



AIRCRAFT ACCIDENT REPORT
OCCURRENCE NUMBER 98/1250
SCHWEIZER (HUGHES) 269C HELICOPTER
ZK-HPG
7 KM NORTH-EAST OF WAIKANAE
5 MAY 1998

AIRCRAFT ACCIDENT REPORT

OCCURRENCE No 98/1250

Aircraft type, serial number and registration:	Schweizer 269C, S1182, ZK-HPG
Number and type of engines:	1 Lycoming H10-360-D1A
Year of manufacturer:	1985
Date and time:	5 May 1998, 1300 hours*
Location:	7 km north-east of Waikanae Latitude: S 40° 51.6' Longitude: E 175° 08.9'
Type of flight:	Aerial Work
Persons on board:	Crew: 1 Passengers: 1
Injuries:	Crew: Fatal Passenger: Fatal
Nature of damage:	Destroyed
Pilot-in-command's licence	Commercial Pilot Licence (Helicopter)
Pilot-in-command's age	37 years
Pilot-in-command's total flying experience:	1173 hours 885 on type
Information sources:	Civil Aviation Authority field investigation
Investigator in Charge:	Mr J L Cheetham/ Mr A J Buckingham

* Times are NZST (UTC + 12 hours)

Synopsis

The Civil Aviation Authority was notified of the accident at approximately 1400 hours on Tuesday 5 May 1998. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. Mr J L Cheetham of the Civil Aviation Authority was appointed Investigator-in-Charge and an on-site investigation was commenced at 1730 hours that day.

The helicopter had been transporting a number of sling loads in bush country. During transit between loads, the lifting strop was projected into the main rotor and inflicted damage which precluded further flight. Both occupants were killed in the ensuing ground impact.

1. Factual Information

1.1 History of the flight

- 1.1.1 The helicopter operator had been contracted to carry out a sling load operation, lifting bundles of punga logs from an area of bush to a suitable clearing with vehicular access. The hirer of the helicopter and an employee prepared bundles of logs during the morning, and once the helicopter was on site, were to hook the bundles of logs to the helicopter sling.
- 1.1.2 The operation commenced about 1230 hours with the arrival of the helicopter at the clearing. The pilot dropped off two 20-litre jerrycans of fuel, and attached the lifting sling assembly to the cargo hook. The first part of the operation was to lift 17 bundles of punga logs from three sites close to the clearing.
- 1.1.3 On completion of this phase, the helicopter returned to the clearing and picked up the hirer, one of the fuel jerrycans and some strops, and departed for the next pickup site. This site, with 43 bundles to collect, was about 1 km from the clearing.
- 1.1.4 The hirer's employee, who had been hooking up, saw the helicopter depart from the clearing, after which it disappeared from his sight. He set off for the next pickup site, but his motorcycle ran out of fuel and he was delayed some 20 minutes while he refuelled. When he drove down to the valley floor afterwards, he caught a glimpse of the blue tail boom of the helicopter amongst a stand of young pine trees and, on investigating, discovered the aircraft wreckage and the bodies of both occupants.
- 1.1.5 The accident occurred in daylight, at approximately 1300 hours NZST, 7 km north-east of Waikanae. Grid reference 260-S26-913365, latitude S 40° 51.6', longitude E 175° 08.9'.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	1	0
Serious	0	0	0
Minor/None	0	0	

1.3 Damage to aircraft

1.3.1 The aircraft was destroyed.

1.4 Other damage

1.4.1 Nil

1.5 Personnel information

1.5.1 The pilot held a valid Commercial Pilot Licence (Helicopter) issued 29 January 1993 and a current Class 1 Medical Certificate with no restrictions. He was rated on a number of helicopter types including the Schweizer (Hughes) 269 series.

1.5.2 His flying experience consisted of 885 hours on type and 1173 hours total flying time. He had flown 20 hours in the 90 days prior to the accident. His most recent competency check was in December 1997.

1.5.3. According to a relative who had spoken with him a short time before the accident flight, the pilot appeared to be in a normal frame of mind.

