



Australian Government

Australian Transport Safety Bureau

# Safety Advisory Notice

To Yakovlev Aircraft Factories Yak-52 owners and maintainers

Number: AO-2019-027-SAN-024

## Elevator bellcrank inspections

Elevator bellcranks manufactured from aluminium alloy, fitted to Yakovlev Aircraft Factories Yak-52 aircraft, are known to crack. Periodic inspections are important for detecting the presence of fatigue cracking early and ultimately preventing the failure of the component in-flight.

### What happened

On 5 June 2019, the pilot and passenger of a Yakovlev Aircraft Factories Yak-52 aircraft, departed Southport airfield, Queensland, for a private aerobatic flight. During the flight, the aircraft collided with water near South Stradbroke Island. The occupants were fatally injured, and the aircraft was destroyed.

### What increased risk

During the wreckage examination, the ATSB identified two small cracks at the change in section of the elevator bellcrank. The location was coincident with that identified in previously published airworthiness directives<sup>1</sup> and the manufacturer's airworthiness data. Further examination confirmed at least one was a pre-existing fatigue crack (Figure 1). Although this crack did not contribute to the accident, if not detected, cracking in this area could result in failure of the bellcrank and a subsequent loss of aircraft control.

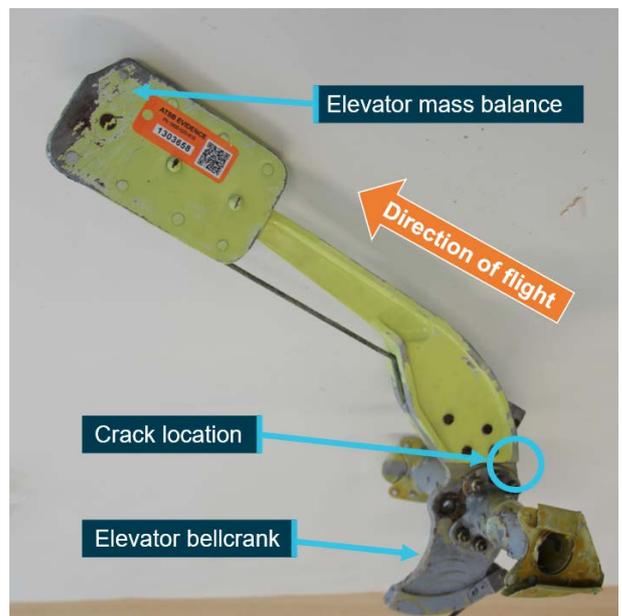
The aircraft had flown about 35 hours since the bellcrank was last inspected. In Australia, the Australian Warbirds Association Limited<sup>2</sup> Yak-52 maintenance schedule specified bellcrank inspections to be carried out in accordance with the United Kingdom Civil Aviation Authority issued Mandatory Permit Directive (MPD 2000-004, issued in 2000), which required:

- a dye penetrant inspection of the elevator bellcrank every 100 flying hours or 12 months, and
- if cracks were detected, no further flight was permitted until replacement.

However, a review of the available Yak-52 maintenance documentation identified a difference in the requirements for inspecting the bellcrank. In 2009, the Yakovlev Design Bureau in Russia, issued an amendment to the scheduled maintenance program, which required a dye penetrant inspection of the elevator bellcrank every  $25 \pm 5$  flying hours. Further, as a result of a fatal Yak-52 accident in 2010, where the elevator bellcrank had failed in-flight, the manufacturer directed that all aluminium alloy bellcranks be replaced with steel. A service bulletin issued on 12 July 2012, 121-BD (121-БД), required the bellcranks to be replaced no later than December 2012.

The airworthiness requirements for Yak-52 aircraft are determined independently in countries outside Russia and have remained relatively unchanged since 2000. While significant, the 2009 changes made to the Yakovlev Design Bureau's scheduled maintenance program and their actions in response to the accident in 2010 had not

Elevator bellcrank and mass balance removed from VH-PAE



<sup>1</sup> CAI-TSD-007/2000 (Lithuania), MPD 2000-004 (United Kingdom), and DCA/YAK/5 (New Zealand).

