ACCIDENT

Aircraft Type and Registration:	Pelican PL, G-MPAC
No & Type of Engines:	1 Rotax 912-UL piston engine
Year of Manufacture:	2001 (Serial no: PFA 165-12944)
Date & Time (UTC):	30 August 2020 at 1205 hrs
Location:	Stoke Golding Airfield, Warwickshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Serious) Passengers - None
Nature of Damage:	Damage to propeller, landing gear, wings and fuselage
Commander's Licence:	Private Pilot's Licence
Commander's Age:	63 years
Commander's Flying Experience:	630 hours (of which 114 were on type) Last 90 days - 13 hours Last 28 days - 3 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft had flown from Oxenhope Airfield in Yorkshire and, with a northerly breeze, its pilot positioned to land on Runway 08 at Stoke Golding Airfield. He reported being slightly fast on the approach which resulted in a protracted flare and deep landing approximately halfway along the runway. Despite applying maximum braking, the pilot could not stop the aircraft, which overran the runway at an estimated 15 kt. It entered the boundary hedge and tipped nose-first into a deep ditch where it came to an abrupt halt. The pilot attributed the accident to accepting an excessively deep landing rather than going around.

The passenger was uninjured, but the pilot sustained severe injuries having struck his head on a metal bar running across the top of the cockpit. He put the severity of his injuries down to only having a 3-point harness and not bracing for impact. A post-accident field trial by the Light Aircraft Association showed that a slack shoulder strap would allow enough body movement for a seat occupant's head to strike the metal bar during a rapid deceleration.

History of the flight

The aircraft had flown from Oxenhope Airfield in Yorkshire. On arrival at Stoke Golding Airfield the weather conditions were good with a 10 kt northerly breeze and the pilot positioned to land on Runway 08. The aircraft was slightly fast on the approach, 58 kt rather than 50 kt, which resulted in a protracted flare and deep landing. The pilot estimated

that he touched down approximately halfway along the runway. Despite the deepness of the landing, the view forward at touchdown looked longer than he was used to seeing at his home airfield. Satisfied that enough runway remained ahead, he elected to stop rather than initiate a go-around. Despite the pilot applying maximum braking, the aircraft did not slow down as quickly as he expected. He attributed the low rate of deceleration to short grass on a slightly downhill runway, little or no headwind and the additional weight of the passenger. He reported also having misread the airfield details, believing the runway to be 585 m rather than 525 m long.

Approaching the end of the runway it became evident that the aircraft would overrun into the boundary hedge beyond. The pilot was not aware that the hedge line contained a ditch and assumed the safest course of action was to go through it. The pilot stated that if he had known of the ditch he would have tried to turn away before impact. G-MPAC left the runway at approximately 15 kt and penetrated the hedge before tipping forward and coming to an abrupt halt (Figure 1 and Figure 2).

Figure 1

G-MPAC in the airfield's boundary ditch
(image © Leicestershire Police)

Figure 2

View looking down Runway 26
(image © Leicestershire Police)

The sudden deceleration caused the pilot to be thrown forwards and he struck his head on the front spar carry-through tube just behind the windscreen (Figure 3). He suffered severe injuries as a result. The passenger's straps were tight and, having braced for impact, he was uninjured.

Figure 3

Front spar carry-through tube crossing behind G-MPAC's windscreen
(image © Leicestershire Police)

The occupants were able to exit the aircraft using the door on the right side of the aircraft, although progress was hindered by the hedge's thorny branches. Bystanders were quickly on scene to assist.

Figure 4

Photograph showing exit route through the right cockpit door
(image © Leicestershire Police)

Weight and balance

The aircraft's basic weight was declared as 380 kg and it had a maximum certified landing weight of 635 kg. The pilot calculated that, with his passenger weighing 95 kg, the landing weight at Stoke Golding was 585 kg.

Given the relatively light basic weight of the aircraft, with the passenger on board it was approximately 20% heavier than if the pilot had been solo. Approaching the field at 58 kt the aircraft's kinetic energy was 34% greater than it would have been at the target speed of 50 kt. Compared with a solo approach at target speed, G-MPAC had 60% more kinetic energy as it arrived in the flare.

