

ANTI-WIRE STRIKE TECH

Nothing replaces identifying hazards before a flight, and vigilance once in the air, but technology is increasingly protecting pilots from a lapse in concentration.

An Australian Transport Safety Bureau study¹ indicates 63 percent of pilots involved in wire strike accidents know in advance the wire is there.

So wire detection and protection systems have been used overseas for years to help situational awareness, and to provide a 'last resort barrier' if all else fails.

New Zealand operators are yet to pick up the technology in a big way, however. Here's an introduction.

Detection

Wire detection science alerts the pilot to the proximity of nearby lines.

One overseas-manufactured kit picks up the electromagnetic fields produced by all power lines and emits a pulsing tone, which increases in frequency the closer the pilot gets. If the pilot continues to approach the line, a red warning light illuminates the cockpit. As the aircraft moves away, the pulsing tone reduces in frequency.

This kit costs around NZ\$24,000 including the antenna but excluding installation.

Using the New Zealand-produced TracMap TML-A, pilots mark wires and hazards on the device in the cockpit. The device then warns the pilot on the lightbar and screen when they're near a hazard.

The marked hazards are shared with all the other TracMap devices in the organisation.

The cost for such technology is between NZ\$4,000 and NZ\$16,000, depending on a rebate for trading in an old unit.

Radar is also being used to detect the presence of power lines. Mounted on the nose of the helicopter a radar unit transmits a very high radio frequency to detect obstacles along the flight path.

The pilot is given an audible alert, the level of which depends how near the obstacle is. A cockpit display lights up in a way that indicates distance and direction of the obstacle.

Lasers are also being used overseas to scan the environment for wires and other obstacles. The system uses optical and acoustic signals to warn pilots of a hazard.

Both the radar technology and laser technology cost around NZ\$144,000.

The advantage of detection tech is that the pilot is given ample warning they are near a wire hazard. The disadvantage for some pilots is that the alerts can become intrusive over areas with many lines and they have to turn the alert down or off.



Photo: Unsplash/Roger Starnes.

¹ ATSB. Avoidable Accidents No.2. Wirestrikes involving known wires: a manageable aerial agriculture hazard.

Nevertheless, a NASA study² examining the circumstances of 208 wire strike accidents in the United States concluded that detection technology would have prevented 76 percent of them, and 30 of the 37 people killed in those accidents would have survived.

Protection

Wire protection technology, as the name suggests, protects the aircraft and its occupants, if contact is made with lines.

A wire cutter, like a sharp forward-pointing fin, sits above the windshield, and one below. There's a 'deflector' running down the middle, which guides the cables into those cutters.

The advantage of this tech is its price – between NZ\$8,500 and NZ\$20,000.

Its disadvantage is that the aircraft actually makes contact with the lines, and to be truly effective, the helicopter needs to be travelling faster than 30 kts and at an angle of 60° or more from the wire.

The NASA study deduced that wire cutting kits would have prevented 49 percent of the 208 wire strike accidents it looked at, and about 18 of the 37 people who were killed would have survived.

Training

Low-level operations in a 'wires environment' require specialist and formal training.

The international helicopter body, the HAI, says such flying is subject to the following potential hazards:

- Collision with wires, conductors, or structures
- CFIT
- engine failure at low altitude
- settling with power
- loss of tail rotor effectiveness or failure at low altitude
- bird strike
- loss of situational awareness due to sun, low light or haze
- fatigue-related stress
- complacency or over-confidence.

The HAI recommends specialist training for both pilot and crew members including in crew resource management, communication, hazard identification and risk mitigation.

Such flying in multi-crew aircraft requires good and effective communication, and an understanding that, "Each person on board has a role, responsibility and authority to make the other team member(s) aware of any hazard or safety concern and to effectively communicate that concern to the other team member(s)."

The US-based magazine *Professional Pilot*³ says that "Specific training in the 'wires environment' and proper crew resource management ... can all lessen the threat of an accident".

The NASA study also recommended formal training for safe flying techniques and procedures near wires. It concluded that such training would have reduced the 208 accidents it looked at by 56 percent, and an estimated 20 lives of the 37 lost in the accidents would have been saved.

Hazard identification, risk mitigation

"No amount of technology should replace preflight identification of the location of wires and of other possible hazards, and then using safe practices to mitigate the risk they present," says CAA investigator Sam Stephenson.

"As with any technology the danger lies in the pilot turning over responsibility for 'seeing' the lines to the tech, which can fail for any number of reasons.

"But technology should be treated only as a final risk control measure – in the case of wire cutter kits – or in the case of detection equipment, an *aid* to maintaining and enhancing the situational awareness of those on board."

And *Professional Pilot* says, "The best methods for reducing the wire strike threat are education about this potentially lethal environment and increased vigilance in the cockpit." [↗](#)

// FURTHER INFORMATION

The following websites are for readers' further information only. In no way does Vector recommend any particular product.

safeflight.com

dartaerospace.com

TracMap.com

amphitec.com

magellan.aero

Comments or queries?

Email sam.stephenson@caa.govt.nz

² NASA – Civil helicopter wire strike assessment study. Volume 1: Findings and recommendations.

³ *Professional Pilot*, "A plan for reducing wire strike accidents", Stuart Lau.