, the helicopter was flown over the proposed landing site which was then judged to be suitable. The helicopter was landed against the wind, at the site, in front of a vacant factory building. See photograph 2. The engines were stopped and the embarkation begun. The passengers were shown their places in the helicopter, instructed to fasten their safety belts and put on their headsets. The child, the guest of honour and another adult were placed in the rear seats, one adult in the intermediate seat and one adult in the seat next to the pilot at the front. According to reports, no further safety instructions were given. It has not been definitely established that the centenarian was or was not secured by his safety belt.

The pilot has stated that he then started the engines, checked that their power output and the rotor speed were normal before beginning the take-off. He lifted and reversed and had climbed to approximately three metres above the surface when he realized that the engines were not giving full power. Because of the possible risk to the spectators who had assembled near the take-off site, the pilot decided that it was dangerous, to them, to land immediately and continued the flight at the altitude reached, veering slightly to the right. The rotor broke off twigs from a tree by the path of the helicopter. The flight continued along a street and approached a car which had stopped.

Before the helicopter reached the car, the main rotor impacted on a steel street lighting pole which was broken off, fragments of the rotor blade flying off. The helicopter dropped, contacted the ground with the right landing wheel and rolled to the right, swung some turns to the left and came to rest on its right side. The pilot escaped quickly from the helicopter through the left front door which had already opened. He then asked the front seat passenger for a fire extinguisher mounted in the cabin as a fire had started in the engine compartment. This passenger and bystanders began to fight this fire while the pilot hurried to the back door, on the left side, (photograph 1) to help the rear seat passengers escape from the cabin. This was successful after some difficulty in opening the door.

The accident occurred at position 5956.48N, 01651.76E approximately 50 m above sea level.



*Photograph 1. The helicopter concerned*



*Photograph 2. The take off area, taken against the direction of travel*



*Photograph 3. The take off area, taken in the direction of travel*



*Photograph 4. The final position of the helicopter*

## 1.2 Injuries to persons

	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>	<i>Total</i>
Fatal	–	–	–	–
Serious	–	1 <sup>2</sup>	–	1
Minor	1	4	–	5
None	–	–	–	–
<b>Total</b>	<b>1</b>	<b>5</b>	<b>–</b>	<b>6</b>

## 1.3 Damage to the aircraft

Substantially damaged.

## 1.4 Other damage

Limited damage to road surface and street lighting and a house nearby.

## 1.5 Personnel information

### 1.5.1 Pilot in command

The pilot in command was a male, aged 50 years a, with a Hungarian helicopter pilot licence which had expired 2003-05-31. His latest PC (Proficiency Check) had been performed 2005-05-27 – 31 on Mi-2. Renewal of the licence had been requested. The flight was undertaken on the basis of this licence. The pilot also had a valid Swedish AH licence without valid type ratings.

<i>Flying time (Hours)</i>			
<i>Latest</i>	<i>24 hours</i>	<i>90 days</i>	<i>Total</i>
All types	1	7	380
Type concerned	1	7	250

Number of landings of the type concerned during the latest 90 days: 21.  
Flight training on type concluded in 2002.

<sup>2</sup> The seriously injured passenger aged 100 died three days after the accident. See 1.13 above.

### 1.5.2 Pilot's duty schedule

The pilot had been awake 3.5 hours before the accident and flown approximately 1 hour. He had slept 8 hours the previous night.

## 1.6 Aircraft information

### 1.6.1 General

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#### HELICOPTER

<i>Manufacturer</i>	PZL-Swidnik, Poland	
<i>Type</i>	Mi-2	
<i>Serial number</i>	518914104	
<i>Year of manufacture</i>	1984	
<i>Gross mass</i>	Max. authorised start mass 3550 kg, actual according to accident report approx. 3330 kg	
<i>Centre of mass</i>	Within authorised limits.	
<i>Total flying time</i>	1105 hours, as noted 04-03-07	
<i>Number of cycles</i>	1474, noted 04-03-07	
<i>Flying time since latest inspection</i>	15 hours (after 100-hours inspection) according to pilot accident report.	
<i>Fuel filled before accident</i>	Jet A-1 (850 litres on 18 June at Arlanda). Estimated volume on board at time of accident 600 litres.	

