**ACCIDENT**

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| **Aircraft Type and Registration:** | Skyranger Swift 912S(1), G-SKSW | |
| **No & Type of Engines:** | 1 Rotax 912ULS piston engine | |
| **Year of Manufacture:** | 2007 (Serial no: BMAA/HB/553) | |
| **Date & Time (UTC):** | 15 September 2019 at 1040 hrs | |
| **Location:** | High Cross airstrip, Hertfordshire | |
| **Type of Flight:** | Private | |
| **Persons on Board:** | Crew - 1 | Passengers - 1 |
| **Injuries:** | Crew - None | Passengers - None |
| **Nature of Damage:** | Damage to nose landing gear, engine cowling, engine, propeller, cockpit windscreen, left and right wings | |
| **Commander's Licence:** | Airline Transport Pilot's Licence | |
| **Commander's Age:** | 61 years | |
| **Commander's Flying Experience:** | 10,300 hours (of which 160 were on type)<br>Last 90 days - 14 hours<br>Last 28 days - 8 hours | |
| **Information Source:** | AAIB Field Investigation | |

## Synopsis

The aircraft's nose landing gear failed during a normal landing roll, causing the aircraft to pitch over and come to rest inverted. It is probable that the landing gear fork was damaged during a recent, but unidentified, landing or taxiing event that weakened the fork to the extent that it subsequently failed during the accident flight. The nosewheel fairing would have made it difficult for a pilot to fully inspect the area where the failure occurred during the pre-flight inspection.

## History of the flight

The pilot returned to High Cross airstrip from Clacton airfield after a 30-minute flight in fine weather conditions. An uneventful approach to Runway 22 was flown, followed by a normal touchdown on the main landing gear. As the nose was lowered during the landing roll, the nose landing gear fork failed, causing the nose leg to dig into the surface of the grass runway. This caused the aircraft to decelerate suddenly and to pitch forward, coming to rest inverted (Figure 1). The pilot and passenger, who were wearing four-point harnesses, were uninjured and able to unfasten their harnesses and vacate the aircraft without assistance.

**Figure 1**

G-SKSW following the nose landing gear failure

### Accident site

The aircraft came to rest approximately 170 m along Runway 22. The runway's grass surface was firm, following a prolonged period of dry weather. Witness marks made by the aircraft on the runway were consistent with a progressive collapse of the nose landing gear fork during the landing roll. There was no evidence of the nose landing gear having struck an object and there were no significant holes or depressions in the runway surface.

A small quantity of fuel had leaked from the aircraft's left wing fuel tank whilst the aircraft was inverted.

### Aircraft information

The Skyranger Swift is a high-wing, two seat microlight aircraft with a conventional fixed landing gear. The nose and mainwheels are enclosed in fairings that limit the degree of examination of the landing gear during normal pre-flight checks. G-SKSW was built in 2007 and had accumulated 422 hours at the last maintenance check, which occurred on 21 August 2019. The aircraft had suffered a landing accident in 2012 that bent the nose landing gear leg, which was replaced by a new component as part of the repair.

The aircraft owners were not aware of any recent taxiing or landing events that may have damaged the nose landing gear.

**Aircraft examination**

The aircraft sustained damage to the nose landing gear, propeller, engine cowling and engine. The cockpit windscreen was broken and the upper surfaces of both wings were damaged.

The left leg of the nose landing gear fork had failed at its welded joint with the nose landing gear down tube (Figure 2). The right leg of the fork remained attached to the down tube and had folded rearwards, with the nosewheel remaining attached to it. The nosewheel tyre was in good condition and no pre-accident defects were evident when it was examined.

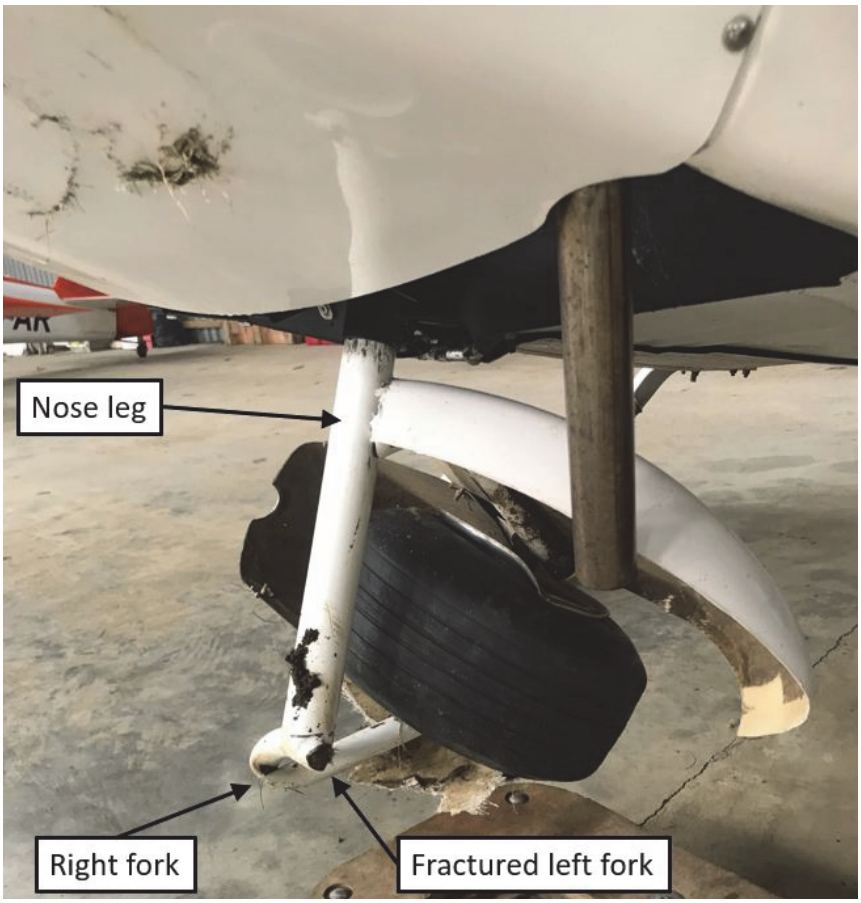


**Figure 2**

Fractured nose landing gear left fork

The fractured section of the nose landing gear fork was subjected to a metallurgical examination, which revealed that the left fork tube had bent rearwards during the failure, at the point where the fork tube was attached to the down tube by a welded joint. The rear section of the welded joint between the fork and the down tube had failed in ductile overload close to the edge of, but within, the weld bead (Figure 3). The front section of the left fork tube had failed in ductile overload outside the welded area.

