WIRE STRIKES SAFETY ARTICLE

Objective of the Article:

The purpose of this report is to share with the aviation industry the risks and prevention involving the wire-strike accidents reported to the AIID, and factors which contribute to the accidents or factors which need to be considered while flying.

Case Study 1:

On 22 May 2014, a Cessna 172 aircraft struck power lines while conducting a private flight over a private farm in the general flying area. The accident occurred during daylight conditions at GPS coordinates S 26°26.397 E 028°35.668 at 5375 feet elevation. The aircraft struck the power lines at about the lowest point of the span, which was 5.6 metres above ground level.

The aircraft was seen flying low in the area and whilst simulating a forced landing, the aircraft impacted high tension wires at the height of approximately 5, 6 meters above ground level (AGL). The forced landing was simulated whilst flying into the sun. The occupants on board suffered serious injuries and were taken to the nearest hospital.

Wire strikes generally occur when an aircraft is operating in close proximity to the ground, including the landing and take-off phases of flight. However, on occasion, wire strikes have occurred over water where a wire is strung between two high points. Below is the wreckage after the accident.

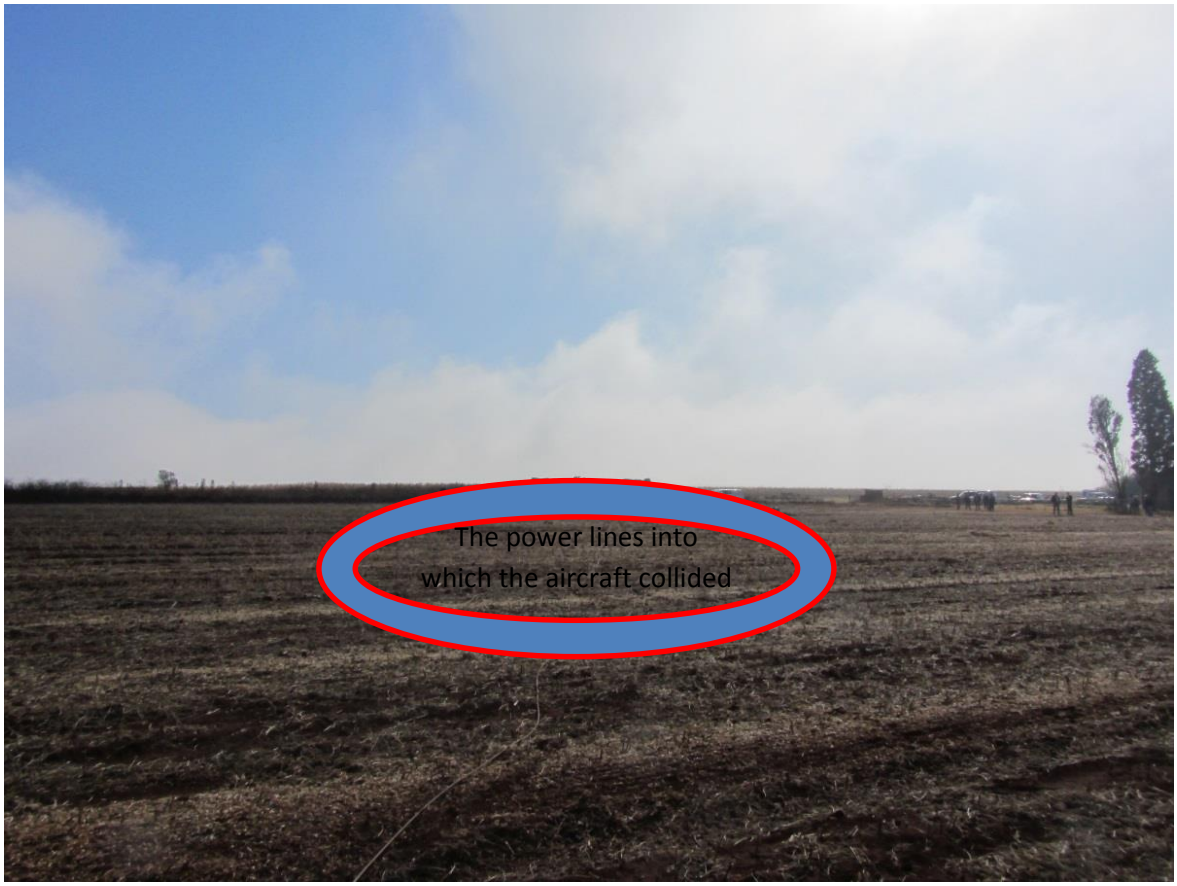

Figure 1: The red circle indicates the position at which the aircraft impacted.

CASE STUDY 2:

1.1.1 On Sunday morning 24 May 2015, the pilot and the passenger were engaged on a private flight under Visual Flight Rules (VFR) from a privately-owned Tambotie farm located in Witpoort, Lephalale when the accident happened. The aircraft headed easterly towards the Ditlou rural area, after which it was observed by local residents maneuvering at a low level above the houses. The two-seater single engine, aero-trike, weight-shift controlled aircraft continued to fly alongside Shongwane Seleka public road at about fifty (50) feet above ground level (AGL), after which it collided with power lines and then impacted the ground heavily.