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#### ENGINE

<i>Engine manufacturer</i>	PZL-Rzeszow, Poland	
<i>Engine model</i>	GTD-350 IV	
<i>Number of engines</i>	2	
<i>Engine</i>	No 1	No 2
<i>Manufacturing number</i>	481611022	481652068
<i>Date of manufacture</i>	81-01-28	85-04-28
<i>Date of 1000 hour overhaul</i>	88-11-10	89-05-04
<i>Installed in helicopter,</i>	01-03-20	00-08-10
<i>With operating time</i>	1453 hrs	1608 hrs
<i>Latest record of operating time total hrs</i>	1511	1666
<i>Date</i>	04-03-07	04-03-07
<i>Date for latest 100 hrs. inspection</i>	04-06-28	04-06-28
<i>Total operating time, hrs.</i>	Appr. 1530	Appr. 1680
<i>Operating time since overhaul hrs.</i>	530	680
<i>Cycles after overhaul</i>	Unknown	Unknown

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#### ROTOR

<i>Rotor manufacturer</i>	PZL-Swidnik
<i>Rotor operating time after overhaul</i>	
<i>Main rotor</i>	Unknown
<i>Tail rotor</i>	Unknown

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The above information has been obtained, with certain difficulty, partly from a translation to English of the helicopter's technical logs from Hungary, partly from older logs, see section 1.16.3. The flight log containing in-

formation about flight times while in the Lithuanian register disappeared in connection with the accident. According information the helicopter had not been flown very much during this time.

The helicopter had a valid Certificate of Airworthiness as experiment class from the Lithuanian authority 2004-07-02. The English text in this certificate includes “Special Certificate of Airworthiness”, “Category Experimental”. See Annex to the certificate in Appendix 1.

The helicopter was equipped with extra fuel tanks, one on either side, outside the body. Photograph 1. It was also equipped with dual controls.

In an annex to the Certificate of Airworthiness, the Lithuanian authority has specified a number of limitations including the following:

- The helicopter may not carry passengers. In a separate document, this is clarified as applying only to paying passengers.
- When passengers are carried, there is to be a special notice displayed indicating the experimental class of the helicopter and that it does not have full airworthy status.
- Its experiment class shall be specified in writing on all doors and the pilot shall inform the passengers of the helicopter being classified as experimental and that it is not fully airworthy in all respects.
- Flights in other countries than Lithuania require permission in those countries.
- The helicopter may not be flown in air spaces with heavy traffic or over closely populated areas.
- When flying to or from airfields with air traffic control, the pilot is to inform the controller of the helicopter’s experimental class.

The above is a translation of the translation to Swedish by SKF of the English text in the Lithuanian annex. The original Lithuanian-English text is given in Appendix 1.

#### 1.6.2 *The history of the aircraft*

The helicopter type was designed by the Mils design office in Moscow during the 1960’s. Manufacture began in 1966. During the 1970’s, the design was taken over by PZL-Swidnik in Poland<sup>3</sup>. The type was manufactured in large numbers for different purposes, passenger and goods transport, ambulance flights, agricultural flights, and also in an armed military version. It was flown in a number of countries, including Sweden, in its agricultural version. PZL have issued a flight manual<sup>4</sup>.

The engine was originally developed by the Isotov design office in Russia during the 1960’s. Further design and manufacture was taken over by PZL-Rzeszow in Poland<sup>5</sup> who issued an operating manual<sup>6</sup>.

The helicopter concerned was acquired 2005-01-28 by UAB Aerolib, the owners at the time of the accident. It was entered into the Lithuanian register 2004-07-02 at which time the Lithuanian Certificate of Airworthiness was granted. It was registered previously in Hungary<sup>7</sup>.

<sup>3</sup> According to Janes All the World’s Aircraft 1983-84

<sup>4</sup> Helicopter Mi-2 Flight Manual. Polish version in English, issued 1981 and specified as valid for the helicopter concerned. Latest revision specified as 1995

<sup>5</sup> According to Janes All the World’s Aircraft 1983-84

<sup>6</sup> Operating and Servicing Instructions Engine GTD-350, Issue 2, 1975, latest revision 2004

<sup>7</sup> Hungarian registration HA-BGP

## 1.7 Meteorological information

According to SMHI's analysis: Southerly wind 5 knots, good visibility, no low clouds, temp./dp +22/+13°C, QNH 1014 hPa.