1.6 Aircraft information

1.6.1 Schweizer 269C helicopter serial number S1182 was built in 1985 and had been flown regularly up until the time of the accident. It had a non-terminating Certificate of Airworthiness, issued 3 June 1992, in the standard category for air transport operations and had been maintained in accordance with the operator's approved maintenance programme. Total airframe hours up to but not including the day of the accident were 2484.3. The last maintenance inspection was completed on 11 March 1998, at 2449.4 airframe hours and the next was due on 11 June 1998, or at 2500 hours.

1.6.2 An estimated weight and balance calculation indicated that the helicopter would have been within the Flight Manual limitations for normal operations.

1.6.3 ZK-HPG had been hired from another operator for this particular task.

1.7 Meteorological information

1.7.1 The weather was reportedly fine, clear and calm in the area at the time of the accident.

1.8 Aids to navigation

1.8.1 Not applicable

1.9 Communications

1.9.1 Not applicable

1.10 Aerodrome information

1.10.1 Not applicable

1.11 Flight recorders

1.11.1 Not applicable

1.12 Wreckage and impact information

1.12.1 The aircraft wreckage had impacted heavily on a north-north-easterly heading while banked some 20° to the left. Ground impact marks and nearby tree damage indicated that the aircraft had struck the ground with low forward speed and an almost vertical descent path. A wreckage trail consisting mainly of fragments of the cabin transparencies lay up to 70 metres to the rear and up to 20 metres to either side of the main wreckage. The outermost 60 cm of one main rotor blade was found about 60 m to the front of the main wreckage.

1.12.2 The nature of the damage to the main rotor suggested that it was turning at very low rpm at the point of ground impact. Damage to the rotor head components and witness marks on the control runs indicated that the aircraft had been subjected to considerable, probably violent, vibration in flight.

1.12.3 There was clear evidence that the main rotor had been struck by the cargo chain, which itself had been severed by the impact. The section of rotor blade referred to in 1.12.2 had separated as a result of impact with the chain. Also found with the main wreckage was a rope strop used in conjunction with the chain sling. See 1.18 for a description of the lifting sling.

1.12.4 Strike marks corresponding to the pattern of the chain were also noted on the tail rotor, horizontal and vertical stabilisers, and the aft portion of the tail boom. There were several chain strike marks on trees in the immediate vicinity of the wreckage, but a wider search did not locate any strike marks further afield.

1.12.5 Control continuity was satisfactorily established as far as was possible. Some damage to the control runs was found, but was attributed to impact forces. All major parts of the aircraft were accounted for at the accident site. No evidence was found of any defect or pre-impact failure of the control system or structure.

1.12.6 The fuel tank had an impact-related split close to the bottom, and this had permitted all but about one litre of fuel to drain away. Fuel was found in the boost pump and other parts of the engine supply system. Clean samples were obtained from the boost pump and from a partially used jerrycan found with the main wreckage.

1.12.7 Rotational damage to the engine cooling fan fins indicated that the engine was still operating at impact.

1.13 Medical and pathological information

1.13.1 Post-mortem examination and toxicological tests revealed no evidence of any condition that would have adversely affected the pilot's ability to operate the helicopter.

1.14 Fire

1.14.1 Fire did not occur.

1.15 Survival aspects

1.15.1 The accident was not survivable, owing to the high decelerative forces involved.

1.16 Tests and research

1.16.1 Not applicable

1.17 Organisational and management information

1.17.1 The pilot was both Chief Executive and Chief Pilot of his own company. The company held a Regulation 136 Air Service Certificate valid to 31 December 1999 and a Regulation 136A Aerial Work Certificate valid to 20 January 1999. Maintenance and the training and checking functions were contracted to outside organisations.

1.17.2 A detailed organisational and management investigation was not considered applicable to this case.

1.18 Additional information

1.18.1 The lifting sling used on this operation consisted of two elements joined end to end: a 5.5 metre (18 foot) rope strop and a 6.8 metre (22.3 foot) chain. The rope strop consisted of a doubled length of 10 mm polypropylene rope attached to a "hammerlock" link and D-shackle at either end. The chain sling had an oval link at one end, suitable for attachment to the helicopter cargo hook, and a snap-lock hook at the other. Both these items were attached to the chain by hammerlock links.

