Sikorsky S76B, G-BWDO

AAIB Bulletin No: 10/98	**Ref: EW/G98/06/06**	**Category: 2.2**
Aircraft Type and Registration:	Sikorsky S76B, G-BWDO	
No & Type of Engines:	2 Pratt & Whitney Canada PT6B-36A turboshaft engines	
Year of Manufacture:	1989	
Date & Time (UTC):	4 June 1998 at 1210 hrs	
Location:	Blackbushe Airport, Surrey	
Type of Flight:	Private (Training)	
Persons on Board:	Crew - 2 - Passengers - None	
Injuries:	Crew - None - Passengers - N/A	
Nature of Damage:	Three of the four rotor spindles damaged	
Commander's Licence:	Airline Transport Pilot's Licence (Helicopters)	
Commander's Age:	41 years	
Commander's Flying Experience:	10,000 hours (of which 602 were on type) Last 90 days - 73 hours Last 28 days - 30 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Two training details were planned for the day of the accident to conduct vertical/oblique flight profiles. The first detail was uneventful, lasting one hour. A rotors running refuel and change of student was carried out prior to the second detail which commenced at a weight of 9,480 lbs (maximum allowable take-off weight 11,700 lbs). The student had previously carried out a dedicated training detail on the vertical/oblique profiles to a good standard and this second detail was planned as a consolidation exercise. The training box was used with the number one engine selected for simulated one engine inoperative operation.

The weather was good with light and variable winds, good visibility and no significant low cloud. The ambient temperature was +15°C.

The first exercise was an all engines operating oblique take off with simulated (all engines operating) reject back onto the runway. This exercise was carried out satisfactorily. The subsequent

exercise involved a simulated failure at approximately 180 feet with a Take-off Decision Point of 200 feet. At this stage the aircraft weight was approximately 9,400 lbs.

Initially, the reject was satisfactory although during the later stages slightly too much collective was used causing the rotor speed to droop to around 101%. At about 50 feet, the rate of descent was checked at around 600 to 800 feet per minute with an indicated airspeed of just under 20 kt and the rotor speed above 100%. Apart from the rotor speed, which ideally should have been higher, the instructor considered that the aircraft was in good condition at that point and had no doubt as to the successful outcome of the manoeuvre.

As he moved his hand from the engine levers to cover the flying controls, the rate of descent began to increase during the last few feet, but there was no change in pitch attitude. The student made a large application of collective in order to arrest the rate of descent. This was applied slightly early but the aircraft touched down firmly and bounced slightly. The aircraft yawed to the right (consistent with low rotor speed and loss of tail rotor thrust) and departed the paved surface of the runway onto the grass at a speed of 10 to 12 kt. At this stage, the collective was almost fully raised and the student delayed lowering the lever in order to avoid the risk of flapping down and contacting the tail boom at low rotor speed.

Once the rotor speed had recovered, an external visual inspection was carried out. No damage was observed but the aircraft was returned to the operator's hangar facility for an engineering inspection. This inspection revealed that there was damage to three of the four rotor spindles where they had contacted the main rotor hub due to low rotor speed.

The manufacturer indicated that the damage resulted from the extended period that the collective was raised after the landing during a period of low rotor speed rather than from the manoeuvre directly.