The flight was undertaken in daylight with sunshine.

Before take off from Vassunda, the pilot obtained weather information through ATIS<sup>8</sup> at Arlanda, this giving southerly wind, 9 knots, temperature +21°C and QNH 1017 hPa.

## 1.8 Aids to Navigation

Not applicable.

## 1.9 Radio communications

Not applicable.

## 1.10 Aerodrome information

Not applicable.

## 1.11 Flight recorders

There was no requirement to carry a Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR) on board the helicopter and neither was fitted. A GPS navigator of type Garmin was fitted. The information recorded by its memory was recovered and a study confirms other information regarding the relevant sequence of events.

## 1.12 Accident site and aircraft wreckage

### 1.12.1 Accident site

The site consists of an take off area, intermediate terrain and accident site. The take of area was an asphalted area outside a vacant factory building, photographs 2 and 3. The accident site was on an asphalted road surface in the Heby community and an adjacent grassed area, photograph 4. The intermediate terrain is the same road with street lighting poles and street trees, photographs 3 and 4. A nursing home, the vacant factory and private houses are nearby. SHK has taken measurements at the take off area, these being given in photograph 5<sup>9</sup>.

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<sup>8</sup> Automatic Terminal Information Service

<sup>9</sup> BCL-D, which requires that there is no obstacle which can reduce the helicopter's required area for take off and landing, did not apply in this case

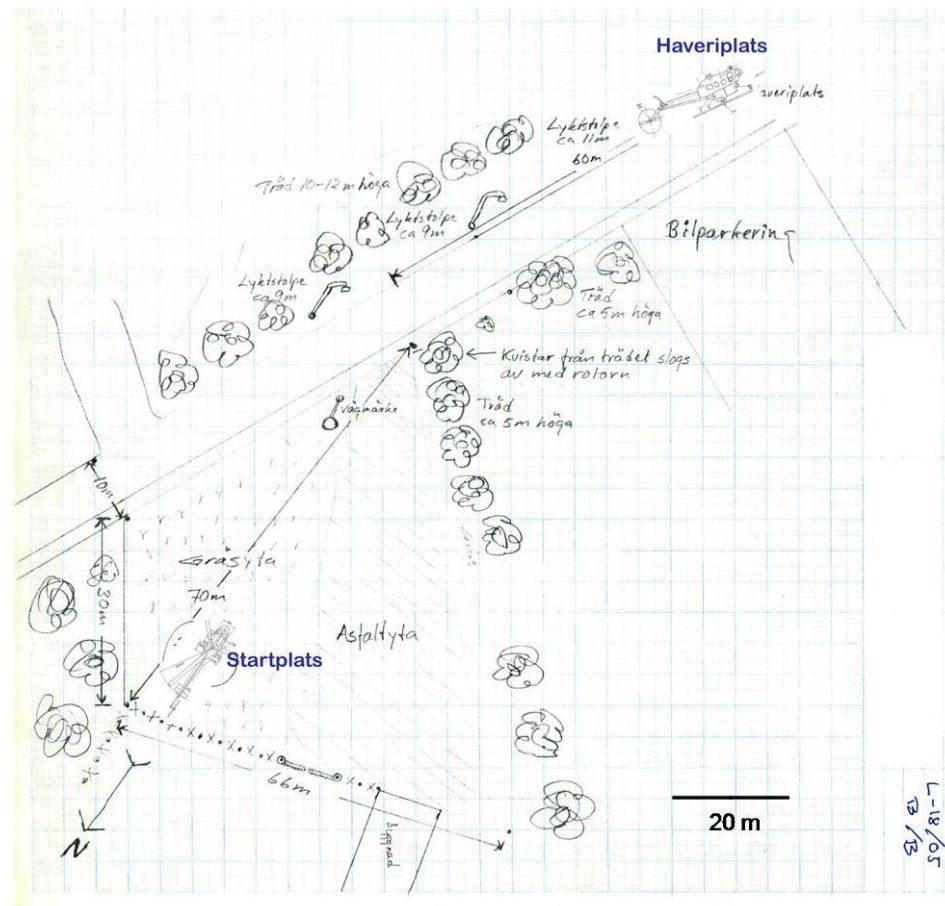


Figure 5. Measurements at the take off place

#### 1.12.2 Aircraft wreckage

After the accident, the helicopter came to rest on its right side. Fuel escaped and was ignited. See 1.14 below. The main rotor was completely wrecked and its pieces scattered. The tailboom was considerably damaged.