Airfield information

Stoke Golding is an unlicensed grass airstrip with a single runway which is 525 m long. From the midpoint of the runway there is a slight downslope towards each threshold. The Pooley's Flight Guide shows 4 ft hedges at both ends of the runway but does not indicate the presence of a boundary ditch.

The accident pilot had been based at Oxenhope in West Yorkshire, where the shortest runway is 325 m long and the longest 460 m, for 13 years. Oxenhope is described in the Pooleys Flight Guide as a '*challenging airfield*.' The pilot reported that, due to waterlogging in the threshold area, the available safe landing run on Runway 24 at Oxenhope was only 225 m long. He also stated that a normal landing run for G-MPAC was 190 m. Video evidence recovered from a camera carried in the aircraft showed landing runs at Oxenhope, by necessity, often terminating quite close to the end of Runway 24.

Survivability

The pilot sustained severe head injuries resulting from impact with a metal bar running across the front of the cockpit. The aircraft was equipped with 3-point harnesses. The pilot reported that his lap strap had been tight and the diagonal shoulder strap was "comfortable". He surmised that tipping forwards into the ditch resulted in a greater upward vector within the cabin making contact with the bar more likely. The passenger attributed his lack of injuries to a tight shoulder strap and bracing for impact.

The Light Aircraft Association (LAA) conducted a field trial on the salvaged aircraft to assess the effectiveness of the harness in G-MPAC. They reported that the harness attachment points were secure and that the seat belt latch was in good working order. They considered it unlikely that the latch would have been inadvertently released during flight. The LAA also found that it was necessary to '*slacken off*' the single shoulder strap to reach forward and make '*essential adjustments*' on the instrument panel. It was apparent that unless the strap was tight it had a natural tendency to fall sideways off the shoulder. With a slack shoulder harness, the seat occupant's upper torso could pivot forward during a sudden deceleration allowing their head to strike the front spar carry-through tube crossing the top of the cockpit (Figure 5). The LAA used this accident as a case study highlighting to its members the importance of ensuring that all '*Hatches and Harnesses*' are secure and tight during pre-landing checks. The LAA also informed the only other owner of a G-registered

Pelican aircraft of their findings concerning harness security and the potential for injury from the spar carry-through tube.

