

ACCIDENT

Aircraft Type and Registration:	Wittman W10 Tailwind, G-BJWT	
No & Type of Engines:	1 Lycoming O-290-G piston engine	
Year of Manufacture:	1984	
Date & Time (UTC):	1 December 2007 at 1340 hrs	
Location:	Hucknall Airfield, Nottinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Significant damage to undercarriage, engine mount and propeller	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	48 years	
Commander's Flying Experience:	254 hours (of which 80 were on type) Last 90 days - 1 hour Last 28 days - 0 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent investigation by the AAIB	

Synopsis

The right gear leg fractured and collapsed after landing. The failure was attributed to incorrect material properties in the gear leg, probably introduced during heat treatment.

to a halt, damaging the propeller and engine mount in the process. The pilot switched off the fuel and magnetos and radioed for assistance before exiting the aircraft with the passenger, without injury.

History of the flight

The pilot was returning to Hucknall after a local flight, and was making a straight-in approach from 2,000 ft to Runway 22. The wind was given by the tower as "estimated south-south-west, 20 gusting 30 kt". The approach and round-out appeared normal, but the aircraft bounced three times after the initial touchdown. The right gear leg fractured and collapsed and the aircraft slid

The pilot considered that he should have gone around after the first bounce rather than attempt to 'cushion' it. He also commented that the energy absorbent material used in the seats worked well.

Aircraft information

The Wittman Tailwind is homebuild aircraft that was designed in the 1950's and features a high wing and a

tail-wheeled undercarriage, see Figure 1. The main gear legs are undamped steel struts and are attached to the tubular steel engine mount. These gear legs are 44 inches long with a bend immediately inboard of the axle. They are made of a heat-treatable alloy steel (6150) for which the Wittman drawings specifies:

'assemble gear struts in place and bend red hot (1/16" toe-in) and with 4-5° camber – then heat treat and temper to give 42-44 Rockwell "C" hardness.'

This corresponds to a range of Vickers hardness of 400-430 HV.

This particular Tailwind was built in 1984. The legs were bent as specified and then sent to be heat treated by a specialist organisation. This operation was repeated some years later when the position of the main wheel was moved approximately 2" further forward.

Metallurgical examination

The right and left main gear legs, see Figure 2, were recovered to the AAIB and then sent to a metallurgist for examination. The metallurgist determined that the



Figure 1

failure had resulted from a low-cycle, high-peak cyclic stress, fatigue mechanism that had initiated in three positions, see Figure 3, although the conditions could not be explained by the normal service loading in a gear leg with uniform properties throughout its volume.

The hardness was measured at several locations in the vicinity of the failure and the material was found to be very soft in the centre (circa 200 HV) and very hard on the surface (greater than 600 HV). It was concluded that the fracture had resulted directly from the use of incorrect heat treatment methods after the strut was fabricated.



Figure 2

*Acknowledgement:
HT Consultants*



Figure 3

*Acknowledgement:
HT Consultants*

Light Aircraft Association action

The LAA have been informed and will publish an article in their newsletter to highlight the importance of correct heat treatment for critical components. In view of this action, no safety recommendations are made.

AAIB comment

The fabrication of gear legs, including heat treatment, is probably a difficult task for many homebuilders.

For many homebuild aircraft types it is possible to purchase complete gear legs which require no further manufacture, and it is currently possible to purchase such legs for this aircraft type.