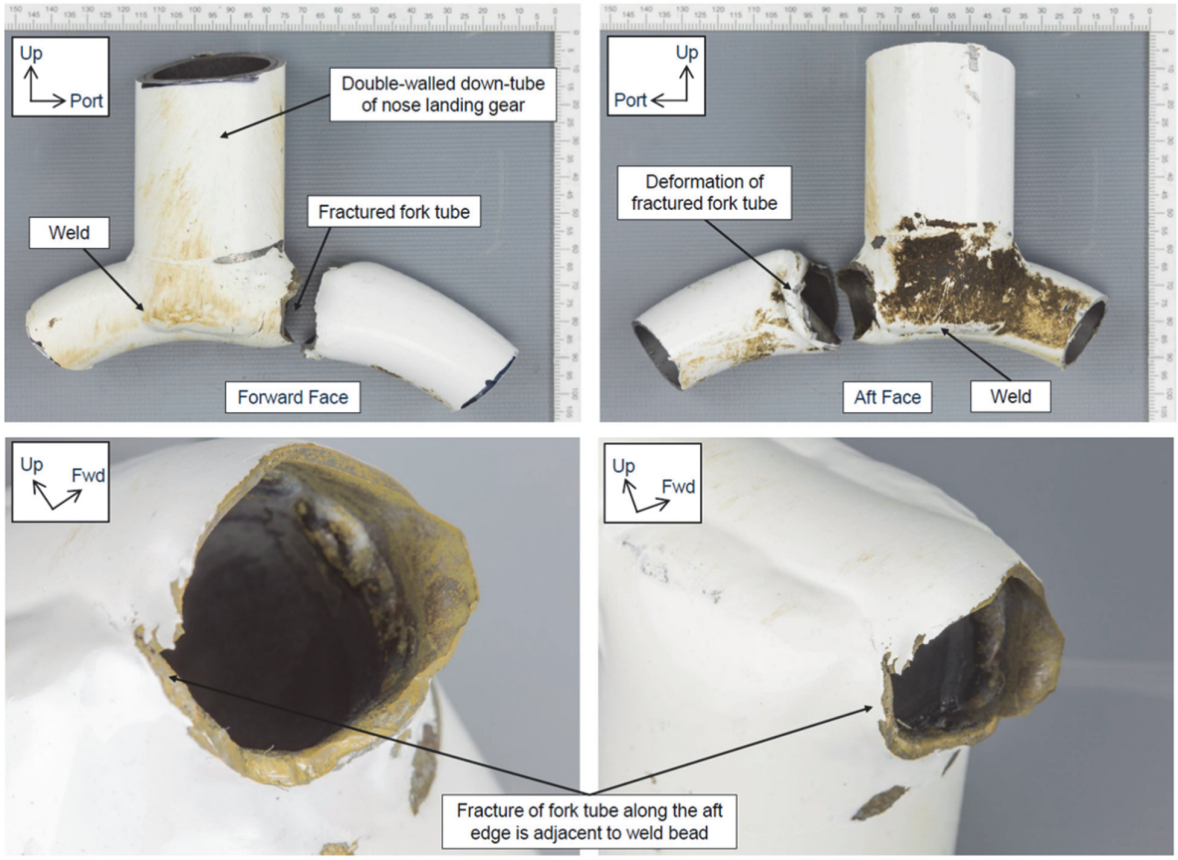


**Figure 3**

Fractured section of the nose landing gear fork tube (image courtesy of QinetiQ)

Some light corrosion was evident across the fracture surface although there were no heavily corroded areas as might be expected with a pre-existing crack in the fork. There was also no evidence of progressive crack growth in the fracture surface.

The welded joints were examined by taking microsections and no defects such as porosity, inclusions or micro-cracking were evident within the weld beads. No significant heat-affected zones were observed in the tube material adjacent to the welded areas. Although the degree of weld penetration was variable in the welds examined, it was not thought to have significantly affected the strength of the welded joints in the fork assembly.

No significant discrepancies were identified in the material composition and tensile strength of the fork tube material between the manufacturer's specifications and those values noted during the metallurgical examination.

## Analysis

The metallurgical examination of the nose landing gear left fork determined that the fork had failed in overload, due to being subjected to loads in excess of its design strength. It also found that there were no material defects or progressive cracking present that may have contributed to the failure.

The initial stage of the landing during the accident flight was uneventful, with a normal touchdown on the main landing gear. The nose landing gear collapsed during the landing roll without having been subject to an excessive impact. It is, therefore, considered likely that the nose landing gear left fork had been previously damaged, during a recent but undetermined landing or taxiing event, that caused a crack to form which eventually led to the failure of the fork during the landing roll.

**Conclusion**

The investigation established that the most likely cause of the failure of the nose landing gear leg was a crack emanating from damage that occurred prior to the accident flight. The fixed nosewheel fairing would have constrained the pilot's inspection of the damaged area during the pre-flight inspection.

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