#### 1.13 Medical information

No evidence has appeared that the pilot had any psychic or physical abnormality before or during the flight.

The injured 100 year old passenger died three days after the accident. The extent of his injuries required more than 48 hours hospital treatment. According to Annex 13<sup>10</sup> to the Chicago convention of 1944, they are therefore categorized as serious.

#### 1.14 Fire

Following the accident, fuel escaped from the venting opening on the extra tank on the left side. Fire broke out in and around one of the motor compartments. When the helicopter came to rest, the pilot escaped through the left front door and asked the front seat passenger to hand him the hand fire extinguisher mounted in the cabin. The passenger and personnel from the nearby nursing home could reduce the flames with this fire extinguisher

<sup>10</sup> Annex 13 to the Convention on International Civil Aviation, Aircraft Accident and Incident Investigation. Issued by International Civil Aviation Organization, ICAO

and others from the nursing home. When the local fire brigade arrived, the fire was extinguished and the wreck covered with foam.

## 1.15 Survival aspects

### 1.15.1 General

The emergency transmitter of ACK E-01 type which was incorrectly installed in an inverted position in its holder was not activated by the accident. The batteries were also incorrectly installed. The safety instructions or other information required by section 1.6.1 of the Certificate of Airworthiness were not available.

It has not been possible to determine if or not the deceased passenger had fastened his safety belt. The others on board are understood to have fastened their safety belts.

### 1.15.2 Rescue efforts

After the accident, the pilot immediately initiated action to evacuate the passengers. He instructed one of the passengers to begin combating the fire which had broken out. Personnel from the nearby nursing home assisted in controlling the fire.

The local rescue service, Heby deltidbrandkår (Heby Auxiliary Fire Brigade), received the alarm at 10:24 hours and arrived at the scene of the accident at 10:30 hours. The fire was still active. Rescue service reinforcements from Sala arrived at 10:42 hours. Ambulances from Sala and an ambulance helicopter arrived at 10:48 hours. The seriously injured passenger was taken by helicopter to the University Hospital at Uppsala and the others by ambulance to the Central Hospital at Västerås. All except the seriously injured 100 year old could leave hospital after approximately 24 hour's observation.

## 1.16 Tests and research

### 1.16.1 Technical investigation

The Polish company PZL-Hydral was commissioned by SHK to investigate different components of the fuel system (outside the engines). It has been concluded that these components functioned as intended until the moment of impact. It was told that the synchronization of the engines was adjusted to produce a high level of power. The revolution gauges for the engines and the rotors have been tested by Patria Ostermans and found to function normally.

SP Sveriges Tekniska Forskningsinstitut AB<sup>11</sup> have investigated the fuel injection system in the engines and discovered foreign material in the channels in the injection nozzle of engine no 2. This had partly obstructed the nozzle, photograph 6. It consisted mainly of corrosion products which adhered firmly to the insides of the channels.

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<sup>11</sup> At the time for the investigation, SP Sveriges Provnings- och Forskningsinstitut AB



*Photograph 6. Part of the injection nozzle showing foreign material*

The entire fuel injection system has been tested by the engine manufacturer PZL-Rzeszow. They estimate that the maximum possible fuel flow in one of the engines was reduced by approximately 50 % by the deposits of foreign material.

#### *1.16.2 Estimate of the maximum power output of the engines*

On the basis of the above investigations, PZL-Rzeszow has estimated that one engine could deliver full take off power of 415 hp whereas the output of the other was limited to approximately 180 hp. Their combined power was thereby estimated to be approximately 595 hp<sup>12</sup>.

#### *1.16.3 Review of the technical documentation*

SHK has been provided with comprehensive technical documentation from Hungary for the helicopter, for each engine and for the main gear box. These documents log the inspections performed before the helicopter was registered in Lithuania, consisting of 250 hour inspections 04-03-07 and 100 hour inspection 04-06-28.

SHK has also been provided with manufacturing documentation and other original documentation relating to procedures and operating times, all in Russian, Polish and Hungarian language versions.