<sup>2</sup> Australian Warbirds Association Limited (AWAL) is a self-administering recreational aviation organisation providing oversight of warbird, ex-military and replica aircraft.



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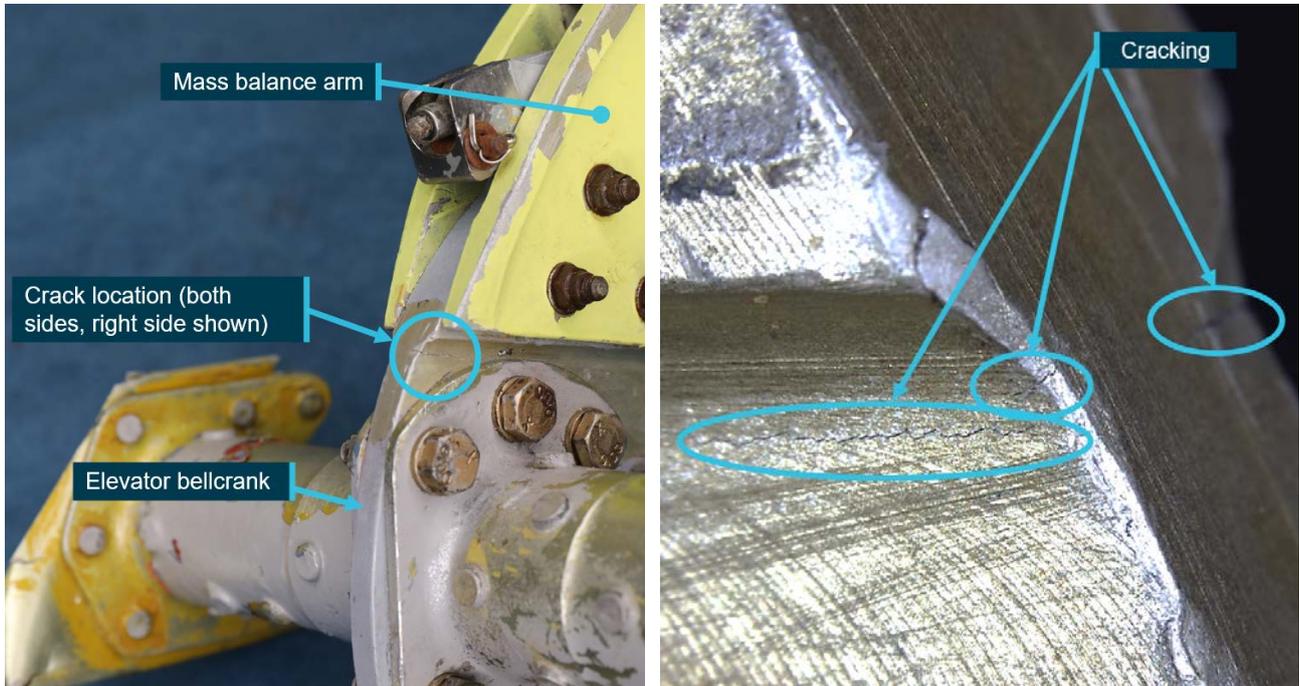
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been incorporated into maintenance schedules in Australia, nor was there a requirement to do so. Common to both, however, is the importance of detecting cracks and the removal of these bellcranks from service.

**Figure 1: Elevator bellcrank cracks observed on VH-PAE**



Source: ATSB

## Safety advisory notice

**AO-2019-027-SAN-024:** Given the known fatigue cracking and potential failure of Yakovlev Aircraft Factories Yak-52 elevator bellcranks manufactured from aluminium alloy, the ATSB reminds maintainers and operators of the importance of dye penetrant inspections to remove defective bellcranks from service. The ATSB would also like to ensure that operators and maintainers of Yak-52 aircraft are aware that Russia, the aircraft's state of design, increased the inspection frequency for the bellcranks to  $25 \pm 5$  flying hours. Further, aluminium alloy bellcranks are no longer approved for use on Yak-52s operating in Russia.

Read more about this ATSB investigation: [AO-2019-027](#)

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