1.18.2 Attached to the snap-lock hook was a release device incorporating a sprung hook, enabling a suspended load to be released automatically when placed on the ground. Use of this device required ground personnel only for hooking up, not for unhooking.

1.18.3 In this case, one end of the rope sling had been attached to the cargo hook by the D-shackle, and the D-shackle at the other end had been attached to the oval link of the

chain sling. This arrangement gave a longer reach, suitable for working amongst trees or other obstructions. The weight of the chain and hook assembly was 10 kg, that of the rope sling less than 1 kg.

- 1.18.4 The chain had been severed by the main rotor, and was found in two halves some 40 m back along the wreckage trail. The hammerlock link attaching the oval link to the chain showed evidence of recent severe overload. The rope strop was found at the main wreckage, loosely wound about the rotor mast. It had failed at the lower end, in the bight to which the hammerlock and D-shackle were attached. The latter two items were found still attached to the chain.

1.19 Useful or effective investigation techniques

- 1.19.1 Nil

2. Analysis

- 2.1 It was clearly evident from the wreckage examination that the striking of the main rotor by the chain sling had caused catastrophic damage, which immediately rendered the helicopter incapable of further flight. The question to be addressed is how the chain came to be in the area of the main rotor.
- 2.2 A typical chain sling attached to a helicopter cargo hook is normally a stable load, even at high airspeeds. The chain, particularly the type used in this operation, will stream aerodynamically rearward from the vertical with negligible flailing. In normal flight there is virtually no risk of the chain sailing or flicking high enough to contact the main rotor.
- 2.3 In this case, increasing the overall length of the lifting sling by adding a rope sling between the chain and the helicopter cargo hook would have made for a combination with flying characteristics little different from those of the chain alone. The main requirement when operating with an extended sling is for the pilot to remain aware of the extra length suspended beneath the helicopter.
- 2.4 In the circumstances, the only logical explanation for the chain sling striking the main rotor is the momentary snagging of the chain in a tree or other obstruction, allowing the chain to spring up suddenly when released.
- 2.5 The pilot was transitting between the drop-off point and the next pickup point only a short distance away, so was unlikely to have climbed to any appreciable height. The flight was over a plantation of young pines on undulating terrain. Had the hook snagged one of these trees, the momentary tension on the sling assembly would have taken up what elasticity there was in the rope sling until either the rope snapped or the hook tore free from whatever it had caught on. In the latter case, the “spring” effect of the rope would then have to be sufficient to propel the chain forwards and upwards into the main rotor disc.

- 2.6 The only tree damage found which could be attributed to the sling was where the chain had landed after being severed, but this does not necessarily rule out damage further back along the flight path. The fact that no damage was found, despite a limited search, merely illustrates the difficulty in locating such evidence from ground level.
- 2.7 The snagging of the chain on a tree would require that the pilot either misjudged his height above the trees, or momentarily forgot that he was operating with a 40-foot composite sling below the aircraft, rather than just the 22-foot chain.
- 2.8 There was no evidence to suggest that the helicopter was operating other than normally until the rotor strike occurred, nor was there any evidence of pilot incapacitation.

3. Conclusions

- 3.1 The pilot was appropriately licensed, rated and experienced for the task.
- 3.2 The helicopter had a valid Certificate of Airworthiness and maintenance documentation.
- 3.3 The helicopter had been operating normally up to the time of the accident.
- 3.4 Damage inflicted by the chain sling striking the main rotor rendered the helicopter incapable of further flight.
- 3.5 The sling probably snagged momentarily in a tree or other obstruction, the elasticity of the rope component of the sling then catapulting the chain forwards and upwards into the main rotor.
- 3.6 The resulting collision with the ground was not survivable.

4. Safety Recommendation

- 4.1 It was recommended to the Manager, Safety Education and Publishing that he publish a short article in “Vector”, based on the circumstances of this accident, and emphasising the extra care required when operating with unladen lifting slings attached to the helicopter.

(Signed)

Michael G Hunt
Assistant Director Safety Investigation and Analysis