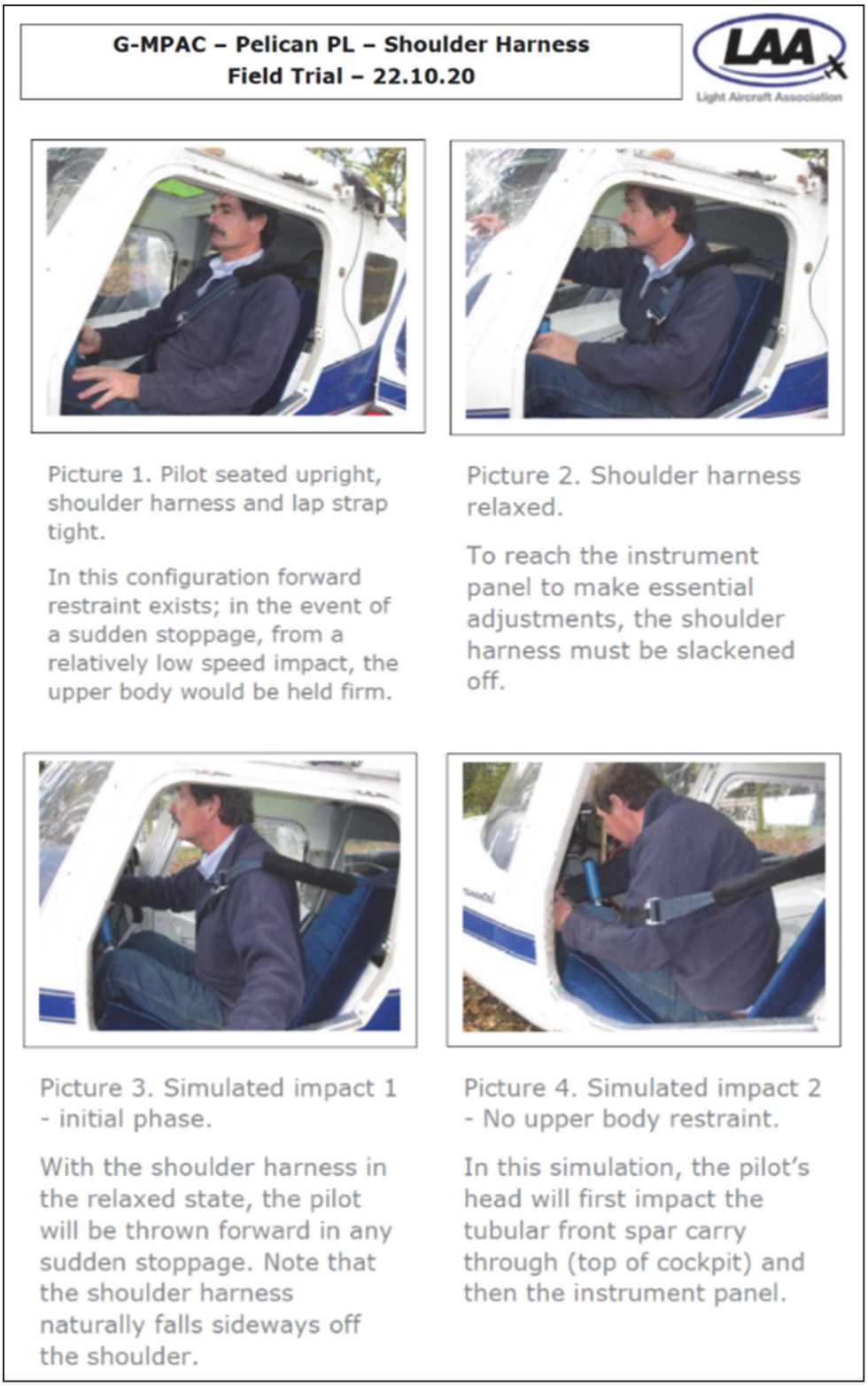

Figure 5

LAA field trials report
(courtesy of the LAA)

Additional information

Deep landings, those achieved beyond the normal touchdown zone, can quickly lead to situations where the braking distance required exceeds the remaining runway available ahead. As a precaution against runway overruns, in their Safety Sense Leaflet 1[1], entitled '*Good Airmanship*', the CAA recommends that pilots should go around if not '*solidly 'on' in the first third of the runway*'.

Analysis

For very light aircraft, relatively small increases in all-up-weight weight and excess speed can have a disproportionate effect on performance. While G-MPAC was below its maximum landing weight, it had 60% more kinetic energy as it arrived in the flare than had it been flown solo and on-speed. This additional energy contributed to the protracted flare and deep landing which was further challenged by a downhill slope and the lack of headwind.

It is likely that his acclimatisation to landing on a 225 m strip at Oxenhope contributed to the pilot's confidence that the 250+ m of runway remaining on touchdown at Stoke Golding would be sufficient. The pilot reflected that, having not controlled the approach speed accurately or landed in the first third of runway, he should have gone around. Establishing a touchdown cut-off point before starting an approach makes the subsequent, land or go-around, decision making process easier. When determining a safe cut-off point, exacerbating factors such as adverse weather conditions, landing weight and runway characteristics should be taken into consideration.

It is likely that the pilot's injuries resulted from his shoulder strap being "comfortable" rather than tight. The slackness in the shoulder strap was likely a result of the pilot adjusting it so that he could reach the instrument panel during the flight and not pulling it tight for landing. While the collision dynamics of this accident were due to a landing overrun, they could equally have resulted from a rejected takeoff.

Discussion

The accident pilot reflected in hindsight that a decision to go around would have been a more appropriate course of action than to continue with a compromised approach and landing. Pilot decision making is a key contributor to flight safety. Incorrect approach speeds, steep approaches, deep landings, challenging airfields and unhelpful weather conditions are known hazards in aviation. Anticipating and mitigating these and other hazards, including planning contingency strategies in advance, can help pilot decision making when unexpected, but not unanticipated, situations develop.

That the aircraft occupants were sat side-by-side and one suffered serious injuries while the other was uninjured highlights the importance of ensuring harness security during takeoff and landing.

Footnote

[1] Available at http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=1156 [accessed October 2020].

Safety action

The Light Aircraft Association took the following safety action:

- It alerted the only other owner of a G-registered Pelican aircraft to the potential for head injury in an accident if the harness shoulder strap is not tight.
- It used this accident as a case study to emphasise to its members the importance of the '*Hatches and Harnesses*' pre-landing check.