#### *1.16.4 Mass and balance*

In the accident report, the pilot estimated the mass to have been 3330 kg, i.e. 220 kg under the maximum permitted, 3550 kg, this being determined by requirements for structural strength, not performance requirements. The flight manual states that under certain conditions, the performance can be good with this mass. Under other conditions, high air temperatures, high altitudes, a demand for performance can require a lower weight limit.

The method for calculating masses in the flight manual Appendix 1, section 3, applies to the standard version and is based on an assumed empty weight of 2500 kg. The Hungarian documentation for the helicopter mentions an empty mass of 2425 kg, a somewhat lower weight, without specifying date and preconditions.

<sup>12</sup> Quote from the report from PZL-Rzeszow: "Thus, one can assume that during take-off attempt, the total power delivered by two GTD-Engines was 595 HP, approx."

The section also refers to the weights of added extra equipment such as was added to the helicopter concerned. That these are or are not considered in the empty weight specified is not documented.

As for the take off mass, there was no documentation of any calculation of the position of the centre of mass before the flight. This was not required.

#### 1.16.5 *Take off performance of the helicopter and other preconditions for take off*

The section Limitations in the flying manual contains the following:

- With rated engine power and at an air temperature of +22° C, the helicopter should be capable, with a good performance margin, of performing a take off with the stated assumed mass, 3330 kg, fig. 2.1 in the flight manual.
- Without rated power, with a flight mass of 3330 kg, the helicopter would have marginal capacity to take off, fig. 2.1 a in the flight manual.

The above information applies without consideration of wind conditions. The wind at the time and place of the accident was weak but to the extent that it was significant, its direction was favourable.

#### 1.16.6 *Relevant regulations and requirements.*

In accordance with the helicopter's Certificate of Airworthiness, issued by the Lithuanian Civil Aviation Authority, the helicopter was classified as experimental and further, that for it to be flown in a country other than Lithuania required that country's acceptance. No request for approval to fly the helicopter in Sweden had been received by the Swedish Civil Aviation Authority and no such approval had been granted. According to the pilot, the approval of the Authority had been given by telephone when the helicopter arrived in Sweden. ECAC, European Civil Aviation Conference, in which both Lithuania and Sweden participate has recommended that its members relax this requirement of approval in the case of "homebuilt aircraft" (a form of experimental- classified aircraft) The helicopter concerned was not a "homebuilt aircraft" and was therefore not included under this recommendation.

There were, as shown above in section 1.6.1, and as shown in detail in Appendix 1, limitations in the helicopter's airworthiness certificate. These limitations had not been subjected to examination in Sweden for the helicopter as the question of its acceptance in Swedish air space had not been examined. With respect to notification of the helicopter's experimental status, such notification was present in the helicopter, as required, in Russian, Hungarian and Lithuanian languages.

### 1.17 **Organizational and management information**

Not applicable.

### 1.18 **Additional information**

#### 1.18.1 *Nature of the flight*

The pilot has described the flight as being private. The person ordering the helicopter transport has stated that he was informed by an acquaintance of a helicopter company which could provide the transport envisaged. He explained his requirement to the pilot by telephone and was given a price. On

request, he sent a list of the passengers by e-mail. No written offer was sent by the helicopter company.

1.18.2 *Questions relating to genus equality*

Not applicable.

1.18.3 *Environmental aspects*

The accident had no effects on the environment.

1.18.4 *The performance requirements of helicopters for take-off in general*

The performance characteristics of helicopters which are the preconditions for take off and landing with high loads are considerably dependent on the effects of proximity to the ground and the possibility of acceleration after take-off.

A so-called ground effect and the lift which this creates, often referred to as an air cushion, is spoken off in the same way as the lift which develops as a result of the speed forward, the latter called transitional lift.

That which is important from the performance aspect is that both of these lifting forces develop without the application of increased engine power. Behind this are aerodynamic phenomena not entered into here<sup>13</sup>. The ground effect results in it being possible, with a given engine power, to fly close to the ground with a heavier load than higher up. There is thus a load range within which the helicopter can lift off but not hover at greater heights.