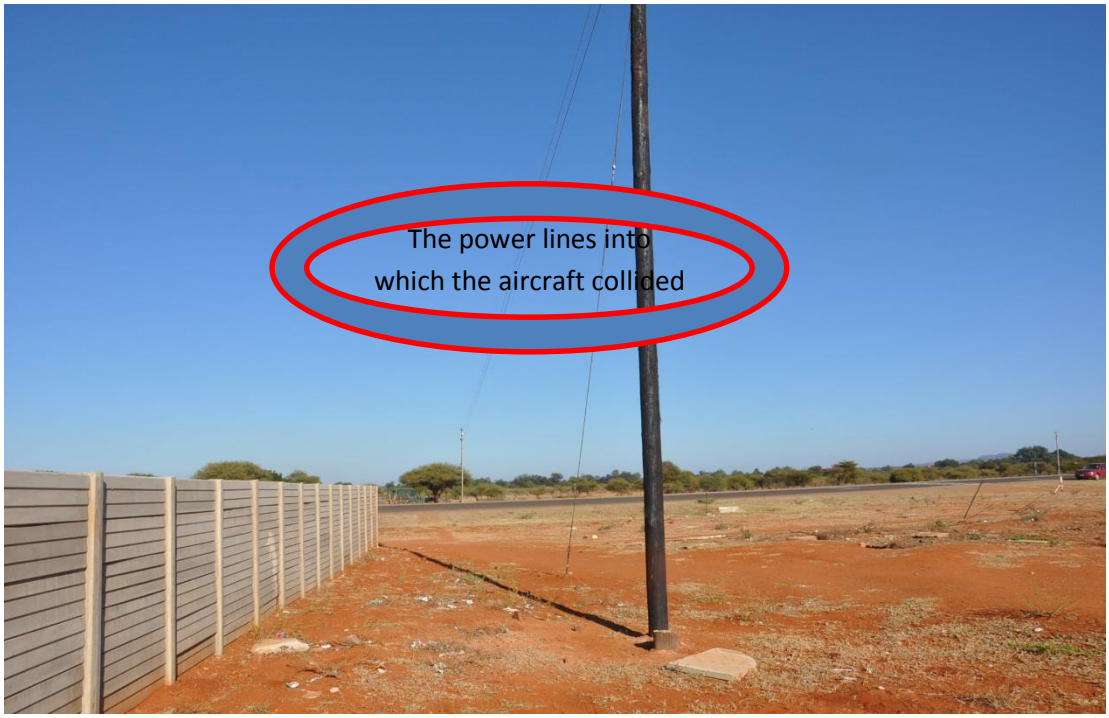

Figure 2: The red circle indicates the position at which the aircraft impacted.

CASE STUDY 3:

On Wednesday 31 August 2016, the pilot, accompanied by the passenger, was conducting a private flight when the accident occurred. The weather conditions in the area for the time leading up to the accident were consistent with visual meteorological conditions (VMC), unlimited visibility. The aircraft took off without incident but it was later reported to have collided with the power lines on the flight path and crashed.

