ACCIDENT

Aircraft Type and Registration:	AW109SP GrandNew, G-FRRN	
No & Type of Engines:	2 Pratt & Whitney Canada PW207C turboshaft engines	
Year of Manufacture:	2017 (Serial no: 22371)	
Date & Time (UTC):	19 November 2018 at 0902 hrs	
Location:	London Heliport (Battersea)	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to rotor brake requiring replacement	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	71 years	
Commander's Flying Experience:	14,142 hours (of which 391 were on type) Last 90 days - 55 hours Last 28 days - 3 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The pilot was starting the helicopter in order to depart from the heliport before it closed. Having completed his checks and been given permission to start, the pilot started the No 1 engine. He was alerted by the marshaller and by ATC that smoke was coming from the rotor head. He shut down the engine and, whilst completing the checks, noticed that the rotor brake was on.

History of the flight

G-FRRN had flown from Denham Airfield to London Heliport, Battersea arriving at 0854 hrs. The helicopter had been flown into the heliport by another pilot with the incident pilot sitting in the left seat. After the helicopter had been shut down and the passengers and the other pilot had disembarked, the incident pilot moved to the right seat in preparation for the flight back to Denham.

The incident pilot was told by the controllers at the heliport that it would shortly be closing due to a requirement for ATC breaks. There would be a wait of 30 minutes unless G-FRRN could depart before the closure. The pilot decided that it would be best to depart before the heliport closed and began to complete his before start checks.

The pilot was given permission to start from ATC once another helicopter had parked on the adjacent landing spot. As engine No 1 started and the rotors began to turn, the pilot was

alerted by the marshaller and ATC that smoke was visible from the top of the helicopter. He immediately shut down the engine thinking that he had an engine fire. He was about the dry-crank the engine to dissipate any residual fuel when he noticed that the rotor brake was on.

The heliport fire service and the local fire brigade attended the scene, and it was soon clear that there had been no fire; although parts of the rotor head were hot. After opening all the cowls the temperature decreased and the helicopter was moved from the parking spots.

Examination by the maintenance organisation found the helicopter to be largely undamaged except for the rotor brake system, which was replaced before the helicopter was returned to service.

Helicopter information

The AW109SP is a modern, four-bladed helicopter with a fully articulated main rotor. It is designed to be operated by a single pilot but has dual cockpit controls. With a fully articulated rotor system, each rotor blade is attached to the rotor hub by a series of hinges which allow the blade to move independently. The rotor brake, which is fitted to allow the blades to be stopped more rapidly after engine shutdown, is a hydraulically operated calliper acting on a disc secured to the tail rotor drive pinion. The rotor brake handle is in the centre overhead console of the flight deck on the left of the engine control levers and, with the rotor brake off, the handle is fully forward. There is no requirement to have the rotor brake on when the aircraft is parked unless there is a very strong wind.

As part of the pre-start procedures the rotor brake is applied to check that a yellow caution message, ROTOR BRAKE, illuminates. The message indicates that the rotor brake lever is not in the off position or that the rotor brake system is degraded. The rotor brake is not to be applied when the rotor rpm, N_R, is greater than 40%. When the rotor brake is on or the brake pads are not in the fully retracted position, a red message, ROTOR BRAKE ON, appears on the right electronic display unit in the centre of the instrument panel.

Some helicopters have a sensor in the rotor brake system (such as in the lever itself) to prevent starting with the rotor brake on, but no such system is fitted to this helicopter type.

Human factors

The AW109SP is designed to be flown by a single pilot and the checks are generally performed from memory without reference to a written checklist.

The incident pilot did not tend to leave the rotor brake on after shutdown, selecting it off once the rotors stopped. The pilot who flew G-FRRN into Battersea tended to leave the rotor brake on after shutdown. With the checks before start completed rapidly from memory, the incident pilot missed the fact that the rotor brake was on because he was not expecting to see the handle in that position. The rotor brake handle can be difficult to see from the right-hand seat because it is partially obscured by the engine control levers.

Analysis

The pilot was keen to depart from the heliport before it closed. Although checking the disengagement of the rotor brake was part of the before start checklist, it was not the pilot's usual practise to leave it on. The checks were completed from memory, with time pressure to start and take off as soon as possible. The helicopter is not designed with a system to prevent the pilot starting the engine with the rotor brake on, and the rotor brake lever can be difficult to see from the right seat. The pilot did not notice that the rotor brake was on before he started the first engine.

The attentiveness of the marshaller and ATC personnel meant that the pilot was alerted quickly to the smoke coming from the rotor head. He rapidly shut down the helicopter which probably prevented much greater damage.

Conclusion

A combination of factors led to the pilot starting an engine with the rotor brake on. The helicopter was not fitted with any system that would have stopped the engine starting, although a caption would have been visible on the electronic display on the instrument panel.