At greater heights, under such conditions, it is necessary to compensate for this with speed forward. This means that under marginal conditions, with a helicopter which is heavily loaded in relation to its available engine power, it is necessary, to continue climbing, to increase the forward speed before beginning the climb and then climb further when the speed is sufficient. This is complicated by the forward acceleration in itself requiring power which must be taken from that which would otherwise be available for generating increased lift and thereby permit early climbing. Take offs with heavily loaded helicopters therefore need a clear forward area free of obstacles to permit acceleration at low height.

## 2 ANALYSIS

### 2.1 Weight and balance

In the accident report, the pilot estimated the mass of the loaded helicopter to 3330 kg which is 220 kg less than the maximum permissible 3550 kg. No calculation had been performed before the flight of the mass or the position of the centre of gravity. It must be added here that no documentation with calculation of mass and centre of gravity location is required for the type of flying concerned.

SHK is not aware of any weighing log for the helicopter beyond the information in the technical log. It was provided with a certain amount of extra equipment. SHK considers that any effect on the performance of the helicopter of a possible increased mass is insignificant in relation to the results of reduced engine power. To this must be added that the latest mass information suggests a somewhat lower mass than the basis for calculation in the flight manual.

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<sup>13</sup> For example, a simplified and illustrative explanation is given in US Army Field Manual 1-51 found at [www.copters.com/helo\\_aero.html](http://www.copters.com/helo_aero.html) - 3k

SHK considers that the distribution of the passengers was reasonable in relation to the location of the centre of gravity. There are no indications of error in this respect.

## **2.2 Performance in the case concerned**

From the flight manual it appears that the helicopter, with the mass given, 3330 kg, and at the air temperature +22° C could perform a take off with a performance margin. The performance section of the flight manual makes no mention of obstacles in the direction of take-off. It can also be seen from the flight manual that with the data given, it should be possible to take off without the development of rated engine power. This suggests that there was a purely performance-technical possibility of a vertical lift. SHK considers therefore, that lift-off and climb over the existing obstacles should have been quite possible provided the helicopter was in normal functional condition.

## **2.3 The technical status of the helicopter and its significance for the accident**

The reduction in the available power from one of the engines must have had a decisive effect on the capacity of the helicopter to accelerate and climb. The loss of power had its cause in the part-obstruction of the fuel injection nozzle. This had its origins in corrosion in the channels of the nozzle. SHK considers that these could not have been obstructed suddenly and in connection with the accident but must have reasonably become clogged gradually as corrosion developed.

SHK observes that inspections were performed in the required manner during the year before the accident.

## **2.4 Summary judgement of the cause of the accident**

The difficulty described by the pilot to climb as intended after the take off must be accepted as resulting from the loss of power due to technical causes.

That this then led to an accident depended on the existence of obstacles in the direction of flight and the failure of the pilot to interrupt the take-off at an early stage. That the pilot did not interrupt the flight when the helicopter showed signs of difficulty in climbing can be associated with the presence of spectators in the immediate vicinity. The pilot relied on his own inspection of the site before landing and his judgement that the area outside the vacant factory was suitable in this respect.

## **2.5 The pilot's licence**

The pilot flew the helicopter on the basis of his Hungarian licence, This had expired at the time of the accident but was under renewal. As part of the renewal procedure, the pilot had performed a PC on the helicopter for a Hungarian instructor some weeks before the accident. At the time of the accident, this renewal had not been executed by the Hungarian civil aviation authority. SHK therefore considers that the pilot was not formally licensed but that the conditions for licensing were reasonably satisfied.

SHK considers that the formal situation with respect to the pilot's authority to fly the helicopter had no significance for the accident.

## 2.6 Rescue efforts

The prompt actions of both those on board and persons in the vicinity are considered to be of great importance for the evacuation of the helicopter and the suppression of the fire. These actions reduced the risk of further damage caused by the possible increase in the intensity of the conflagration.

The availability of the local rescue services in Heby meant that the fire came under control sooner than might have been the case otherwise.

## 3 CONCLUSIONS

### 3.1 Findings

- a)* The pilot was not formally licensed to fly the helicopter.
- b)* The helicopter had a valid certificate of airworthiness in the experimental class issued by the Lithuanian civil aviation authority.
- c)* No formal application for acceptance to fly in Sweden had been issued for the helicopter.
- d)* Because of nearby obstacles, the helicopter pilot was dependent on either the capacity to climb steeply or to interrupt the take off soon after a loss of power became evident.
- e)* The helicopter could not climb sufficiently steeply because of a technical fault which caused a considerable loss of engine power.
- f)* The helicopter was maintained in the required manner during the previous year.
- g)* The initial rescue efforts were effective and the rescue services were quickly at the site.

