ACCIDENT

Aircraft Type and Registration:	Rotorsport UK Cavalon, G-CKYV	
No & Type of Engines:	1 Rotax 914-UL piston engine	
Year of Manufacture:	2018 (Serial no: RSUK/CVLN/026)	
Date & Time (UTC):	9 August 2018 at 1306 hrs	
Location:	Wolverhampton Halfpenny Green Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damaged beyond economic repair	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	67 years	
Commander's Flying Experience:	701 hours (of which 13 were on type) Last 90 days - 95 hours Last 28 days - 24 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The rotor was being pre-rotated in preparation for departure. The pilot recalled seeing 200 rpm but shortly thereafter noticed the rotor rpm indication had dropped to zero. Concerned that the rotors might now be rotating below 200 rpm he decided to attempt to increase the rotor rpm by commencing a takeoff roll. At approximately 30 kt the cyclic control moved violently and was wrenched from the pilot's grasp. The aircraft pitched up, yawed left and rolled left before falling upright and sliding along the runway.

It is likely that the aircraft encountered a blade sailing[1] event as the airspeed increased and the rapid movement of the rotor disc forced the controls from the pilots grasp.

History of the flight

The pilot was delivering the aircraft to a new owner. As is usual, he engaged the pre rotator before departure to accelerate the rotor to a suitable rpm for takeoff, and he recalled seeing 200 rpm, which was normal. Shortly thereafter, he noticed that the rotor indication had dropped to zero and, concerned that the rotors might now be rotating at less than 200 rpm, decided to attempt to increase the rotor rpm by commencing a takeoff roll with less than full power. At approximately 30 kt the cyclic control moved violently and was wrenched from his grasp. The aircraft pitched up, yawed left and rolled left before falling

Footnote

[1] See later section: *Blade sailing*.

upright and sliding along the runway. The pilot was assisted from the aircraft by the Fire Service and suffered only minor injuries.

Figure 1
Aircraft on the runway

Pro-rotation

The pre-rotator system uses a clutch from the engine to accelerate the rotor prior to takeoff and reduce the required takeoff distance. For a normal takeoff, the clutch is disengaged leaving the rotor unpowered, but the cyclic control is initially held fully aft to maximise the airflow through the rotor and maintain the rpm. When he noticed the rotor rpm at zero, the pilot decided to attempt to increase it by running the aircraft forward along the runway. Increasing the flow of air through the rotor disc will increase the rotor rpm.

Blade sailing

A condition known as 'blade sailing' can occur at low rotor rpm in strong wind conditions. In this case the increasing airspeed would create the wind. With the aircraft facing into wind, the advancing blade experiences an increase in lift and will flap up excessively due to the low centrifugal force, reaching a maximum height to the front of the aircraft. As the blade progresses on the retreating side, it experiences a sudden loss of lift and will flap down rapidly, flex and reach its lowest position to the rear of the aircraft, over the tail. There is a danger that the blade may strike the tail. In this case, the pilot recognised the danger of the blades striking the tail and did not move the cyclic fully aft as he accelerated the aircraft. His intention was to try and move the cyclic aft in stages as the aircraft gained speed to generate sufficient rotor rpm for flight.

At low rotor rpm, blade sailing can cause the rotor disc to move violently. It is probable that G-CKYV encountered a blade sailing event as the airspeed increased and the rapid movement of the rotor disc forced the controls from the pilots grasp. Though he reduced power, he was unable to effectively counter the motion of the aircraft.

The pilot recognised that his determination to take off distracted him from the obvious course of aborting due to the rotor rpm indicator issue.