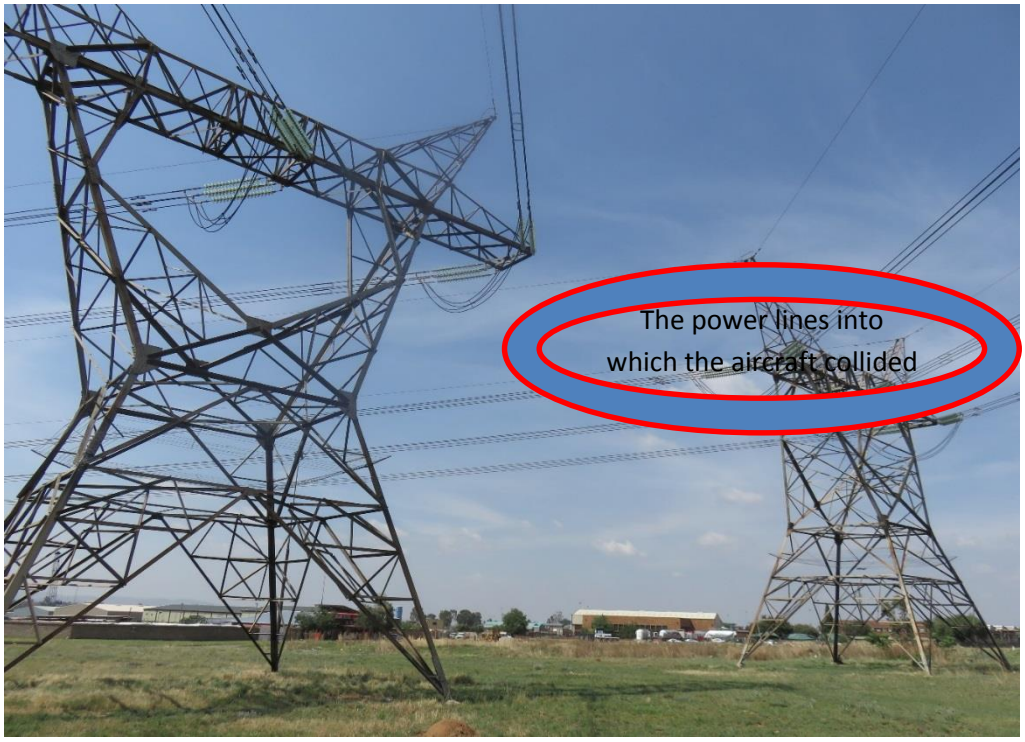

Figure 3: The red circle indicates the position at which the aircraft impacted.

According to the South African Civil Aviation Authority, *The regulation below indicates the minimum height at which the aircraft is supposed to be flown to clear the obstacles.*

The Civil Aviation Regulation of 2011 regarding minimum heights states:

Minimum heights

91.06.32 *(1) Except when necessary for taking off, or landing, or except with prior written approval of the Director, no aircraft -*

(a) shall be flown over congested areas or over an obvious open-air assembly of persons at a height less than 1 000 ft above the highest obstacle, within a radius of 2 000 ft from the aircraft;

(b) when flown elsewhere than specified in paragraph (a), shall be flown at a ***height less than 500 ft*** *above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water and the PIC operates at a height and in a manner that allows safe operation in the event of an engine failure.*

In all of the above, the investigation determined that the aircraft collided with the wires. It was also established that the flights were all conducted at a low-level attitude.

The investigations into all of the above occurrences also determined or highlighted what is important or crucial for the pilots before their flights. Flight planning was found to be crucial, as it informs the pilot about the locations of obstacles and their height within the area where they are planning to fly. The likelihood of a pilot seeing wires is determined by a number of factors including the number of wires, type of support structure, length of wire span, the environment and the background against which the pilot is viewing the wires. Importantly, there is evidence to suggest that many pilots have prior knowledge of the presence of wires before they strike them. This indicates that there are reasons other than a lack of awareness causing wire-strike accidents and incidents to occur.

WIRE-STRIKE HAZARDS

Low flying is hazardous because of the aircraft's close proximity to obstructions such as trees, power lines, buildings and radio towers. Colliding with obstructions such as these can cause significant damage to an aircraft, resulting in loss of control and subsequent impact with the ground. Impact forces will likely involve further aircraft damage and possibly injury or death to aircraft occupants.

IDENTIFYING POWERLINES

It is important for pilots to always be vigilant when flying low and also to consider the following: wires, the height of the wires, and the direction of the wire run; these factors can determine whether or not a pilot sees a wire. Single power lines are possibly the greatest hazard, as they can be extremely difficult to detect from the air and can be encountered in the most unexpected places in rural areas. Other factors restricting visibility include the position of the sun, changing light conditions, background camouflage, the obscuring effects of terrain, and poor weather. A more obvious factor is a dirty windscreen. The ability to identify the presence of power lines can be facilitated by objects and landmarks on the ground. Buildings such as houses and sheds are likely to have power connected through above-ground wires. Roads may also provide a convenient path for power lines. Furthermore, power poles may offer clues as to wire direction and height. By identifying at least two poles, a pilot may be able to gauge the path of the wire. Insulators attached to the poles run in the same direction as the wire and may also assist in identifying the number of wires and their direction. The orientation of the insulators could indicate whether the wire continues in the same direction or turns a corner.

Problems arise when the wire span is long and requires poles to be placed several hundred metres apart. When this occurs, the pilot's ability to focus on the pole and recognize a potential wire hazard is decreased. In addition to the issues described above, there are a number of other human factor limitations that may contribute to a wire-strike accident or incident, such as information-processing, stress, fatigue, and fitness to fly. However, one of the major human factors associated with low-level aerial tasks is pilot distraction.

Wire-strike prevention

Situational awareness

Risk mitigation strategies associated with low-level flying rely heavily on the level of situational awareness maintained by the pilot. Strategies used to establish and maintain adequate situational awareness include reading the physical structure indicators (i.e. orientation of insulators and sighting two or more poles), self-discipline, and proper flight planning and pre-flight briefing, observation, situational awareness, and appropriate flying techniques, maintenance of a good visual scan and consideration of weather factors and areas previously checked for wires.

Pilots can also rely on the wire markers which assist them in the detection of wires. Wire markers can be white, yellow, red, or orange, and may be spheres, or warning lights.

Phase of flight

The majority of wire-strike accidents occur during the low flying phase of flight. This phase includes that part of the flight directly involved in the purpose of the flight (for example during agricultural spraying and during the survey component of other aerial work activities).