### 3.2 Causes

The accident was caused by a loss of power which was not discovered in time to interrupt the flight.

## 4 RECOMMENDATIONS

None.









LIETUVOS RESPUBLIKA  
CIVILINĖS AVIACIJOS ADMINISTRACIJA  
REPUBLIC OF LITHUANIA  
CIVIL AVIATION ADMINISTRATION

SPECIALIOJO TINKAMUMO SKRAIDYTI  
PAŽYMĖJIMO PRIEDAS  
ANNEX TO SPECIAL CERTIFICATE OF AIRWORTHINESS

Orlaivio skrydžių apribojimai  
Aircraft operating limitations

1. Nacionalinis ir registravimo ženklai Nationality and Registration marks	LY- HCS
2. Šis priedas yra neatskiriama tinkamumo skraidyti pažymėjimo Nr. ....01166... dalis ir privalo būti kartu su juo orlaivyje skrydžio metu. This certificate are a part of the Certificate of Airworthiness No. ....01166... and shall be aboard the aircraft during flight.	
3. Draudžiami skrydžiai virš tankiai gyvenamų vietovių (gyvenviečių), taip pat oro keliuose, kuriuose yra intensyvus oro eismas. No operations shall be conducted over densely populated areas and in congested airways.	
4. Skrydžiai leidžiami tik Lietuvos Respublikos oro erdve. Orlaivio skrydžiui užsienio valstybės oro erdve privalu gauti tos valstybės įgalios institucijos leidimą. The flight shall be performed in the airspace of the Republic of Lithuania. For foreign operations the operator of the aircraft must obtain authorization of that state prior to undertaking the flight.	
5. Skrydžiai turi būti vykdomi tik pagal VST (vizualiųjų skrydžių taisyklės) dienos metu. This aircraft shall be operated day VFR only.	
6. Pradinis pilotų mokymas šiuo orlaiviu draudžiamas. Initial training on this aircraft is prohibited.	
7. Šiuo orlaiviu draudžiama vilkti sklandytuvus. This aircraft shall not be operated for glider towing.	
8. Šį orlaivį draudžiama naudoti parašiotų šuoliams. This aircraft shall not be operated for parachute jumping.	
9. Šiuo orlaiviu leidžiama skraidyti tik zonoje: This aircraft shall not be operated outside the assigned area.	

<p>10. Šio orlaiviu draudžiama atlikti akrobatinius skrydžius. This aircraft is prohibited from aerobatic flights.</p>	
<p>11. Šio orlaiviu draudžiama vežti keleivius. No passenger may be carried in this aircraft.</p>	
<p>12. Jei skrydį kontroliuoja SVT (skrydžių valdymo tarnyba), ją privalu informuoti apie tai, kad orlaivis eksperimentinis. The operator of this aircraft shall notify the control tower of the experimental nature of this aircraft when operating into or out of airports with operating control towers.</p>	
<p>13. Šio orlaivio pilotas privalo informuoti keleivius prieš skrydį apie tai, kad orlaivis yra eksperimentinis ir neatitinka standartiniams orlaiviams Lietuvos Respublikoje taikomų skrydžių saugos reikalavimų. The person operating this aircraft shall advise each person carried that the aircraft is experimental and does not comply with safety regulations of the Republic of Lithuania for standart aircraft.</p>	
<p>14. Keleivių kabinoje privalo būti gerai matomas visiems keleiviams užrašas: The following placard shall be displayed in the cockpit in full view of all occupants: “KELEIVIO ĮSPĖJIMAS: šis orlaivis yra eksperimentinis ir neatitinka standartiniams orlaiviams Lietuvos Respublikoje taikomų skrydžių saugos reikalavimų. PASSENGER WARNING: this aircraft is experimental and does not comply with safety regulations of the Republic of Lithuania for standart aircraft.”</p>	
<p>15. Prie kiekvienų orlaivio durų, o jei jų nėra – gerai matomoje vietoje turi būti užrašas “EKSPERIMENTINIS/ EXPERIMENTAL”. The word “EKSPERIMENTINIS/EXPERIMENTAL” must be displayed in full view on the aircraft near each entrance.</p>	

Pastaba: galiojantys punktai pažymėti CAA spaudu. Negaliojantys — perbraukti įstrižainėmis.  
Note: CAA stamped items are valid. Crossed items are not valid.

