Piper PA-28-161, G-BSVF, 26 September 1999

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Aircraft Type and Registration:	Piper PA-28-161, G-BSVF
No & Type of Engines:	1 Lycoming O-320-D3G piston engine
Year of Manufacture:	1984
Date & Time (UTC):	26 September 1999 at 1310 hrs
Location:	Wycombe Air Park, Marlow
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - None
Injuries:	Crew - None - Passengers - N/A
Nature of Damage:	Extensive, beyond economic repair
Commander's Licence:	Private Pilot's Licence
Commander's Age:	35 years
Commander's Flying Experience:	61 hours (of which 6 were on type)
	Last 90 days - 2 hours
	Last 28 days - 0 hours
Information Source:	AAIB Field Investigation

History of the flight

Following a 'touch-and-go' landing on Runway 25, the pilot applied full power and initiated a climb. At approximately 200 feet agl he heard a 'bang' and the engine started to run very roughly. Whilst carrying out his engine related cockpit checks he observed that the engine gauges were indicating normally. Since the engine continued to run roughly, the pilot decided to return immediately to the airfield and declared an emergency to ATC. As the aircraft was at about 800 feet agl, he decided to turn and land downwind on the reciprocal Runway 07. However, as the pilot started to make an approach for this runway, he heard ATC clear another aircraft for take off on Runway 25 and so he re-aligned his approach for the grass Runway 07. He observed the other aircraft climbing away from Runway 25 and continued his approach for the grass Runway 07, with the engine still continuing to run at idle. He selected full flap at about the runway threshold, but found difficulty in reducing airspeed and landed about midway down the grass runway. The pilot applied maximum wheel braking, but the wheels skidded on the grass. The aircraft was brought to a halt by its collision with the airfield's boundary hedge. The pilot was not injured.

Examination of the engine

Initial examination revealed that the engine's No 1 cylinder lower spark plug, complete with it's helicoil insert, had been blown out of the cylinder head. A later metallurgical examination of the cylinder, spark plug and the helicoil insert revealed that the spark plug hole in the cylinder head had had an oversized helicoil thread insert fitted. In addition, it was apparent that the new threads which had been cut in the spark plug hole, to receive the helicoil insert, had been cut 'off-centre'. The consequence of this was that the threads were only partially formed on one side of the spark plug hole which had resulted in the helicoil insert not being held securely within the cylinder head. There was also evidence that the sealing washer fitted between the spark plug and the cylinder head had only been in contact with the cylinder head over about 120° of its circumference during a period of operation. Evidence on the inside of the cylinder head, in the form of excess threads that had not been 'dressed out', strongly suggested that the work which had been carried out to fit the oversized helicoil insert had taken place after the last overhaul by an approved maintenance organisation, and with the cylinder fitted to the engine.

Previous overhaul

The engine had been overhauled to zero hours in 1994 by one of the manufacturer's approved overhaul organisations. During this overhaul the No 1 cylinder had been refurbished and part of this work had included rework of the lower spark plug hole. This rework had involved the partial filling (re-metalling) of the hole and, using a manufacturer's approved jig, the tapping of a new thread to take a standard size helicoil insert. The excess thread at the inner end of the spark plug hole had been 'dressed out' in accordance with the manufacturer's instructions.

Inspection of the aircraft and engine log books, and the operator's spares provisioning list, revealed no record that reflected any replacement of the No 1 cylinder or of work associated with the re-tapping of the spark plug hole and the fitting of the oversized helicoil insert. The engine had accumulated 1,934 hours since its overhaul in 1994.

Previous similar engine incident on another aircraft

On 4 September 1999, 22 days prior to this accident, the same operator had the No 1 cylinder lower spark plug blow out of the cylinder head of the engine on another Piper PA-28-161 aircraft. Examination of the No 1 cylinder from that engine by the AAIB showed very similar evidence to that seen on the cylinder from the engine of the accident aircraft. However, the spark plug and helicoil insert from this earlier incident were not available for examination by the AAIB. That engine had been overhauled in 1995 by the same manufacturer's approved overhaul organisation and a standard size helicoil insert had been fitted to the lower spark plug hole of the No 1 cylinder. Examination of the aircraft and engine log books from that aircraft, and the operator's spares provisioning list, again revealed no record of subsequent replacement of the No 1 cylinder, or of re-tapping the spark plug hole and fitment of an oversized helicoil insert. That engine had accumulated 1,515 hours since its overhaul in 1995.