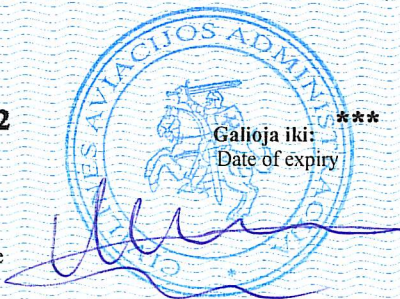
Išdavimo data:  
Date of issuance

**2004.07.02**

Galioja iki:  
Date of expiry

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CAA įgalioto darbuotojo parašas:  
Signature of the CAA representative





LIETUVOS RESPUBLIKA  
CIVILINĖS AVIACIJOS ADMINISTRACIJA  
REPUBLIC OF LITHUANIA  
CIVIL AVIATION ADMINISTRATION

Pažymėjimo Nr.  
Certificate No.  
**01166**

**SPECIALUSIS TINKAMUMO SKRAIDYTI PAŽYMĖJIMAS**  
**SPECIAL CERTIFICATE OF AIRWORTHINESS**

<b>1. Nacionalinis ir registracijos ženklai</b> Nationality and registration marks  <b>LY- HCS</b>	<b>2. Gamintojas ir gamintojų suteikta orlaiviui žyma</b> Manufacturer and Manufacturer's designation of aircraft <b>MI-2</b> <b>„PZL-Swidnik“</b> <b>Lenkijos Respublika</b>	<b>3. Orlaivio serijos Nr.</b> Aircraft serial No.  <b>518914104</b>
<b>4. Kategorijos</b> Categories <b>Eksperimentinė/Experimental</b>		
<b>5. Civilinės aviacijos administracija (CAA), vadovaudamasi Lietuvos Respublikos aviacijos įstatymo 30 str. 1d. ir CAA nuostatų 6.12p. ir 6.18p. leidžia šiam orlaiviui skristi Lietuvos Respublikos oro erdve laikantis skrydžio apribojimų, įrašytų šio pažymėjimo priede. Šis specialusis tinkamumo skraidyti pažymėjimas neatitinka 1944m. gruodžio 7d. Tarptautinės civilinės aviacijos konvencijos. Orlaivis yra tinkamas skraidyti, jei jam atliekama techninė priežiūra ir jis naudojamas pagal galiojančius teisės aktus ir atitinkamus skrydžių apribojimus.</b> <b>Keleivių, krovinių ir pašto vežimas už užmokestį šiuo orlaiviu draudžiamas.</b> <b>Apribojimų, taikomų skrydžių metu, sąrašas Nr.01166 išduotas šiam orlaiviui, yra neatskiriama šio specialiojo tinkamumo skraidyti pažymėjimo dalis ir privalo būti kartu su juo orlaivyje skrydžio metu.</b> The Civil Aviation Administration (CAA), executing its powers under the Aviation Act of the Republic of Lithuania, Part I, Chapter 30 and the CAA Statute, Parts 6.12 and 6.18, hereby, authorizes this aircraft to operate within the airspace of the Republic of Lithuania in compliance with the limitations specified in the Annex to this Certificate. This Special Certificate of Airworthiness does not fully meet the Convention on International Civil Aviation dated 7 December 1944. Aircraft is airworthy when maintained and operated in accordance with the effective regulations and pertinent operating limitations. No person may operate this aircraft for carrying passengers, cargo or mail for compensation or hire. This certificate is valid only when accompanied with the list of the operating limitations Nr.01166 issued to this aircraft and must be kept on board throughout the flight.		
<b>6. Patikrinimas ir galiojimas</b> Inspection and Validity		
<b>Patikrinimo data</b> Date of inspection	<b>Galioja iki</b> Date of expiry	<b>Parašas</b> Signature
<b>2004-07-02</b>	<b>2005-06-27</b>	

